Sustainability and Perceptions of Fair Water Resources Management:

a case study of the Lark Valley, Suffolk

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Abstract

As socially and naturally imposed limits place water resources under greater pressure, the frequency of resource disputes will intensify. The emerging regulatory challenge is to mediate competing claims to water while taking account of conflicting decision criteria within the sustainability discourse. This thesis set out to explore the extent to which the objectives of sustainable and just water resource management strategies can be informed by an understanding of different perceptions of fairness among water abstractors, other interests groups and the environmental regulator.

The normative dimensions of resource problems and solutions are under-represented in the literature on water resources management and most work on equity and water operates with a predetermined position regarding the meaning of equitable allocation and management. There exists, therefore, a need for an understanding of local fairness norms for water, and fairness judgements held by stakeholders themselves. The main objective of the research was thus to determine what is fair water resources management, and to what extent are perceptions of fairness important in advancing sustainable water resources management?

A qualitative and quantitative stakeholder analysis and catchment case study were employed to map competing claims on water in a small, rural water stressed catchment in East Anglia. The empirical study is contextualised in the drought events, regulatory change and new discourses influencing water management of 1989-1995. Analysis of attitudes to the regulator and to management strategies and support for different principles of water justice reveals the differing views of fair water management and expectations for water regulation which frame conflict and co-operation in the catchment.

The thesis shows that as the environment has become a major player in water resource management; the notion of fairness as 'balance' (implicit in the regulation of water abstraction) has become contested, and the expectations for regulation more diverse.

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For Dr George Edward (Ted) Hollis

1947-1996

for agreeing with me that

"When all scientific questions have been answered the problems of life will still remain" (Wittgenstein)

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Abbreviations

ADAS	Agricultural Development and Advisory Service
CLA	Country Landowners Association
CPRE	Council for the Protection of Rural England
DETR	Department of the Environment, Transport and the Regions
DoE	Department of the Environment
DWI	Drinking Water Inspectorate
EA	The Environment Agency
FoE	Friends of the Earth
FWAG	Farming and Wildlife Advisory Group
HoC	House of Commons
HMIP	Her Majesty's Inspectorate of Pollution
IDB	Internal Drainage Board
IWEM	Chartered Institute of Water and Environmental Management
MAFF	Ministry of Agriculture, Fisheries and Food
NFU	National Farmers' Union
NGO	Non-governmental organisation
NRA	National Rivers Authority
OFWAT	Office of Water Services
RSPB	Royal Society for the Protection of Birds
RWRS	Regional Water Resources Strategy (NRA, Anglian)
tcma	Thousand cubic meters per annum (1 tcma= 1 megalitre per year)
SI	Spray Irrigation
SWRM	Sustainable water resources management
UKIA	UK Irrigation Association
WCA	Water Companies Association
WCo	Water company
WSA	Water Services Association

Preface

During the course of this research, this study evolved into a historical examination of water management for several reasons. The study began in 1994, that is before the period of drought that began in 1995. The issues that were being discussed in the field reflected mainly on the drought event of 1989-90, and the developments in policy and changes in attitudes since then. Second, the transformation of the National Rivers Authority into the Environment Agency in April 1996 forced the perceptions and opinions of the stakeholders regarding the regulator into an historical context. There was much expectation but no certainty as to the approach that the new agency would take, nor the principles that it might introduce. In effect, there was no experience of 'current' regulation, so the data collection became retrospective.

Chapter 1

Introduction: sustainability, fairness and the problematisation of water

> *"This is the water planet. No look at prospects for the future can ignore it. It relates to everything else".*
>
> Sir Crispin Tickell,
> Chairman of the Government's Panel on Sustainable Development[1]

Over the past two decades, water has become increasingly problematised in England and Wales. This is an outcome not only of intensified pressures on the resource resulting from growth in demand and prolonged drought events, but also new ideologies which have influenced notions of 'proper' water resources management. Issues concerning absolute and relative entitlements to water resources have led to an increased questioning of society's relationship with water, and the fairness of the management system which is evolving. An enduring question for policy makers is how to reconcile different demands and uses within the limits that are imposed by both the natural water environment *and* the objectives and constraints of social, political, economic systems and cultural expectations.

The analysis presented in this thesis addresses the question of what is considered *fair* water resource management through a study of local issues and conflict concerning the allocation of water and the regulation of abstraction. This introductory chapter will set out the context for the research objectives. The first section will introduce the theoretical argument that fairness is an important concept within sustainable water resources management and regulation. The second section will describe how water management has become increasingly contested in England and Wales, as a consequence of water availability problems and the institutional framework for their solution. The third section presents the research objectives, and is followed by the final section which set outs the key research questions and an outline of the thesis structure.

i. *Troubled waters: water availability and sustainability*

The benefits of water go beyond the vital sustaining of plant and animal life to the maintenance of social and cultural life. Because water must be shared between these

[1] Address to Council of Chartered Institute of Water and Environmental Management, February 1997 (quoted in Bailey, 1997).

functions, normative issues such as environmental and social justice determining which uses deserve validity are particularly significant for water resources management. Water is a renewable resource which, once used, eventually returns to the environment. However, the amount available for human use is determined by its quality, the distribution in time and space dictated by the natural hydrological cycle and the infrastructures set in place by society to manage water supply and demand. Overcoming the constraints of water's natural distribution has cost implications and limitations that are both financial and environmental. Several attributes of water impose on management decisions. One is the extremes of availability. Under normal conditions water may be a minor resource in terms of cost, but become highly valued during periods of shortage. Second, abstraction from the environment for one use at any one time reduces the amount remaining for other uses; i.e. there is a human *and* environmental opportunity cost to water. The use (or misuse) of water in one location can effect the water quality and the reliability of water flows in another. Also, water is on the whole non-substitutable which makes it even more of an essential resource. Finally, there is a complex array of competing claims on water from environmentalists and recreationists to industrial and domestic users. A limit to availability of water thus presents society with a social dilemma which it attempts to resolve through the regulation of resource use, and the principles and norms that determine mechanisms for water allocation.

Property rights, including rights to water, are a socially constructed (Roberts & Emel, 1992). The abstraction of water, access to water and the allocation of water to the environment are a result of a particular combination of social, political and economic relations and objectives which in turn are rooted in a particular set of cultural beliefs and principles, including ideas of what constitutes just and fair natural resources management. Postel (1992) refers to this as a '*water ethic*'. Shortage of water in the UK is not absolute. It too is socially constructed. The proportion of effective rainfall used for water supply in England and Wales amounts to around 10% of surface water and 25% of groundwater, and exceeds demand forecasts by a factor of four[1] (HMSO, 1992). The extent to which limitations to water use apply in the UK is a function of the societal choices that determine, for example, levels of environmental protection, water quality protection and responses to shortage. As water use provides essential, positive externalities to society it has typically been managed as a public good, but water may also be regarded as a commodity to be bought and sold in the

[1] Data on effective rainfall underestimates resources availability by including only natural replacement and ignoring replacement through direct or indirect reuse.

market. A central argument of this thesis is that construing water either as a social, environmental or economic good, and managing it accordingly, represents different normative principles and ideas of what is 'proper' (i.e. desirable, ethical, fair, just, right) water resources management.

Arguments for the *'proper'* use of natural resources form the backbone of the sustainability paradigm. During the 1990s, the rhetoric of *sustainability*[1] has been adopted as a key principle guiding water resources management, both internationally (United Nations, 1993) and nationally (DoE, 1994b; NRA, 1994b). The sustainability paradigm is fundamentally concerned with (unspecified) physical limits to resource use, but the sustainable management of a resource is more complex than a balancing of quantities of the resource across time and space. Employing sustainability as an agent of change will typically result in winners and losers. Yet, the paradigm does not *prescribe* the desirable shape of society; it does not indicate by what means it should be attained, or how society should be organised, or how the expected costs and benefits of sustainability should be apportioned. Debates and perspectives on sustainability, therefore, commonly start from an assumption of consensus on its normative aspects, and focus on altering institutions to fit that consensus; for example, on what is to be sustained, the legitimacy of property rights, the distribution of scarce resources, the distinction between basic and extravagant demands (Elliot, 1993; Harvey, 1996:148). A plethora of approaches define *ecological, economic, social or cultural* sustainability[2], and many *different* paths that lead to sustainable resource use which will be judged as socially, politically or economically acceptable to differing degrees by different people. Such a plurality of views may form the basis of natural resources conflict and may undermine the legitimacy of regulatory institutions seeking to operationalise sustainability[3]. Different interest groups or stakeholders in a resource are likely to perceive environmental problems in different ways, and so will anticipate different solutions and use different criteria for assessing the desirability and worth of a given intervention (Grimble & Wellard, 1997). As Reed & Slaymaker (1993:723) conclude "*without explicit environmental ethical premises, the*

[1] O'Riordan (1997a:7) discusses 'sustainability' as covering "*how any society and economy move from a present, non-sustainable state to a future, less unsustainable state*". He also calls it a "*wonderfully flakey phrase* " (ibid).

[2] The concept of *social* and *cultural* sustainability should not be narrowly interpreted as the protection of particular cultural systems, social relations, customs, capital and institutions. Natural resources are used within a social context and it is the rules and values within this context that determine the definition, exploitation, distribution and use of resources, and permit or hinder sustainable resource use. Once in place, it is these 'enabling' preconditions that one might label as socially and culturally sustainable (Pugh, 1996).

[3] That is not to dismiss the fact that the ambiguity of the term may have served to create common ground among differing views by putting 'the environment', rather than single environmental issues, on the political agenda and integrating environmental considerations in other policy fields.

sustainability debate is indeterminant".

One of the principles to which the paradigm is powerfully but ambiguously committed is *equity;* obligations to future generations, and international and intra-generational justice. The concept of *equitable* water resources allocation is becoming increasingly salient, and yet an understanding of what is meant by equitable or *fair* in a water management context has been inadequately explored. I suggest that looking at different perceptions of fairness, as criteria for determining the acceptability or resource regulation, is a way of thinking simultaneously about the *appropriate* institutional evolution for sustainability, as well as about the cultural and normative beliefs from which local sustainability is having to emerge. Options for water resources management need to be compatible, at least in part, with local water norms, attitudes and expectations in order to reinforce existing sustainable behaviour or successfully to thwart unsustainable practices. Most literature which debates sustainable water resources management has not incorporated recent social scientific argument which says that people respond to policy as moral, emotional, social and cultural beings rather than as rational individuals. Studies of responses to water regulation, for example, have suggested that people tend to make assessments of it, not only in the context of the availability of the resource, but in terms of who is advantaged and disadvantaged (Lant, 1994). Once an impression of fairness has been produced it becomes extremely resistant to change Peterson (1994). Behaviour by water users is affected by existing social and cultural forces that determine water use norms and attitudes to a regulating authority, and by the pressures of policy and market decisions in other sectors. The legitimation of regulation rests on the degree to which its objectives and operations are deemed worthy and justified or trustworthy (Habermas, 1976; O'Riordan et al, 1988).

Following this brief outline of the theoretical arguments that frame this thesis, a description of the empirical context from which the research questions have emerged is necessary. The next section will provide a chronological outline of events and issues that have shaped water policy and attitudes to water in England and Wales[1] over the past three decades. It serves to provide an historical and regulatory context to developments in water resources management that came together in the first half of the 1990s when the research began.

[1] The analysis is primarily concerned with England and Wales. Separate and distinct water management systems exist in Scotland and Northern Ireland, although some of the issues and events described will apply to the whole of Britain.

ii. *The problematisation of water in England and Wales*

The main objective of this section is to illustrate how and why 'water' came to be increasingly problematised. The most significant points are that:

- the institutional framework for water management and regulation underwent significant restructuring and redefinition, beginning with the formation of the multi-functional Water Authorities in the 1970s, to the privatisation of the water supply industry and the creation of an environmental regulator for water, the National Rivers Authority (NRA), at the end of the 1980s,
- attitudes to water management were in a context of contestation over the redefinition of water as a commodity,
- the environment entered as a major player in water resource management,
- the NRA had a split role of meeting obligations to abstractors and being an advocate for the environment,
- resources were stressed a) due to drought and b) due to the increase in demand for water and for abstraction licences over time,
- environmental problems due to water abstraction worsened,
- inefficiencies in the licensing system for allocating water were being exposed and contested.

This section is in two parts: a recent historical perspective on water management is followed by a discussion of problems and approaches to water management between 1989 and 1995.

Water management leading up to 1989

The present system of licensing water abstractions was introduced by the *1963 Water Resources Act*. At the time, 29 River Authorities (under local government control) charged with managing all uses of water at the river basin level were established, along with the Water Resources Board, a national advisory agency to co-ordinate long term planning. Before 1963 abstraction had been controlled through the use of common law or other statutory regulations. The new legislation provided for 'licenses of right' (i.e. permanent rights) to be granted to authorise existing abstraction (Streeter, 1995). Subsequent applications for abstraction rights were allocated on a first-come-first- served basis. The *1973 Water Act* brought together the component parts of the water and sewerage industry (river authorities, water supply and sewage disposal functions) under the governance of 10 Regional Water Authorities (RWA).

This 'integrated river basin management' was based on hydrological boundaries. Resource 'shortage' was considered in the main as a managerial and technical problem to be solved through supply development and the engineering professions dominated water management at that time:

> *...both the perception and identification of problems, social goals, priorities or needs and the solutions adopted to meet these stages in the planning process reflect these professionals interpretation.*
>
> Parker & Penning-Rowsell (1980:48)

As an island surrounded by water and with a climate renowned for the bounty of its rainfall, the availability of water was generally taken for granted, and users were expected to have to adjust to shortages only on rare occasions. Minimal concern with resource limits and the understanding of water as a public good meant that normative issues associated with resource allocation and the trading of different claims and different policy objectives were not a notable feature of water concerns. Until the mid-eighties, water politics was largely contained within the governing water institutions and the management of water was the concern of a technical bureaucracy. The absence of measures to intervene in resource use behaviour beyond licensing regulations and drought management meant that public interest in water management was minimal; the exception being increasing resistance, mainly by farmers and conservationists, to the building of reservoirs. Even during 1976 when a severe drought was experienced by Wales and central and southern England[1], a spirit of co-operation governed responses to pictures of empty reservoirs, dried river beds and, in response to publicity campaigns, consumption all over the country dropped substantially (Kinnersley, 1988:93). Voluntary cut backs were seen as part of public duty as the resource was considered a shared good. Although consumption levels returned to normal soon after the drought, the experience raised awareness that water availability could not, in fact, be taken for granted.

The removal of local public accountability was completed under the *1983 Water Act.* The statutory requirement for RWA membership to comprise a majority local authority membership was replaced by small management boards of 'experts' appointed by central government. The 1980s were characterised by an 'administrative fix' approach to water management (Kinnersley, 1988:93) and business principles were beginning to encroach on the view of water management as social service (Rees, 1990). In the decade following the 1973 Water Act, charges for public water supply had increased dramatically as public subsidies were removed and the RWAs

[1] Rainfall was down to 37% of long term average and some rivers to only 20% of their normal flows (Kinnersley, 1988).

were entirely self-funding through local water rates and service charges. The strict fiscal controls on public sector borrowing and water spending by successive central government prevented the water authorities from improving supply infrastructure (Kinnersley, 1994). In addition, as operator and regulator of water supplies, the RWA were criticised for being 'poacher and game keeper' and for failing to protect river resources.

A re-examination of existing structures in the water sector was forced by the conservative government's strong political commitment to reducing the public sector by transfers to private ownership (Maloney & Richardson, 1994). The momentum for privatisation of the water industry began in 1985 and induced protracted political and public debate that effected the final structure of the regulatory framework. The 1989 Water Act was the longest Act ever produced in parliament (Evans, 1991). It privatised four fifths of the water industry[1] and combined the remainder into an environmental regulator, the National Rivers Authority[2]. The Office of Water Services (OFWAT) was created as financial regulator to monitor and regulate the charges and services of the private monopolies, and to ensure that investors would receive an appropriate return on their capital and that water companies were able to finance the proper carrying out of their functions. This radical restructuring of water management and the complexity which accompanied its conception began the generation of a new water culture in the UK.

The changes in water management in England and Wales from the mid 1980s onwards can be analysed in terms of two dominant discourses which were influencing the pursuit of 'optimal' water resources management: on the one hand, the political ideology of economic rationalisation; and on the other, a growing environmental awareness and increasingly strident calls for environmental sustainability. Both discourses implied a recognition of limits to natural resource exploitation and use, but each embodied different normative assertions rooted in different notions of what was fair, proper and desirable. The former focused on identifying and putting in place mechanisms which would lead to an economic and efficient water supply system. The latter embodied an ethical imperative to protect landscapes, other species and their habitats for either their intrinsic or instrumental value.

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[1] This was an asset sale privatisation of utility services in the 10 RWA regions (Kinnersley, 1994). The 10 new water service companies and the 29 existing supply-only companies were given 25 year licenses as providers of water supply and/or sewage services. For a description of the financial regulation in more detail see OXERA, 1994. The government also set up a Drinking Water Inspectorate to enforce European Community Directives relevant to drinking water which the government had committed itself to.

[2] The NRA was a non-departmental public body, sponsored by the Department of the Environment (DoE) and with policy links with the Ministry of Agriculture, Fisheries and Food and the Welsh Office.

The ideology of privatisation asserted that a new commercial ethos, and the discipline of competition, shareholding and profit making, would result in increased efficiency, reduce bureaucracy and inspire technical innovation and development[1]. There was, however, a strong ethical rejection of privatisation. One view was that water services represent such a fundamental part of the fabric of society that their management by commercial companies, with the objective of generating profit, was morally wrong. On normative grounds, it was argued that a vital public service ought to be collectively organised and universally distributed according to need rather than ability to pay. It was also argued that water supply should not be subjected to the risks associated with commercial business; that the monopoly position enjoyed by water companies would be open to abuse; and that their diversification activities would result in neglect of the core business.

The prospect of the environment being the responsibility of a private company was also thought by many to be unacceptable. Initially, the government had planned to privatise the *regulatory functions* of the RWAs, along with their supply functions, but there were strong public interest arguments for independent regulation. In the 1980s, the focus of environmental concerns had shifted to pollution, river quality issues and the failure of regulatory standards to protect the environment (Lowe et al, 1998; Royal Commission on Environmental Pollution, 1984; HoC Environment Committee, 1987). In addition, there was recognition that rising water demand, coupled with protracted shortages of rainfall, was posing a threat to the aquatic environment. These concerns brought new actors into water policy as high profile media campaigns opened up debates to interests as diverse as surfers, anglers and bird watchers. Plans for privatisation had provided the opportunity for pressure groups to represent the public interest in water, and particular opposition issued from the strengthening non-governmental environmental movement (NGOs). Along with the efforts of pollution regulators within the Water Authorities, this opposition is widely recognised as being instrumental in forcing the government to accept the need for the creation of an environmental regulator separate from the privatisation of the water supply industry (Kinnersley, 1994).

According to Maloney and Richardson (1994:128) privatisation "*had the effect of exposing these real issues to wider public scrutiny*" and raised the political salience of

[1] A backlog of necessary capital spending needed to be addressed, especially to meet European Directives on drinking water quality. Huge increases in public sector borrowing would be avoided as capital expenditure would be financed though higher water bills to users or through private sector borrowing. This was in a global context where the market economy was being viewed as the most effective route to economic development.

water enormously. The consequences have been that domestic consumers' and other users' perceptions and attitudes to water management have changed. Previously, legitimacy had been high and expectations low, but transformation into a profit making sector made consumers more proactive in their demands and other users more concerned to guard their interests[1] (Maloney & Richardson, 1994).

From the beginning, the NRA projected itself as *Guardian of the Environment,* drawing on a wide public mandate supported by UK and European Community legislation. The NRA was charged with the physical management of the supply sources, and the regulation of resource use through the abstraction licensing system, as well as being required to take action to conserve and enhance the aquatic environment[2]. The NRA maintained the 10 region organisation for its operational functions (flood defence, fisheries and navigation) and regulatory functions (water resources and pollution), and it inherited many of the staff, policies and practices of the previous Water Authorities. Direct raw water abstraction and the allocation of licenses continued to be controlled by the 1963 Water Resources Act, the main development being the greater obligation on the NRA to conserve and enhance the water environment as well as maintaining its obligations to the needs of licensed abstractors.

Problems and solutions: 1989-1995

At the same time that the water sector was completely reorganised, the UK began to experience what was to be a prolonged drought. The NRA almost immediately found itself under intense public and political scrutiny.

Water resources availability. According to The World Resources Institute (WRI), in 1986 England and Wales had a water availability of 1400m^3 per person per annum which is categorised as *low.* However, as mentioned above, there is no absolute shortage of water in England and Wales as a whole, but there are great temporal and spatial variations which in effect make the national resources problem one of distribution. Regions such as the Thames and Anglia, for example, fall in to the WRI's *very low* category (<1000m^3 per person per annum) (NRA, 1995). By the 1990s, groundwater supplies in many parts of the country, and especially in the south and

[1] In recognition of the wide range of stakeholders in policy, OFWAT administers a system of regional Customer Service Committees for consumer consultation and a National Customer Council. The DG of Water Services took the view that decisions on the level of service and investment by water companies should reflect customers' priorities and preferences, and OFWAT has undertaken numerous studies to further its understanding of the public's viewpoint (OFWAT, 1991, 1992c; Tunstall et al, 1993).

[2] See NRA (1993b:8) for a list of its duties and powers. The water resource duties and responsibilities of the NRA were consolidated in the Water Resources Act of 1991 and later modified in the Environment Act of 1995.

east, were heavily used. The vast majority of available resources were already licensed and scope for further groundwater development was limited. For surface water, the environmental acceptability and opportunity for additional storage was also limited, especially in areas of greatest need (Swinnerton & Sherriff, 1992).

In 1992 the demand for water by purpose was divided as follows (DoE, 1992c): public water supply (PWS) - 51%, power generation - 36%, industry - 12%, agriculture including spray irrigation -1%. Table 1-1 shows the distribution of demand for water resources by volume (for 1993). The consumption of water by individual households rose by 17% from 1971 to 1993, to 140 litres/head/day (HoC, 1996:428)[1]. A rise in demand from public water supply (PWS) was not attributable to growth in population alone. Other contributing factors reflected social and lifestyle changes: decreases in average household size; increased garden usage, increased personal use. In addition, recent evidence showed that distribution losses (leakage) have contributed to increases in PWS demand (OFWAT, 1996). Although the NRA reported a surplus in PWS resources in all regions (NRA, 1994b), it has been increases in *peak* demand that have had most implications for the management of both domestic supply and environmental protection (Wilson, 1996; OFWAT, 1996)[2].

In contrast to the rise in demand for domestic supply, the historic trend in the last decade for directly abstracted water for industrial use has been declining due to a fall in industrial production and improvements in efficiency (NRA,1994b:23). This is expected to continue. Of the major non-household uses of water, only agricultural demand is forecasted to show a significant increase in the next 30 years (Weatherhead et al., 1994). The agricultural demand for water is around 1% of total water demand, with 70% of that used for spray irrigation during dry years, mostly in the Anglian region (NRA, 1994b:26)[3].

The past three decades, and the last in particular, have seen large changes in the UK agricultural industry, characterised by intensification and externalisation (Van de Ploeg, 1990; Winter, 1997; Morris and Sutherland, 1991; SWT, 1996). These changes have integrated farmers into industrialised food systems, and into other aspects of the rural economy. The absence of water stress during the eighties set a precedent of high expectations for developing and meeting agricultural demand. Agriculture shifted

[1] Per capita household consumption in 1995/96 was 154 litres/head/day (EA, 1997). More recently, a growth in distribution input of less than 1% had been forecasted to 2015 (OFWAT, 1996:2).

[2] For example, peak demand in 1995 was 21% above the average in 1991 (HoC, 1996:430). It was the major determinant of many water companies' supply problems in 1995 and has been a major driver of capital expenditure by the water undertakers (Herrington, 1996).

[3] During 1987-1995, spray irrigation used 0.4% of total water abstracted under license (36.8 million m^3) in the wettest year, and 1.7% in the driest year (163.9 million m^3) (DETR, 1997) (excludes water used for electricity industry).

Table 1-1: Water resources abstraction in England and Wales, 1993
(megalitres/day)

Total abstraction licenses:		48,000
Total water abstracted		59,200 mld
Demand for water :	PWS	17,500 mld
	Industry	5,500 mld
	Agriculture	500 mld
	Electricity supply	30,350 mld
Abstraction from surface sources		32,400 mld
Abstraction from groundwater sources		6,900 mld
Abstraction from tidal sources		19,900 mld
		Source: NRA, 1993b

to water demanding crops such as potatoes and this has resulted in a dramatic need for spray irrigation. At present 65% of early, and 44% of main crop, potatoes are under irrigation (Weatherhead et al., 1997). The demand for outdoor irrigation rose by 3% a year between 1982 and 1995[1].

Water abstraction issues need to be considered in the context of a more general discourse on sustainable agriculture within which the negative environmental consequences of modern food production methods have been deemed no longer acceptable (Lowe et al., 1998)[2]. Farmers have argued that their behaviour is constrained by the adjustments in the wider political economy beyond their control (Munton, Marsden, and Whatmore, 1990; Holloway and Ilbury, 1997). This view, however, can be contrasted with other studies on agriculture-environment relationships which show that the environmental effects of changing farming practices can be ascribed to the attitudinal disposition of farmers themselves, and the choices they make at the farm level, as much as to the external repositioning of agriculture within the food system (Ward and Munton, 1992; Battershill and Gilg, 1997). These broader agricultural issues are beyond the scope of the thesis, but they are recognised as an important part of the context for farmers' perceptions of fairness.

In addition to the increase in pressure on resources that has arisen due to demand increases over time, the first half of the 1990s began and ended with prolonged drought periods and record peak demands. Drought management as well as long term resource balance has characterised water resource problems. Water resources

[1] It is estimated that it will continue to rise by between 2.5% and 2.8% per year until 2001 but is likely to tail off to a 1.5% annual increase thereafter (Weatherhead, 1997). A decline in irrigation of lower value crops such as cereals and grass is predicted as irrigation becomes unviable.

[2] The notion of farmers as *stewards* has been set against farmers as *squanderers* of the rural environment. From the point of view of pollution control, agriculture had became one of the most regulated industries (Lowe et al., forthcoming).

reliability is a function of extreme events, not average conditions. The regions of maximum drought intensity are principally in the south and east where concentrations of population, commercial activity and intensive agriculture generate the highest demand for water and impose the greatest threat to the water environment (Institute of Hydrology, 1992; Gustard, 1996).

The drought of 1988-92. Immediately following the institutional reorganisation of water management, the UK experienced what was to be a 3 year drought which, in its own right, was to impact on how water resources were perceived and managed as the pressure on water supplies and on the environment were highlighted. The years of 1989 to 1992 were notable throughout England and Wales for persistently warm temperatures (the 1988-91 period was the warmest four-year sequence for 330 years (Institute of Hydrology, 1992:6)), and low rainfalls - some of the lowest since recording began. Dryness was especially severe in eastern areas, extending into autumn and winter and impacting on human and environmental water needs[1]. Aquifers became seriously depleted, falling from near maximum levels in 1989 to less than the minimum ever recorded by the end of 1990 (Johnson, 1991). Rivers suffered low flows and 20 million people were affected by hosepipe bans. Two notable outcomes of the drought event at the beginning of the 1990s were the pressures being inflicted on water dependent natural habitats, and conflict over the implementation of drought restrictions.

Environmental impacts of abstraction. By the 1990s it had become clear that aquatic wildlife sites and wetlands, in particular, were under threat from abstraction[2] (Beardall, 1992; Philips, 1995). The NRA had investigated some 92 rivers felt to be suffering from low flow, and a list of the 40 most at risk were published in 1993 (NRA 1993c)[3]. Other reports[4] highlighting environmental threats have suggested a much wider impact; over the past decade many environmental and conservation groups have expressed strong concern for the water environment and the detrimental effects of excessive abstraction, even during normal years, and have called upon the NRA to reallocate water from abstractors to address environmental derogation (RSPB, 1995).

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[1] Although rainfall for the whole of the country was close to the long term average, southern and eastern England received less than 80%; the lowest since the 1850s (Institute of Hydrology, 1994).

[2] The Redgrave and Lopham fen in Suffolk became a key example.

[3] The report noted that in most cases the cause of most low flows was that groundwater reserves had suffered from lack of recharge and been over-exploited because of abstraction authorised by licenses of right. Depressed runoff rates over extended periods have also been associated with shrinkage in river headwaters and flow changes in estuaries have altered sedimentation and salinity balance.

[4] See for example: RSPB, 1988; CPRE, 1991; Royal Society for Nature Conservation, 1992; Beardall, 1992; Rees & Williams, 1993; FoE, 1996a, 1996b; Drury Hunt, 1997.

Debates over the degree of environmental protection required, who should decide and what should be done gained momentum in the aftermath of the Earth Summit in 1992[1] which coincided with the end of the 1989-92 drought. The government published its own reports on the national water resources situation (including: DoE, 1992b; DoE, 1995; DoE, 1996b), but its main mechanism for ensuring sustainable water resource management was through the duties and powers of the water regulators. The NRA adopted the principles of sustainable development as its framework for meeting its environmental objectives (NRA, 1994b). But, as I shall show in the thesis, this normative dimension to water resource management meant that the NRA was open to attack from different interest groups, who argue that the 'wrong' claims to the resource were being prioritised and that it was operating with a 'wrong' degree of precaution.

The main tool of the NRA for regulating resource use was the licensing system which controls direct abstractions from water sources. Although the largest abstraction by volume was for PWS, it was with the agricultural use of water that abstraction proved to be most problematic. Agricultural demand for water can be particularly problematic for a number of reasons.

Irrigation demand is concentrated in the summer months when resources are most limited and when there is peak demand for the domestic sector. There is a large regional variation with irrigation taking place in areas most likely to suffer from a shortfall in supply and demand. During this season (May to August) the peak daily demand for spray irrigation can exceed the amount of water abstracted for public supply (Wilson, 1996). Unlike most other uses, water for irrigation is nearly all consumed[2], and therefore, during periods of low river flows or low aquifer levels, gives rise to a large environmental impact. Farming also affects water resources through the changes in run off and aquifer recharge associated with different land uses[3]. Irrigation accounts for 5% of the country's total water *consumption*. It is also a highly visible use of water which contributes to public concern. During the drought, restrictions were applied to irrigation which caused tensions in the agriculture sector. Major financial losses for farm business were incurred and the National Farmers Union (1993) argued that 'legitimate' requirements for water ought not be constrained. A Water Resources

[1] United Nations Conference on Environment and Development, Rio de Janeiro, 1992

[2] Water that is abstracted may return to the water course depending on how it is used. That which is not returned is considered as consumed and lost from the source.

[3] It has been argued that if water is a precious commodity, then groundwater could be treated as a 'crop', and land allocated specifically for seepage into aquifers (*The Guardian,* letters page, April 4, 1997). On the other hand, Stansfield (1997) points out, a 2% national saving in leakage by water companies would supply all the water which farmers need for irrigation.

Liaison Group was formed in 1993 with representatives from the DoE, MAFF, National Farmers Union, the Country Landowners Association, UK Irrigation Association and ADAS. Chaired by MAFF, the group have met twice a year to discuss water policy issues in the agriculture sector.

Drought in 1995. The wet winter of 1994 meant that both groundwater and surface resources had been recharged, but the unprecedented dry period together with the exceptionally hot weather that followed in 1995 put severe strain on distribution systems throughout the country. Local water resource problems were mainly experienced for surface sources. In April 1995, rainfall was 46% of average, and by June, some areas were receiving less than 25% of average (Hough, 1995). In contrast to previous droughts, the north-west, Yorkshire and the south west were the worst affected areas. The drought continued over the winter and in June 1996 the total rainfall in England and Wales was 46% of the long term average. Groundwater levels in some areas fell below the lowest ever recorded (WSA, 1996)[1].

Developments in water management. The drought of 1988-1992 intensified concern about the availability of an adequate future supply of water and attention was given to the degree of security that water resources management systems ought to offer. The adequacy of the historical 1 in 50 years standard for resources planning was questioned. The heightened water awareness contributed to the consideration of new management approaches (POST, 1993). Two strategy developments were noticeable. First, the embargoes on new abstraction licenses were implemented in some areas, and second, an increased emphasis on demand management.

Embargoes on new abstraction licenses. Historically, resources have been available for new abstraction over most of the country, but by 1992, licensed abstraction was approaching, or had already reached, the limits of resource availability in a number of catchments. Human users were now competing for water with the environment as well as each other. In some areas of the country resources were under stress as a direct result of *over*-licensing as levels of abstraction had been authorised which were considered in excess of that which would be considered 'sustainable', and has resulted in some cases in dried up, or low flow, rivers or unreliable yields. For the first time, in some catchments the NRA began to close water resources to new

[1] Figures from the Institute of Hydrology (1997) show that during the 25 months of August 1995 - to September 1997, rainfall across England and Wales was at its lowest for 200 years. In June 1997, reservoir levels for PWS in the Anglian region were between 45%-94% full and groundwater levels were at their lowest ever recorded (Anglian News, July 1997). Six of the last ten years have been drought years.

applications.

Managing demand. In 1992, the UK government asserted that economic instruments should be used to deliver environmental policy objectives such as the conservation of water and waste reduction (DoE, 1992a). 'Proper' use of resources was being increasingly interpreted as requiring a move to a more economically efficient use of both water and financial resources in the long term. Economic efficiency as well as environmental sustainability were to be applied to water resource development, and to water resource allocation and use.

> *Economic analysis will reveal the most efficient use of the increasingly scarce resources within an overall strategy for sustainable use.*
>
> *(NRA 1993:4)*

> *There is no way of ensuring that our water resources are properly used, properly defended and properly shared unless they are properly priced*
>
> John Gummer, Secretary of State for the Environment, 1994[1]

Increasing pressure to justify resource development or low flow alleviation schemes, for example, on a cost-benefit basis, including the requirement that environmental benefits and disbenefits be considered in monetary terms, meant that understanding, forecasting and controlling *demand* became more important. Although the NRA did examine the scope for increasing supply (NRA, 1994), recognition that resources would become increasingly difficult and costly to develop, particularly in the southern and eastern parts of the country, meant that at a policy level the NRA shifted its emphasis from improved supply management to embrace a demand management strategy[2].

> *...there is increasing realisation in England and Wales that water on demand cannot be taken for granted*
>
> NRA (1992b:2)

> *The NRA is of the view that before any new resources are developed, it is essential that water companies make sure they are doing everything they can to reduce leakage to realistic levels and to carry out effective demand management. The NRA support selective domestic metering with an appropriate tariff, in areas where water resources are under great stress.*
>
> Swinnerton & Sherriff[3] (1992:10)

In 1992 the conservative government published a consultation document entitled *Using Water Wisely* which examined the options for reducing demand as an alternative to major works to increase supply (DoE, 1992b). Following that

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[1] Quoted in Drury Hunt (1997:18).
[2] The NRA's definition of demand management is given as "the management of the total quantity of water abstracted from a source of supply using measures to control waste and consumption" (NRA, 1995:8).
[3] Senior Water Resource Managers, NRA.

consultation, a later report (DoE, 1995) set out government policy on water conservation. It avoided the use of direct regulation such as compulsory metering, relying instead on the water companies to respond to the need for demand management and favouring economic instruments. The government's *Biodiversity: The UK Action Plan* (DoE, 1994a) and *Sustainable Development: the UK Strategy* (DoE, 1994b:ch8) also highlighted the need for demand management of water. OFWAT published *Paying for Growth* (OFWAT, 1993) which examined the costs of increased water and waste water treatment, and encouraged water companies to think about demand side management; primarily through the minimisation of leakage and the use of meters. (Water companies now must submit water efficiency plans to OFWAT).

During this period, the allocative inefficiencies of the abstraction licensing system were also being recognised as a challenge to sustainability (Rees & Williams, 1993; RSPB, 1995). The use of economic incentives within the licensing system, including incentive pricing and the trading of licenses, are therefore now under consideration by policy makers (Streeter, 1995, 1997; DoE, 1996b; HoC, 1996, DETR, 1997b). Licenses of right, the first-come-first-served system, and the low license charges constrained to cost recovery had resulted in water being used inefficiently, or being unused and therefore being denied to other, arguably, more 'needy', 'deserving' or economically efficient users. Licensing charges have been based on authorised abstractions not actual quantity used[1], and estimated to average at about 1p per m^3, these charges have no conservation or efficiency incentive and so raw water is effectively a free good (NRA, 1995; Sherriff, 1997). In effect, this has acted as a subsidy for inefficient irrigators and uneconomic farming practices (Rees et al, 1993; Bate and Dubourg, 1997). In 1993, over-licensing, or under-utilisation, was found to be 33% of total licensed quantity (Streeter, 1995). Nationally, even during the dry summer of 1991, the actual use of spray irrigation was only 20-60% of the aggregate licensed quantity. A study (Morris et al, 1996) of spray irrigation in Norfolk found only 60% of the licensed quantity of water was being used, even in dry years[2]. License charges fail to reflect the environmental and economic costs of abstraction; thus, in the long run, sustainability goals are being undermined.

Greater efficiency is a mutual virtue of both the doctrines of economic

[1] Except for spray irrigation licenses for which a split tariff applies.
[2] A recent report on licensing (Weatherhead et al, 1997) confirmed that some farmers have more water than they need so do not bother to save, while others do not have enough. It concluded that urgent reforms were needed to the licensing system to allow the flexibility needed to promote more efficient use and allocation of water.

rationalisation and sustainability. Both therefore endorse the management of demand within the limits of existing resources and this has been widely sanctioned in England and Wales. Debates have shifted from whether demand management is a necessary course of action to how it can be achieved (NFU, 1993, RSPB, 1995; DoE, 1995; NRA, 1995a). The main focus for demand management in this country has been on the use of price incentives through domestic metering, leakage reduction from supply infrastructure, and awareness raising campaigns on the conservation imperative.

Conflict in the domestic sector - 1995. Although the focus of this thesis will be direct abstraction within a rural context, PWS issues have been formative in defining how water resource management is perceived so require some attention here. For the majority of the public in England and Wales, the most contentious issues surrounding water have concerned domestic water supply; principally the ethics of privatisation, charging, the conduct and attitudes of the water companies and the allocation of the blame for water shortages. Traditionally, water bills had been a minimal proportion of household expenditure, yet water bills which rose in real terms by an average of 39% following privatisation (1989-1995) (Rees, 1997), impacting on poorest households the most (Save the Children, 1995; OFWAT and DoE, 1992). The monopoly positions enjoyed by the water companies for domestic supply meant that customers could not chose alternative suppliers. The use of water pricing to secure a sustainable water management situation was limited by affordability considerations that restricted the acceptability of including the costs of long run environmental damage (Rees, 1997). '*Water justice*' in this context implied the right to affordable water supplies for essential domestic and social use for all sectors of society and this was privileged over any discourse concerning the justice principles for determining allocation to environmental needs.

The widespread metering of household supply also developed into a controversial issue[1]. The DG of Water Services commented that it was "*neither economically or environmentally justified to meet all possible demands for water when the customer is not charged for additional use*" (OFWAT, 1993:I). But groups such as *Waterwatch* and the *National Campaign for Water Justice* formed to represent the "*victims of privatisation and of unfair metering*"[2]. Metering has in fact progressed very slowly around the country as a whole; nationally only 25% of all potable water was delivered on a measured basis by 1995 (WSA, 1995). This was partly because of the costs

[1] The Water Industry Act of 1991 forbid water companies from continuing to base their charges on rateable value of property after March 2000.
[2] Interview with Chairman of the *National Campaign for Water Justice*, March 1996

involved in fitting meters, but also due to consumer resistance. There were undisputed claims in the media that privatisation had shifted the allegiance of the water undertakers to the shareholders; large salary rises awarded to the chief executives of the privatised companies were also strongly criticised in the press by opposition parties and by consumers[1].

The conflict around metering is an example of how opposition and loss of public confidence in the privatised companies and the government that privatised them, has affected the acceptance of policies, which in the longer term, might advance sustainability. To a large extent, the arguments against 'paying for water' and the injustice of metering were entwined with the ideological and political debates around privatisation itself. The two issues became inseparable in the minds of the public. Metering became linked in discourse to the issue of making profit from water and to social justice issues, and not to the issue of resource limits and the conservation imperative[2].

During the drought of 1995, water supply shortages affected a large part of the UK population in some way. They had followed a winter of unusually heavy rainfall (NRA, 1995a). These shortages, alongside public outrage over the conduct of the water companies (salaries of utility directors, large payouts to shareholders and rising bills for example), focused the media and public attention unfavourably on to water issues. Headlines were captured by criticisms of the water industry and the location of responsibility for securing supplies; and not on the issue of sustainable resource use, environmental pressures or the question of limits[3]. The media coverage of these debates was extensive and reflected consumers' rejection of arguments to reduce consumption because of perceptions that any benefit would go to the private water companies who were making huge profits at the same time that leakage rates from the supply infrastructure were known to be as high as 30%[4].

This attitude by the public can be contrasted with that during a drought in 1976 when the call to 'share a bath' was accepted as a public duty. Privatisation had changed attitudes. Limits to water, such as hosepipe bans, became unacceptable[5]. Expectations were that water should be available whatever the weather, and water

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[1] See for example *The Guardian*, 19 and 28 July 1994.

[2] Where environmental issues did receive attention, they were commonly issues of effluent treatment rather than resources.

[3] "*This summer we have been bashing the media to talk about the environment. All they have been doing at the moment is the impact of drought on water from the taps. We have been trying to say 'look it also effects the environment*", RSPB Water Policy Officer, interviewed September 1995.

[4] In 1995/96, 31% of public water supply was estimated to have been lost through leakage from distribution or supply pipes (OFWAT, 1997).

[5] Graffiti in Halifax in 1995 read: *Get your own back - turn your taps on!*

companies had to find ways of ensuring this[1]. This of course conflicted with the message of the environmental movement, the environmental regulator and the government's own strategy for sustainability. Protecting the environment was seen as a duty of the water companies rather than a burden to be placed on the general public through restrictions or voluntary cut backs. High peak demands were experienced by many water companies over several months.

The above review has suggested two things important to this research. First, that how water problems are perceived and dealt with is as much ideologically as hydrologically embedded. Water has became the subject of social, cultural and ecological discourses rooted outside the boundaries of the water resource professionals. As competition for resources has intensified, the principles that are used to set limits and to allocate water have come to be challenged across the stakeholder spectrum. Secondly then, as water became problematised it also became moralised[2]. The resolution of water resource issues in England and Wales has come to demand a greater engagement with the normative dimensions of natural resources management. In particular, I have shown that the environment has become a significant actor in water resource management and how the abstraction licensing system is presenting a number of challenges to sustainability. The question is how, in this problematised context, should water be regulated in a way that is fair?

iii. *Research objectives*

This research explores the range of beliefs and competing perceptions regarding the objectives of water management held by different stakeholders, and explores the extent to which the NRA was able to reconcile the conflicting aspirations of abstractors with environmental interests. To understand how water regulation is experienced a rural catchment case study was chosen. This was for several reasons. First, a dialectical approach to water resources problem was taken: problems are studied as the interaction of the physical 'facts' of the environmental problem and the way people involved with these facts perceive them. Second, because equity concerns are relational, and considered here as both a function of social norms as well as personal judgements, they need to be considered as embedded in a social,

[1] Yorkshire Water for example resorted to transporting water by road tankers costing £47 million to avoid rota cuts (Uff, 1996).

[2] It is worth adding here that after this study began, the Environment Act of 1995 created the Environment Agency in place of the NRA. Significantly, the Act contained two new directions on the interpretation and implementation of sustainable water resource management. One is an explicit duty on the Environment Agency to give attention to costs and benefits, and the other is to consider the impact of its decisions on rural communities.

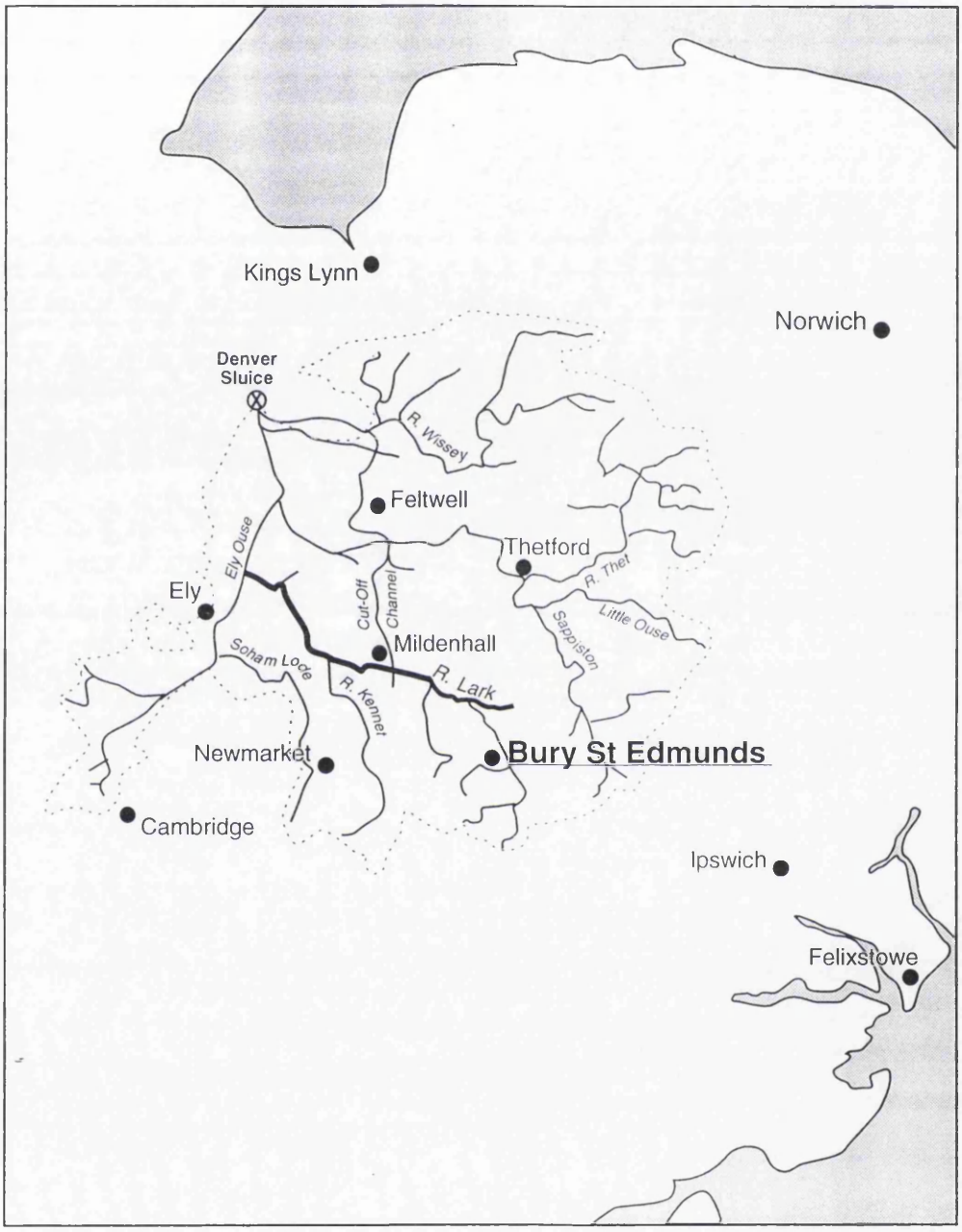
economic and institutional context. A small, rural catchment would better allow a mapping of different perceptions. Third, the interests of this thesis are in the conflicting objectives of the sustainability paradigm, and a rural catchment was likely to contain a greater diversity of claims on water. Fourth, water problems in the UK are to a large extent at the margins; conflicts occur during periods of low effective rainfall and peak demand, and over the demand for new abstraction rights. The majority of these demands, in both cases, are from farmers. While abstraction for domestic water supply accounts for by far the most demand on water, it is the abstraction license holders who are at the 'face' of the resource dilemma. Finally, as I am interested in how competing claims for water are managed, the thesis concentrates on the licensing abstraction system for raw water resources, rather than issues within the public water supply sector. The area chosen for this study, the Lark Valley, is situated in East Anglia, a region where water resources have been under pressure; as the driest region in England with the largest demand for irrigation and the fastest growing population. The valley of the River Lark, which is underlain by aquifers, forms a sub-catchment of the larger Ely Ouse catchment and is shown in Figure 1-1.

iv. *Structure of the thesis*

This chapter has introduced the problem context for the research questions. This thesis explores how, within the changing context of the first half of the 1990s, water resource management and conflict was constituted at a local level. How was fair water resources management construed both institutionally, and by different abstracting and non-abstracting stakeholders? Within the context of sustainability objectives, how were water resource problems perceived by the various stakeholders?

To answer these questions, first requires an understanding of the concept of fairness, and how it has been understood in the context of debates over sustainable water resources management. ***Chapter Two*** discusses how the translation of the rhetoric of sustainability often ignores the important role of normative principles and judgements in the success of interventions seeking to advance sustainability. The second part of the chapter concentrates on the role of equity and fairness norms in natural resources management by bringing together literature from moral philosophy, and the social sciences. Equity is found to matter in three ways: first, as a principle that defines policy goals for resources allocation and management ; second as a judgement that affects the legitimacy of regulating authorities, and responses to policy; and thirdly as a social norm that affects claims to resources, expectations and

Figure 1-1 : Location of the Ely Ouse Catchment and the River Lark



co-operative behaviour. I argue that a 'situated' understanding of equitable resources management is necessary.

In ***Chapter Three***, I examine how fairness has been construed in the literature on water resource management. This chapter begins by looking at the mechanisms and rules that exist for allocating and managing water, and the principles that justify those rules. A review of the literature reveals that there is very little work on equity from the perspectives of local stakeholders in water, and particularly that there has been a lack of attention at this level to the dynamics of tensions and conflicts that are arising over water r*esources management in England.*

Chapter Four explains the rationale for the methodological approach adopted for examining notions of fair water resource management. Details of the case study area are provided. A water resource geography of the Lark Valley describes the physical, and water supply and demand context for the analysis, and details are given of the stakeholder groups who were the subject of the study. I describe the fieldwork experience, data collection and analytical techniques used to map different stakeholders' ideas of fairness at the catchment level. At the institutional level of the regulator, empirical enquiry was required that reveals the principles upon which water allocation is founded and how those principles of regulation have been translated into action at the local level. A combination of interviews and documentary sources were used. Unstructured interviews with other stakeholders were used to identify issues and concerns in the catchment. These were followed by a questionnaire survey which explored how local stakeholders had experienced water resources problems and regulation, and evaluated their attitudes to water management and their perceptions of fairness. As it is during periods of relative scarcity that water problems are more acutely experienced, much of the empirical work concentrates on a case study of the 1989-92 period of drought.

The empirical chapters begin with an account of the local story of water from the perspective of the environmental regulator, the NRA. ***Chapter Five*** addresses the following questions:

- What principles and normative assumptions underl · the licensing system for allocating water and how was fairness construed within water resources regulation?
- How were these principles translated, played out, and experienced by the NRA staff?

- What conflicts arose as the NRA sought to advance 'sustainable' water resource management, how were they resolved and to what extent was the NRA's pursuit of sustainable water resource management able to take account of different ideas of fairness?

The principles and concepts that characterised water resource management are uncovered; firstly in national legislation on water resources management and licensing; secondly in the NRA's own national, regional and local policy and strategy documents; and thirdly in the translation of principles into practice. The analysis shows how the NRA staff rationalised the legitimacy of their decisions as the notion of 'balance' was being redefined to explicitly include the needs of the environment. This chapter also illustrates how fair water resources management as 'balance' was being challenged at the level of the catchment.

Chapter Six moves on to examine the perspectives of abstracting and non-abstracting stakeholders. In order to provide an overview of the attitudes and judgements found in the catchment, the stakeholders are classified according to their support for the regulator and the licensing system using responses to the questionnaire survey. The accounts given by four main stakeholder groups are then described in detail; they are the water supply company, industrial users, agricultural users and environmentalists. The aim of this chapter is to address the following set of questions:

- How do stakeholders account for *water resource problems?*
- What rationalities, expectations and understandings characterise the range of *claims to water* in the catchment and how do stakeholders judge other claims to water?
- What *fairness concerns* form the basis for judgements of, and responses and challenges to, water regulation and management?
- What do different stakeholders understand to be fair water resource management?

Chapter Seven builds on the analysis in Chapters Five and Six to achieve two aims:

- to assess stakeholder attitudes to different supply and demand management strategies, and
- to identify what 'principles of water justice' characterise the different perceptions of fair water resource management in the catchment and the degree to which there is consensus.

Finally in Chapter Seven, I bring together the findings to examine the extent to which there is a correlation between judgements of the regulator and the licensing system, support for different water management strategies and support for different fairness principles.

Chapter Eight, the concluding chapter, will identify and interpret the major findings. It will address the extent to which conflict and water resource problems can be explained in terms of different notions of and judgements of fairness. Thus, in theoretical terms, this research contributes to an understanding of how important these notions of fairness are to the pursuit of sustainable water resource management, and the importance of perceptions of fairness in the context of natural resources regulation and conflict. In practical terms, it begins to provide an empirical basis for improving water resources strategies, avoiding conflict and evaluating any claim that regulation is equitable.

Chapter 2

The fairness of sustainability and the nature of fairness

Introduction

Following Hardin's (1968) claim that a tragedy of the commons would result as rational beings pursued their own best interest, scholars intensified the search for the most *effective* system for managing natural resources which would minimise the effect of this tendency. I suggest in this chapter that an equally expedient question is 'what is *desirable* and *acceptable* environmental regulation and natural resources allocation?' The management of regulation of a resource generally addresses two problems associated with resource use: in addition to acting to control the *impact* of human activity on the natural environment or on the resource base, under conditions of scarcity resources must be *allocated* among competing claims. By addressing the notion of limits which is a central driver of the sustainability paradigm, the objectives of regulation imply and require *normative* decisions. The normative principles that condition decisions on social and private resource use underpin both environmental protection and degradation.

In section one of this chapter, I explore the extent to which sustainability is a normative concept requiring answers to such questions as to what extent do the goals of sustainability comprise ethical imperatives, and prescribe moral constraints on the achieving of those goals and to what degree are there implicit normative assumptions about what are desirable and proper outcomes and procedures? Since the focus of this study is on the principles by which natural resources distribution and management are judged to be equitable, particular attention is paid to principles of equity and justice which have been advocated by the sustainability paradigm.

Having argued that sustainability does imply a concern for equity, the second section of this chapter will explore what fairness means in natural resources management and how equity might be conceptualised so as to progress sustainable natural resources management. Theoretical and empirical arguments show how fairness is construed, and the importance of distributive and procedural fairness norms and judgements for successful natural resources regulation. This review will suggest that policy interventions such as those based on improving markets or raising public awareness can be criticised for failing to engage explicitly with normatively determined assertions and for failing to take into account equity norms, in particular.

Natural resource governance, and many environmental problems, may be framed as a dilemma whereby an individual perceives the collective interest as conflicting with their own best interest[1]. As well as social regulation seeking to influence individual behaviour towards the collective interest, an individual's own moral reasoning may lead them to respect the interests of others. In this chapter, the argument is presented that normative ideas of what is acceptable matter greatly for sustainability, both at the level of policy making and at the level of an individual's responses in terms of their social and resource use behaviour.

I The Sustainability Paradigm and Normative Assumptions

Over the past 30 years, the rhetoric of sustainability has been adopted in recognition that improved human well-being must be achieved within the limits of the Earth's resources. Sustainability is about resources management: how we use nature while limiting environmental degradation; and how societies are to adjust to constraints to human development. Limits that are scientifically, economically or culturally determined are, to a large extent, predicated on the assumption of a broad consensus on the normative aspects of sustainability. Policies typically concentrate on how modern society should adapt to achieve sustainable growth within environmental limits. Constraints on advancing sustainability have been seen in terms of either a deficit of technical or scientific understanding about environmental limits, or in terms of inappropriate institutions and tools for regulating resource use to respect those limits. Equally important constraints, but less often recognised, are the moral and ethical tensions connected with the establishment of environmental limits, or with the allocation and use of scarce resources within those limits. What principles and what kinds of knowledge should guide our responses to the limits of, and the undesirable consequences of, natural resource use? These normative tensions are important in identifying 'acceptable' responses (Olser Hampson & Reppy, 1997). They are manifest within the sustainability paradigm itself, and within the plurality of societies seeking the values, attitudes and behavioural shifts required if ecologically, economically and socially sustainable resource use is to be achieved. I examine first the principles inherent within the call for sustainability and then consider the implications of its normative ambiguity.

[1] In the case of water resources abstraction for example, an individual abstractor may decide to use the resource while all others conserve i.e. to free ride, or conserve water while other users continue to abstract.

i. *To what extent is sustainability a normative paradigm?*

Sustainability calls for existing attitudes and values towards natural resources use to be abandoned in favour of a new ethic (Grove-White and Szerszynski, 1992). This section explores the extent to which the sustainability paradigm has provided a new ethic. To what extent is sustainability a moral or prescriptive concept indicating what should be attained and the means by which it should be attained? What normative assumptions and tensions does the paradigm contain?[1]

There is much debate over the meaning of sustainability[2], but the starting point for considering *sustainability (*or *sustainable development)* as an ethical position is that it implies consensus in favour of a few central, normative principles which act to limit its interpretation. *Inter-generational equity, social justice, ecological limits* and *sustained economic well-being* are the most common. As O'Riordan (1988:30) writes, sustainability is a broad phenomenon "*embracing ethical norms pertaining to the survival of living matter, to the rights of future generations and to institutions responsible for ensuring that such rights are fully taken into account in policies*". These are *meta*-principles, however. I shall show below that the definition and attainment of each are open to interpretation within a plethora of rationalities and arguments.

Inter-generational equity. Sustainability's fundamental moral assumption is the acceptance of inter-generational equity as an overriding ethic, i.e. the moral necessity leaving sufficient resources for future generations (Dovers, 1989). The central objective of the World Commission on Environment and Development[3] (WCED, 1987) in this definition of sustainable development was to resolve intra and inter-generational conflict: meeting the *needs* of the current generation should not compromise the *needs* of future generations. Normative questions within this goal need answering. First, how are the needs of future generations to be defined? Should well-being be limited to meeting 'needs'? Cooper and Palmer (1995) write that justice for future generations is based on the principle of not taking more than one's *fair* share, conserving options, quality and access to resources, and that gratitude to the past is repaid to the future. This still leaves us with the problem of defining 'fair', which is critical for prescribing the limits that must be imposed on current use of

[1] In referring to the 'sustainability paradigm', the discussion includes both 'sustainability' and 'sustainable development'. One distinction between the two, Dobson (1996) suggests, is that the latter is anthropocentrically motivated and the former need not be so. Reed & Slaymaker (1993) make the distinction on the basis of the latter, and not the former, being linked to economic growth.

[2] My own definition matches that of Reed & Slaymaker (1993:725): "*the persistence of certain necessary and desired characteristics of the natural and the sociopolitical system*".

[3] Also known as the 'Brundtland' report.

resources. Second, what should be the degree of sacrifices by the current generation in order to safeguard the needs of the future? Tensions arise when it becomes necessary to balance justice requirements between and within generations; when for example the burden of conservation programmes that would benefit future generations fall upon the poorest in today's society. Third, inter-generational equity is totally anthropocentric; the concept does not imply attention to or concern for the 'needs' of present and future generations of non-human species.

Social justice: intra-generational equity. If inter-generational equity is accepted as a valid moral standpoint for sustainability, then that concern "*must logically be extended to equity within generations*" (WCED, 1987:43). Principle Three of Agenda 21 states: "[T]he *right to development must be fullfilled so as to equitably meet developmental and environmental needs of present and future generations*" (United Nations, 1993). As Brown Weiss (1989) argues, there is a moral duty to ensure equitable use based upon the common and shared right of all people to use and benefit from the natural resources of the planet.

The concept of justice and equity among existing generations is also ambiguous, and the question remains as to what an is equitable distribution of resources? A policy or decision that one person considers fair might be considered unjust by another.

> *Conceptions of social justice differ substantially, because of varying cultural and national traditions and according to the position of groups within the patterned and largely self perpetuating distribution of resources, claims and demands at the national level.*
>
> Schaffer & Lamb (1981:119)

Reed and Slaymaker (1993) show convincingly that a separate expression of ethics is associated with scale. Under a social justice axiom, *international equity* is a view on sustainability that seeks to alter patterns of production and consumption in the North which perpetuate under-development in the South (see Martinez-Alier, 1994). How do we decide which inequalities are unjust, and who should be expected to 'aid' whom? This is a ethical issue concerning the extent of our moral community and ideas about rights and responsibilities (Hayward, 1995). As well as the moral obligation that all nations have the right to share in the planet's natural resources and economic development, an objective of regional or international equity might be reasoned on the basis of the self interest of the North; for example, preventing environmental or economic migrants, creating new markets or enabling collective action over global environmental issues (see Rowlands, 1997).

Justice can also take dramatically different forms within the same society (Lerner, 1975). In much sustainability literature, social justice is discussed as meeting a level of basic needs to which all people in society are equally entitled. But, in addition to the problem of defining need already mentioned above, the allocation of natural resources according to need is too simplistic a view of justice. There are questions concerning the fair allocation of rights and political voice. Academics have joined activists in arguing that empowering people through improved property rights, the use of local knowledges or more democratic decision making structures, can lead to more informed, more appropriate and more successful resource protection (Pretty, 1995). Participation, like sustainability itself, has been taken up, promoted and operationalised both instrumentally, as a panacea for successful development, and as a moral right. The degree of public participation considered to be fair and just is itself a normative issue of procedural equity.

However, the principle of local self determination inherent in procedural equity can conflict with distributional principles of equity. Lake (1996) describes an example of such tensions within the environmental justice movement in the United States which is concerned with the just distribution of environmental problems or hazards such as pollution and degradation; i.e. with environmental bads rather than environmental goods (see Albrecht, 1995). A decision not to locate a toxic waste dump in a disadvantaged area already experiencing more than its fair share of environmental 'bads' was objected to by that local community on the grounds of the economic benefits that it would be likely to bring. The inequity, Lake argues, lies within the limited choices the community faces. A focus on spatial or distributional fairness is insufficient if it ignores or obscures the broader institutional and cultural context within which decisions are made and environmental problems are caused. Lake (1996) reasons that equity should extend beyond distribution itself to the prior decisions regarding the production of the burdens that require distribution[1].

Social justice maybe a moral axiom, i.e. an end in itself, or it may be an instrumental prescription for achieving environmental sustainability. There is a large body of literature on environmental movements and environmental politics that explores the link between social justice and environmental sustainability (see for example Pepper, 1993; Dobson and Lucardie, 1993). The term *environmental* sustainability itself, is concerned more commonly with the aggregate impact of using resources rather than with the distribution of environmental goods or bads.

[1] See also Mason (1997) for a discussion of the tensions between participatory democracy and deep ecological activism.

Environmental protection . Including nature in our moral community is even more contentious. Justice is defined not only in terms of the effects of an equitable distribution between humans, but also in terms of the effects of human activities on the whole ecosystem. One objective of environmental sustainability is to accommodate not purely anthropocentric positions (held by people whose primary motivation is the promotion of human well being), but also purely *bio* or *eco*centric positions (held by those whose prime concern is protecting the natural environment. Indeed, some would argued that the environment ought not be conceived of as a collection of goods for human use, at all). Sustainability requires difficult decisions over which environmental assets should be preserved and in what form, but it does not prescribe any answers. The paradigm emphasises the 'inter-connectedness' of things but does not necessarily insist that we should treat other species equitably. Rather, the arguement commonly made is that it is in our best interest to preserve biodiversity on the grounds that other species may one day be useful if not already (Steverson, 1996). Biodiversity, or species equity, appeals equally to arguments that habitats should be preserved for their intrinsic *or* their instrumental value. Sustainable management does not *require* any special ontological commitment to inherent or intrinsic value; all that is absolutely prescribed is an agreement that environmental policy should be based at least on the long-term interests of humans. The normative argument is complicated further by the need for decisions over the carrying capacity of ecosystems, i.e. deciding what levels and kinds of scientific or other expert knowledge should reliably inform what is a 'sustainable' use of environmental resources and what environmental risks are jusified[1].

Economic interpretations. Some notable work on sustainability in recent years has been undertaken in economics. The central hypothesis of some economists' interpretations of sustainability is that continued economic growth is irrational because the resources of our 'closed' planet are finite (see for example Daly, 1996). Less extreme models are based on finding a way to avoid the negative repercussions of growth (such as resource depletion and pollution). This is the model advocated in Agenda 21 (United Nations, 1993). In each case, it is suggest that development (qualitative change) or growth (quantitative change) can continue, and future

[1] The *Precautionary Principle*, emerging from attention given in the Brundtland report to the issues of knowledge and risk (WCED, 1987), has been advocated in much sustainability literature. It stipulates that a lack of adequate knowledge as to potential environmental effects shall not be used to hinder policies and actions designed to prevent environmental degradation (Lafferty, 1996:189). Even when applied, the level of precaution that is 'fair' needs addressing. The role of uncertainty within modern society has been the subject of much attention in social science approaches to understanding and resolving environmental problems (Beck, 1992).

generations can be assured an equivalent standard of living to our own, by using advances in physical or economic science to overcome environmental problems[1].

For environmental economists, one starting point for sustainable resource use is 'non-declining capital stock' which fixes limits to resource exploitation (Turner, 1993b; Pearce et al., 1987). A 'weak' position concentrates on maintaining an aggregate stock, whereas a 'strong' position regards some natural assets as 'critical', not to be depleted and non-substitutable. This immediately raises two normative issues: what constitutes the natural capital that is to be protected and which models are to be used to predict 'sustainable' yield? (see Daly, 1992). These questions are complicated by uncertainty over the externalities of a particular resource-using activity. Assessments will be based on subjective judgements of desirability and reliability which become more contentious as resource stress and conflict increases.

A second principle used by environmental economists is that the proper pricing of resources should include the full environmental externalities and costs of resource use or depletion. An essential feature of the application of this model of sustainability is the conflict that ensues when attempting to allocate values quantified in monetary terms to values that are of an ethical nature. Value prescription depends on the nature of value, and the assumption that all goods can be reduced to commodities is not universally held (Buchdahl, 1997). Evaluations of nature involve many different experiences, criteria and discourses which are incommensurable (O'Neil, 1993).

In standard models of economic exchange, the focus is on the process by which resources are allocated to their most efficient uses through the utility-maximising choices of individuals in the market. Sustainability is then defined as maintainting utility (Pezzey, 1992). Value is represented through the aggregation of individual preferences which will maximise social well-being. The question of how resources *should* be divided so as to ensure inter-generational welfare issues is avoided. Strictly speaking then, any claim that economics is a positivist rather than a normative discipline would not be entirely correct. Efficiency itself is a normative principle. Economists would say that a proper and just use can be assessed by the degree of economic efficiency and *aggregate* welfare.

Economists have traditionally given insufficient attention to the nature of 'well-being' which is crucial to the goal of sustainable development (Dodds,1997). Human and social well-being is of course more complex than *material* concern; environmental issues encompass cultural, aesthetic, amenity and non-instrumental dimensions that

[1] See Klaassen and Opschoor (1991) or Munda (1997) for a review of different economic approaches to sustainability.

define desirable ends and means, and which economic frameworks alone can not capture (O'Neil, 1993; Dodds,1997). As Sagoff (1988;1994) states in his critique of neo-classical economics, well-being is as much about what a person believes is right, fair and for the common good, as personal welfare. For sustainable resource management, society needs to address how limits to natural resource exploitation *ought* to be set, and how resources *ought* to be allocated as well as how they *can* be set[1].

> *The ethical underpinnings of economic analysis and the policies which may result should be exposed and compared to the ethos of the specific society to which they are applied. This would facilitate the identification of dissonances which could hinder the successful application of the policies and suggest viable alternatives*
>
> Tacconi and Bennett (1995:222)

Typologies for positions on sustainability or sustainable development that do acknowledge the range of social, environmental, economic and moral dimensions in which it is embedded are to be found among academic interpretations (Redclift 1984, 1993; O'Riordan, 1981, 1995; Pearce, 1993a; Dobson, 1996). These recognise that there is little agreement as to what a sustainable society would look like. Some of the tensions I highlighted above are captured within O'Riordan's (1995) distinction between four stances on sustainability, for example: consisting of two kinds of *ecocentrics* and *technocentrists.* Among the former, there are those who hold the view that other forms of life have as much right to live as humans - the *deep environmentalists,* and those whose focus is on local social and cultural as well as ecological well being -the *soft technologists.* There are technocentrists who favour a degree of environmental concern within the existing social and political order - *accomodators,* and *cornucopians* who believe that 'leaving things to the market' will lead to an optimal outcome for society. Each have different normative positions regarding the principles which determine the allocation of resources and rights.

ii. *Why is the normative ambiguity important?*

The purpose of the brief review above was to illustrate the extent to which 'sustainable' natural resources management is by no means a fixed or universally given concept. Whether or not we *should* concern ourselves with the well being of others, beyond reasons of self interest, is an ethical question, but the ethical

[1] Recently, these normative constraints to economic approaches have begun to be addressed through the new paradigms of *ecological economics* and *socioecological* economics which have shifted the emphasis to an understanding of why environmental resources are important to human beings (Dodds, 1997). The importance of uncertainty and value conflict, and commitment to normative goals are made explicit (Jaobs, 1996; Munda, 1997). Less recently, *institutional economics* also recognised the significance of world views and power relationships in the control of resources (Soderbaum, 1992).

framework of the sustainability paradigm is in itself incomplete. There is no universal prescription for what *ought* to be sustained and *how* it ought to be sustained, how society should be organised, or how the expected benefits of sustainability should be apportioned. Yet, as Milton suggests:

> *There are underlying disagreements over how problems are defined, their degree of seriousness, who is responsible for solving them, and how amenable they are to solution. These disagreements run deep; they are based on different moral principles, different values, different assumptions about how the world operates, and they are found not only at the international level, where cultural diversity is to be expected, but at all levels, within a single society or organisation, and within the actions and policies of a single corporate group.*
>
> Milton (1991:4) (quoted in Adam 1994:92)

The paradigm itself does not provide answers to such normative questions as: what is the collective good, what is a useable resource, what are legitimate claims to a resource, what are acceptable allocations of environmental goods and environmental bads and decision making opportunities? I have shown that the leading normative principle of sustainability is that of equity, but the interpretation of the principle is not fully resolved.

Why might this lack of resolution matter? Values and norms are important in the debate about sustainability not because some value is right or wrong in itself, but because value systems refer to underlying principles about 'proper conduct' and ways to evaluate events and polices in terms of their commitments to particular ideals (O'Brien and Guerrier, 1995). All societies have a set of ethics, or social goals and against which individual policy goals, outcomes and process will be checked (Dovers, 1989). These ethics are culturally embedded and are evolving and, as Lerner suggests (1975:7), "*societies which have the best norms will thrive*". Equity and other norms upon which social rules and regulations are based, sometimes encode established ideas of proper conduct. At other times they are handed down in order to establish norms of proper social behaviour.

This thesis is concerned principally with the translation of sustainability into practical solutions to natural resource stress, i.e. through policy and regulation. The majority of policies devised in the name of sustainable development interpret sustainability in terms of narrowly defined economic or ecological goals and mechanisms. Policy makers are technocentric or managerial in their approach to the tensions between environment and development (Redcliff, 1984, 1993). Those responsible for developing political strategies in the name of sustainability are not normally obliged to engage with moral arguments in defence of their prescriptions or,

when they do so, the values that determine these goals and mechanisms tend to be taken for granted. Although there is a plurality of attitudinal, ethical and metaphysical positions which people adopt regarding the environment, the normative question of the desirable shape of a sustainable society is overlooked or remains within the realm of rhetoric (Lafferty, 1996). As Smith argues "*in the contemporary world, science acts to close off normative questions and direct debate to technical efficiency*" (Smith, 1996:29). Sustainability is frequently preached as having a universal moral authority. It is often assumed that conservation strategies, resource management or sustainable development plans are representative of, or compatible with, the normative goals and understandings of individuals within the society and can be implemented within the existing social and political structures that reproduce those values. In fact, when sustainability is assumed to be based on a superior ethic, such strategies may undermine existing ethical frameworks (Frey, 1992) and moral capital (Hirsh, 1976).

The Brundtland Report (WCED, 1987) and Agenda 21[1] (United Nations, 1993) at best set out objectives such as political structures for securing participation in decision making, and economic structures that preserve the ecological basis for development. But neither documents sufficiently tackled the normative dilemmas that prioritising the various physical and social elements of sustainability raises (SANGO, 1992). Rothenburg (1994:39) argues that "*from the outset it is clear that there is no underlying philosophy to Agenda 21 at all. That is, there is no attempt to define the basic terms used as the foundation for the policy...*". Both the Brundtland Report and Agenda 21 provide only a limited philosophical grounding for our approach to nature and natural resources. They lack recognition of the significance of normative dimensions to social relations that characterise all social processes, and which must therefore be a part of understanding and finding solutions to environmental problems. It has been suggested that 'sustainability' has become so universally accepted because it can be interpreted to mean exactly what the interpreter wishes it to mean (see Redclift, 1993; Lele, 1991). As long as 'sustainability' is unspecific, few people will disagree with it, and this may be its strength (Lafferty, 1996).

Others would argue that this is also one of its weaknesses: what is to be sustained, how and why is open to interpretation: "*environmentalists want environmental systems sustained, consumers want consumption sustained, workers want jobs sustained*" (Norgaard, 1988:607). Sustainability needs to be able to deal with these dilemmas; as Reed and Slaymaker suggest:

[1] Product of the United Nations Conference on Environment and Development, Rio de Janeiro, 1992

> *Without explicit environmental ethical premises the sustainability debate is indeterminate and cannot lead to consistent or even acceptable environmental or social policies.*
>
> Reed & Slaymaker (1993:723)

Environmental policy processes have been criticised for being technocratic because either they fail to incorporate ethical concerns and translate them into social change, or they make implicit or incorrect, top-down normative assumptions which work alongside scientific and technical parameters (Lowe et al., 1993; Grove-White and Szerszynski, 1992; van den Bergh and van der Sraaten, 1994; Parker, 1995). Norgaard (1988) described a co-evolutionary view of sustainability: requiring new and holistic understandings of how social systems, knowledges and values interplay and evolve. Grove White and Szerszynski (1992) have identified three models of environmental policy-making which illustrate how ethics are ignored or inadequately incorporated into policy. The first which they refer to as the *Science Alone Model* is based on assumptions that the determination of policy can be left to technical expert knowledge since human beings, once enlightened as to the consequences of their actions and given the 'right' information in accessible ways, will be rationally bound to amend their behaviour. This 'deficit', top down model has dominated government strategies for the last thirty years. But social scientists have questioned the validity of the deficit model because of poor response and observed resistance to life style change (Irwin, 1995; Harrison et al. 1996). According to Habermas (1984:88), action is determined not by external conditions alone, but is normatively regulated and evaluated in terms of rightness and legitimacy. New work in geography has revealed that the public are suspicious of expert-political information (Burgess and Harrison, 1993; Myerson and Rydin, 1996).

The second model, Grove-White and Szerszynksi call the *Values as Social Lubricant Model,* whereby values are acknowledged as non-rational determinants of behaviour which can be manipulated through policy instruments, i.e. conservation through changing people's perceptions. As part of the predominant technocratic approach, "*ethics itself becomes an objectified tool for manipulation*" (1992:289), and technical knowledge, not ethics, still determines policy. This assumes that the goals that we want to pursue are already known. The third model, the *Division of Labour Model*, does assign a role for ethics in the constitution of knowledge. Ethical judgements determine what is to be done and what is desirable - once facts are known. This model is criticised for the lack of a clear demarcation between fact and value, and '*ceding the realm of fact over to the technical*' (Grove-White and Szerszynksi:290). As Douglas argues, the setting in which public policy for dealing

with environmental problems and risks is developed *"will necessarily be one in which people assign definite symbolic significance or values to harms of different kinds. These will yield action-preferences which may be systematically at odds with official ones, and be deemed, from that standpoint to be irrational"* (quoted in Redclift,1994:9).

Grove-White and Szerszynksi (1996) conclude that many social conflicts, overtly about environmental problems, can more usefully be seen as conflicts between commitments to certain models of how society is, or should be ordered and are manifestations of deeper anxieties about "*embedded trajectories of contemporary society*" (1996:292). Social objectives are usually decided against the background of an unquestioned power structure rather than an engagement over those 'desired trajectories'; the motives and goals of institutions and authorities who govern and manage the natural environment have often evolved independently of the social and economic goals of other social systems.

Beck (1992) suggests that ecological sustainability requires a reconceptualisation not only of progress but also of the processes that determine what counts as social progress. If an evolution of values is required, then it is *reflexive* processes, which allow the *status quo* to be challenged, that permit such an evolution. In an important article, Drummond and Marsden (1995) pursue this issue, arguing that to influence the conditions under which sustainability occurs is a more tenable approach than striving to 'manage' sustainable development itself. Because sustainability necessarily incorporates complex social, environmental, economic and moral dimensions, Drummond and Marsden argue that a managerial or structural approach which seeks to ameliorate specific problems is untenable. The level of knowledge required cannot possibly exist. Physical systems are so complex that there can often be no consensus regarding cause and effect and where even small margins of error have important implications for policy. If sustainability is a process rather than an end state, then the key to operationalising sustainable development is located in the creation of conditions which predicate such processes - including the reconstruction of values at economic and social levels, and the consequent reflection of environmental and social values within institutions governing resource allocation and use. The key, Drummond and Marsden maintain, is to alter modes of regulation.

> *The task ahead is to incorporate ecological and moral criteria into the conditions which make regulation viable and thus to create, or at least to establish the conditions which predicate, new modes of social regulation.*
>
> Drummond and Marsden (1995:59)

Social constraints on sustainability are manifested in the dominant institutions and regulations which enforce established norms and are subordinate to dominant ideologies. The suggestion is that an efficacious focus for addressing the social and ecological limits to sustainability lies in the elements of regulation that influence the ways in which natural resources are exploited, and how the ability to consume and the right to consume are defined, legitimated and sustained. This includes an understanding of institutional structures, but also determinants of human action, such as values and norms, the construction of values and how they are moulded by 'cultural realities'.

Drawing these arguements together, the origin and nature of the normative assumptions, including notions of equity and or fairness, asserted in the name of sustainability merit attention for a number of reasons. First, the sustainability paradigm itself prescribes a very inadequate normative engagement. This means that its usefulness in helping us to solve environmental problems is restricted because of the impossibility of eliminating value conflicts. Given that people have different and conflicting views on 'the good life', a similar plurality of views on the desirable shape of a sustainable society is to be expected. Second, it follows that the role of norms in the transition to sustainability needs to be better understood. What role do norms play when individuals engage in behaviour that is, or is not, supportive of a sustainable future? In what way do social, economic and political mechanisms perpetuate, challenge or undermine normative frameworks? The challenge is not only to identify systems that are a precursor to sustainable resources use, but to identify those that fulfil normative ideals. As Wenz says, "*principles that have served human beings well for millennia ...may no longer be trustworthy*" (1988:29). Third, any engagement with the normative issues of sustainability tends to be chiefly academic and theoretical rather than empirical. More studies of 'situated moral understandings', such as the geographies of scale, place and context of equity perceptions are necessary. What is ethical and responsible in one community, or for one particular dilemma, maybe sacrilegious and unjust in another. Fourth, if sustainability is to be advanced, the normative foundations of policies must either be compatible with those that already exist in society or, if necessary, new systems must be put in place to foster norms of behaviour which are compatible with the ecological, social and economic objectives of sustainability. In either case, and whether sustainability is a wholly instrumental or wholly moral discourse, the philosophical claims and implicit values of sustainable development policies need to be made explicit, laid open to challenge and comparison with the values of the target communities. In the absence of universal ethics,

justification for what is done in the name of sustainability needs to be negotiated at the local level, for there are no moral experts (see Parker, 1995):

> *The realm of the ethical is best approached through an ever-deepening engagement with the lived realities of day to day existence.*
>
> Grove-White & Szerszynski (1992:293)

> *A defensible decision is not the same as the best possible decision, but at least it is a transparent decision*
>
> Munda (1997:223)

In the next section I suggest that a concern for equity is not only an ethical objective of sustainability but is also an instrumental imperative in regulations which seek to intervene in resource use behaviour.

II Equity Matters for Natural Resources Use and Management

As the frequency of resource stress increases and competition becomes more intense, an increasingly important value influencing the desirability and assessment of policy for the management of scarce resources will be the principle of equity; what is fair. Above I have shown that ideas of justice, that is the *proper* treatment of human beings and other living creatures are an important consideration in the sustainable management of resources. Justice beliefs shape our behaviour towards nature, non humans species and shared common resources such as water and air. Where equity concerns are included in the sustainability literature, the concept is usually articulated as a concern for the spatial and temporal distribution of resources. But perceptions of equity and social justice are more complex and have wider implications than distribution or economic equality alone. Achieving sustainable resource management poses numerous equity challenges, amongst which the following are important:

- establishing which social justice principles should determine what is a fair *distribution* of natural resources *within society* and *to the environment*
- the different and conflicting notions of fair and just resource *management mechanisms*
- environmental *problems* and *resource shortages* will affect different people with different severity
- *policies and interventions* in the name of sustainability will create winners and losers.

Because equity is typically too narrowly defined and its meaning usually taken for granted, this part of the chapter will explore the various meanings and understandings of equity relevant for answering the question 'what is fair natural resources management?'. The focus is also on the role of equity in natural resource regulation. The first section looks at the principles that establish particular fairness norms.

Debates on equity draw mainly from two literatures; the philosophical literature on the nature of distributive and procedural justice, and social-psychological investigations in to behaviour. The second section reviews the latter for an understanding of equity judgements by individuals at an empirical level. Section three moves on to consider the social dimensions of fairness and a stakeholder approach to the analysis of equity is proposed. The arguments here will suggest that, as a variety of positions can be described as fair for any given issue, a greater understanding of equity concerns would aid the design and success of interventions seeking to influence resource use. Thus, a set of research questions will be arrived at.

i. *What is equity?*

In this section, I attempt to arrive at a typology of equity which might be helpful in answering 'what is a fair management of natural resources?' by giving a brief overview of notions of equity within the extensive literature on formal principles of justice.

The meaning of 'equity'

Within the literature on moral philosophy, equity is when the ratio of one person's outcomes to inputs is equal to another persons' outcome/input ratio (Walster et al, 1978). It is that aspect of justice concerned with entitlement, and how people fare relative to others, and can be distributive, or procedural. "*Justice is essentially to be thought of as a principle (or set of principles) for resolving conflicting claims* [... which arise] *out of the need for social co-operation*" (Harvey, 1973:97). 'Rights' to natural resources can be claimed by recourse to an agreed principle of equity.

In common usage, equity is used interchangeably with fairness and justice[1]. In lay terms, the concept of *fairness* is more familiar than equity, and so in this study I use the terms interchangeably. The use of fairness here is not restricted to any formal definition. For example, it is possible that if someone was asked "is x fair?", a plausible answer might be "no, because x will reduce my options?". This is not strictly an equity concern as it does not explicitly include any interpersonal comparison, but the respondent feels that the result is unacceptable or undeserved (unfair) in some way. A sense of injustice is felt when one's expectations have not been met. In this thesis, equity is used to encompass an amalgam of broad interpretations and all possible components that might be implied in the use of the word *fairness* such as *rightness, just, proper, acceptable, appropriate, trusting.* All can be considered as 'meta' concepts since they do not imply an exact and specifically defined judgement criterion. Strictly speaking they encompass broader moral concerns than equity as 'entitlement'.

[1] The Concise Oxford Dictionary states that equity is 'fairness or recourse to principles of justice'.

How can resources be allocated so as to be fair?: philosophical principles

What principles and criteria might a society use to establish what is meant by *equitable* and *just, fair, proper* and *right* natural resources management? The world is made up of contestable meanings of what is *fair*, but discussions of equity usually refer to either or both of two general categories of issues:

- *consequentialist* issues (the outcomes of *distribution* decisions and the *criteria* used to determined them)
- *procedural* issues (dealing with the *processes* by which decisions are made).

I present here just some of the arguments which have been used in the extensive literature on justice to formulate theories of the fair and just allocation of *benefits* or *burdens,* when there is a scarcity of resources or *benefits* relative to people's wants or needs.

Distribution criteria. Every society has rules for sharing goods and burdens among its members, founded on notions of just distribution. The rules of sharing are expressed in the notion of *equity*, or judgements regarding what is a fair allocation of resources and who should be included in that allocation. The specifics of a natural resource allocation decision will be derived from particular normative principles that determine the criteria considered relevant for sanctioning either equal claims or preferential treatment. Those principles are based on beliefs about the 'proper' distribution of resources, rights, duties, opportunities and obligations.

Allocation principles usually fall in to 3 broad conceptions of achieving equity: need, equality, and merit.

- *Need*: What each person receives is determined by the size or nature of their need. *Application* of this principle requires consensus as to the comparability and hierarchy of needs (Mikula, 1980). The problem is to define exactly what it is that need is relative to.

- *Egalitarianism*: There are differing positions on the scope of equality. Does impartiality *extend towards other societies, other generations or other species? Does.* who is included in our moral community differ with situation? In the eighteenth century Rousseau argued that people's natural state was equality but that the evolution of society ravaged this idyllic state (in Walster et al., 1978:221). Certainly, the Western world panders to the notion that all individuals are created equal and are therefore entitled to *receive* the same treatment. The indiscriminate division of advantages or

resources, in equal amounts, independent of any criteria, represents *pure equality.* There are also those who would argue all people are entitled to equal *outcomes* (Belsey 1992). Thus, it makes sense to for society to take account of the relative helplessness of the very young, the old and those stricken by events to which all members may be vulnerable, and to ensure that their needs are met. Thus distribution may be in unequal amounts, as equitable allocation becomes a question of *redressing* the inequalities between individuals. This is known as *substantive equity.*

- *Proportionality*: equal treatment is unambiguous when everyone is equally situated. But when claimants differ in contribution, in need, in blame or in ability equal treatment may not be equitable treatment. The "equity theory" of Walster and Walster (1975) posited justice as *proportionality* i.e. a set of outcomes is considered just if entitlement has corresponded to the relative inputs, merits or deserve of the individuals. This has been most commonly adopted as a formal definition of equity. For fairness then, people compare themselves with others in order to decide how much they are entitled to receive, regardless of need or any equality objective. Aristotle (quoted in Goodwin, 1992) maintained that it is as unjust to treat unequals equally as it is to treat equals unequally[1]. Proportionality (or the contribution principle) acknowledges differences between resource claimants and divides the goods according to those differences. Proportionality is deep-rooted in Western law and custom as a norm of distributive justice.

Theories of justice: how to decide on criteria. In almost any situation there is ambiguity as to the criteria that might determine deserve. Walster et al (1978: 217) quote Aristotle:

> *Awards should be according to merit; for all men to agree that what is just in distribution must be according to merit in some sense, though they do not all specify the same sort of merit, but democrats identify it with that status of freemen, supporters of oligarchy with wealth (or with noble birth), and supporters of aristocracy with excellence.*

Deutsch (1974) has observed that, at one time or another, societies have defined almost everything to be a valuable deserve criterion. Equity judgements cannot be applied in any meaningful way until it is established who among natural resource claimants are equals and unequals, and what form the different treatment of unequals will take. Consensus on what criteria to use is unlikely among a heterogeneous society with disparate interests and conditions. For example, farmers with more land

[1] Positions referred to by economists as vertical inequity and horizontal inequity respectively (Le Grand, 1991:71).

might advocate that water be distributed per hectare, whereas those with water thirsty crops would argue that fair distribution would be according to crop type.

According to moral philosophy, the concept of equity is one dimension of what is meant by a 'just social order', and justice can be applied to all three stages of an action; the intention, the act and the result (see Goodwin, 1992). This theme has bothered political philosophers since Plato's and Aristotle's conceptions of the ideal state, through the social contract theories of Hobbes, Locke and Rousseau, to the more modern theories of Rawls, Nozick and Walzer (see Scherer, 1992 and Mikula, 1980 for a full interdisciplinary review of justice research). Within theories of justice, there is a spectrum of philosophical beliefs concerning the scope of a moral community, what rights and attributes to value, reason versus virtue, conceptions of the good, conceptions of the self, procedures for how to chose principles, and the extent to which we are morally obliged to correct an injustice if it is in our means to do so. Theories of justice are views on how principles of distribution and so judgements of equity should be arrived at; for deciding what is meant by a just distribution or social order. Justice theories attempt to supply an underlying rationale for the adoption of specific principles and some way of arranging them in a hierarchy. I describe here just some of the most well known arguments.

• Rawls (1971) starts with a presumption of equality so that any departure from it requires a justification. His argument is that justice and fairness is a matter of maximising the benefit of the least well off (*maximin* principle) in terms of certain *primary goods* such as opportunity, power, income and self respect. Only then would inequality be acceptable. This is closely related to the basic needs approach - the notion that an individual or community has a right to some minimal level of goods. He also advocates a 'social contract' approach in which the common good is not seen as an aggregation of individual interests, but is determined by a social process of judgements.

• Rights: According to Nozick (1974), justice is a matter of protecting individual rights to resources rather than a matter of how they are distributed (and is therefore a libertarian position). For him rights emerge from past actions such as when appropriation is just, as in 'finders keepers' for example (Elster, 1992:230).

• Efficiency: is the notion that rights should be given to those who can use resources most efficiently, i.e. those who can generate most return from it. This is closely related to utilitarianism which argues that goods should be divided in order to maximise the

total welfare of the claimants (the greatest good for the greatest number) without concern for relative distribution among individuals because individuals are considered as being part of the whole[1] (O'Neil, 1993).

• Some social philosophers (see for example Feinberg, 1973; Le Grand, 1991) consider that goods should be allocated on the basis of criteria that we have all had a fair chance to acquire. Le Grand (1991) argues it is unfair for someone to be worse off through no fault of their own (1991).

• In order to command a consensus, Le Grand advocates the use of moral intuition when searching for a definition of equity. The ultimate test, he suggests, is whether the interpretation of equity conforms or conflicts with people's fundamental beliefs (1991:57)[2].

It is necessary to mention theories of 'green justice' or environmental ethics in this brief outline of equity criteria. Exploitation of natural resources will be defined by the scope of our moral responsibility to non-human life as well as to fellow human beings, and by whether nature is felt to have intrinsic value. The moral principles underlying society's concern for the environment will colour how people make decisions, individually or collectively, about their use of it. The environment can be considered as a just claimant, in its own right (see Wissenburg (1993) for a discussion of nature as distributor, recipient, or resource). By defining how we allocate absolute or relative rights to nature, our environmental ethic, i.e. our conception of fairness toward the natural world, plays a fundamental role for sustainability in setting limits to our exploitation of natural resources and in allocating environmental goods and bads. According to Optow and Clayton (1994:8), there is a greater diversity of values and perceptions of justice in the way that people think about environmental issues than may be commonly assumed; and, appeals to justice are made by those who both oppose and favour environmental regulation. Merchant (1992, in Axelrod 1994:89) outlines three 'grounds for environmental ethics'; *egocentric* whereby what is good for each individual will benefit society as a whole, *homocentric* whereby the greatest good for the greatest number of people is embraced, and *ecocentric* which adheres to laws of ecology. Wenz (1988) gives a comprehensive analysis of the relative merits of a

[1] The Pareto criterion is used in welfare economics as an equity constraint on efficiency. This states that an allocation is more efficient if it makes on person better off and no one worse off. In practice, such as with cost-benefit analysis, the *potential* Pareto improvement criterion is usually applied to remove this constraint: this takes account of the *potential* of gainers to compensate losers when calculating net benefits.

[2] This is similar to a Kantian interpretation: that moral principles are *a priori* and should be followed regardless of the consequence.

range of theories of distributive justice for dealing with the tension between the need for social justice and environmental protection; from utilitarianism, to animal rights theories, to libertarianism. His conclusion is that each has something to offer and that none alone will provide the ultimate framework for making decisions; individual and collective judgement is still required.

Procedural equity: decision making and conduct. As well as the allocation of natural resources, sustainability implies a fair allocation of political rights and voice - procedural equity. As the world is made up of contestable meanings of what is fair, consensus on what criteria to use is unlikely among a heterogeneous society with disparate interests and conditions. In practice, the choices that institutions make are usually more complex than any single normative principle. Fairness most often reduces to a question of how to strike an equitable balance between diverse points of view and the focus for fairness judgements shifts from outcomes to procedures. Lind and Tyler (1988) for example, have found that evaluations of fairness are driven as much by process as by outcomes. Allocation decisions are usually made by a group, or by an institution acting on its behalf, and the question arises of how to design a process that fairly aggregates individual opinions into a collective decision. If actors cannot agree on a criterion of division, they may agree on a process of division that determines an outcome as acceptable[1]. Levanthal (1980) proposes six rules that individuals use to evaluate the fairness of allocation procedures: consistency across time and person, suppression of biases, accuracy of information, correctability of the decision, representation in decision making, and the maintenance of ethical standards. A further procedural criterion is efficiency; decision-making or conflict resolution should not be complicated or time consuming. Lind & Tyler (1988:172) also mention self-respect, or the extent to which a process recognises an individual's rights and reinforces their value to society. More recently, Lake (1996) has called for a radical, far reaching definition of procedural justice which extends equity into decision making on the production of burdens that require distribution.

What is 'fair' natural resources management?: an 'everyday' concept of equity

It is clear from discussion thus far that equity is salient to natural resources policy because social decisions must be made regarding:

- the total amount of a good available for distribution,
- the principles for deciding which claims to resources are just claims, and

[1] For example, the game in which one player divides a good into two halves and the other player gets first choice; or a lottery; or a queuing system.

- for deciding how to share goods and burdens amongst those just claims.

Ideas regarding which claims to resources are fair, and why, will be translated into, and reflected within, natural resource policy objectives and strategies. The equity norms of an institution will determine the choice of regulatory tools and mechanisms that it employs for allocating and managing a resource. Whether or not policy favours particular economic sectors, geographical regions or particular communities by preferentially allocating rights to natural resources will be a function of the notions of equity that apply to a particular situation. Although a common set of principles do often apply to a wide variety of distributive problems, it has been argued that no general principle will produce *just* results in every sphere of distribution. As there is a diversity of social goods that require a different distributive criteria, then different criteria of justice apply in different areas of economic and social life (Walzer, 1983; Le Grand, 1991:111).

Two defining questions for the design of my research emerge from this discussion: '*whose notions of fairness should be used*?', and '*is there a difference between what is equitable and what we think is equitable*?'. This represents the classic dichotomy in moral philosophy regarding *universality* and *particularism*[1,2]. On the one hand, the former involves inclusive, objective, abstract and universal principles, for which place, time and context are irrelevant. The theories of justice mentioned above are generally situated in the abstract realm of moral and political philosophy, and all will have ethical or practical limitations to their application to environmental problems[3]. The latter, on the other hand, imply judgements of actual cases based on tradition, real commitments and actual responsiveness to others. As Van Velson (1964) argues, rules and norms of conduct cannot be defined in the abstract; "*they are part of a body of social knowledge that is constructed by individuals through active engagement with their world*" (cited in Long A, 1992:163). Thus their meanings are context specific.

A local approach is endorsed by Young's (1994) study of equity at work in everyday affairs. He argues that "*it is possible to analyse the meaning of equity in the small without resolving what justice means in the large*" (1994:14). Assigning priority in policy making may involve trade-offs among various principles, and an allocation is usually judged to be fair based on a mixture of criteria or a balancing of considerations rather than on just one equity principle. In practice, the issue is usually

[1] This can be distinguished from 'moral *relativism*' which implies that there is no rational grounds for criticising different moral outlooks (Reed & Slaymaker, 1993).
[2] Hay (1995) discusses the use of these terms in geographical studies. O'Neil (1996) discussed the ability of each approach to take account of the pluralism within modern society.
[3] See Wenz (1988a) for a review of justice theories and their application to environmental issues.

how to achieve an allocation and decision that is as equitable as possible. Young (1994) shows that equity is strongly shaped by cultural values and by the specific types of goods and burdens being distributed. This argument finds support in Grove-White & Szerszynski (1992:294):

> *It is integral to our approach that no particular person can claim meaningfully to be in a position to reveal the 'true' (as it were 'ultimate') meaning of ethical judgements. In the essentially dialogical picture of ethics proposed here, ethical judgement can not be reduced to the monological deliberation of a privileged observer. Interpretations are open to challenge, and to further interpretation.*

I am persuaded by these arguments, and following Young's study, this thesis concerns not what *is* equitable, but what people *think* is equitable[1]. A useful distinction is made by Lind & Tyler (1988:3) between *objective* and *subjective* justice. The former concerns a judgement made according to some *established* formal standard of justice, while the latter represents peoples' *perception* of what is fair. Likewise, *unfairness* can be a deviation from perceived rights and principles, as well as from established ones.

Given the above, as well as conceptualising equity in terms of the formal principles that may structure resource regulation and policy, another way of considering equity, found in the social psychology literature will be considered in the next section. That is, an empirically based discussion of equity in terms of people's *judgements* of fairness.

ii. *Understanding perceptions of fairness*

Over the past decade, it has been increasingly acknowledged that the psychological aspects of environmental problems are relevant, and that psychological models are able to contribute to predicting environmental behaviour (see Optow & Clayton, 1994 for a review). The justice aspects of environmental issues have been shown to be significant in determining how people relate to the environment, in motivating people to take a *pro* or *anti* environmental stance, and in affecting the way they resolve environmental decisions and conflicts (Optow and Clayton, 1994). Studies have documented that environmental attitudes, and personal ethical values and moral orientation are related to environmental activity, although this correlation is frequently a weak one (McKenzie-Mohr et al, 1995; Ungar, 1994). Stern et al (1993) posit that a person's attitude to environmental protection can be predicted from three value orientations based around either *personal gain, social good* or *benefit to ecosystems.* Clayton (1994) shows that *pro-environmentalists* are likely to appeal to *macro*-justice arguments that centre on the welfare of the *group*, while *non-environmentalists* will

[1] Although I recognise that there does have to be some moral framework to equity judgements higher than our own perceptions - consider, for example, the happy slave. Her perception is unlikely to be the definitive source for our ultimate judgement.

appeal to *micro*-justice arguments focusing on *individual* welfare.

Literature specifically relating fairness judgements to environmental issues is however, not abundant. In this section therefore, I seek to build an understanding of the role of fairness in natural resources management through a review of literature in the field of psychology that explores factors influencing fairness judgements by individuals. Samuelson et al. (1986) suggest that many motives or norms influencing fairness evaluations will be present simultaneously but in varying degrees. A range of factors, from individual value orientation to cultural context, are likely to be predictors of judgements of fairness. In addition, the degree to which *self* or *collective* interest influences people's judgements of a situation and their response to it will also be significant. In reviewing this literature, I explore the nature of people's fairness *judgements of regulatory authorities* and policy designed to intervene in resource behaviour, and seek to understand how equity judgements may affect an *individual's response* to regulatory strategies

Fairness judgements, attitudes and behaviour. As many studies show, attitudes and behaviour, and the empirical relationship between them, are key components in understanding conflict (Mack and Snyder, 1971; Lynne et al., 1990). Understanding environmental problems in terms of the attitudes and behaviour of individuals is therefore an important approach to sustainable natural resources management (Optow, 1994).

An attitude is "*a disposition to respond favourably or unfavourably to an object, person, institution or event*" (Ajzen, 1991:2), or an "*evaluative reaction*" (Weber, 1992:117). Since equity can be conceived in terms of evaluations or judgements of fairness, this model is useful for understanding how equity might influence behaviour decisions and responses to resource strategies. The dominant model for linking attitudes and behaviour has been that developed within psychology by Fishbein & Ajzen (1980) (see Figure 2- 1). It is assumed that intention and behaviour are under the influence of psychological factors such as attitudes and personality traits; in other words, if attitudes are positive and norms support the behaviour it will take place. Intention, attitude, subjective norm, and perceived control each reveal "*a different aspect of behaviour, and each can serve as a point of attack in attempts to change it*" (Ajzen, 1991:206). A *subjective norm* is a belief about normative expectations and motivations to comply, i.e. the degree to which the social environment supports or discourages the individual to perform the behaviour. It will be suggested below that equity is a social norm providing rules for what is fair. *Perceived behavioural control*

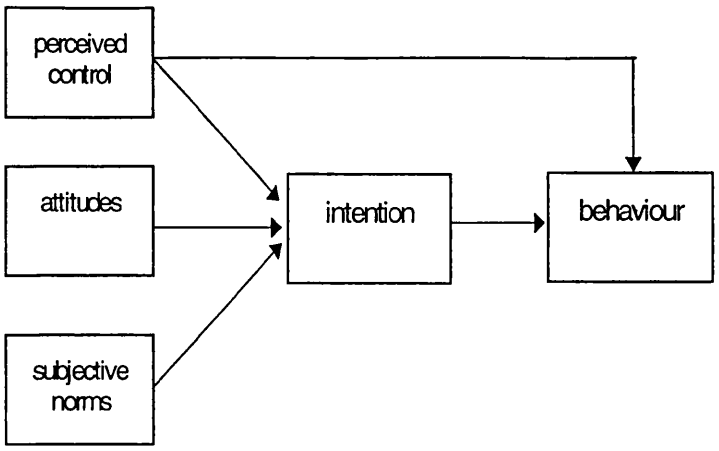


Figure 2- 1: The Fishbein-Ajzen attitude-behaviour model (Ajzen, 1991)

concerns the degree to which performing the behaviour is under the volitional control of the individual.

This model does not address why certain attitudes are held or why social norms are salient but it can be used as a framework for exploring the nature and role of fairness judgements in behaviour. The model has indeed been shown to be useful for explaining intentions to conserve water (Kantola et al. 1982, Lynne et al., 1995), and this work will be discussed in Chapter Three. Some studies based on the Fishbein & Ajzen model of the individual, centre around the role of *internalised values* and *norms* (Peterson 1994; Tetlock, 1986), while others look at external influences on behaviour such as *social* norms and other situational *contexts* (Deutsch, 1985; Seligman et al., 1994). Some see *self interest* as a dominant motivation (Dawes, 1980; Liebrand et al., 1992), while others identify *concern for the collective good* (Kuhlman and Marshello, 1975; Kelley and Thibaut, 1978).

Personal values and fairness judgements. One view on the psychology of fairness is that differences in fairness judgements and the meaning of social justice vary as a function of individual value orientation (Greenberg, 1979). Attitudes are considered as composites of values and beliefs and, according to Rokeach (1973), the ranking of values relative to each other forms a fairly stable value system used by individuals to determine attitudes and behaviour. Optow (1994) has found that attitudes represent an evaluation of the justice of a particular decision or outcome if justice is seen as relevant to that decision. Stern & Dietz (1994) suggest that personal environmental value orientation (towards the self, other human beings and towards other species) and environmental beliefs (about consequences to the things that are valued) together construct attitudes and guide behaviour and reactions. Others have shown

that personal values identify which factors need to be considered when making a decision, in order for the decision to be perceived as just (Cvetkovich and Earle, 1994; Seligman et al., 1994). Rasinski (1987), for example, demonstrated that individuals organise the different value principles determining their judgements of what is fair in to two sets of generic values - proportionality and egalitarianism. These were discussed above as formal justice principles. Rasinski (1987) found that individuals who endorse proportionality were more likely to judge as fair those aspects of government polices relating to opportunity to access a resource. Those who were egalitarian in their orientation were more likely to judge those aspects of policy that affect the distribution of resources in society.

Lind's 'fairness heuristic model' (Lind, 1992 in Peterson, 1994:97) argues that an assessment of the fairness of an organisation or authority mediates the relationship between an individual's values and their support for policy. Peterson (1994) takes the point further by proposing that values lead directly to procedural and distributive fairness evaluations which, in turn, lead to judgements of policy. A person's fairness judgement of a policy will depend on the interaction of their values with those projected by the policy. For example, Cvetkovich & Earle (1994) found in their study of meanings of justice for land management that compatibility between values (of managers and the managed) strongly related to judgements of the trustworthiness of management policies.

Context and fairness judgements. Value orientations will, of course, not be the sole determinants of what is considered *fair* policy. Social psychologists have shown that people make equity judgements differently in different situations (Deutsch, 1985). Seligman et al. (1994) found, for example, that values and ethical principles are context dependent but are consistently applied within similar contexts when judgements of fairness are being made[1]. Le Grand (1991) and Zinni (1995) give accounts of studies which show that people's views of fairness vary according to the commodity to be distributed and the context of distribution, with little consistency among different kinds of people. Rasinski (1987) has found that factors such as direct experiences with government, anger about government practices, and media priming all play a part in fairness judgements, although smaller than that of values. Samuelson and colleagues, in a study of American and Dutch subjects (Samuelson et al, 1984), discovered that individual resource behaviour and responses to change in

[1] The implication of their finding is that it should be possible for decision makers to arrive at allocative procedures and outcomes which reflect society's values and normative considerations, and avoid conflict by emphasising the commonality of values found.

an allocation system were different for the two cultures, and that the subjects differed in their responses to inequity[1].

Self interest, fairness and behaviour. Much of the work on institutional solutions to resource competition (Ostrom, 1990, 1993; Herring, 1990) has held that a rational model of behaviour lead by self-interest explains successful *common property* resources management. It has been argued that co-operation can be explained in terms of, and achieved through, attention to self interest incentives alone. Ostrom (1990) for example, uses a model of individual rationality and non-coercive, self-regulating behaviour bounded by the rules and regulations of social institutions. The core proposition behind Olson's (1971) '*logic of collective action*', however, is that self interest will not lead individuals to co-operate to a group objective. Instead punishment or inducement must be employed[2].

The '*social dilemma paradigm*' has been widely used in social psychology to frame a situation in which there is a conflict between an action that would result in immediate individual gain but which would be detrimental to the common good, and another action which would be to the common good and bring more individual gain but only if all members participated in a collective rationality (Dawes, 1980; Liebrand et al., 1992). Its theoretical underpinning is *'Rational Choice Theory'* which predicts that individuals will maximise their expected subjective utility, i.e. preferring options they perceive would bring the greatest individual gain. Social psychologists seek to identify the factors, either structural or psychological, that enhance collective action and reduce motives to free ride, i.e. increasing perception that individual utility will be maximised by acting for the common good. The social dilemma paradigm sees conflict as being located within the individual, and co-operative behaviour as being based on constraints on individualistic value orientation, such as group identification, social pressures and rewards.

The understanding of decision-making behaviour as bounded rational individualism has played a major role in the social sciences and public policy (Etzioni, 1988:1); notably within neo-classical economics and the contribution that it has provided to natural resource policy makers. Bounded rational individualism assumes that people are individual *utility* maximisers, that well-being can only be satisfied through the consumption of goods, and that all goods can be compared against each other to

[1] The fact that, in practice, the perceived fairness of a resource management situation depends on the particulars of the case does not mean that equity is an arbitrary concept that only exists in the eye of the beholder. Principles of equity arise from rational arguments and precedents that create shared expectations among affected parties.

[2] See Wade (1987) for a critique.

achieve measures of preference. The idea of the market is to harness a dominant self-interest motivation to the common good through competition among rational choosers. A pressing problem in environmental policy has been how to measure environmental values as the *proper* pricing of resources so as to include the full environmental externalises and costs of resource use or depletion (Pearce 1993b; Turner 1993a). To compete in a market place, nature must be seen to have an economic value and this will lead to optimum depletion paths. To quote Pearce (1993b:3): "*Until the economic value of environmental quality is an everyday feature of the way we compute progress, and more importantly, of the way we make economic decisions, then this imbalance* [between economic development and environmental degradation] *will not be corrected and the environment will not be given a fair chance*". In the debates over sustainability, the methods employed by environmental economists for applying economic value to natural resources are based on the assumptions found within the model of rational behaviour (see Green and Tunstall, 1996)[1].

It is assumed that 'value' is solely given by the individual whose attitudes, beliefs and perceptions are reflected in individual preferences. A central hypothesis is that once the net costs and benefits of an environmental degradation can be calculated, taking into account the monetary values given to environmental goods, an individual will choose to allocate and use the resource in a way that maximises their expected personal utility. It is a static model; assuming that people have both perfect information and pre-existing preferences that need not be explained[2] (see O'Neil, 1993; Jacobs, 1991 for a critique). The point that I wish to make is that within this bounded rationality model, justice is presupposed and construed in utilitarian terms i.e. a process is deemed fair by virtue of the fact aggregate utility or 'preference satisfaction' is maximised[3].

Some economists and other social scientists however, have long recognised that individuals often explain the choices they make in terms of commitments to *social* and

[1] The objective is *better* resource regulation using improved economic information to better influence private decisions in a market, or public agency decisions between alternative courses of action which have a different set of consequences.

[2] For example, it would assumed that individuals are familiar with the ecological importance of a natural resource, so that they could then make an appropriate value judgement.

[3] Under this paradigm, public bodies have been under pressure to put a figure on environmental benefits; such as the preservation of biodiversity. Environmental economists use economic values that people place on natural resources and the environment to improve cost benefit accounting and classical indicators of economic well being. Value preferences are measured by an individual's *willingness to pay* for environmental change or to accept compensation for losses. The method of *contingent valuation* has been increasingly used as a decision making tool and is considered as being able to account for welfare, social and cultural, as well as economic, preferences (Pearce, 1993a; Turner, 1993).

moral norms, including what is fair, rather than in terms of their own welfare (Etzioni 1988; Booth, 1994; Sagoff, 1988, 1994; Foster, 1997). Some have developed a preference satisfaction model that extends motivation beyond self-interest to factor *non-use values* and *responsibility* into the valuation assignation process. Others extend the definition of self-interest to be whatever the individual seeks to maximise rather than simply utility (see Bateman and Turner, 1993:131; Green & Tunstall, 1996). Keats (1994) differentiates the economists' use of preference, as simply an indication of what is it that people want in pursuit of their private interest, from a '*value judgement*' which is a belief about what is *right* or *good*. While moral norms and self interest may act together to determine an individual's actions, they should be considered in terms of two entirely separate utilities (Etzioni, 1988). Sagoff (1988, 1994) argues that individuals can operate as both *individual consumers*, and as *citizens* whose behaviour is influenced by an ethical rationality encompassing duties, obligations and needs, and cites Stevens et al.'s (1993:309) finding that people are "*motivated by the ethical concerns, altruism, or the desire to do their fair share*".

Social norms and fairness judgements. One position on the psychology of fairness holds that people's judgements of what is fair are determined not by *individual* concerns but by the normative goals of *society* (Rasinski, 1987). Although Rasinski argues that social goals are internally represented and form the basis of individual values, rational schema alone do not account for whether an allocation is judged as fair. In some situations, people are influenced by social expectations that are not internalised by the individual (Ajzen, 1991). According to Deutsch (1975), the *normative goals of society* influence which types of distribution an *individual* considers to be fair, that is, which theories of justice dominate. Equity, equality and need will be labelled fair principles to the extent that the respective goals of productivity, social harmony or humanitarianism, and values placed on individualism or a society's concern for its weakest members are salient in the society. Social morals provide individuals with a code for deciding which equity principles are *valid* for making such judgements. Thus fairness judgements are tempered by a society's ethos, i.e. the values and beliefs that shape the social consciousness; particularly for deciding which claims are just claims. According to Bechtel (1997:125), people's attitudes, values and beliefs are organised into belief systems which are socially reinforced, and belief systems are more effective in explaining human behaviour than personal attitudes or value alone. Stern and Dietz (1994) also propose a model based on the influence of belief systems; arguing that attitudes, value and specific beliefs are anchored in social

systems. Precedent is one of the most important sources of shared expectations and will strongly influence how claimants perceive the fairness of a distribution or policy. The maintenance of customary practices will also preserve the promotion of particular rights.

If judgements and behaviour were a function of self interest alone, then fairness would always be evaluated according to what was in the best self-interest of the individual, without concern for the common good. Although much justice research shows that individually-orientated equity assessments are a common basis of fairness judgements, many studies have provided evidence that socially based concerns are a strong component of evaluations of justice (see for example Clayton, 1994; Cvetkovich, 1994; Seligman, 1994). The work of Lind and Tyler in particular, has demonstrated that behaviour is profoundly influenced by a belief that the allocation of benefits and costs within a group *should* be equitable, that the procedure should be fair, and that any situation is judged by comparison to the situation of others (Lind & Tyler, 1988:12).

Co-operation and concern for equity. Psychological studies have shown then, that behaviour is not shaped by purely self interested concerns, but by the broader implications of behaviour; such as concern for the collective well-being, the desire to provide a good example to others, or to act in line with one's personal moral obligations and with social norms (Kelley and Thibaut, 1978). Rasinski (1987) shows fairness to be an *ideologically* based response, as judgements of fairness seem to be independent of perceptions of *individual benefit* from a policy. A '*personal norm*' factor incorporates the degree to which a person feels that their conscience allows them to perform a behaviour if it might have beneficial or harmful consequences for others[1]. People differ in the way they attach value to the collective welfare (Kuhlman and Marshello, 1975), but a sense of what is right and wrong, i.e. the violation of personal morality implied in an act of deviating from a regulation, can be more important than gain to self interest. Likewise, a moral imperative may lead a person to act against a regulation if they conflict. Take for example, Sutinen and Kuperan's study of levels of compliance with fishery regulations (1995). They show the inadequacy of a *deterrence* model which argues that an individual's resource behaviour and compliance with regulatory policies can be modified using monetary incentives (fines) to alter individual utility calculation. Their model does suggest that individuals will asses the risks of non-compliance with harvesting or abstraction regulations, and the monetary costs and

[1] Gilligan (1982) describes two types of moral orientation for example; the ethic of care and the ethic of rights

benefits, and will act to maximise individual utility. However, their studies have shown that even when fines are insufficient to produce a deterrent, and the chances of detection are low, compliance is high because of moral and legitimacy factors.

Wilke (1991) has proposed that three factors affect co-operation in social dilemmas: *greed, efficiency*, and *fairness*. Greed refers to the assumption that individuals try to maximise their own benefits, but Wilke argues that if this leads to the depletion of a resource, individuals will constrain their greed in order to preserve the resource efficiently. In essence, Wilke's hypothesis states that greed is constrained by a desire to use a resource efficiently but also by the motive to realise fairness. Furthermore, individuals generally attempt to ensure that the distribution of benefits to themselves and to others is fair.

Other studies have shown that individuals who are concerned with outcomes for others (including those who show a concern for social justice and fairness) will chose more co-operative behaviour than those with little regard for others' outcomes (Van Vugt et al, 1996) i.e. they will behave with more restraint. Samuelson & Messick (1986) have shown that 3 factors, *self interest, the desire to use a resource responsibly* and *conformity to group norms* all appear as important determinants of use behaviour decisions but will vary in weight across different situations. A standard model in social psychology is that people engage in an identification process with various social groups. This means that the way in which people value environmental resources will be a function of the relative salience of social identities (Chase and Panagopoulos, 1995). Reinforcing identification with the collective can encourage individuals to attach more value to the collective welfare, enhance perceptions of trust, and change people's behavioural motives and concern for fairness (Brewer and Schneider, 1990; Tajfel and Turner 1986; Lind and Tyler, 1988). In addition, Biel & Garling (1995) suggest that increased group communication reduces uncertainty about what others are doing (*social uncertainty*) and about resource depletion (*resource uncertainty*) and so enhances co-operation.

Fairness evaluations of regulatory authorities. It has been shown that outcome satisfaction and evaluation of an authority's decisions are influenced by the assessment of the fairness of the *decision-making process* (Lind & Tyler, 1988). Efforts by social psychologists to understand perceptions of procedural justice have led to a distinction between *decision control* and *process control*. Low levels of decision control i.e. when a person's statement has not influenced the outcome, may still lead to heightened judgements of procedural fairness if the opportunity to state

their case was given and if it is felt that their views are being taken into consideration (Tyler, 1987). Participation in the decision making process therefore, is an essential equity criterion. Decision-makers can gain public support by creating decision-making structures that allow opportunities for citizen voice. Cohen (1985) identifies a '*fair process effect*' that contributes to institutional stability, but he also found a '*frustration effect*'. When there is a strong perception of conflict of interests, individuals may feel that there is 'voice' but not 'choice' and the acceptability of outcomes decreases.

Werner Bierhoff et al. (1986) and others have found that the manner in which people are treated by the personnel of an agency is crucial to judgements of it, and that people want a "*normative expression of care or concern, an ethical resolution to a dispute and an indication that they are entitled to individualised treatment*" (Brisbin & Hunter, 1992:26). Samuelson and Messick (1986) found that evaluations of allocation systems are affected by perceptions of the capacity for *efficient* management, and the degree of individual freedom afforded by the system. Other studies have shown that perceptions of an authority's *competency* and *honesty,* and the *severity of a resource shortage* are important basis's for judgements (see for example Lewis & Weigert, 1985; Kasperon et al., 1992; Tyler & Degoey, 1995). Among their American subjects Samuelson et al. (1984) found the extent to which fairness of distribution among group members affected the legitimacy of an allocation system depended on the source to which the inequity problem was attributed. If only a few selfish individuals are seen as the problem, as opposed to a problem inherent in the system, its structure will not be undermined. Support also depended on how individuals perceived their own restraint behaviour relative to that of others. Moral outrage at the improper conduct of others may lead to calls for change in management mechanisms[1].

In section (i) I have shown that the concept of fairness co-ordinates and legitimates different claims to natural resources (Rasinski & Tyler, 1986; Baland and Platteau, 1996). Drawing together the contributions to our understanding of fairness judgements made by social psychologists, it is clear, as Peterson (1994:9) suggests, that "*once an impression of fairness has been produced, (...)it provides a cognitively available summary judgement. People use their summary fairness judgements in lieu of a more complicated analysis of policy (...)*". This suggests that the concept of fairness is exceedingly important in mediating dissatisfaction in settings in which

[1] In Western culture, psychologists have noted that peoples' explanations for the behaviour of others tends to be dispositional, but for themselves is more situational (Bechtel, 1997:144). This is 'Attribution Theory'. In other words, when you do something, it is because of something in you, but if I do something it is usually because something beyond my control made me do it (see Bechtel, 1997).

conflicts are resolved or goods are allocated. Adams (1963), an early equity theorist, found equity to be *"such a fundamental norm that when outcomes did not meet the standard of proportionality individuals experienced 'inequity' distress, a motivational state that prompts actions to restore equity"* (quoted in Lind and Taylor, 1988:10). Lerner (1975:10) suggests that "*justice plays a central role in the well-being, if not the survival of society*" and Plato argued that the just society is the internally harmonious society (Goodwin, 1992:352). Good social relations are paramount for advancing sustainability. I will now move from an understanding of equity perceptions that has focused on the judgements of individuals, to a perspective which is more socially situated.

iii. *Social dimensions of equity: approaching the research questions and getting to a stakeholder analysis*

The aim of this section is to explore some of the social dimensions of equity that suggest how fairness norms are important in understanding the success of institutions governing resource use. This section will be brief as, to date, there is little literature that specifically addresses equity issues in this way.

A growing body of social scientists argue that environmental problems and solutions are an end product of dynamic social processes of negotiation, definition and legitimation within which (competing) interests operate and natural resources decisions are made (see Redclift & Benton, 1994; Hannigan, 1995; Gramlin and Freudenburg, 1996). This approach contends that a focus on the individual is inadequate if environmental, social and economic sustainability is to be achieved. Critically, it is argued that relationships with natural resources and the environment are shaped by the contingent cultural and normative biases that characterise social processes. Thus far, the discussion has, for the most part, ignored the question of how an alignment of particular beliefs actually come to be established. Much of the literature reviewed assumed the pre-existence of the preferences, personal values and social norms that were found to influence evaluations of fairness and act as prior attributes to behaviour. Thus, a perspective that would enrich this literature would be one that addressed social dimensions to the production of fairness norms. Such an approach to seeking an explanation of fairness concerns would focus on the mediation of equity norms within social mechanisms and relations. As O'Neil argues (1993:170): "[I]ndividual's *conceptions of their interests do not exist in a social vacuum: they presuppose particular institutional contexts*". This approach has implications for understanding sustainable natural resources use by positing

individuals as social beings, and situating their attitudes and responses to policy within their specific social and cultural contexts.

Key arguments on the nature and origin of social norms have been made by Jurgen Habermas (1984). His position is that the *ethical* both constitutes and is constituted by the particularities of social practices and mechanisms - such as 'discourses' and 'institutions'. Habermas (see White, 1995) argues that knowledges and claims become normified into culture through a process of discursive and communicative rationalisation. Discourses are systems of knowledge which codify practices and express values and, in the context of this thesis, act to reinforce or challenge cultural expectations regarding rights and obligations associated with resource use (Marsden et al, 1993). Through their participation in different discourses people come to believe that particular actions are just or unjust (Cvetkovich & Earle, 1994). Over time people take account of the consensus opinions around them, and adapt their own value structures. Furthermore, Habermas argues that an ethic emerges from codes of behaviour. Foucault (1980), too, argued that people are 'normalised' through ethical codes that have their origins in social mechanisms determining what they know and what they ought to do[1]. A belief that practice and discourse lead to an ethic rather than the reverse has profound implications for policy interventions that are seeking to 'change' values and attitudes in the name of sustainability. As Szerszynski (1991) argues, we do not change behaviour by introducing a new ethical theory which then alters discourse and then influences behaviour. Instead, practices and discourses become formalised into a moral theory for understanding our experiences. It may follow then, that just as values are practically and concretely realised in social action and organisation, so too an ethic of being concerned for justice and equity emerges from commonly held views, practices and discourses which acknowledge it as an essential concern.

Institutions themselves must be seen as normative entities, creating fairness norms and changing rationalities through their systems of action and information control. Institutional arrangements serve individuals by co-ordinating their expectations about the behaviour of others (Runge, 1984). In the 1980s a flood of literature on *common property management* examined the role local institutions in solving commons problems (see Berkes (1985), Dudley (1992) and Wade (1987) for a review). This literature attacked Hardin's *tragedy of the commons* paradigm for assuming that

[1] Foucault, as Darier (1997) argues, was critical of moralistic justifications and universally imposed prescriptions for behaviour. Instead he preferred that individuals transgress such codes and gain meaning and values through their own 'aesthetic of existence' (Foucault, 1990).

individuals have immediate economic interests which are not constrained by the community, and it showed that many communities had devised informal and successful ways to control access to resources and institute rules among users. These critics linked conservation with procedural equity issues by showing that a particular resource may be most sustainability used under the specific control of a group of users who depend upon it to meet their needs (Gobbs and Bromley, 1989; Berkes and Feeny 1990, Yan Tang, 1993)[1]. More recently, O'Neil, (1993:170) suggests that institutions act "*as a bridge between an individual as a self-maximising agent and an individual as a citizen whose behaviour is founded in the public discourse about value*". A consequence of establishing a market economy, for example, is a tendency for most people to value the sorts of traits that are conducive to its success. It gives status to the allocation of resources that maximises efficiency and utility that comes to be considered fair and proper in that context (Deutsch 1975; Gorr, 1995; O'Neil 1993). Thus, different institutions imply different understandings of fair resources allocation and management[2]. Institutions must be understood not just at the level of structure i.e. setting rules and regulations for resource allocation and management, but also in terms of how they act to normalise notions of equity and fairness.

However, according to Habermas (1984:88) action is determined not only by external conditions, but is normatively regulated and evaluated in terms of *rightness* and *legitimacy,* and guided by shared norms and values. His classification of motives of behaviour includes the extent to which actors are judging the actions of others, or are constrained by conflicting norms (see Seur, 1992). In understanding natural resource behaviour and response to policy, we must then, look not only at institutional context and structural determinants but at *normative motives* too, including the recognition by individuals of the right of an external authority to dictate their behaviour. An analysis of the problems that constrain sustainability should lie with how institutional structures come to be legitimised. A Habermasian view of legitimacy is that the degree to which there are shared expectations between regulators and regulated regarding the rationalities upon which policy is based is as critical as the

[1] These arguments endorse the participation imperative of the sustainability paradigm by advocating the need to incorporate local participation and existing local structures and mechanisms into the planning process and into natural resources management strategies be they private, communal or state based.
[2] Deutsch (1975:143) discusses how which of 3 fairness values (equity, equality and need) come to be favoured: "*Where does the legitimacy come from for different allocative systems? In co-operative relations in which economic productivity is a primary goal, equity [proportionality] rather than equality or need will be the dominant principle of distributive justice. In co-operative relations in which the fostering or maintenance of enjoyable social relations is the common goal, equality will be the dominant principle of distributive justice*".

degree of agreement over the rules of decision making (Habermas, 1973, 1976). It should follow then, that policies which contradict a community's notion of what is fair will be viewed as untenable and illegitimate. Habermas (1976) also contends that legitimacy of institutions rests on the degree to which the community deems them *worthy* and *justified*. Goode (1978:329) argues that:

> *Any substantial theory of society must explain social order and conflict. It does so through its explanations of social control, while these must focus implicitly or explicitly on whether members of a society believe its social arrangements are reasonably just. Such a focus is necessary, for that belief will affect somewhat the willingness to maintain the society, or to destroy it.*
>
> (quoted in Scherer, 1992:177 (emphasis mine))

For Giddens (1990) too, maintaining the legitimacy of institutions relies on maintaining public expectations, trust and confidence in the mechanisms by which they work[1]. Improving co-operation with natural resource management decisions and satisfaction with government decision making has been shown to be influenced by disposition to trust in authorities (Brann & Foddy, 1987; Syme & Williams, 1993; Crance & Draper, 1996). Macnaghten & Jacobs (1997:21) have recently argued that "*[b]ehavioural responses* [to policy] *depend not only on the vertical relationships for each individual between knowledge, concern and efficacy, but on the horizontal relationships between individuals and institutions*". Thus, environmental claims are legitimised, or not, when their sponsors are seen as legitimate and authoritative source of information (Hannigan, 1995)[2].

Finally, Young (1994:8) suggests that natural resource *use* is an outcome of three different decisions: i) the total amount to be distributed - the *supply* decision; ii) the principles by which it is allocated - the *distributive* decision; and iii) an individual's response to those institutional choices - the *reactive* decision. As described in section (i), equity is important as a criterion for setting the supply and allocation of resources - reflecting the predominant notions in society of distributional and procedural justice, including the nature of social and ecological well-being. Resource management involves intervention to regulate user behaviour in accordance with those provision criteria. A regulating authority will be charged with co-ordinating these decisions so that conflict and free riding are minimised. Wenz (1988:30) argues that:

> *[T]he appropriation made by each person must be co-ordinated with those of others to ensure the collective appropriation is not excessive and ruinous. So in these situations it is practical to determine each person's fair*

[1] See also Goodwin,1997.

[2] However, there has been a growing body of research highlighting the alienation of ordinary people from authoritative institutions and the erosion of public trust in government and institutions (Johnston, 1993, Macnaghten et al., 1995). Traditional assumptions that the staff of public authorities worked in the public interest have been replaced by a perception that both service providers and the public work in pursuit of their own interests (Taylor-Gooby, 1998).

> *share of the collective good in order to avoid the tragedy of the commons. Such a determination can only be made by reference to an agreed standard of justice.*

While an objective of regulation will be to avoid conflict over the allocation of scarce resources, regulation itself can be a cause of conflict. For example, equity issues and social conflict are likely to arise not only when resources are in short supply relative to the demand for them, as when there are competing claims, but also when shifting conditions challenge existing systems of property rights, or when institutions are reformed. Those who are dissatisfied may seek to change or leave the system or no longer commit themselves to a common goal (Mikula, 1980). As Wenz (1988:21) writes (emphasis mine):

> *Social solidarity and the maintenance of order require that people consider their sacrifices to be justified in relation to the sacrifices of others, environmental public polices will have to embody principles of (environmental) justice that the vast majority of people consider reasonable.*

In most cases natural resource regulations, require some degree of voluntary co-operation. Without some degree of agreement upon the principles of allocation, the co-ordinated restraint of people's actions that is required for sustainability will be difficult.

Resources management and resource conflicts are about the ways that people seek to command nature, but also about the ways that groups of people relate to and influence each other. Different actors have competing perceptions of a situation (Lynne et al., 1990; Burton, 1992; Spiertz, 1996), and it is anticipated that in the field, a range of equity beliefs and concerns will exist. Seur (1992) argues that when actors describe their own ideas, situations and decisions they do so by implicitly or explicitly comparing and contrasting their own '*life-worlds*' with those of others. An approach which encompasses these arguments, and which has recently been applied to assessments of natural resource conflict and management, and to environmental problems, is a *stakeholder* perspective (Martin ,1991; Margavio et al., 1993; Roling, 1994; Johnson et al., 1996; Papineau & Kiely, 1996; Fineman & Clarke, 1996; Krogman, 1996; Grimble & Wellard, 1997). A stakeholder (social actors with a stake in a natural resource) model is appropriate because it should allow me to map together the fairness norms of the water regulating authority and the fairness judgements of other stakeholders within a 'problem' catchment. The following direction from Ingram et al. (1984:325) confirms this reasoning:

> *Potential conflicts can be generated by those who perceive impacts as significant and are willing to take action to protect their interests (...). In approaching the analysis of current institutional arrangements* [for water availability] *the analyst should therefore pay particular attention to actors and their stakes in decision making for water allocation.*

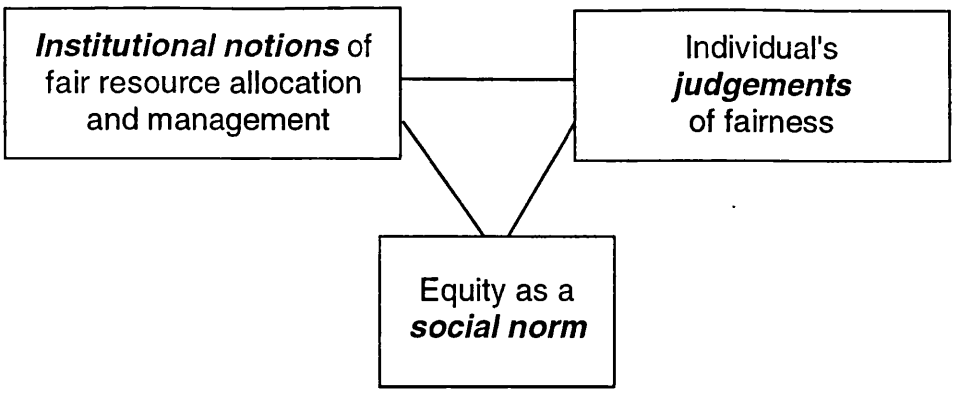


Figure 2- 2: A conceptual framework for the nature of equity

A stakeholder profiling will allow a relational and contextual investigation of fairness concerns for water, pulling together and comparing fairness perceptions and judgements among individuals, and with institutional norms.

Conclusion

From the discussion so far, a clear and significant position on understanding equity has emerged. First, equity consists of both individual's fairness judgements and social norms, and both these must be related to their institutional contexts. The conceptual framework for equity employed in this research is thus simply represented in Figure 2-2. Second, a new research agenda is suggested consisting of the following set of specific questions:

- What are the fairness concerns of the different stakeholders in a resource problem?
- To what extent do fairness beliefs influence the ways in which resources conflicts are conceptualised and framed?
- To what extent do justice and fairness have a functional and empirical role for sustainable natural resources management?
- What role do equity norms play in the legitimation and moral authority of natural resources regulation?

In Chapter Three, I assess the extent to which the questions and arguments raised in this chapter have been addressed by the existing literature on water resource management. In particular I seek an understanding of how fair *water* resources management is construed.

Chapter 3

Fair Water: linking sustainability, equity and water resources

Introduction

An increasing number of regions of the world are facing a situation where existing water resources are fully or almost fully allocated, where demand is still rising, and where the options for increasing supply are limited or the costs prohibitively high (Postel, 1992; Gleick, 1993). These conditions of water stress, and the policy solutions designed to ameliorate them, will result in one or more outcomes. First, there may be environmental degradation when habitats such as wetlands, lakes and estuaries are lost or degraded as their water is diverted for use in agriculture and other economic sectors. Second, a deterioration in water quality may occur. Third, agricultural, business and domestic users may suffer reduced security of supply and finally, social impacts may occur such as changes in economic and community structures, or reduced recreational opportunities.

Under conditions of scarcity three options are available to water resource managers: to increase the supply available; to do nothing; or to reallocate water. Managing water resources sustainably presents two sets of decisions relating to the supply and demand for water. First, criteria that set *limits to increasing supply* need to be determined. Where is the water barrier? Who is affected by not increasing supply, and what effects are fair? How are the needs of future generations to be accounted for (Brown Weiss, 1989:238)? What is the appropriate geographical unit for sustainability constraints: the river stretch or the river basin (Dubourg, 1997)? The second, concerns the criteria for determining how to *allocate* water that is available. What degree of regulation is fair and proper? What political or economic mechanisms are acceptable? Whose access to water can be fairly restricted? What is a fair geographic or sectoral distribution of the burden of necessary restrictions? As resource use nears the limits of availability, conflict over these decisions becomes more likely

Water policy is thus social as well as resource policy; it determines the viability of particular economic, social and cultural activities. The different demands on water are becoming increasingly interdependent and there is a growing appreciation of the complexity and uncertainty of the responses of physical and social resource systems.

Water management decisions involve value judgements which are taken under conditions of scientific uncertainty. There is likely to be disagreement about the severity of a problem, who is responsible and how to resolve it. The rhetoric of sustainability can exacerbate these tensions by asserting environmental claims, for example, or by introducing new resource management mechanisms (Handmer et al., 1991). The challenge to sustainable water resource management (SWRM) is to find ways of ensuring a balance between environmental, economic and social sustainability.

This chapter explores the principles and mechanisms that have been used to allocate water resources among competing claims, in order to understand what is meant by the fair allocation and management of water. An outline of the different instruments, mechanisms and approaches for managing water sustainably will concentrate on their equity assumptions and issues. The aim is to identify an approach to studying fairness and water which sits comfortably with the theoretical framework established in Chapter Two.

However, in international law there is no universally accepted definition of equity in the allocation of waters between users (Wolf & Dinar, 1994). The UN Conference on Water held in Mara del Plata in Argentina in 1977 emphasised sharing and co-operation. This was the first time, at the international level, that the concept of water development was considered as more than just an engineering issue (Lonergan & Brooks, 1994). The International Law Association provides guidelines for the sharing of a common water-way in the Helsinki rules of 1966:

> *Each basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin.*
>
> (quoted in Wolf & Dinar, 1994:79)

Eleven factors are listed which must be *taken into account* in defining 'reasonable and equitable' but the factors are not ranked. Subsequently, the International Law Commission, a body of the United Nations, identified very similar factors bearing upon equity in determining reasonable share of water. Moore (1994:377) lists these as:

- *geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character*
- *the social and economic needs of the water course States concerned*
- *the effects of the use or uses of the watercourse in one watercourse State on other watercourse States;*
- *existing and potential uses of the watercourse*
- *conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect*
- *the availability of alternatives, of corresponding value, to a particular planned or existing use.*

Wolf and Dinar (1994) in reviewing attempts to deal with increasingly intensive water use in the more than 200 international river basins, conclude that the law is generally ambiguous. They believe that equity is at the heart of water conflict and argue that many Middle Eastern disputes that have been successfully resolved have not been rights based, but based on division which has focused on needs-based equity. Moore shows (in a Palestinian-Israeli context) that taken separately, the above points lead to different divisions of water rather that converging to give one 'best' allocation outcome. In consequence he makes the point that equity criteria should not be fixed. Caponera (1992) also feels that such a flexible approach actually 'provides scope to establish justice and fairness on the basis of circumstantial factors' (1992:214).

Most published work that links equity issues with water has, until very recently, been concerned with irrigation management and governance at the local level. Geographically, the focus has been in developing countries (Chambers et al., 1989; Ascher & Healy, 1990; Moench, 1992; Tsur & Dinar, 1995; Rhodes & Sampath, 1988), and areas such as the western United States (Sherrow, 1992) and Australia (Handmer et al., 1991) where supply has long been problematic. The arguments made in this chapter are therefore frequently illustrated with reference to that literature, but I shall also show how equity issues have begun to gain salience in other geographical contexts.

This chapter is divided into 3 sections. Section one reviews ideas of SWRM. Sustainable water *management* entails the management of physical and social systems, but in this thesis I am concerned principally with the social and cultural, rather than the technological and ecological, dimensions of sustainability. Section two looks at a range of both theoretical and empirical notions of water equity found in the literature in order to identify key debates and existing interpretations of 'fair water resources management'. Finally, section three concentrates on published studies which have investigated the equity perceptions of stakeholders themselves.

I Sustainability and Water management

Since water is fundamental to life, it is in the collective interest that water is managed 'sustainably'. Every society devises rules and regulation to manage and allocate water in a way that is compatible with its goals, and to prevent conflict among competing claims. Regulation of abstraction and use is necessary because the consumption of water by one user has impacts on the environment and on the ability of other users to abstract, i.e. there is an opportunity cost to water use (Briscoe & Garn, 1995; Green,

1997b). The use or misuse of water in one location can have far reaching effects or externalities, altering downstream resources, the reliability of water flows, water quality and ecosystems. For these reasons, governments intervene in water resource allocation and management to ensure that individual or group behaviour does not conflict with societal water use preferences and ideas of fairness. There is a range of systems by which water is allocated, representing distributive and procedural norms enmeshed in both legal and cultural traditions.

Water is a scarce resource that is generally non-substitutable, and yet it has typically been treated as a 'free' resource. Impacts of water use on the environment and on other users have been insufficiently managed because of institutional failures and uncoordinated regulatory systems. Because the opportunity costs have not been accounted, water use has been inefficient. Debates concerning SWRM have focused on correcting these failures so that water is treated as a precious and valuable resource (Frederick, 1986; Golubev, 1993; Dubourg, 1993; NRA, 1994b, RSPB, 1995; Serageldin, 1995; Raskin et al., 1996). The most conspicuous debate in recent years has been over the use of economic instruments and the commodification of water (OECD, 1989; Turner & Dubourg, 1993; Winpenny, 1994; Morris, 1996; Jackson, 1996; Green, 1997a). In 1992 for example, an international conference on water and the environment held in Dublin[1] concluded that water has an economic value in all its competing uses and should be recognised as an economic good. Three further guiding principles were enunciated: (i) freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment; (ii) water development and management should be based on a participatory approach, involving all users, planners and policy makers; (iii) women should be recognised as playing a central part in the provision, management and safeguarding of water (UNEP, 1992). All four principles were endorsed at the Rio Earth Summit later in 1992 and key principles for sustainable, *integrated* water management were established as part of the Agenda 21 document (Chapter 18). Water should be managed within a 'comprehensive framework, taking into account its impact on all aspects of social and economic development' (United Nations, 1993)[2]:

> *By the year 2000 all states should have national action programmes for water management, based on catchment basins or sub basins, and efficient water use programmes. These could include integration of water and other resources planning with land use planning and development and conservation, demand management through pricing, regulation , conservation, re-use and recycling of water.*[3]

[1] "*International Conference on Water and the Environment: development issues for the 21st century*", Dublin, Ireland, 26 January 1992.

[2] Falkenmark (1993) criticises Agenda 21 for treating water as a resource separate from land and for neglecting its linkages into all aspects of environmental and social well-being.

[3] In the past decade, an integrated approach to water planning and management has been widely

The goals of SWRM have been generally conceptualised in the literature as encompassing either or all of the following principles (Rees & Williams, 1993):

- **Resource sustainability**: balancing supply and demand of water so that *use* is sustained over long periods of time i.e. so that water sources are not permanently degraded and water remains renewable (Golubev, 1993).
- **Environmental sustainability**: the retention of sufficient water within natural environmental systems to protect aquatic habitats and water dependent flora and fauna, and to maintain recreational and aesthetic value; and the consideration of the environmental impact of water management projects (Dubourg 1997).
- **Economic sustainability**: ensuring that the value of the fresh water 'capital stock' should not decline over time in order that economic development is maintained through efficient, long term use (see Turner & Dubourg, 1993).
- **Social and political sustainability**: ensuring that basic needs for water are met at a level that maintains the livelihoods of individuals as well as communities and cultures (see Gleick, 1996; Raskin et al., 1996)[1]. Participation in decision making for water resources (as part of legitimation and appropriateness) is associated with political sustainability.

However, it is the resource focus, i.e. a technical or ecosystem approach, that has dominated debates over sustainability and water (Biswas & El-Habr, 1993; Dubourg, 1993; Golubev, 1993; Raskin et al., 1996). Dubourg for example suggests that the quantity of water that can be sustainably *abstracted* from a natural water system, i.e. without depletion or environmental degradation, is dictated by the time needed for natural replenishment (Dubourg, 1997). Yet, even within the rhetoric of an integrated approach, water resources might be used in a way that ensures replenishment and environmental sustainability, and yet still be managed in a way that is politically, socially or economically unacceptable or untenable. So, the distinction between sustainable *abstraction*, *use* and *management* is important. The latter can be thought of comprising the social processes that work to secure sustainable *use* and *abstraction*: such as strategic supply decisions, allocation strategies and procedures

endorsed which recognises the intersectoral links of water management and environmental goals, and the need to co-ordinate decision making. Agenda 21 (Ch.18.8) defines *Integrated water resource management* (IRM) as '*management based on the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good*'. It also means that all water sources are recognised as being linked by the hydrological cycle, and therefore part of the same resource base. As such, management needs to occur at the level of the catchment (see OECD, 1989; Mitchell, 1990; Downs et al 1991; Goodman and Edwards, 1992; Rogers, 1993; Young et al. 1994; and Gardiner, 1995).

[1] As a generality, an annual availability of less than 1000m^3 per person is considered to be a threat to human health and well being.

as well as the direct regulation of demand and 'proper' use. These processes need to be viewed as entailing cultural, as well as legal[1], political and economic issues.

Although much attention has been given to institutions and practices that might shape water use behaviour (Frederick, 1986; Biswas, 1991; Ostrom et al., 1993; Serageldin, 1995), relatively little work has explored the value assumptions and cultural constructions within which those institutions and individuals are situated (Waterstone, 1990), and within which water problems are defined. Yet, in many situations there will be tensions between water sustainability goals because they are essentially interdependent (Rees and Williams, 1993). In addition, the response of individuals to water policy and regulation will be distorted by other regulatory forces (Williams, 1997) and cultural dynamics operating in society. In many situations then (and as I argued in Chapter Two), water conflict could be configured as a conflict between different cultural rationalities where the definition and resolution of tensions would involve normative and, in particular, equity concerns.

There is a wide range of strategies, policy interventions and allocative mechanisms for meeting future demands for water and for correcting unsustainable practices, but none is likely to satisfy all sustainability goals, and inevitably, trade-offs will be involved. As Rees & Williams (1993) argue:

> *In order to asses realistically the potential political acceptability of particular management options, it is often crucial to identify the likely winners and losers, to establish who will bear the costs and who will reap the benefits.*
>
> Rees and Williams (1993:15)

I suggested in Chapter Two that solutions to environmental and natural resources problems will be hindered - they will be culturally and politically unsustainable - if they fail to take account of equity concerns and judgements on resource behaviour and the legitimation of policy. On the basis of arguments put forward in Chapter Two, I suggest that equity issues enter into discussions about sustainable water resources management in the following ways:

i) environmental problems, water resource shortages and the benefits and costs of water use will affect different people with different severity
ii) water policies implemented in the name of sustainability will result in winners and losers
iii) distributive justice principles determine what is a fair use and allocation of water resources within society, to future generations and to the environment
iv) procedural justice principles determine what decision making and water regulation strategies are acceptable.

[1] See Caponera (1992) for a comprehensive international and historical review of the diversity of water law, regulation and management principles in different cultural traditions.

In the next section, I explore the ways in which equity and water have been linked in the literature on water management.

II Water Management Mechanisms and Equity

This section explores in more detail different interpretations of 'fairness' in water resources management by looking at the literature on a range of water management mechanisms. First, the focus is on demand management with an emphasis on the use of economic principles, as it is within this literature that equity issues have recently received most attention. I then review a range of more traditional water allocation and management mechanisms, and the principles upon which they are based.

As Roberts and Emel (1992) argue, property rights, including rights to water, are a social construction. Within this paradigm, the abstraction of water, access to water and the allocation of water to the environment can be viewed as outcomes of particular combinations of social, political and economic relations. Objectives for water management in the wider sense, thus result from a particular set of cultural beliefs and principles, including ideas of what constitutes justice and fairness.

There is a difference between absolute physical water scarcity and the extent to which water is scarce, or available, as a result of economic, political and social choices. Britain as a whole, for example, receives plentiful rainfall, but suffers periods of drought and shortage in some areas. More supply could usually be provided 'at a price'. This means that water availability is a factor of opportunity cost as well as quantity, and so is governed by social processes, as well as natural ones. Total water resources availability will thus be a function the following: (i) the amount of resources made available by the natural hydrological cycle, (ii) the degree of understanding of environmental impact and recovery, and the degree environmental degradation deemed (un)acceptable, and (iii) the availability of, or willingness of a society to forfeit the opportunity costs of, financial resources and land needed to maintain or improve storage and supply.

Traditionally, limits to water availability have been viewed as being defined by the limits of technological capability to overcome the fact that water is, naturally, either in the wrong place or in abundance at the wrong time. Over the last 200 years, the approach to water management has been to satisfy demand through engineering solutions, more collection, storage or abstraction or transportation, entailing for example dams and reservoirs, increased or relocated groundwater pumping, regional transfers, or desalination. Considerations of the benefits of these approaches

commonly ignored their environmental costs and have resulted in environmental degradation, loss of aquatic habitats through the draining of wetlands for example, and loss of amenity and aesthetic value (Parker & Penning-Rowsell, 1980:76). In developed countries where basic needs have been met, opposition to local impacts has often made engineered supply solutions socially and politically unacceptable. In terms of equity concerns, the building of dams and reservoirs often impacts negatively on vulnerable communities; for example, in developing countries, the poorest people will often suffer displacement, a reduction of base flows and/or increases in pollution in rivers vital for drinking water (Postel, 1992; Clark, 1991).

However, the rise in environmental awareness, major drought events and the growing commitment to sustainability has meant that environmental constraints are increasingly being taken into consideration in management options. Kinnersley (1994:xv), for example, writes "*by far and away the greatest change affecting water agencies and professionals since the early 1960s has been the world-wide surge in concern about the impact of human activities on the natural environment*". Winpenny (1994:2) has suggested, that a supply-based approach fosters an '*entitlement syndrome*', where requirements for water are taken as given, and supply is viewed as achievable at little opportunity cost.

Yet, even if environmental and social impacts are put aside, marginal costs of supply expansion projects still increase over time as the more suitable and easy sites are exhausted (Golubev, 1993). Thus, as a doctrine of economic rationalisation gained strength within the rhetoric of sustainability, an alternative to costly supply augmentation approaches has been required and attention has turned to other approaches for achieving a 'sustainable' water supply. These alternatives include (i) improving scientific understanding of environmental and hydrological impacts; (ii) managing demand; and (iii) improving the calculation of costs and benefits involved in water resources development and use. I will next explore how, and the extent to which, the equity implications of the latter two options have been addressed within existing literature.

i. *Demand management and economic mechanisms*

When water demand approaches existing levels of availability, a number of strategies can be implemented to reduce demand and to improve the efficiency of use or water delivery (see Winpenny 1994: Rees and Williams, 1993; Herrington, 1987). Policy options include technical improvements that reduce wastage by either: i) increasing *distributive* efficiency through improving delivery infrastructure and repairing leakage;

or ii) by increasing *productive* efficiency through recycling technologies and water saving devices in industry or the home. Incentives to bring about water conservation usually take the form of educational strategies to raise public awareness about the value of water and to heighten moral suasion, and economic incentives such as pricing or subsidies. Direct regulation, such as legal efficiency requirements, restrictions or quotas on usage, is also an option particularly during times of water crisis[1]. A further approach to demand management is to increase allocative efficiency; that is maximising aggregate utility by *reallocating* water, to uses with a higher economic return. The use of economic mechanisms has generated most debate in terms of equity concerns.

Economic mechanisms . Economic approaches have been prominent in water resource sustainability debates in recent years, and a growing theoretical and empirical literature over the last decade has put forward arguments in favour of economic mechanisms for water management (Gibbons, 1986; OECD, 1987; Postel, 1992; DoE, 1992a and b; Rosegrant & Binswanger, 1994; Winpenny, 1994; NRA, 1995; RSPB, 1995; Lee & Jouralev, 1997). Treating water as an economic good is a way of improving supply decisions or improving allocation, and involves a range of approaches with varying degrees of private ownership, government regulation, pricing and trading in the domestic, agricultural and industrial sectors.

Using economic principles as the criterion for water allocation or resource planning decisions requires that a value is placed on water so that its opportunity cost can be calculated in use and *in situ.* Values and 'incentive prices' can be calculated by economists through, for example, 'willingness to pay' evaluations (Green, 1997b, Bate & Dubourg, 1997). This enables a cost/benefit analysis of supply decisions, or more economically informed allocation of abstraction licenses (see Bate & Dubourg, 1997). The incentive pricing of water can be used by governing authorities as a tool for specific allocation and conservation objectives, as well the regulation of use behaviour. This involves charging for abstraction rights or for water supply at a level that would prove an influence on water demand in a way that meets social and economic objectives (Streeter, 1995; Chalker, 1996). Alternatively, in a competitive economy, the value of water might be established by a market mechanism whereby water, or water permits, become tradable (Colby & Bush, 1987; Streeter, 1997). In this

[1] I am not aware of any other published literature on the equity implications of restricting supply development in the name of environmental and economic sustainability. In the UK, embargoes on new abstraction have only been very recent, although on constraints on availability have been felt during drought periods (see Chapters Five and Six below). Of course, in the context of developing countries, a lack of water supply in both urban and rural areas has always disproportionately affected the most disadvantage social groups (World Bank, 1993:31; Swyngedouw, 1995).

way, water becomes an economic commodity so that 'deserve' for water is related to utility gain (Winpenny, 1994).

In the domestic supply sector, incentive pricing has been widely advocated as the solution to water availability problems. The metering of domestic households was found by the OECD (1987), and also by later trials in the UK (WSA et al., 1993) to reduce demand by 10-30%. In terms of advancing sustainability, metering has a greater impact on peak demands in the summer when there is most stress on resources (Binnie, 1992). It is this peak demand that generally determines the necessity for new supply capacity. Millerd (1984) argues that peak period charging is efficient and equitable, because it is those pressurising the system capacity who are charged for it[1]. In the rural sector, Tsur and Dinar (1995) argue that pricing schemes, when combined with equal water quota rules, rather than allocations proportional to land size, can reduce income inequality. The World Bank, through its publications and lending practices, has been implementing a policy prescription of incentives for greater use of water pricing and markets (alongside protection of aquatic systems and the establishment of user participation practices) (World Bank, 1993,1994; Serageldin, 1995).

Economists argue that markets enhance society's interest through the higher aggregate welfare associated with increases in efficiency that arise when water resources are moved from lower to higher-valued uses. Trading within or across sectors can be also argued for (within the available capacity of a catchment or aquifer) on the grounds of reduced administration, information and implementation costs associated with regulatory agencies (Rosegrant and Binswanger, 1994). Who gets how much water is determined via voluntary transactions, thus releasing government from responsibility for distributional consequences. The ability to sell a water abstraction right as a discreet asset to the highest bidder for another use might be considered fair on the grounds of the flexibility it offers both users and society. Users can change the nature and place of water use, and society benefits from its allocation to the most productive use (Freyfogle, 1986). Also, the rights of existing permit holders are not detrimentally affected, while 'juniors'[2] are given the opportunity of access to water that they would otherwise not have (see Rosengrant & Binswanger, 1994). Finally, when opportunity costs and externalities are fully incorporated,

[1] Also in this sector, the UK introduced a model of privatisation of the water industry in 1989 which has been promoted during the 1990s. It is however, the French model of the private management of public assets that is reported as being most favoured by other countries, and by the World Bank, mainly because of the complicated regulatory regime that the UK model requires (DAG, 1995; Bruggink, 1992).
[2] A term used to describe a 'new' abstractor in a system where prior applicants (seniors) have priority.

economic instruments might also be considered as equitable according to a 'user pays' or 'polluter pays' principle.

Examples of water trading can be found in different parts of the world. The trading of water is particularly well established in the western United States, where it is usually referred to as the 'transfer of water rights' (Anderson, 1983b; Sherrow, 1992; Dudley, 1992; Howitt, 1994; Israel and Lund, 1995; Klein-Robbenhaar, 1996). Water has been reallocated mainly from agriculture to industry or municipal use and, although traded may still continue to be state owned. Transfers may be permanent or on a rental basis (Howe et al.1986). Anderson (1983a) argues strongly that water demand is price elastic in the United States; that pricing mechanisms are the only solution to the 'water crisis', and that markets will '*yield a more efficient and equitable allocation of water in the context of a free society*' (1983:3). In Australia, transferable water entitlements in agriculture established in the 1980s have begun to show efficiency gains (see Synnott, 1991), with unused allocations, and the allocations of farmers in financial difficulty, entering the market first (Björnlund and McKay, 1995 in Merrett, 1997). In Chile, Gazmuri et al. (1996) found that markets in tradable water have fostered efficient use of water and given farmers a greater flexibility. In terms of equity, public resources have been freed up and targeted at the provision of subsidies for poor urban users and small farmers. In India, Shah (1993) shows that in areas where groundwater is the main source, competitive water markets have produced the best equity outcomes in terms of rural income distribution. Often, the poorer inefficient farmers have more to gain by selling water than using it.

The 'equity limitations' of economic mechanisms. Economic approaches to water allocation and management have been subject to criticisms on both normative and practical grounds (Frey, 1992; Sherrow, 1992; Taylor, 1994; Institute of Fiscal Studies, 1993; Klein-Robbenhaar, 1996; Howe, 1996). The normative constraints of efficiency goals have been mentioned in the previous chapter where I argued that the assumptions upon which neo-classical economics is founded and the methods that environmental economists employ for valuing nature, reveal an inadequate understanding of what motivates resource behaviour, and judgements of and responses to policy. In particular, the neo-classical approach assumes that individuals approach choices about public and collective goods in the same way as for private goods. But construing water as a commodity and using economic instruments to determine environmental costs is antagonistic to many cultural expectations regarding water use and management. As Rees and Williams (1993:57) write, a pure pricing scenario is :

> *unlikely to prove politically acceptable. It has important equity implications and many environmentalists may argue that it would be ethically inappropriate to let the market alone determine whether rivers and dependent ecological resources should survive.*

At a more practical level, there are doubts that economic mechanisms would be successful in limiting demand. For example, Rees et al. (1993) found in a study of the use value of water resources that in the UK short term demand changes would be slight, even at high price levels, for many types of abstraction (see also Malla and Gopalakrishnan (1995) on similar findings in Hawaii). Rees et al found that reasons for little change in use or demand for abstraction rights were both practical and behavioural. They included existing large capital investment, slow equipment renewal times, investment constraints, unwillingness to change established practices, avoiding risks associated with future shortage or policy changes, and monopoly users simply passing costs on to customers. However, the study did suggest that in the longer term, full cost charges would shift water use behaviour and, in particular, could work to change attitudes and raise water issues up the political agenda[1].

Equity and pricing have been of concern in the domestic supply sector in the UK. Charges have traditionally been linked to the size of the user's house and averaged into particular size categories (Jackson, 1996). This is inequitable in the sense that within any one category, low users pay the same as high users (Taylor, 1994). A transfer to volumetric pricing may be considered the fairest way of allocating water, as bills then reflect consumption, but the introduction of new charging systems, whether for reasons of economic efficiency or for water conservation targets, affect different categories of customers in different ways. In the domestic metering situation in the UK those most adversely affected by higher charges are the already worse-off households (Institute of Fiscal Studies, 1993)[2]. Under a pure market mechanism with marginal cost pricing, charging would not only accord with volume consumed, but also with local water availability influences such as the type of supply source, environmental conditions, time or season of use and location of use (Dinar et al., 1997). Those who cannot afford to pay would be excluded.

Markets are equity neutral, that is they do not consider what is a desirable

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[1] Additional barriers to the trading of water permits include the need to safeguard third party interests and local source replenishment, to differentiate between the effect of consumptive uses (irrigation) and non-consumptive uses, the impact of awakening 'sleeper' licenses i.e. those which were issued but unused, as well as the local socio-economic side effects of large scale or permanent transfers (see Rees and Williams, 1993:61).

[2] Special tariffs have been established for special categories of consumer such as low income households in Belgium, for example (CPRE, 1991). Alternatively, general tariff structures are possible that include a free or low cost tranche to cover basic social need which is considered as a merit good that everyone should have by right. Thirdly, it would be possible to keep a high volumetric incentive and address equity issues through a very low 'standing' charge (see Hills et al., 1997).

distribution of the costs and benefits that arise through the exploitation or trading of natural resources. When neo-classical economic analysis does address equity, the concept is related to the distribution of income or costs, whereas in everyday use equity is a richer and more diverse concept. A value judgement implicit within the use of economic mechanisms is that economic efficiency should be deemed more important than the resolution of the unequal distribution of any burdens between different sectors of society, between different generations or different countries. For neo-classical economists, the notion of efficiency translates as 'sustainability at least cost' where the costs that count are monetary (Turner and Dubourg, 1993). However, economic efficiency will rarely be the only objective for water resource allocation policy (Green, 1997b), and allocating water according to economic efficiency may have social, cultural or environmental externalities that are judged as unfair or unacceptable. Sustainability requires 'least cost' for many other, non-monetary, values. As an example, Rees and Williams (1993) suggest that to shift water within the agriculture sector to uses with the highest values would be likely to favour the most intensive farming techniques, exacerbating pollution problems associated with pesticide and fertiliser use, and resulting in unsustainability in long term. Frey (1992:409) argues that the use of tradable permits can 'crowd out environmental ethics'. Individuals feel that their moral stance (an 'intrinsic motivation') is unnecessary when they are induced by a price system (an 'extrinsic behavioural motivation'). He argues that the application of regulations on the other hand, "*gives a signal that the environment is to be protected and that it is commendable to have environmental ethics*" (ibid:409).

Much literature on water markets in the United States addresses equity in the context of these antagonisms (Klein-Robbenhaar, 1996; Howe, 1996). Sherrow (1992) for example, describes a comprehensive study of transfers which reveals a wide range of third party effects, including social, political and environmental impacts, not measured in economic terms but which must be taken into account to ensure that transfers balance efficiency and fairness. Sherrow, recognising a *'clash among values'* concluded that "*governments must work to give third parties a more effective voice in the water transfer decision making process. (...) The recognition that third party interests are legitimate is a first step toward this accommodation*" (1992:14). Grant (1983) describes a situation where a judicial court in Oregon asserted that economic efficiency was not to be the only goal for water policy. The example was one whereby upstream 'junior' appropriators argued that they should be allowed to divert water to the detriment of downstream 'senior' appropriators because they could

use it for greater benefit to more people with less waste. The argument they made was that existing rights were protecting low value users from market forces and economic progress was being blocked. The court rejected this argument with the comment that "*equity does not consist in taking the property of a few for the benefit of the many, even though the general average benefits would be greater*" (quoted in Grant, 1983:55). This example illustrates how tensions and conflicts arise and the legitimacy of existing management mechanisms are challenged as pressure on water resources increases.

According to Klein-Robbenhaar (1996), sixteen of eighteen western states in the USA incorporate a public interest review of water transfers and new appropriations that include such factors as customary rules and regulations, as well as environmental sustainability. This represents an unease at giving the market exclusive control at the same time as an unwillingness to accept the inefficient use of water. Freyfogle (1986) suggests, that in times of drought, equitable cutbacks in use across all users would be difficult contractually to implement within a market system, and in arid areas, society might need to purchase water rights from private owners for community use which would be socially undesirable. Cummings & Nercissiantz (1992:733) write that "*there is growing evidence that water law in western states is becoming increasingly influenced by considerations related to equity or, more generally, to the idea that water has communal value*". The idea is that any transfer of rights must be subject to close scrutiny by representatives of the general public. Klein-Robbenhaar (1996) recommends that a 'public welfare impact statement', similar to 'environment impact statements', be submitted on transfer applications..

A study of irrigation systems by Maass and Anderson (1978) showed that in Utah, USA, 'efficient' management has been more associated with conflict control and the attainment of social justice than with economic growth. They found that social attitudes in Utah forbid free markets in water. Similarly, their study in Murcia, Spain identified similar attitudes: "*to separate the land and water may be more efficient but it paralyses agricultural development by promoting great antagonisms among water users*" (Diaz Cassou quoted in Maass and Anderson, 1978:5).

Government intervention and legislative action is often required to create the necessary conditions. One such necessity is the formalising or redefining of property rights. The allocation of these rights may worsen inequity unless for example, existing *de facto* rights are already reasonably equitably distributed. Freyfogle (1986) points out that the windfall which senior users in the USA would experience if markets were

introduced and their water rights suddenly became valuable, prejudices junior users unfairly. Chatterton & Chatterton (1995:1) argue the same point in their discussion of the 'closure'[1] of water resources in Australia:

> *It is unfair that a single generation of farmers who happened to be owners of irrigated land should receive a capital bonus. The previous generation received nothing because the resource was open, and the next generation will receive little or nothing because they must first pay the present generation.*

Markets, and private ownership are grounded in the idea that a good is the property of an individual which they have the right to dispose of as they see fit,i.e. private property. Yet a central aspect of sustainability is the notion of the environment as a common good because of the collective implications of its well-being. Decisions over how resources are viewed, used and treated, necessarily extend beyond self interest towards stewardship and long term sustainability (Green, 1997b). In England, Tunstall et al. (1993) for example, found that the willingness to pay for water services were influenced by moral and ethical principles, as well as attitudes to water service companies. Varner (1994) has argued that it makes no sense to hold a narrow economic view of land; rather it must be treated as a public resource owed in common because the ecological effects of its use go beyond the individual user. The same might be argued for water resources.

To summarise the argument made so far, the sustainable management of water resources does require a shift away from the notion that water is a free good and economic instruments can make an important contribution, particularly where supply enhancement is unfeasible and technical efficiency is already high. Lee Brown (1997) differentiates between objections to 'water as an economic good', and 'water as a commodity' *'devoid of religious, cultural and aesthetic values'* (1997:3). An economic good is one which is scarce relative to the uses to which it is put, and therefore water has been recognised as such a good *'by every civilisation that encountered a scarcity of it'*. Some cultures, he describes, imposed penalties for failing to respect water that are far harsher than monetary losses. He argues that cultural objections to market concepts are based on the imposition of a status upon water that challenges the non-monetary value that it has to a community. He writes: "*if a large majority of a particular society subscribes to values that detest the notion of water as a commodity, then one or another of the legs of the policy platform will buckle under the weight of implementation placed upon it*" (Lee Brown 1997:3). People value water more than the use they can make of it. The use of economic instruments needs to be bounded

[1] A term referring to a declaration that no new supplies are available.

by social objectives and expectations, cultural attitudes and normative values which are not accurately captured through markets but which, in practice, delimit water use and management.

In the next section, I look at traditional alternatives to the use of economic principles as criteria for determining water allocation and management practices. My aim is to identify further 'constructions' of equity within water resource issues.

ii. *Alternative allocation and management mechanisms*

Traditionally, markets in water have not been the norm. Water, or water rights, have not typically been allocated on the principle of economic efficiency or utility gain. Nor has charging for water typically been carried out according to marginal cost pricing. In most societies and cultures water has been thought of as a *public good*; one where the provision of the good to one person results in a loss of its availability to others. Often it is also understood as a *collective* good; something an individual cannot provide a supply for on their own (Dinar et al 1997; Green, 1997a). Water has usually, therefore, been managed as a common property resource, in the public sector, and based on co-operation among individuals. Methods for sharing water and managing abstraction, and for deciding who gets what share and why, have involved a variety of institutional arrangements, mechanisms and direct regulation reflecting different social and cultural criteria (Teerink and Nakashima, 1993)[1]. Water rights have generally been based on *riparian rights, prior* rights, or *public* or *state* allocation. Riparian rights allocate water according to rights associated with land ownership, whilst prior rights are either based on capture or on acquisition through actual use over time. Public or state allocation is associated with the public good characteristic of water.

Regulatory frameworks exist to balance the interests of individuals with those of the rest of the user community and/or with the goals of the wider society. Allocation and management criteria may be *outcome driven*: concerned with how the resource is to be used; the consequences of its use; the needs it meets; or the economic or other benefits it brings to either communities or economic sectors. Water rights may be *subject to conditions* of place, use, or co-operation with regulations. They may be allocated in perpetuity, or with a time-limit . Allocation criteria may be *procedurally driven* according to fair processes of governance, management and implementation. Finally, the governance of water resources can vary from state controlled ownership

[1] Frederiksen (1992) distinguishes between water rights, allocation objectives and allocation mechanisms. Often "*allocation mechanisms are proposed without a clear statement of national allocation objectives or an understanding of how the mechanisms effect national objectives. And water rights are formulated without deciding which combination of allocation mechanisms to adopt*" (ibid:7).

and regulation, to common property management by user associations.

The intention of this section is not a full review of options for the management of water resources, but to illustrate the nature of some of the equity principles which they represent or present. I discuss five management themes here; abstraction permits, allocation for social objectives, irrigation schemes, procedural issues, and community water management. The majority of literature on water resources management deals with irrigation. This is because world-wide consumption of irrigation water accounts for about two thirds of the total withdrawn and 80% of total water consumed by humankind (Frederiksen, 1992). The sustainable management of irrigation water is therefore significant to achieving sustainability objectives in other sectors and for aquatic ecosystems.

Water abstraction permits. Government permit systems are used to protect the rights of 'seniors' or the rights of downstream abstractors. Private rights are usually only usufructuary in nature because water is considered a public resource in most cultures. Abstraction permits typically do not, therefore, grant title to the water itself but only the right to abstract and use it (Grant, 1981) . As well as restrictions on abstraction to protect existing users, imposed by direct regulations such as quotas, abstraction rates and seasonal restrictions, environmental concerns may be introduced. Permits are then bounded by the impact of abstraction on the aquatic environment, as well as on other abstractors. This represents a public allocation to environmental need. Other normative values might constrain the allocation of a permit, such as the necessity for water abstracted to be put to 'reasonable' use, as with licensing in England and Wales.

As well as allocation issues, permits require decisions over charging regimes and a wide variety of charging schemes may be found (see OECD, 1989:85). Abstraction charges may aim simply to recover the costs of administering regulation, or the operating costs of an irrigation scheme. The OECD study (1989) found that in some countries (e.g. Australia, Belgium, Canada, Italy, Japan and Portugal), general income redistribution goals were incorporated into water abstraction charging systems to foster development in agriculture and industrial sectors; to lighten charges in isolated communities; and to assist low-income households. Pricing of permits may be employed as a conservation incentive, or to promote greater economic efficiency. Charges may be, but rarely are, applied that mirror the market value of water (calculated through a willingness to pay approach, for example). Charges may reflect *actual* quantities abstracted, or reflect quantities of water *authorised* to be abstracted

(a flat rate fee as in the UK) which makes it more difficult for authorities to effect use behaviour when conditions change and depletion problems occur, such as during drought periods.

Within a first-come-first-served system for allocating permits to abstract, water goes to the first user rather than explicitly to the most deserving, efficient or socially beneficial users. This 'doctrine of priority' is explained by Grant (1983:58) as sanctioning the collective benefit to society of ensuring security of investment by individuals, and rewarding pioneerism. It also represents two principles of fairness; a belief in entitlement to the product of one's own labour, and in rights acquired by 'finding and developing'[1]. Freyfogle (1986) argues that this system ranks poorly in distributive fairness.

Where abstraction permits are granted *in perpetuity*, the inflexibility towards society's changing values introduces an element of unfairness. As mentioned above, a tension is created between protection of prior rights and the goal of economic efficiency when junior abstractors, who would generate more utility but impact on the abstraction of seniors, are denied the resource. Freyfogle (1986) argues that a fair system is one which, because standards are value based, is changeable overtime with water availability. When historical, first-come-first-served rule of allocation were established, alternative sources of water are likely to have existed. When this is no longer the case the system becomes unfair. However, changing established rights is often politically difficult. Freyfogle's assessment of water fairness for any licensing scheme involves a balance between the security offered to users and the need for social flexibility. Society as a whole and users require flexibility; the former in the freedom to reassign of water to new uses and the latter in their ability to accommodate changes in water using activities. Users need security and predictability in the quantity and quality of their water flows, and society needs a system that is free of lengthy, expensive disputes. It is in these terms that Freyfogle proposes the fairness of any water allocation system be judged. As an alternative to a system of *rights*, Freyfogle (1980) suggests a water-*'wrongs'* model of regulation. This would set out, not what a user can do, but what they should avoid doing according to socially defined limits for permissible conduct, minimum standards of fairness and respect for equal entitlements of others. For Herrington (1997) however, this would be undesirable: *"homogenous regulations bear upon increasingly heterogeneous water uses inequitably in that they allow little or no scope for the preferences of the*

[1] See Nozick's argument mentioned in Chapter 2.

individual water-using economic agent to be expressed" (1997:264).

Allocating for social goals. As well as protection of the rights of existing abstractors or the prevention of environmental degradation, water may be allocated and regulated as a means to achieve particular social goals. For example, a government may use access to water for wealth or income distribution effects. One objective pursued through water allocation may be the protection of particular economic sectors, livelihoods or regions representing a judgement about their value to society which transcends a market place pricing of water. Lord (1990) pursues this point, defining equity as being when "*all potential impacts upon all potentially affected parties*" are given full consideration in deciding water management policies and options. He criticises Arizonian water policy (ibid:42) for prioritising both the present needs of town dwellers above the well-being of rural residents, and groundwater with more economic value over the protection of lakes. Grant (1983), on the other hand, shows that some water laws in the USA do favour and protect small family farms even though larger corporate farmers are more economically efficient. He also recounts water transfer situations where the agrarian way of life has been protected against potential municipal or industrial users.

Typically, it is domestic water use that receives statutory preference (be it manifest through subsidies or preferential drought treatment); rooted in the ethic that water is a necessity that should be available to all, and that its domestic use is a public good (e.g. individual use confers health benefits for example, to other members of society).

Finally, a notable example of government pursuing national objectives through water management is that in South Africa which has embraced social justice as an key element in its new water strategy (see Asmal, 1996; Republic of South Africa, 1996[1]). The new slogan for water governance is '*some for all, for ever*', and the new water policy embodies new national values rather than entrenched property rights. Water is being used to bridge the gulf between white and black farmers, wealthy suburbs and areas without potable supplies, and to support different economic sectors. The aim is all inclusive and new democratic processes have been put in place; allocation will be for equitable and sustainable economic and social development.

Equity and irrigation schemes. Most discussion of equity, or rather inequity, issues and water is to be found in the irrigation literature on developing countries (Moench,

[1] See also FT Global Water Report, 8 May 1997, Issue 22, p12, and web site: www.polity.org.za/water/policy

1992; Chambers, 1984; Rao, 1984). Central to these concerns are issues of socio-economic equity, evaluated in terms of the distribution of income generated by accessing water according to different criteria such as, location relative to a distribution point, early membership of an irrigation scheme, proportional to land area or to highest yielding crops (see Rhodes and Sampath, 1988). Farmers at the tail-end of a scheme are notoriously disadvantaged (Rao, 1984). For example, research in Sri Lanka (Chambers,1984) has shown concentrations of wealth, influence, tractors and services in the head reaches, and elements of poverty at the tails extending even to teacher-pupil ratios in the schools. Allocating water proportionately to land area is generally considered as one way of dealing with this basic inequity. However Chambers (1984) argues that this strategy is based on existing inequities of land distribution and therefore results in a reinforcement of existing inequality. He describes alternative models in India where water resources are allocated equally to all households, including the landless. Disparity is also found between farmers within, and those outside, an irrigation command area. The latter group encounter reduced competitiveness while the former experience a cycle of enhanced ability as yields increase, their land gains in value and they are able to secure access to credit (Chambers, 1984). Inequity is also discussed in the literature in terms of those worse-off being made even more worse-off for the sake of productivity gains. For example, Ascher and Healy (1990) discuss the trade-offs between a concern with the distribution of benefits only within a local production area, and the aggregate gain for society as a whole which results from an emphasis on increasing overall economic return.

Two studies on irrigation have recognised a tension between resource sustainability and equity. Chambers (1984) describes a situation in Tamel Nadu where over extraction during normal years leads to a lowering of the water table. This is offset by gains in recharge in years of heavy rainfall. Over the long term, this might lead to increases in total production, but does not serve equity to the extent that smaller and poorer farmers are unable to afford to deepen their wells or use lift technology (to 'chase the water table'). For many large farmers then, a drought year may turn into a boon year, especially as their ability to enter collective arrangements is less limited than that of the poor and they can afford risks to attempt striking new water. Moench (1992) also argues that the less wealthy are disadvantaged as they generally lack representation in government organisations whereas the influential sections of society are often able to bypass water regulation. As the need for efficiency and use reductions increasingly necessitates limiting access or use

patterns, the tendency towards inequity increases. Moench (1992) concludes that the balance between resource sustainability and equity goals needs more examination.

Procedural equity. Within any resources management situation, there are many questions about representation - not least, which socio-economic groups should be involved in decision making; when and how should they be consulted? Procedural fairness issues focus attention on the policy making process itself, as well as the implications of policy implementation. As Vincent (1994) argues:

> *Many water planners have emphasised the need for better forums of negotiation over water rights within catchments. Such forums need to give all users in the catchment a voice, and allow the survival needs of all groups to be considered.* (1994:319)
>
> *The critical problem may be inadequate political power to ensure water rights, both within a group and within a catchment. It is the issues of transaction costs and negotiation opportunities for all irrigators, not simply their relative poverty or financial liquidity, which should concern policy makers* (1994:321)

Her points are exemplified in the comparative study by Maass and Anderson (1978). These researchers found that equity in the irrigation systems they investigated in Spain and the United States was construed not only from the point of view of rights to water, i.e. *distributive* justice, but also in terms of the objectives, decision processes and operational practices of the governing organisation charged with managing the resource, that is *procedural* justice. The prime objective for the governance of many of the irrigation communities in both countries was the resolution of conflicts, along with the realisation of social justice and equity. The 'justice' of the institutions governing water was related to a balance of popular control, distributive shares, economic growth and the farmers' concepts of fairness. In Spain, for example each landowner had one vote to elect a member of a general assembly which proposed new water regulations, taxes to be levied for canal construction, and how water was to be allocated. A water court of elected members was charged with any judicial matters, such as the breaking of those regulations.

Maass and Anderson (1978) found that, as a direct objective, equity meant avoiding unreasonable inequality in the treatment of individuals in the same situation, in other words, superseding economic notions of equity. The researchers found that a community might introduce considerable complexity into an otherwise simple procedure in order to avoid unfair inconvenience; not always delivering water at night to the same farmers, for example. During drought and shortage, some communities adopted different principles of allocating water. For example, water was denied to farmers in proportion to normal consumption, or according to the order that land came

under irrigation; or the quantity of water allowed was proportional to the needs of crops. Maass and Anderson (1978) conclude that, generally, the irrigators in their studies of the United States and Spain traditionally believed that stability was achieved by respecting seniority, and that rewarding merit and hard work were more important than distributive outcomes. Most of the operating systems studied had evolved to minimise centralised power and to maximise popular participation. The fairness of water governance was measured in terms of the extent to which the community members were satisfied with their participation and the effectiveness of the systems for dealing with conflicts.

A further interesting example of participatory water management is found with the French river basin agencies. They are governed by 'water parliaments' which are representative of the major stakeholders in a catchment (Briscoe, 1993). The committees of up to 110 persons are the centre for planning, negotiating and policy making. According to Briscoe (1993) there are three central features of the French model: non-interference in the functioning of municipalities; broad, consensual decision making, and the use of economic instruments.

Community water management. The practice of involving users more directly in the processes of water system design and management has received increasing prominence over the past two decades as a way of facilitating increased co-operation in long term and 'collective good' strategies (World Bank, 1993). Attention has been paid to the successful management of water as common property as an alternative to private ownership or a state control solution to the open access 'tragedy of the commons' argument. Ostrom (1990) in particular, has studied the evolution of institutions to encourage community development of operational rules for irrigation management (see also Yan Tang, 1993; Cruz, 1989, Somma, 1994). The findings of these studies indicate that effectiveness of user-based management depends on the strengths of local norms and the existence of 'collective action' institutions with authority to make decisions on water rights rather than issues of property rights. Such institutions have advantages of response to local needs and high levels of co-operation. But they are also limited first by the large capital investments required, and second by the high transaction cost of allocating water over large areas which means that intersectoral or regional level transfers are generally not feasible (see Dinar et al., 1997). In the UK, interest is growing in water sharing initiatives. For example, in England a group of farmers have formed a company to jointly invest in the capital costs of a local water transfer by pipe (*Farmers Weekly*, 1 March 1996:61).

Other farmers have explored ways of pooling their licenses to increase flexibility and security of supply (Smith, 1995). Likewise, in Australia, 'capacity sharing' has been used as method for improving allocative efficiency within a group of users who have joint rights to water flows and their own small independently managed reservoir (Dudley, 1992).

Limitations to regulatory approaches. Like economic mechanisms, government regulation and management of water resources have their critics. Regulators approaches are generally criticised for fragmented public sector management that neglects the interdependencies between sectors; neglect of financial accountability; poor user participation; and neglect of water quality, health and environmental externalities (World Bank, 1993). Regulatory systems often fail to create incentives for water users to improve use efficiency. There are mounting costs of developing new sources of water and problems with quality of monitoring and enforcement by regulatory services (Dinar et al., 1997). More regulations require more information gathering and more policing, especially as resources reach their limits. As with economic mechanisms, state or user managed systems also face the challenge of sufficiently incorporating direct use, indirect use and intrinsic values of water resources. Regulatory approaches also have difficulties in developing mechanisms that are socially and culturally sustainable, as well as successfully protecting the supply/demand balance and environmental systems.

The studies reviewed in this section have illustrated how different elements of fairness are embedded in different water management systems. It would also be true to say that it is the norm for discussions of equity to be based upon academic and expert understandings of equity, and that analysis is typically directed at an institutional level. Very few studies have approached an analysis of equity according to the theoretical framework set out in Chapter Two which advocated an investigation of the views of stakeholders themselves. I will now turn to these studies in the final section of this chapter.

III Stakeholders' Perceptions of Equity: an emerging research agenda

As yet, there is little published work to show how the concept of equity is manifest in everyday water resource situations and decision making, and the role that these cultural rationalities play in understanding and defining water problems and conflicts. In this section, I will discuss the few published studies which help inform such an

approach.

I have already presented findings from Maass and Andersons' (1978) study. Their methodology included an examination of legislative history, rules and regulations, enriched by analysis of records of controversies between the communities and outside groups (1978:7). Burton (1992), in a study of drought in California interviewed many stakeholders at all levels of water management and use in an investigation of disputes over water allocation. This is a useful approach for looking at social constructions of equity within an institutional and social context. Hoban, too, confirms that:

> *...area(s) for future research should include the dynamics of controversy and conflicts that arise over water resources management decisions. Such decisions are made in complex political, social and economic contexts.*
>
> Hoban (1990:63)

Attention has recently been given to the need for an integrated resources management approach to address conflict resolution and decision making in a way that allows normative values to be articulated (Dorcey, 1987; Martin, 1991; Watson et al., 1996; Cameron, 1997). Public participation it is argued, should be incorporated into decisions at a normative level, i.e. what *ought to be done*, as much as at the strategic level (*what can be done*) and the operational level (*what will be done*). Dorcey (1987) for example, argues that market, judicial and political mechanisms alone are inadequate for resolving resource conflicts, and that more attention should be given to improving the bargaining and negotiation skills of participants in decision making. Martin (1991) takes this further with his concept of a 'communicative catchment' within which resource, and environmental problems should be managed. He argues that the basis of conflict are people's perceptions of environmental changes and different world views, so that the basis of catchment management should be '*critically normative*' knowledge rather than '*objectively validated*' knowledge.

It is surprising that despite the important social consequences of water policy, community attitudes towards water management should have received so little attention. The only notable body of research to focus on the fairness perceptions of individuals and communities regarding water management is that in social psychology. As early as 1977, Harris suggested that *'human factors'* needed to be incorporated into water resources planning along with technical and economic criteria (Harris, 1977). He identified 42 so called 'human factors' which he grouped as *'the natural beauty of bodies of water, public access to lakes and rivers'*, *'fair allocation and conservation of water'* and *'quality of drinking water'*. In 1979, Pierce related

community values to priorities for water allocation (Pierce, 1979), showing that adherence to a value labelled as 'world of beauty' lead to a prioritisation of water for environmental preservation. In contrast a 'comfortable life' value connected with a negative attitude towards conservation. Following these early studies however, research into public perceptions of water seem to dry up. A recent revival has been led by researchers in the USA and Australia. I begin with three examples of North American studies.

Lynne and colleagues (1990) assess individuals' divergent water attitudes and beliefs to develop an index for measuring the potential for conflict over water in Florida. They drew on informal interviews, a review of regulations and rules, and media accounts of conflicts to compliment their attitude and belief survey of scarcity, outcome and procedural issues. The researchers' focus was to *'understand and explain individual behaviour, but while recognising group context'* and institutional setting (p670). They found that fairness judgements of the regulatory authority were positive and so were not contributing to conflict. Rather, significant tensions were found between the attitudes and beliefs of rural and urban populations, particularly regarding the allocation of water specifically for economic growth. In a later study in Florida (Lynne et al, 1995), farmers' investment decisions were shown to be influenced by community norms for water conservation behaviour. The researchers proposed that a balance needed to be found between attempts to tighten government control of water resources, and the use of moral suasion and economic incentives. As perceived control and actual control both affect the decisions of farmers to adopt and invest in conservation technology, the research concluded that coercive control by government can be counter productive.

Lant and Sim (1993) measured and compared the social acceptability and effectiveness of 111 possible water conservation measures among urban populations in Arizona and Illinois. A questionnaire survey assessed attitudes to the conservation measures and people's intended response to them. They identified not only a behavioural resistance to change, but five social ideologies in American culture that characterised acceptability of water conservation measures. These were *fairness and equity*, *freedom from government control*, *lifestyle entitlements*, *environmentalism*, and *economy* and *effectiveness*. Conservation measures which, to different degrees violated the behavioural norms and values held by the community were met with different levels of public co-operation. Specifically, the equity concerns were found to be 'horizontal', i.e. a belief that conservation practice must fall on everyone's shoulders and be enforced equally. The possibility of a minority being able to ignore

voluntary restrictions undermined the otherwise co-operative spirit of others who felt that restrictions were necessary. There was also a 'vertical equity' concern . This meant that domestic water users were concerned that conservation measures should also be directed at business, industry and government. The perception that these institutions were not doing their fair share to conserve water was an important consideration in winning co-operation from members of the public. Increases in prices were found to be very unpopular as a demand management tool if they were not a reflection of real supply cost increases. There was also an altruistic concern that the poorest should not be denied access through price mechanisms. In this study, Lant and Sim conclude that the "*key to designing water conservation initiatives that are widely adopted and supported is to use these ideologies and principle as a guide and to carefully chose how they will be violated and for what purpose*" (1993:1076).

Finally, Tyler & Degoey (1995) examined people's willingness to restrain their water use during the 1991 California drought - a naturally occurring 'social dilemma' situation. That is, one where individual interests conflict with the collective interest from which they can also gain (Dawes, 1980): the classic example being Hardin's 'Tragedy of the Commons' (1968). Their findings suggest that people were more willing to support authorities who make water conservation decisions when these authorities use *fair* decision making procedures. The perceived severity of scarcity, however, was not significantly influential in the degree of support shown. Tyler & Degoey conclude that the effectiveness of authorities in restraining water use is linked to the nature of their 'social' bonds with the wider community.

While the above studies suggest that perception of fair allocation and governance is important in effective water resource management strategies, their focus was not principally on equity issues. So far as I am aware, the only work on this issue is by a group of Australian social psychologists. In a series of pioneering studies, Syme and colleagues have identified and assessed the water equity beliefs and principles held by stakeholders in different water resource management situations (Syme & Nancarrow, 1992, 1996, 1997; Syme & Williams, 1993; Syme and Fenton, 1993; Seligman, Syme, and Gilchrist, 1994). They have argued that:

> *Equity has been defined in a de facto manner as what the (water) agency describes. Their cultural base may be too narrow. There is a need to obtain specific equity comments from stakeholders for allocation judgements and priorities.(...). There is a long philosophical discussion as to the appropriate value bases from which such allocation decisions should be made. However, there has been little study of which philosophies the community prefers.*
>
> Syme & Fenton (1993:347)

Syme and Fenton's (1993) use of attitude statements in a questionnaire survey of residents of Perth showed that 'egalitarianism' and 'proportionality', both major components of judgements about equity for the political sphere (Rasinski and Tyler, 1986), only weakly characterised equity values in relation to the allocation of water resources. They did find however, that support for *proportionality* could be associated with greater perceived levels of conflict over the allocation of groundwater resources. That is, as competition increases, people start to ask questions about who *deserves* to be allocated water. The researchers found that a concern for both *procedures* and *outcomes* were involved in water fairness judgements. *Arbitration* as a conflict resolution strategy was strongly favoured above *market mechanisms*.

Since the two factor notion of equity (of egalitarianism and proportionality) was found to be inadequate for water, in a second study Syme and Nancarrow (1992, 1996) used an additional, broader series of attitudinal statements to represent different 'ethics of water allocation'. These included different *environmental philosophies* mainly based on the work of Wenz (1988) and views on the need for water planning (such as attitudes to water as a common good, environmental rights, efficiency of use, moral obligations between users and economic rationalisation). The results from questionnaire surveys found that 'lay philosophies' were related to assigned *priorities* for water allocation. Syme and Nancarrow (1996) concluded that there was a definite cultural approach to water allocation which was not necessarily compatible with the prevailing trend in Australia towards market driven approaches. These results were then tested in the context of specific allocation situations in which respondents held a stake, i.e. there was a self interest in the outcome (Syme and Nancarrow, 1997). In five case studies, in which there are a varying degrees of competition for water among different stakeholders and different management mechanisms (ranging from transferable permits to state allocation of dam water), a number of important findings emerged.

First, when making fairness judgements of a water management situation, factors such as *consideration of future generations*, *management for the common good, the rights of the environment* and *not wasting water* were important[1]. *Existing rights, individualism, and deserve* based on hard work were least important criteria overall. The authors note however, that as these latter beliefs were held by certain sectors of the community they are likely to be significant in understanding conflict between stakeholders and regulators (1997:2148). Second, negative fairness judgements were

[1] The authors do not unpack 'efficiency' which could imply both a concern for 'conservation' or for economic productivity.

associated with a concern for procedural issues such as *participation in decision making* and *doing the right thing by others, little support for water markets*, and a concern that the *full social and environmental cost should be paid for providing water* (1997:2151). Third, positive judgements of current water management were made by those who were more *free enterprise orientated, less concerned with community justice* or *downstream impact, less in favour of paying the full costs of providing water* and more in *favour of the status quo* (1997:2151). Fourth, the research showed fairness judgements were consistent and fairness principles were used in a similar way across the different management situations posed by different case studies (Syme & Nancarrow, 1997:2148; also Seligman, Syme et al., 1994). Judgements did however seem to be related to group identity as, for example, farmers, suppliers, and recreationists (1997:2151).

The innovative work by Syme and colleagues contributes then to the theoretical understanding of justice and fairness in the context of natural resources allocation, and provides an empirical basis for evaluating policy goals of equity "*at the community level rather than from the self assertions of decision makers*" (Syme and Nancarrow, 1997:2152). One of the major contributions has been to their development of a robust and series of attitude statements which can be taken forward into, for example, a UK context.

Conclusion

In this chapter I have shown how water resources management involves the employment of mechanisms to regulate water availability, abstraction and use. In most situations, these mechanisms will necessarily combine legal, institutional and economic interventions to control or influence resource behaviour. All of the mechanisms embody different, specific notions of what is fair and justice. People's responses to these mechanisms will also be influenced by normative considerations of what is right, proper and just. *Sustainable* water resource management (SWRM), as I argued in Chapter Two, implies a system which provides an *acceptable* reliability of supply to meet the needs of society at an acceptable social and environmental, as well as monetary cost. The sustainability objectives of water policy must, therefore, take account not just of efficiency and environmental sustainability goals, but also cultural notions of what is *fair* and *acceptable.* To do this, an understanding of prevailing equity notions among water resource stakeholders is required.

SWRM might involve considerations of equity in terms of the following: the

distribution of water resources themselves; the distribution of resulting positive and negative outcomes; and the procedures for decision making. Within the existing literature on water issues, by far the greatest attention to equity was found to be in terms of income distribution effects. Yet, equity concerns also involve impacts on social and cultural values and expectations, and the fairness of decision making processes that control access and determine allocation mechanisms. As well as discussing economic mechanisms for water management which reflect a principle of fair allocation according to the criteria of efficiency and utility, this chapter has shown that 'fair' water resources management can be construed in many different ways. Principles of fairness may reflect, for example:

- geographical or sectoral objectives
- prior appropriation
- intergenerational concerns
- environmental and ecological concerns
- need
- expectations of participation in decision making

Ideas of fairness are, of course, not the only determinant of water use behaviour, and normative or ideological differences are not the only types of conflict. But fairness concerns are an important aspect of social relations involved in water. Social relations, as well as individual attitudes, are key in stakeholders' responses to regulation and the regulator, and key in understanding the foundations of water conflict. David Kinnersley (1994)[1] has suggested that the initial goal of any water resources management policy should be to create the circumstances in which the many, potentially conflicting claims on water can be discussed and sound outcomes achieved. He described new approaches to conflict resolution in the United States which "*foster a spirit of equality and mutual interests*" (ibid:203). I would argue that an understanding of normative constructions among different stakeholders and the impact of policy changes precedes the development of good relations that Kinnersely believes precedes sustainability co-operation.

As Handmer et al. (1991) conclude from their study of water resource management in Australia, "*innovations not only resolve conflicts but create new ones*" (1991:260). The pursuit of environmental and economic sustainability goals, by placing tighter limits on water resources, create a tension between stakeholders with different social, political, economic objectives, and normative values and expectations. If fairness judgements are transgressed, resistance to regulation and conflict results. For example, we may ask whether stakeholders trust a regulator to do what they believe it

[1] A leading advisor in the UK and formerly Chief Executive of North West Water Authority.

should. People will feel that they are getting their fair share of water resources only if they respect the principles of justice that are employed to determine their shares. Water management research has only minimally dealt with these social and cultural dimensions when looking at sustainable water resource management. Very little has been done to discover how users and other stakeholders view existing or proposed management systems.

Research is needed to explore the specific allocation preferences, priorities and judgements of stakeholder groups towards resource allocation criteria. There is a particular deficit of knowledge in the European context, and it is this deficit that my thesis intends to address through the study of 'what is meant by better water management' and whether conflict within a catchment can be understood in terms of different fairness beliefs. This research will explore a) judgements of the regulator and the current licensing system and b) the fairness norms that determine evaluations of management strategies. Drawing on arguments made in Chapter Two, the focus of the analysis will be on actors in context i.e. the perceptions of individuals acting as stakeholders operating within a political, cultural, social, economic and local resource context.

Chapter 4

A Methodology for Examining Fair Water Resources Regulation: a case study of the Lark Valley catchment

Introduction

In Chapter Two and Chapter Three, I developed the argument that when resource strategies are incompatible with the normative beliefs, and social and cultural rationalities of water resource stakeholders, the fairness judgements of policy objectives and resource regulators may hinder sustainability. Constructions of fairness are important therefore, in the legitimation of water resources policy. In the UK context, an increased problematisation of water over the last decade has been characterised by growing pressure on resources, an evolving regulatory framework, and new discourses on sustainability and environmental valuation. An empirical study is therefore required that investigates perceptions of fair water resource management in this context.

This chapter has several aims. The first section will explain the rationale for the methodological approach adopted, including the information requirements for the analysis and the decision to use a catchment-based case study and a 'stakeholder' approach. The second section is dedicated to a description of the physical geography of the study area and a profile of the catchment stakeholders. The third section concentrates on the empirical strategies employed for the fieldwork that took place in a small rural catchment in Suffolk during 1995-1996. The sequence of the research is described, and an overview of the data that were collected is included. The techniques used for data *analysis* are outlined in section four.

I Methodological Rationale

Key conceptual positions which have framed the research were identified in Chapters Two and Three:

- that *sustainable* natural resource management must hold together the environmental with the economic, the political, the social *and* the cultural.
- that what *equitable* water resource management means is bounded by the context-specific, normative judgements of individuals, and at the same time is a concept that is culturally reproduced through social and economic relations and processes.

This study seeks an explanation of water resource problems that privileges the role of the expectations, attitudes and perceptions of people belonging to different stakeholder groups. The emphasis is on a description of different ideas of water justice held by individuals and reproduced through social processes. In light of this and the conceptual framework adopted, an empirical strategy was required which was capable of:

- eliciting the normative *beliefs* and the meanings and claims people use to account for their understanding of the world
- accommodating institutional constructions as well as the rationalities of different actors
- encompassing and moving between the environmental, the social and the economic *contexts* rather than privileging one
- bridging the gap between a constructionist and realist perspective on *natural resource problems*

The methodological challenge was how to study *equity* in natural resources management, as there are very few published studies of perceptions of fair water resources management from which to draw methodological guidance. In Chapter Three, the work of Syme and colleagues in Australia was mentioned as an exception[1]. These researchers focused on fairness evaluations of water resource management at the community level, using attitude measurement techniques developed within the discipline of social psychology. Their work provided much support for my study, and contributed to the consideration of data collection techniques. This thesis, however, is positioned in a broader theoretical framework. A more contextualised methodological strategy was required, holding ideas of structure and agency in partnership, and thus allowing an understanding of both peoples' perceptions *and* their regulatory, social and natural contexts.

A methodology was adopted to explore the perceptions of individuals within the context of: i) the regulatory culture within which institutional ideas of fair water resource management have been established; ii) new environmental and natural resource debates linked to the ideology of sustainability; iii) economic and social processes; and iv) climatic events that have acted to influence demand for water. Below I explain why a 'triangulation' approach[2] and investigation within a catchment

[1] For example: Syme and Nancarrow, 1992, 1996, 1997; Syme and Fenton, 1993; Seligman, Syme, and Gilchrist, 1994.

[2] Triangulation is '*a method of finding out where something is by getting a 'fix' on it from two or more places*' (Robson, 1993:290)

case study were considered most appropriate for a study of *natural resources management* and *equity*.

Studying natural resources management

As stated above, this study is about understanding natural resource problems in terms of the relationship between people, social processes and the environment, as an alternative to a purely technological or natural science understanding. The idea of the social and cultural construction of natural resources is well developed in the social sciences (Mitchell, B., 1989; Redclift and Benton, 1994; Hannigan, 1995). Hannigan writes that '*the chief task here is to understand why certain conditions come to be perceived as problematic*' (1995:2), a research challenge requiring an actor-in-context orientated study.

Water resource conflicts are more complex than simple physical depletion (Roberts and Emel, 1992), but to seek an understanding of water resource problems solely through the eyes of individuals, or solely in terms of social processes, would ignore the reality of natural systems and the causes of resource problems over which social groups have little influence. The material constraints to the social constructionist position are recognised here, and data will be required on the physical water resources context.

Studying equity

Complimenting the constructionist approach to natural resource conflict, is the conceptualisation in Chapter Two of equity as a subjective concept. Having rejected the notion that I could develop a relevant and meaningful indicator of equity with which to assess the impact of policy and change on *other* people, the aim of the thesis has not been to 'measure' equity but to explore its meaning. Fairness is considered to be a judgement rather than an absolute quality, and I am interested in the judgements people make. I am not seeking to investigate adherence to an established theory of justice, nor to undertake a philosophical analysis. Rather I want to explore 'fairness' as interpreted and articulated in everyday use[1]. Having reviewed the diverse literatures, what equitable water resource management means is bounded by the context-specific normative judgements of individuals and is expected to involve, for example, their notions of obligation to nature and to others water users, notions of rights to water, tradition and expectations. Research into perceptions has been traditionally based in attitudinal research techniques whereby an individual's response

[1] Fair is for example, often used interchangeably with *reasonable*, or *acceptable*. Benson and Hughes suggest that '*...an important constraint on sociological inquiry is that the categories, the concepts and the methods for using them must be isomorphic to the ways in which they are used in common-sense reasoning*' (1991:129).

to attitude statements reveals the essence of their thinking about particular issues. This was the primary technique used by Syme et al. (1992, for example) and has also been adopted in this study (see section two below).

However, at the same time as being an internalised evaluation by an individual, equity is a concept that is culturally reproduced through shared social and economic relations and processes. The use of traditional attitude measurements has been criticised for pre-supposing a uni-dimensional model of the individual, and for being unable to take account of 'contexts of time and place' (Burgess, Limb, and Harrison, 1988). Macnaghten (1995) suggests that wider argumentative contexts and dilemmas within society are missed through this technique. He writes that attitudes are generally "*more ambiguous, more contradictory and more dilemmatic than traditional attitude theory supposes*" (1995:136). If these reservations are accepted, the use of attitude measurement can be enhanced through their combined use with complimentary qualitative techniques that allow the complexity and contextuality of perceptions and understandings of environmental problems to be discovered. McCracken (1988) suggests of qualitative and quantitative approaches that neither one can substitute for the other in seeking to gain a further understanding of the world[1]. The methodological implications are that, like a study of natural resource management, a study of equity concerns must combine the following different information arenas and types:

- water justice beliefs at the level of the individual
- perceptions of fair water resource management at the level of the different stakeholder groups
- an understanding of the economic and social mechanisms, natural events and contexts that support these perceptions
- institutional notions of fair water resource management within the regulatory system

Geography, unlike many studies within the discipline of philosophy, is able to ground an inquiry into normative beliefs within the domain of everyday contexts and events.

Information requirements

From the reasoning above, the data that I needed to collect to achieve the study objectives would include the following:

- national context of policy and climatic events, and political-economic and environmental discourses
- key principles in legislation for managing water

[1] Fielding & Fielding (1986:12) suggest that quantitative data inevitably involves a degree of qualitative analysis because of the nature of interpretation.

- information on the regulatory system, namely licensing procedures and practices
- water resources profile of the case study area
- local accounts of water problems, and local resource events and experiences
- judgements of the current water resource management system and future options by stakeholders
- attitudes to the regulator and to other stakeholders
- how water claims are validated
- the contextual opportunities and constraint on water use
- water justice 'philosophies'.

The second part of this chapter will describe the different techniques used to collect these data. Different techniques are required for accessing different types of information, but also serve the function of methodological 'triangulation'. Information collected in one way can confirm information collected in another (Fielding and Fielding, 1986). Alternatively, different techniques can compliment each other by mapping out different aspects of a concept, process, or issue, or by approaching it from different angles (Mason, 1994).

Rather than privileging 'absolute knowledge', the qualitative techniques of the social sciences permit a study of how people understand their worlds, and how their actions draw upon and are embedded in the larger cultural, social, economic and political structures around them (Button, 1991; Cook and Crang, 1995; Hammersley and Atkinson, 1995). This fits with my conviction that to study different accounts and interpretations of water disputes would be more useful than the search for a 'right' account. Pepper (1984:2) writes: "*we should listen to what others say, and reflect not necessarily on the truth of their arguments, but only on why they make them and believe in them, i.e. from what material or ideological vested position they speak".* Ethnographers are involved in "*the struggle to produce inter-subjective truths, to understand why so many versions of events are produced and recited*" (Cook & Crang, 1995:11).

A central theoretical tenet of an ethnographic approach is that normative assumptions and cultural rationalities are determinant of, and can be revealed through, people's perceptions and beliefs. A second tenet is that language and judgement are entwined, so that people's accounts and explanations can be taken as a true representation of how they make sense of the world (following the philosophical insights of Wittgenstein (1968a, b), and that 'realities' can be found in forms of

communication, and interaction with others (Vigotsky, 1978)[1]. Jayyusi argues in his explication of ethnography, that "*moral values are publicly available*" in discourse and in action and "*the details of a person's discourse, his/her descriptions, judgements and inferences make available the 'values', 'relevances', 'concerns' of that person*" (Jayyusi, 1991:243). A third tenet is that data inevitably pass through the filter that is the social scientist's inference (Bulmer, 1979; May, 1993:131; Hammersley and Atkinson, 1995). The fact that it does not claim the objective revealing of 'truth', but explicitly replaces it with a description of *commonality,* or negotiated, transient or established 'shared truths'[2] is a strength of an ethnographic approach.

A stakeholder analysis

Stakeholder analysis is a useful approach for understanding a natural resource management system, and changes and challenges to it, for it identifies key actors and assesses their respective interests in that system (Grimble and Wellard, 1996). It has been argued above that equity norms are reproduced through social and cultural relations and are not simply a function of the beliefs of the isolated individual. 'Methodological individualism' is therefore rejected. Thus, to study the perceptions of fair water resource management of different social groupings made up of individuals with a mutuality of interests is appropriate. I have argued that natural resources conflicts need to be understood holistically from the multiplicity of perspectives involved; including those who affect or implement a policy decision, and those affected by it. In this research, I am interested, in particular, in identifying the full range of 'water justice' beliefs, and in a comparative analysis of the different views. I am interested in the different criteria for assessing the desirability of resource interventions held by different groups[3] with a 'stake' in a resource problem, and how this can be explained in terms of how individuals, as members of different social and economic groups, construe water and account for their claims to it. A comparative account of water resource problems was sought and for this reason, the voices of the managers of water resources were also included.

A catchment case study

Because the research objectives developed into an investigation of the *construction* of equity, rather than a quantitative evaluation of the impacts of the outcomes and

[1] The rationale being presented here represent a 'post-structuralist' view (Nuijten, 1993), whereby language, or rather the discourses that are a part of social processes, is seen as constructing and legitimising particular institutions, set of rules, codes and norms.
[2] See Jayyusi (1991) for a detailed discussion on the distinction between fact and value in ethnography.
[3] The distinction between any stakeholder group can not be considered absolute, as many individuals 'wear different hats' concurrently or interchangeably.

procedures of water resources management, the study is essentially interested in community and local level issues, practices and experiences. This meant that an intensive strategy was preferred to an extensive one. A catchment case study would allow an investigation of stakeholders connected through geography, social processes, a shared water resource system and conflict events. Selecting a small catchment at the local, rather than a regional or national level would allow greater access to an understanding of its contextual characteristics[1]. This would also suit the constraints of time and resources set by a PhD.

The advantage of a study at the level of a catchment is lucidly argued by Martin as he develops the concept of a *communicative catchment*[2]. He writes (1991:778):

> *In accepting the challenge of the communicative catchment, we accept the challenge of working with these 'facts' of environmental problems and the way people involved with these facts perceive them. With this dialectical approach, reality is seen as the interaction of perceptions and the physical 'facts' of the situation.*

Martin's approach is one whereby a resource problem is assessed according to the views of a community of resource users and managers. Within this community, social relations regarding the resource use take place, and new ways of acting and decision-making can be developed. The idea of a 'normative catchment' addresses the requirements outlined above in that human, cultural and physical factors can be taken into account, and it also allows a 'mapping' of stakeholders in terms of their interests and involvement in water issues.

A rural, rather than an urban, catchment was chosen for several reasons. The aims of this study were to consider water allocation issues, and to investigate the rationalities of different claims made on water resources. The issues concerning water management and financial regulation in the domestic sector are extremely complex and far reaching, encompassing for example, household poverty and the politics of privatisation of the water supply companies. Although such issues were outlined in Chapter One as forming an important backdrop for the construction of fair water resource in the UK, they would involve a different set of research questions. I was much more interested in the relationship between regulation and the regulated, and in the competition between abstraction of raw water and environmental need. These issues would be more salient in a rural context where a greater range of abstractors and other stakeholders would exist in a shared context. I also felt that the range of

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[1] See Trudgill & Richards (1997) for an argument that environmental policy and science should be more sensitive to the variabilities of local context rather than privileging the general over the specific. Ward & Munton (1992) make similar arguments concerning agri-environmental policy and regulation.

[2] Like Syme's work, Martin's study is in an Australian context.

stakeholders and their interests would be more easily identifiable, and that a rural catchment would permit greater cultural specificity. A further consideration was that Syme et al's studies[1] were predominately rural in nature, incorporating agriculture interests. A rural catchment would allow comparison of findings with the Australian results.

The East Anglian region was chosen because it is the driest region in England and pressure on resources are derived from a range of different demands: domestic, agricultural, industrial, recreational and environmental. Early meetings with key informants in the region (see below for details of research sequence) identified a small river catchment, the Lark Valley, lying in the centre of East Anglia as one in which demand for resources had reached, and was in fact surpassing, local supply availability during normal conditions (see Figure 1-1, and Figure 4-1). The area, part of the larger Ely-Ouse Catchment[2], was especially vulnerable to restrictions and conflict following periods of low rainfall. It had already experienced severe resource problems during the drought from 1989 to 1992 that had forced the regulator and agricultural users to re-examine water management strategies. Debates over how to respond to intensifying competition for water resources had thus become salient in the catchment, and a real, rather than an academic, issue. In addition an appeal against a licensing decision was pending. I chose to work within the boundaries of 3 surface water units through which the River Lark runs[3]. These units, partly underlain by the Lark Groundwater Unit[4] (see Figure 4-2), would delimit the data used from the licensing archives and confine the extent of qualitative investigations.

Exploratory interviews in 1995 showed that concern amongst the stakeholders fell principally within a temporal framework demarcated by events during the 1989-92 drought and the changes that had occurred since. For this reason, the period of interest for this investigation was set as the 7 years following the overhaul of water resources management in England and Wales in 1989, which saw the privatisation of the water industry and formation of the National Rivers Authority (NRA).

In choosing one particular geographic area of study, it becomes necessary to address its typicality with respect to water resources issues. The Lark Valley is archetypal rather than typical of catchments in England. It represents a resource

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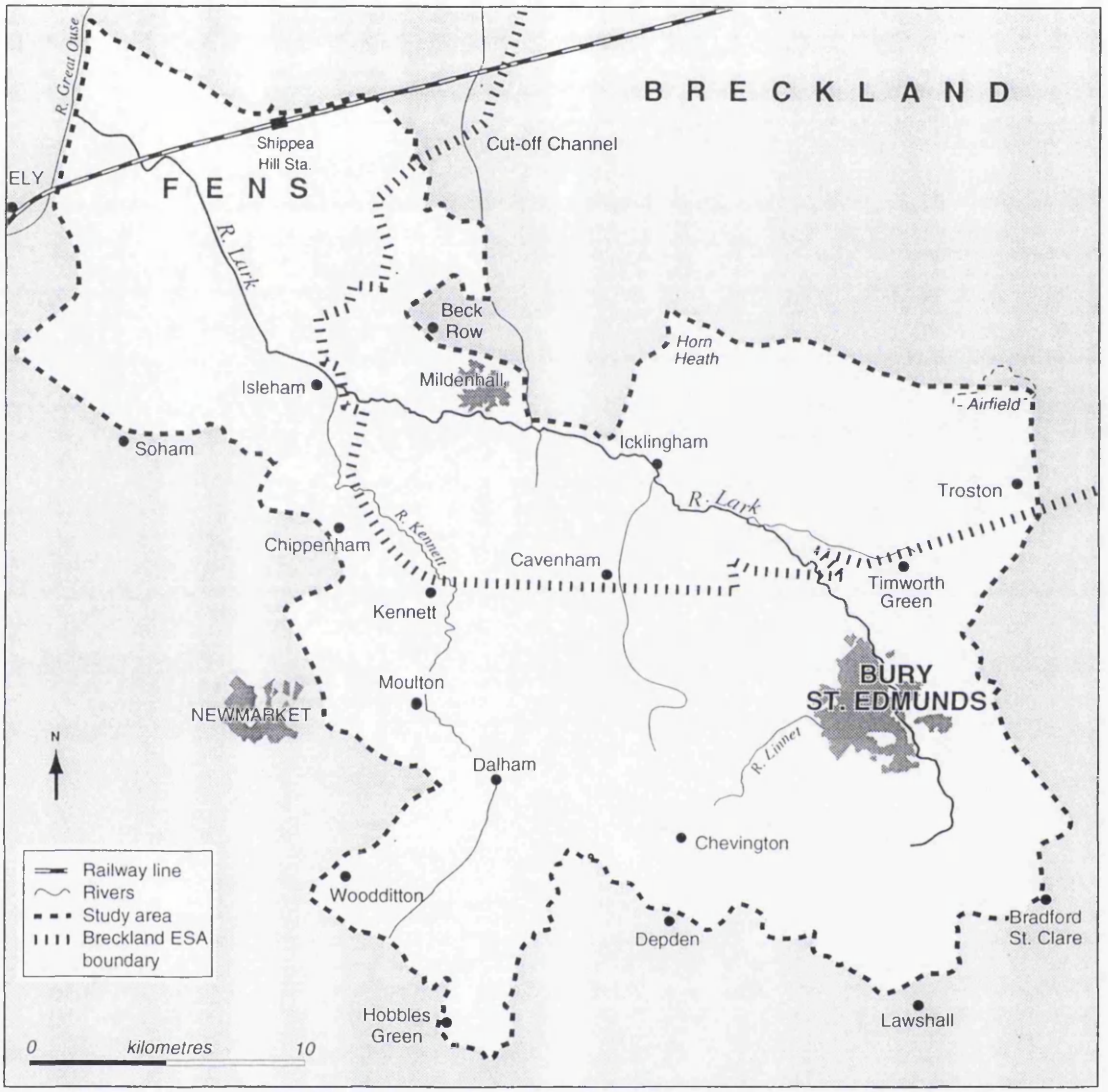
[1] Syme and Nancarrow, 1992, 1996, 1997; Seligman, Syme, and Gilchrist, 1994.
[2] River Catchments are areas defined by the NRA as discrete administrative units used for the integrated management of water resources, water quality, flood control, fisheries, recreation and conservation, although these were separate functions with the NRA infrastructure (Parker and Penning-Rowsell, 1980; Newson, 1992)
[3] These are hydrological units as designated by the NRA: hydrometric numbers 37- River Lark, 38- River Kennett, 39- Lower Lark (see below for more details).
[4] Groundwater Unit number 8.

Figure 4-1: The Lark Valley - study area



situation which many areas may reach as demand management is adopted, allocated resources approach their limit, and resource management is challenged. Mitchell (1983) tackles, on an epistemological basis, the assumption that if a study area is not typical, then its findings cannot be usefully extrapolated to general issues. First, a case study may be used to reflect a principle rather than a population and second, in making inferences from case material, the extrapolation may be "*based on the validity of the analysis rather than the representativeness of the events*" (Mitchell,1983:190). That is, the use to which the data are put is more important than the content of the case study and it is the 'wholeness' of the case, which imposes restraints or conditions that must be allowed for. Mitchell argues that whereas statistical inference of correlational relationships may or may not be valid from one case study, the validity of logical inferences concerning the features and process of the case do not depend on the representativeness of the sample. Benson and Hughes argue along similar lines that "*the frequency of the occurrence of some phenomena is not germane to whether the description of the 'machinery' is adequate or not*" (1991:131, emphasis mine). The Lark Valley has been chosen in terms of its potential explanatory power rather than for its typicality.

As well using the catchment as a case study, individual events that occurred within in the catchment are also used in the thesis. In this way, the study is basically problem-orientated. Benson and Hughes suggest that "*the point of working with actual occurrences, single instances, single events, is to see them as the products of a machinery that constituted members cultural competence enabling them to do what they do, produce the activities and scenes of everyday life*" (1991:130).

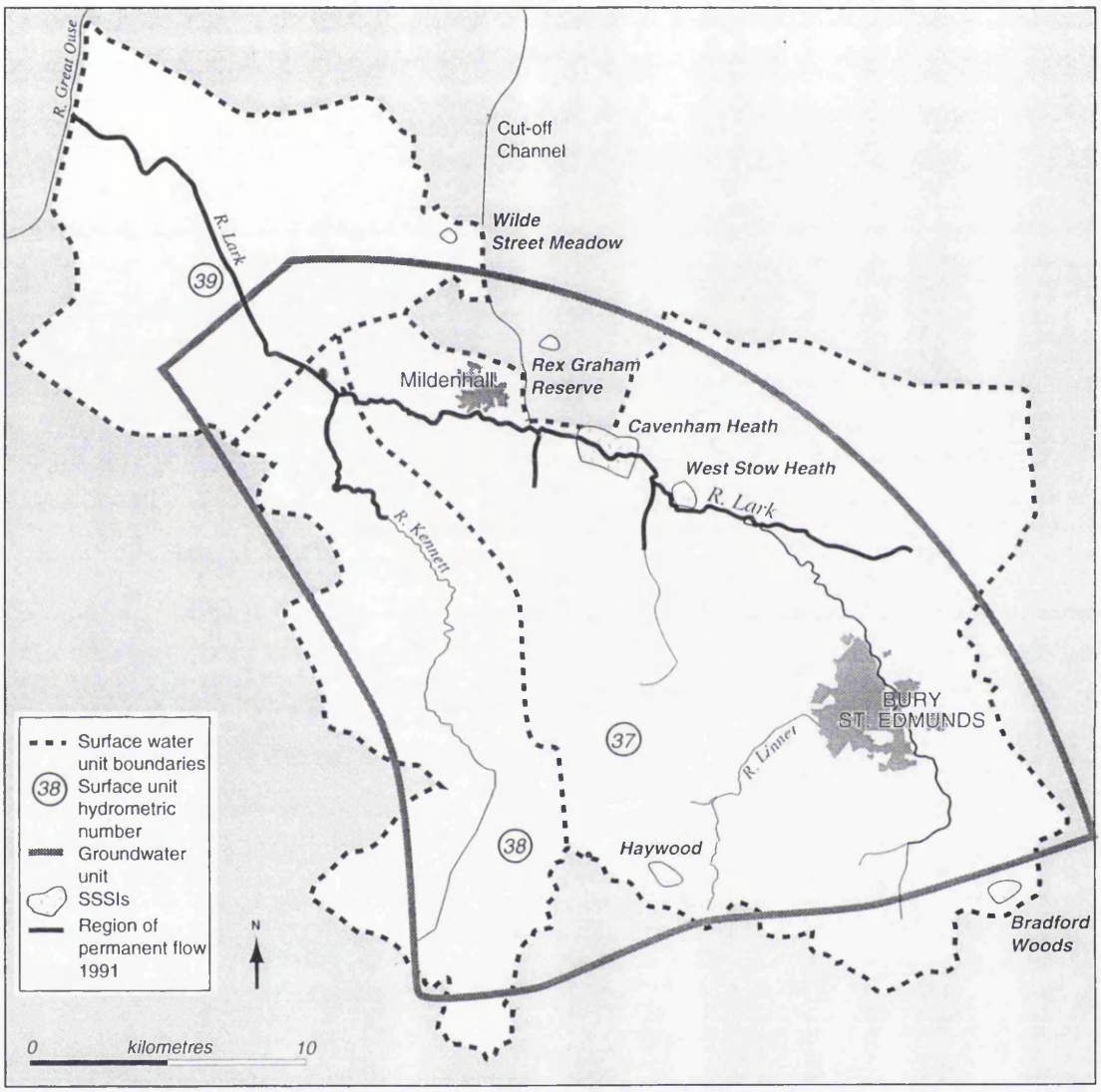
I will now describe the Lark Valley study area, before a discussion of the empirical research.

II A Water Resources Geography of the Lark Valley Catchment

First a water resource profile of the study area is presented. This provides an environmental and physical context for the analysis in the empirical chapters. The stakeholders involved in water resource issues in the Lark are then outlined.

The Anglian Region. Anglia was the largest NRA (now Environment Agency) region with the fastest growing population. It is also the driest. In an average year, rainfall is around 600mm (compared to an average of 912mm for England and Wales as a

Figure 4-2 : Water management units in the Lark catchment



whole (WSA, 1995). But 450mm of this rainfall evaporates leaving an *average effective rainfall* of 150mm per annum to provide ground and surface water resources. Its two thirds of national average annual rainfall is thus cut to *one third* the national average *effective* rainfall. In dry years the effect is even greater, leaving the region with as low as one eighth of the national figure. This average, effective rainfall is about four times the highest forecasted demand scenario, and approximately 18% is committed to abstraction[1]. Rainfall is fairly even throughout the year (NRA, 1994c), and in summer, evaporation exceeds rainfall, drying out the soils and depleting resources. During a 1 in 50 year drought, as little as 40mm is left (Thomas, 1992). Droughts are a feature of the region's climate, so maintaining supplies relies on a complex water network of storage and distribution.

The eastern areas of the Anglian region are underlain by extensive chalk aquifers and areas of limestone, greensand and crag. These aquifers supply around 50% of the region's water supplies. Other substantial regional supplies are maintained by several large reservoirs situated to the west and south east, in clay covered catchments which depend on pumped abstractions from rivers. Because water for summer use must be stored from proceeding winters, either naturally in recharged aquifers, or in man-made reservoirs, public water supplies in Anglia are, on the whole, not vulnerable to short single-summer droughts. But they are vulnerable to multi-season droughts with one or more dry winters (Thomas, 1992). Regional water resources are augmented by a number of major schemes belonging to and operated by the NRA/ EA. These are for river regulation and to support abstraction and interbasin transfers (one involves imports from Severn Trent region).

In the Anglian region, a total of 9,800 water abstraction licenses were in force in 1995 (second only to the South West region), with 890 being issued in 1995/96, (DoE, 1997).

i. *Physical Geography of the Lark area*

Location and waterscape of the Lark

The Lark Valley lies in the centre of the Anglian Region, within the Ely-Ouse catchment (Figure 1-1) and falls within the boundaries of three local authorities: East Cambs in Cambridgeshire (to the west), Forest Heath District Council (the middle section) and St Edmundsbury (to the east) in Suffolk.

[1] Anglia was the only region identified in the NRA's 1992 strategy document as facing a predicted deficit of unmanaged demand over supply for the year 2021 (of -4%) (NRA, 1992).

The course of the river is south-east to north-west, rising to the south of Bury St Edmunds in Suffolk and flowing for 45km to join the River Great Ouse across the Cambridgeshire border, in the area known as the Ely-Ouse pond, north of Ely (Figure 4-1). The Lark contributes 12% to the flow of the main River Great Ouse. This reflects the gradient of the landscape: the land is higher in the east and slopes gently towards the fen areas to the west. Bury St Edmunds is the main town lying to the east, at the confluence of the Rivers Lark and Linnet. The River Kennet flows into the Lark from the south, west of Mildenhall where there is a major military installation. The Cut-Off Channel is a man-made water course which intercepts the River Lark to the east of Mildenhall, and during times of flood discharges into a relief channel at Denver to the north (refer to Figure 1-1). This water is ultimately destined for the Ely-Ouse to Essex transfer system, the amount depending on conditions of availability and PWS need in Essex. During periods of low groundwater levels, the Channel loses water and a transfer is made to it from the River Lark to maintain a small flow (normally 4.3 tcmd) to sustain the environmental and amenity requirements of the channel (NRA, 1993a:24).

The River Lark flows through a wide flood plain which lies at approximately 8m OD (Suffolk County Council, 1986). To aid water resource management, the NRA/EA divides the main Cambridge Upper Chalk Aquifer into catchment units, one of which is the Lark Groundwater Unit (Unit 8) that underlies part of five surface water sub-units (Figure 4-2). The focus of the quantitative part of this study is within the boundaries of three of these surface water units through which the River Lark itself actually runs: hydrometric numbers 37 - River Lark, 38 - River Kennett, and 39 - Lower Lark.

Geology and land use around the Lark

The Valley is underlain by chalk which outcrops spasmodically and is overlain by more recent deposits giving an assorted distribution of soils (Barker, 1992). To the east of Bury St Edmunds there are glacial silts which give way to sand and gravel deposits between Lackford and Mildenhall. This marks the boundary with the rich fenland peats to the west (Figure 4-1). The river runs in a bed of alluvium; deep, coarse, sandy soils tending to be stoney on the valley sides. To the west, the peats are found in the valley bottom. Out of the valley, more loamy well drained soils occur. Away from the river, the Breckland soils are sandy and coarse.

This geological variety is reflected in the pattern and mixture of land uses which makes the area distinctive. Post war, much of the area experienced the improved land drainage required of government agricultural policy to increase production. Rivers were made wider, deeper and straighter, and wet areas were drained and pasture

areas ploughed. Unlike the surrounding areas - Fens to the north-west, Kings Forest to the north, and arable landscapes to the south, no one land use dominates. Towards the eastern end of the river valley urban influences predominate: housing, light industry, a mineral site and a large golf course. St Edmundsbury district possesses relatively large areas of woodland and grassland. Moving west there is a mixture of arable agriculture, riverside meadows, historic parklands, grazing marsh, wetlands, heathland and grassland and vast conifer plantations. In the west, an agricultural landscape dominates the fens (STNC, 1997).

Hydrogeology and resources

The River Lark is intermediate in character between a southern Chalk stream and a Fenland river. From Bury to Isleham, it consists of a series of slow flowing stretches, normally with a bed of soft silt, but broken by short faster stretches with beds of sand and gravel and chalk, and several tributaries flow into the Lark. Below Isleham, the river enters the fen basin and is contained between flood banks, being uniformly slow moving and deeper than upstream (Suffolk County Council, 1986). There are no major inputs in to the river, and river levels throughout the low lying areas are controlled by a sluice at Denver. Lowland drainage systems provide flood protection for land up to 7 metres below normal high tide. In winter, the river flows are increased due to the land drainage pumping, and summer river flows may be reduced as water is drawn off in to the low level drains.

The water in the River Lark is derived in three ways;

- rainfall run-off predominantly in the east and upper part of the catchment which is covered by an increasing thickness of semi-permeable Boulder Clay that limits the extent to which rainfall can infiltrate and recharge the chalk aquifer
- baseflow from the principle chalk aquifer; fine grained fissured limestone with bands of flint nodules. The aquifer yields water readily with the majority of flow through the fissures. The general direction of flow within the aquifers is south-east to north west. Above and below the boulder clay in the upper stretches of the valley are glacial and crag sand and gravels which, along with valley gravels occurring in the middle and lower stretches, form minor local aquifers that easily transmit and store water
- effluent discharges: the largest sewage works in the Ely-Ouse catchment discharges into the river near Bury and another at Mildenhall. Along with surface

run off from an intensively farmed landscape, this means that the water is rich in mineral nutrients.

The river has a high base flow element from the aquifer (normally averaging around 70%). During a drought, the baseflow alone sustains the river flows. Some tributaries without baseflows are vulnerable to drying up during a drought, including part of the River Kennett. Downstream at Isleham, actual flows have been found to be less than the naturalised flow indicating a net reduction due to abstraction (Barker, 1992). Barker estimates that if the total licensed quantities were abstracted, the reduction in flow would be between 15% and 54% during lowest flows.

Roughly 30% of rainfall in the region infiltrates into the groundwater aquifers. The reliable groundwater resource for the Lark Unit is assessed by Barker (1992) as 127.5 tcmd. The river requires a flow of 62.2 tcmd (its naturalised 95 percentile[1]). It receives 15.3 tcmd from effluent and so 46.9 tcmd is allocated to the river environment from the aquifer. It will also receive unreliable surface run-off. These are 1994 figures from the Anglian NRA Water Resources Strategy document (NRA,1994:A95:21c). At that time, 88.7 tcmd was committed to abstractors, leaving a deficit of 2.5 tcmd.

Across the Lark, average annual rainfall is only 582mm (NRA, *perscom*) but may vary by 100mm from Bury to the Cambridgeshire border (Suffolk County Council, 1986). Only 25% of rainfall is effective rainfall sustaining the rivers and groundwater levels. Rainfall trends are not a precise indication of availability trend in this area as most resources are derived from those stored in the aquifer. Availability of water resources for abstraction from both groundwater and surface sources is limited. Currently, no new permits are being issued from the aquifer, and surface water is available only during periods of high winterflow[2].

Drought experiences

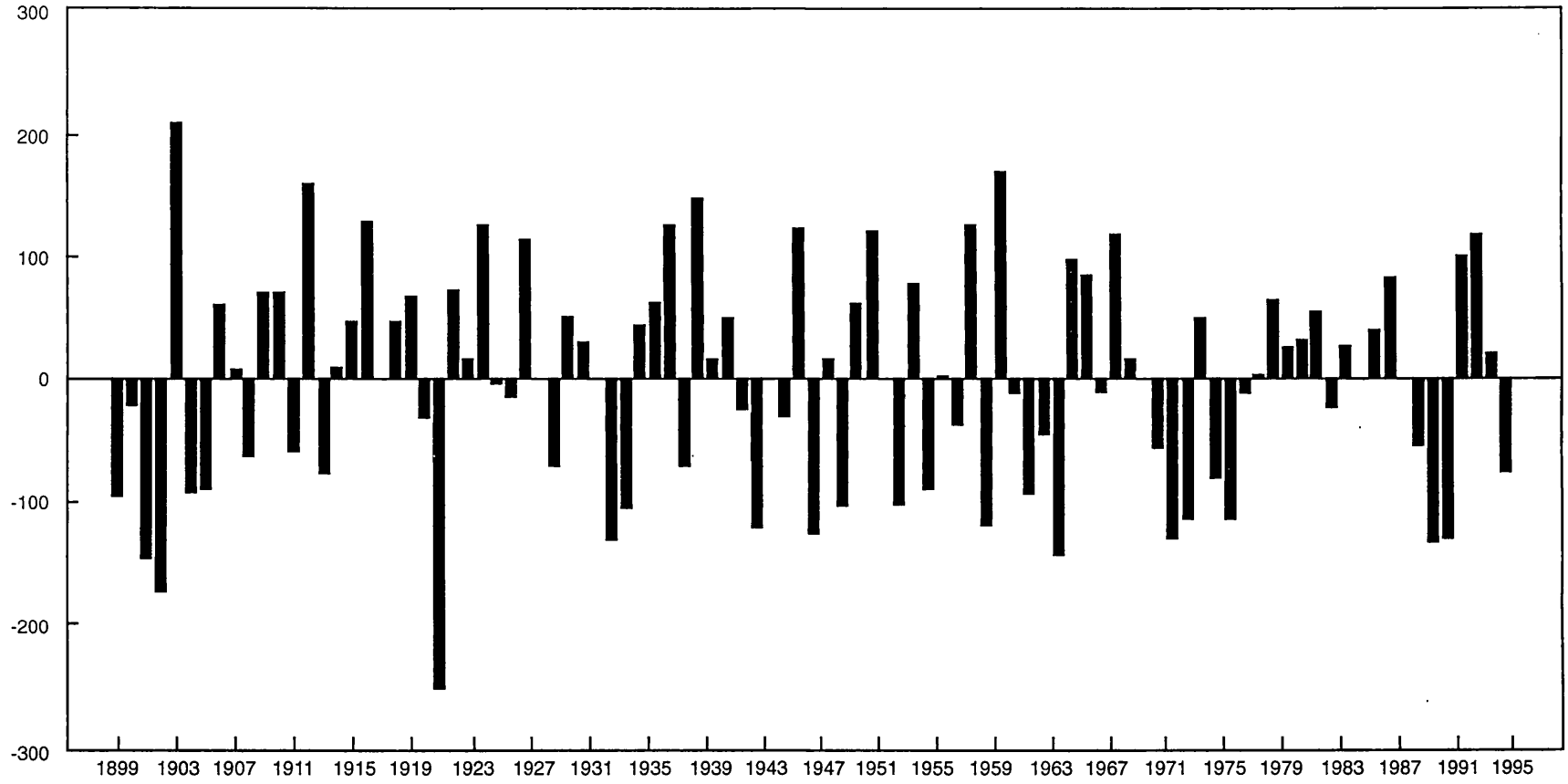
Figure 4-3 would seem to indicate that there has been little change in rainfall patterns over the last century, but there is more persistency in the deviations (NRA, *perscom*). Dry and wet years are more grouped together since the 1950s. The eighties was a very wet decade, and it was during this period that a favourable balance supply to demand balance lent a false sense of security to water managers and abstractors regarding the potential impact of and limits to abstraction (Smith, 1996).

From 1988 to 1992 Anglia experienced its worse drought in a century of records, mainly because it spread across the winter months (NRA, 1994a). During the

[1] That exceeded for 95% of the time

[2] Resources policy for the Lark is described more fully in Chapter Five.

Figure 4-3: Anglian region annual rainfall 1899 -1995 (deviation from mean)



Source: Personal Communication, NRA, Peterborough

consecutive summers of 1989 and 1990, rainfall was at 56% and 52% of average respectively (WSA, 1991). Although this followed one of the wettest winters on record (1987/1988) which initially delayed the effects of the drought, it was much longer in duration than previous droughts, with 28 out of 38 months having below average rainfall. Temperatures were also the highest since records began and winter evaporation was higher (Thomas, 1992).

Table 4-1: Average annual rainfall in East Anglia 1989-1996

Year	1989	1990	1991	1992	1993	1994	1995
mm	587.00	447.00	500.50	682.70	808.80	676.90	431.50

Long term regional average is 615mm (Source: EA *perscom*)

As Table 4-1 shows, the next drought began in 1995. Over the twelve months, June 1995 - May 1996, most of the region received between 80% and 70% of its mean annual rainfall. The 1995 drought was a demand-led drought. The hot dry summer followed a relatively wet winter so that sources of water had been well replenished. The high demand in all sectors was due to higher than average temperatures which put stress on water resources delivery and local impacts. In particular, river flows were low enough during the summer to require restrictions on surface abstraction. For PWS, the problem in 1995 was mainly with delivery rather than resource availability, i.e. the pipes were not large enough to handle the volumes of water demanded[1]. According to the water company the largest peaks were reported to be *'on Friday nights when people got home from work, had a shower and watered the garden'*[2]. In May 1996, nearly the whole of the region was experiencing less than 70% of the mean annual rainfall for that month.

ii. *Human Geography of the Lark area*

The Lark catchment is essentially rural with the population, commerce and light industry concentrated around the old market town of Bury St Edmunds (population 32,310). Until 30 years ago, water abstraction was limited to local needs and was relatively small. Suffolk has an anticipated population increase of 1% per annum to the year 2006 and much of this will be concentrated around Bury St Edmunds and Mildenhall with a proposed 1,500 new dwellings (NRA, 1993a). Cambridgeshire is also planning 1,650 new dwellings in the south of the area near Kennett. The total population of the Lark area was estimated at 76,630 in 1984 (Barker, 1992:13).

The main stakeholders for water resources in the Lark area are described below,

[1] Anglian Water manager, *perscom*
[2] Ibid

Use	PWS	Spray Irrigation	General Agriculture	Industrial	Other
% of abstraction	58%	23%	3 %	9%	7%

Table 4-2: Percentage of licensed abstraction per use in the Ely-Ouse Catchment 1994 (NRA, 1993a)

and the main demands on water in the Ely-Ouse catchment are given in Table 4-2. As well as the water resource staff of the NRA, the groups which made up the sample for the questionnaire survey comprise environmental interests, water abstractors, recreationists, and local authority planning staff. Some of the issues and events that have influenced water resource use and management over the past decade or so are included as a context to the analysis presented in Chapters Five to Seven.

Profile of water uses and stakeholders

Environment and habitats . The Lark Valley, as well as the rivers and streams, contains a wealth of different wildlife habitats, including some areas of national importance. These habitats have been produced by the interaction of nature with the different forms of human activity in the valley over a long period of time. A large area of the Lark Valley forms part of the Brecklands Environmentally Sensitive Area[1]. The area is distinguished by light sandy soils, belts of Scots pine and areas of heathland with a rich variety of flowers, birds and other wildlife. The Breckland 'meres' are a unique hydrological feature, with a specific and peculiar assemblage of plants and invertebrates. Each mere is in direct contact with the chalk aquifer and fluctuates according to aquifer levels. The flood plain of the River Lark is largely occupied by cattle-grazed, meadow grassland, much of which has been partly drained, either deliberately or as a result of lower water levels in the river. Those areas least affected by drying out have a good range of marshy grassland species. The South Level Fens, downstream and to the west, are a type of mere that receive water from mineral ground, surface or sub-surface waters. They are wetlands, at the interface between wet and dry environments, with a wide variety of important rare vegetation communities (Beardall, 1992).

There are six sites designated as Sites of Special Scientific Interest (SSSI) in the area and the River Lark runs through two: Cavenham Heaths and West Stow Heath (see Figure 4-2). These sites contain examples of habitats for which the unique Breckland area of Suffolk and Norfolk is best known, including habitats for numerous nationally rare and uncommon species (English Nature, 1993). The area of free

[1] Areas designated by MAFF, where financial support is given in support of traditional farming practices to encourage conservation and wildlife and restoration of the landscape.

draining sandy soils supports a wide diversity of important wildlife habitats for which the river corridor is an important component[1]. Extensive areas of heather heath, lichen/bryophyte heath, inland sand dunes, fen, mire, dry and wet woodland and alluvial pasture support a number of rare species of invertebrates and plants of national importance. Cavenham Heath is also a National Nature Reserve. There are thirteen wetland Wildlife Trust sites in the Lark Valley[2].

As in the rest of East Anglia, wetlands and aquatic habitats have been under increasing pressure from water abstraction. This has meant that these habitats have been extremely vulnerable during recent periods of extreme water stress such as during the droughts of 1990-1992 and 1995-97. Rivers with reduced flows have suffered from reduced oxygen levels, higher algae growth, higher rates of silt deposition and a reduced current. In addition, low flows increase the concentration of effluent in the river. During the drought of 89-92, the Breckland meres dried out for longer periods than normal. There were several fish kills and rescues. The Brecks have been under threat from poor physical management, water quantity and quality problems and the conversion of land for intensive farming (Roughton, 1995).

The biological quality of the rivers in the Anglian region, as a whole, improved during 1990-95, mainly due to improved effluent treatment. In the river Lark itself, the effect of the water stress has resulted in low flows. Upstream of Bury, actual flows have been found to be similar to those if the river were natural. There, Barker calculates that if the full quantity of all licences were abstracted, flows would reduce by 9%, or even 80% during the lowest flow conditions. Because the river flows through the Abbey gardens in the centre of Bury, it has a very high amenity value. In the Upper Lark between Bury St Edmunds and the sewage treatment works, low flows and poor quality have sometimes reduced the amenity value of the river. Further downstream, the sewage works discharge as effluent a volume of water many times that of the main stream. Further downstream at Isleham, actual flow is less than naturalised flow indicating a net reduction due to abstraction. If all total licensed quantity were abstracted the reduction in flow would be 15% - 54% during the lowest flows (Barker, 1992). This shows that abstractions in the upper part of the Lark can cause a proportionately greater reduction in flows during critical conditions. Water abstraction from boreholes has been identified as the most important factor affecting

[1] In 1985 a *Lark Valley Conservation Project* was established by Suffolk County Council and St Edmundsbury and Forest Heath District Councils with the support of the Countryside Commission (Suffolk County Council, 1986). Its aim was to coordinate and promote recreation, conservation and tourism in the area and to manage the conflicting demands of development on the area.

[2] A detailed profile can be found in (Moore, 1994).

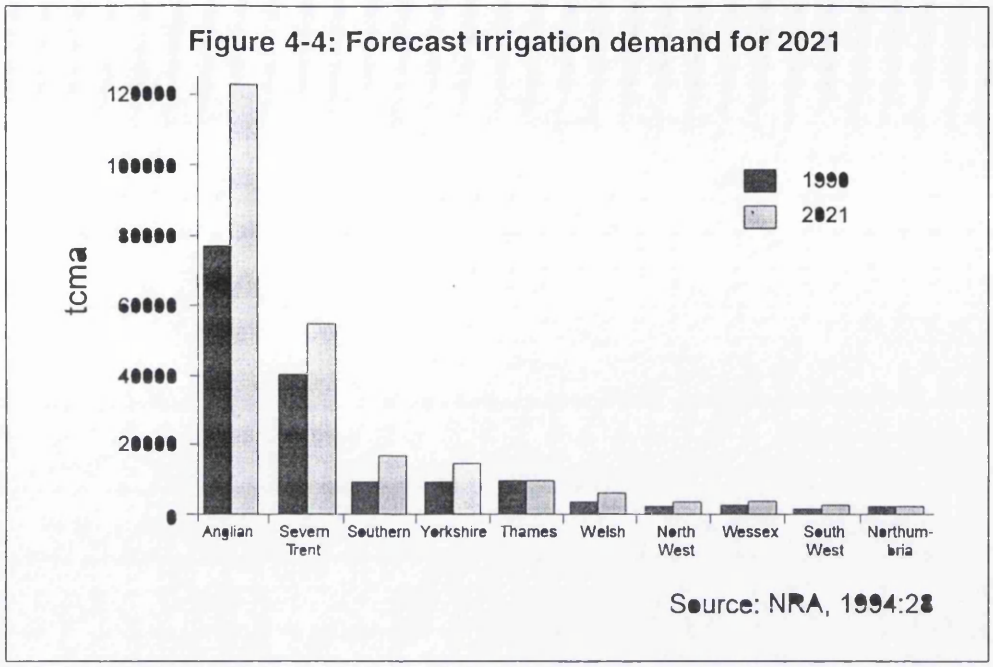
the survival of fenland habitats (Fojt, 1992). It has disrupted supply to the fens and results in an increase in the frequency and magnitude of fluctuations in the water table which can cause environmental change. Spring water is important for its influence on water and peat chemistry in the catchment.

A variety of environmental and conservation groups were contacted for the questionnaire survey - Friends of the Earth, Greenpeace, the Lark Preservation Society, Suffolk Wildlife Trust, Suffolk CPRE and English Nature. This stakeholder group was expected to be diverse in its opinions, representing purely anthropocentric views as well as the 'voice of the environment'. But all could be expected to give some degree of priority to environmental concerns and interests.

Recreation. For amenity purposes, water is used by golf clubs and football pitches, and by boaters and anglers. There is a marina at Isleham. The Lark Valley Countryside Park is an important tourist attraction linked to the water environment. As well as environmental and conservation groups, the survey included local Anglers Groups and Boating Association members.

Fisheries and fish farms. The NRA/EA has a duty to maintain, improve and develop fisheries and to further the conservation of fish species. The Lark supports both coarse fisheries, and natural and introduced brown trout populations. Its tributaries are relatively small streams and are therefore of little recreational value but are considered to be of importance for the breeding of brown trout. Its lower navigable sections form part of the Denver Pond and are defined as requiring protection as a coarse fishery under EU Fisheries Directives. Water is abstracted to maintain a level and flow in one fish farm in the River Lark, but this is returned to the water course in total. A fish nursery is run by the EA in the Cut Off Channel which means that flow and quality must be maintained in it by diversion from the Lark. The upper River Lark is primarily trout fishery controlled by various trout fishing clubs and individuals. During drought conditions the diminished flows in the upper reaches of the river causes loss of habitat.

Agriculture . By far the largest number of abstractors from both groundwater and surface sources are agricultural and their use represents the second largest abstraction demand after PWS. There are about 420 licenses for general agriculture abstraction, and 548 for spray irrigation in the Ely-Ouse catchment as a whole, reflecting the rural character of the area (NRA, 1994b). Three percent of water is for general agricultural purposes, such as livestock watering, and 23% is for spray



irrigation (Table 4-2). Above the aquifer, 20-30% of land area benefits from spray irrigation and in the fens this figure rises to 70% of land (NRA, 1993a). Arable farming is the general rule with the fen deposits forming highly productive Grade I land in the lower part of the catchment. The majority of spray irrigation in the fen area uses water from the drainage channels controlled by Internal Drainage Boards (IDBs). In England and Wales, local drainage authorities (funded by local authorities and the NRA/EA) are responsible for maintenance of internal flood defence and drainage systems in rural and urban low lying areas. In the Anglian region, the role of the IDBs in water resources management is particularly crucial in the maintenance of the fenland drainage channels and pumping stations. Members are elected locally by farmers and nominated by district councils. The Lark Valley area is served by the Mildenhall IDB, Burnt Fen and Middle Fen IDBs.

Forty eight percent of the irrigated land in England and Wales is in the Anglian region, where the demand for irrigation water has more than doubled since 1976 (Weatherhead et al, 1994). The increasing usage, combined with more specific scheduling and timing is leading to higher peaks in irrigation demand collectively over the catchment. Irrigation demand is concentrated in the summer months when supplies are scarcest, and almost all water for irrigation is lost from the catchment to the atmosphere. For this reason agricultural abstraction is significant in water management strategies. As the region suffers a soil moisture deficit every year, some degree of irrigation necessary.

However, it is demands by the food supply system that have placed extra quality and yield demands on farmers and so increased pressures for more intensive irrigation. With new irrigation technology, the farming of potatoes and other vegetables has spread to the Breckland areas because the sandy nature of the soil means that drainage is good, it can be worked for root crops 365 days of the year, and gives good skin quality to the vegetables. The majority of the fens are irrigated by licensed abstractions using water released via 'slackers' out of the drainage channels. These also maintain water levels in the sub soils. The releases are unlicensed because transfer is via gravity and therefore not considered as abstraction. In the Ely-Ouse catchment this water represents ten times the quantity that is licensed for irrigation (NRA, 1993a:19). Being outside of the NRA/EA control, these releases can have a potentially damaging effect on the feeder river. Figure 4-4 shows the NRA's 1994 forecast for irrigation demand in the UK. A recent report forecasted direct abstractions for irrigation in the Anglian region to grow by 60-75% over 1991-2021 with climate change potentially adding another 45-50% of estimated 1991 demands to that figure (Herrington, 1996).

As well as from farmers, data for the research was collected from other 'agricultural stakeholders' including IDB representatives, agricultural consultants and a representative of the National Farmers Union at the national and regional level.

Public Water Supply. In the Ely-Ouse catchment as a whole, there are 42 PWS boreholes into the chalk aquifer, which, as well as serving local populations, meet needs outside the area. Fifty eight percent of the total water licensed for abstraction in the catchment is for PWS. In the Lark area, public water supply is undertaken by Anglian Water Service Ltd (AW), the largest water company in the Anglian region which, local to the Lark, has licenses for 11 boreholes[1]. All the towns and villages in the area are supplied with groundwater from the chalk aquifer. Approximately half the water abstracted for PWS returns to the river Lark system via sewerage treatment works (Barker, 1992). The remainder is consumed, or leaves the catchment as water supplied to towns outside the area.

In 1963 in the Anglian Region, consumption was 90 litres per head per day, compared to around 145 litres per head per day in 1995 - an increase of more than 60%. Since 1976, the total quantity of water licensed for PWS in the Anglian region as

[1] Geographically, it is also the largest of the 10 regional water services companies in England and Wales. It provides 1,160 million litres of water each day to water to 3.9 million people and also sewage services to 5.2 million (Anglian Water's Annual Report, 1995). The Cambridge Water Company operates in neighbouring areas.

a whole had increased by about a third (Thomas, 1992). However, the NRA calculated a 26% surplus of allocated water for PWS using 1991 demand levels for the Anglian region as a whole (NRA, 1994b:16). In 1990, total regional demand met by AW was forecast to rise but, by 1993, this had been reassessed as a decline of 8% by 2001; a consequence of the promotion of demand management. However, for the Bury St Edmunds region, the need for transfers from adjacent zones was anticipated (NRA, 1994c).

Domestic Wells. A number of households in the region are supplied by private water undertakings, wells, springs or boreholes for domestic use - roughly estimated at around 100 abstractors[1]. These must be registered with the local authorities and tested regularly to ensure that their quality meets legal standards for drinking water. Under the Water Resources Act 1991, these do not require licenses when the abstractions are less than $20m^3$ a day.

Local Authorities. Local authority staff involved in water resource issues in the Lark area range from planners to conservation staff and local nature wardens. The NRA/EA is a statutory consultee on local development plans and on environmental assessments, however planning guidelines do not require development to be constrained by water resource availability. Generally, the staff I spoke to were not aware of acute water resource problems in the area, other than local conservation issues such as water meadow drainage[2].

Industry. The greatest concentration of the 50 industrial licences (9 million m^3, 9% of the water) in the Ely-Ouse catchment is around Bury St Edmunds (20 licenses in the Lark Valley area). The industrial uses of water in the Lark area range from food processing in the main (poultry, sugar, dairy, drinks, malting, vegetable washing) to sand and gravel washing, cooling, vehicle washing, concrete manufacturing, laundry and a caravan park. Because of this variety, the concerns of industrial abstractors are likely to be varied. Generally, industrial processes which need water for the product result in a low return of water to the catchment, but the largest single abstraction is for sand and gravel washing which is not highly consumptive. As well as direct abstraction, which fell by 28% in the Anglian region between 1989-93 (Rees & Williams, 1993:83), industry also uses water supplied by the private water companies.

National Rivers Authority. The NRA was charged with the physical management of water supply sources, and the regulation of resource use through the abstraction

[1] St Edmundsbury Borough council, *perscom* 1996.
[2] Their concern had mainly involved water quality and aquifer protection issues.

licensing system, as well as being required to take action to conserve and enhance the aquatic environment[1]. The NRA was a non-departmental public body, sponsored by the Department of the Environment and with policy links to the Ministry of Agriculture, Fisheries and Food, and the Welsh Office. At the national level, the NRA was headed by a board of 15 independent members appointed by the Secretary of State for the Environment acting autonomously. It was funded by a combination of government grant and self-generated income from its own charging schemes. The NRA maintained a 10 region organisation for its operational and regulatory functions. inheriting many of the staff of the previous Water Authorities. The staff who acted as informants for my study were those of the Water Resources function at the regional and area levels (such as licensing officers, engineers and resource managers), plus a few officers in the conservation function.

III Data Collection

To build a picture of the different meanings of fair water resource management, three arenas of investigation are used:

- The first focuses on the perceptions of individual stakeholders; their justice beliefs and judgements of fairness
- The second investigates established principles guiding the regulatory body and the legislation that shapes its policy and implementation practices.
- The third focus is the occurrence of actual incidents of water resource problems, the grounds on which they are based and how they are understood.

The necessity for different types of information means that a multiple strategy, a 'triangulation' approach, was employed. This section describes how the self reporting techniques of interviews, and a questionnaire survey were complimented by documentary sources, analysis of licensing data, and observation of a public enquiry[2]. The aim was to use techniques which would capture the range of beliefs and attitudes

[1] See NRA, 1993:8 for a list of its duties and powers. The water resource duties and responsibilities of the NRA were consolidated in the Water Resources Act of 1991 and later modified in the Environment Act of 1995. Besides water resources, its other separate functions were flood defence, water quality, fisheries, recreation, navigation and conservation. The NRA was succeeded by the Environment Agency in April 1996.

[2] Mason (1994) suggests that a key challenge in integrating qualitative and quantitative data is developing the necessary technical competencies to both collect and deal with the data. I certainly found this to be true for a PhD study in which the research is usually carried out by a 'sole' researcher. I found that I had embarked on the simultaneous conquering of several mountains: to gain qualitative research and analysis skills, as well as becoming sufficiently proficient in the principles and use of statistical methods employed by psychologists, and the quantitative data manipulation used by hydrologists.

and allow an understanding of water resource problems in the catchment. Although the overall methodological strategy emerged from the conceptual framework, the choice of techniques was an inductive processes, as new data collected in turn revealed new data requirements. To a certain extent the research began as a 'soft systems approach'[1], using exploratory interviews to establish and frame the empirical research problem. It was not obvious prior to the empirical work how the concept of 'fair water resource management' would be interpreted in the field, thus a considerable amount of 'scoping' was required to identify the types of issues that were germane and the types of stories that would be told.

A strategy was eventually employed which combined an exploration of attitudes, judgements and fairness principles, among stakeholders and the regulator, with an examination of resource conflict and competition. The research developed in the main as a retrospective look at experiences during the period 1989-1995 with some reference to the contingent situation in 1996. This meant that although the National Rivers Authority (NRA) was replaced by the Environment Agency (EA) during the course of the fieldwork in April 1996, the comments by stakeholders in the catchment concerning the regulator are in fact referring to the NRA. Also, the research was carried out during a particularly 'problematic' year for water resources. In 1995, the UK experienced a severe drought (which was to last until 1998 in some regions). The lack of rainfall and high temperatures meant that restrictions were being imposed in many areas in the form of hosepipe bans for domestic users, irrigation restrictions in the agricultural sector, and environmental problems of dry or low flow rivers were being experienced. As described in Chapter One, throughout the fieldwork period water issues were receiving wide media coverage, although this mostly concerned political debate around domestic supply[2].

Data collection took place during numerous trips to East Anglia and the Lark Valley area during 1995 and 1996. To summarise, the study process entailed:

1. Exploratory interviews: area identification, issue and stakeholder familiarisation [1995]
2. Data collection on water resources licensing and abstraction [early 1996]
3. Archival research for issues of conflict and ideas of fairness within the NRA [early 1996]

[1] A soft systems methodology is employed when a research problem has no preconceived form but is allowed to emerge through the process of the research (Checkland, 1984; Thompson and Warbuton, 1985)

[2] When this project was initially conceived, my aim had been a comparative study of water fairness issues in England and Spain. In 1995, I spent 3 months in Andalucia investigating the water resource issues there. The cultural and political complexity of this topic, especially at a time of a serious drought, meant that this particular aim for the PhD had to be abandoned.

4. Observation: of a public hearing of an appeal against licensing decision [July 1996]
5. In depth interviews and survey piloting [May 1996]
6. Questionnaire: development and mailing [January-June 1996]
7. Identification of national and regional policy and strategy documents [1995-1997]

Interviews

Interviews were conducted throughout the various stages of the research. Initially, exploratory interviews were carried out with a wide range of key actors in the Anglian region, and with representatives in national organisations. These interviews ranged in length, depth and usefulness (some lasted 2 hours or more, others 20 minutes), and became more focused as the research progressed. Once the research aims had become more precise and the specific catchment to be studied had been identified, return visits were made to carry out more in depth, and a number of shorter interviews. A full lists of informants is given in Table 4-3.

Knowledge of the study area and the water resources issues were gained through a series of exploratory field trips. These consisted of a number of visits to, and unstructured interviews with, a range of key water managers, users and interest groups. Individuals were initially identified through a 'snowball method' (Moser and Kalton, 1989), or through official publications in the public domain. The purpose of the initial exploratory interviews was three fold: to develop a set of research questions which were relevant to the local case by identifying live and significant issues; to test how concepts developed from the literature would be received in the field; and to gather contextual facts and identify further sources. I was concerned to understand the different interests involved in water management and how people felt about water resource issues. Generally people were very co-operative, willing to express their views and showed no resistance towards the ideas being explored. In fact, the interviews confirmed the saliency of the theme of the research, and many informants were delighted to have the chance to air their views.

Moser and Kalton (1989) suggest three simple conditions for a successful interview. *Accessibility* concerns whether or not the person has the required information to answer the questions. The aim of familiarisation interviews was to determine whether or not this was the case, i.e. to identify useful sources. I made sure to emphasise that the purpose of the interview was purely exploratory, and that I would be interested in whatever they might feel was a relevant topic[1].

[1] McCracken (1988:22) talks about 'manufacturing distance;' as a way of creating more 'critical awareness' for the researcher. To a certain extent, I felt that in working in a culture, sector and area with which I was not initially familiar, provided me with a distance and therefore an advantage.

Table 4-3: Interviewees and informants for the empirical research

Exploratory Interviews and Meetings, 1995 and 1996

March 1995	
Water Resources Planner & Manager	*Anglian Water Services plc, Cambridge*
Water Resources Manager	*NRA - Anglian Region, Peterborough*
Planning Manager	*Essex and Suffolk Water, Chelmsford*
Water Resources Officer	*National Farmers Union HQ, London*
September-December 1995	
Conservation Officer	*NRA - Anglian East Area, Ipswich*
Licensing Manager	*NRA - Anglian East Area, Ipswich*
Water Resources Manager	*NRA - Anglian Region, Peterborough*
Water Resources Planner & Manager	*Anglian Water Services plc, Cambridge*
Information Officer	*Cambridge Water Company.*
Manager	*Customer Services, OFWAT Eastern*
Environment and Transport Dept.	*Suffolk County Council, Ipswich*
Head of Planning	*Brecks Council*
Farmer	*Suffolk*
Water Officer	*NFU, East Anglia, Newmarket*
Water Policy Officer	*NFU, HQ, London*
Water Policy Officer	*RSPB, Sandy*
Water Resources Officer	*English Nature, Peterborough*
Conservation Officer	*English Nature, Norwich*
Manager	*English Nature, Bury*
Local representative	*CPRE - Norfolk*
Norfolk Wildlife Trust	*Norwich*
Principal hydrologist	*Groundwater Centre, NRA,*
March 1996	
Conservation Manager	*Suffolk Wildlife Trust*
Conservationist	*Suffolk*
Association of Drainage Authorities	*Huntingdon*
Chairman	*National Campaign for Water Justice, London*
Chair and MP	*All Party Parliamentary Water Group, Westminster*

In Depth Follow-up Interviews, March-May 1996

Water Resource Managers x 3	*NRA - Anglian Region, Peterborough*
Water Resource Managers, Engineers, Licensing Officers	*NRA Central Area Office, Brampton*
Agricultural consultant	*Suffolk*
Four farmers	*Suffolk*
Water Resources Manager	*Anglian Water, Cambridge*
Conservationist	*Suffolk*
Conservationist	*Suffolk Preservation Society*

This covered the second of Moser and Kalton's conditions; *cognition*, or the understanding of the interviewee of what is expected of them:

> *Without this, the person being interviewed may feel uncomfortable and this affects the resultant data. For these reasons, clarification is not only practical, but also an ethical and theoretical consideration.*
>
> (Moser & Kalton, 1989:97).

Before each interview, I explained that I had no academic bias nor personal involvement with water issues. I tried to conduct the interviews more as conversations, guided by issues that were raised by the respondents themselves so as to ascertain how they interpreted 'fair water resource management'. On occasions, this meant that I took the position of devil's advocate, agreeing as well as disagreeing with their comments[1], but I was always careful to explain openly that this was my tactic. I found this to be very effective at creating a more 'natural' social relationship. I often presented the interviewees with a philosophical or social dilemma which, rather than being dismissed, were actually enjoyed[2]. Many informants commented that they found the conversations interesting, and this helped disclosure of emotional as well as rational responses[3]. As well as the interviewees using the interview to reflect and engage, and to move away from official rhetoric, I openly offered my own assumptions and interpretations to the interviewee. Although a certain degree of formality was maintained, I was not, and did not present myself as an 'expert'. By making this explicit, the effect was to draw out the informants more than they perhaps would have done to an 'expert'[4].

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[1] McCracken (1988:26) writes that '*the best manner in which to manipulate the presentation of the self for interview purposes is to strike a balance between formality and informality... A certain formality in dress, demeanour and speech is useful because it helps the respondent caste the investigator in the role of the 'scientist', someone who asks very personal questions out of not personal but professional curiosity. This formality also helps to reassure the respondent that the investigator can be trusted to maintain the confidentiality .... promised. A certain balanced, informality is useful because it reassures the respondent that ... the investigator is not a cold distant creature unacquainted with or indifferent to the complexities and difficulties of the respondent's lifeworld*'.

[2] McCracken advocates that '*the investigator must help the respondents to recover his or her beliefs and actions from .. (their) taken for granted state*' (McCracken 1988:23)

[3] I experienced the importance of 'self presentation' first hand when I received a letter from a farmer who had heard from another farmer that I was 'anti-farming'. He said he was very sorry to hear this as he had not believed this to be so during an interview we had previously had. I traced the rumour to a workshop at a conference where during a group discussion I had asked a question concerning agri-environmental issues. The hat of the 'devils advocate' was obviously invisible to his informant. May (1993:119) assures that it is important not to take such approaches as evidence of personal weakness, but to consider them as useful evidence of underlying tensions and concerns within the system or organisation being investigated. The farmer was clearly extremely keen to defend his interests.

[4] One farmer expressed concern that I would be basing my project on incorrect information given by 'ignorant' people and on 'mere opinions rather fact'. I tried to reassure him by explaining that what people *believed* to be true was interesting and that their opinions were the 'facts' that I was studying because, as Pepper writes, quoting Pryce (1977), "*Biased, or indeed, completely erroneous ideas concerning the ... environment are just as influential as those conforming to the real world*" (Pepper, 1984:7). This interaction with an informant was a 'reflective moment' in the process of the research as it actually helped me to clarify my methodological position.

The third condition identified by Moser and Kalton is *motivation*; the subjects feeling that their participation and answers are valued. Explaining that the research involved exploring different opinions, and that therefore all opinions were important, meant that 'negotiating access' and eliciting information was generally untroublesome despite 'water' being a fairly contentious issue.

The early interviews enabled me to gain an overview of the current fairness issues of concern to the different stakeholders and to identify a case study area. They were also invaluable for understanding the local issues, problems and conflicts in the region, for making contacts, and identifying and locating sources of information[1]. The familiarisation exercise was most useful in helping conceptualise a bridge between broad theoretical ideas for research and the field. Exploring equity through ideas of fairness, or to be more precise, unfairness and conflict, was confirmed as a relevant approach.

Given the success of the initial interviews in providing rich data, I did not consider it imperative to use a structured interview schedule. Allowing respondents to talk quite freely meant the ideas of fairness they were discussing could be placed in the context of other issues that they felt were connected.

> *...a phenomenon like rambling can be viewed as providing information because it reveals something about the interviewee's concerns. Unstructured interviewing in qualitative research, then, departs from survey interviewing not only in terms of format, but also in terms of its concern for the perspective of those being interviewed.*
>
> Bryman (1988:47) (quoted in May, 1993)

However, as the research themes developed, the interviews became more targeted and a semi-structured format was adopted to ensure that gaps in data were filled, particularly during later in depth interviews concerning more local issues in the Lark Valley. Where prompting or a direction was required, examples of the general questions put to stakeholders are shown in Box 4 a. The later interviews were also focused more on accessing cultural assumptions, meanings and differences, and as such were more directed at 'mining' rather than 'surveying' the terrain (McCracken, 1988).

Fourteen of the total of 36 interviews were recorded, and these interviews were later transcribed. Initial exploratory interviews were not recorded as they were broad in content. Two informants requested that the tape recorder not be used, and on other occasions I felt that it was either impractical (due to background noise, for example) or

[1] When I approached one NRA office for some contacts for 'friendly farmers', they replied that they '*could not recommend any particular abstractor who is friendly*'!

Box 4 a

Examples of questions asked of all stakeholders

- What do you think are the fairness issues within the water management system?
- What is unfair or fair with the system for you?
- Are you aware of any unfairness for others?
- What has been the effect of drought?
- Are you aware of any conflicts?
- How do you see things as changing and why?
- What are the criteria or ideas of fairness used in your organisation?

Examples of questions asked of NRA

- What differences have discourses on sustainability made to water resource management and regulation?
- What impacts resulted from the drought of 91-92 a) on users b) on regulation.
- NRA staff - how have your procedures changed since 1989?
- Has regulation grown tighter and how?
- Can you comment on the fairness of the system, or any inequities that have developed since 1989?
- What has influenced any changes in water resource management?

would negatively affect the quality of the responses that the interviewee would provide. During these interviews brief 'scratch-notes' were made which were then added to immediately following the interview (Emerson, Fretz, and Shaw, 1995)[1].

Questionnaire

Once it had been decided that a large sample would be needed to elicit the full range of ideas about water justice and allow comparisons across and within stakeholder groups, a postal questionnaire was considered as the appropriate tool of data collection. The interviews had already revealed that stakeholders did not find the concept of 'equitable water resource management' difficult or too abstract, and the aim was to target a relatively 'water literate' population. I used the interviews to inform the design of attitude statements and other items in the survey (Sieber, 1979). The postal survey was used both to complement interview data, and, through a *quantitative* component, to identify and give a structure to general attitudinal patterns and water 'philosophies' in the catchment[2]. The quantitative data was informed by a *qualitative* component which revealed actual experiences and judgements and meanings.

[1] I would like to note the bias that I found in the field towards *in*equity and *un*fairness. It is easier to investigate inequities than equities, dissatisfaction than satisfaction, as they are better documented and are more easily recollected. I found during the pilot interviews that people were more able to express their frustrations than their reasons for finding the system fair.

[2] It was not within my resources to do a 'house to house', personal questionnaire survey.

Design . The questionnaire was to contain a mixture of closed and open questions, and attitude statements, in order to collect qualitative and quantitative data. A copy of the questionnaire is included as Appendix 1[1]. The design of a questionnaire requires detailed planning regarding the information to be collected and consideration of how the data are to be processed and interpreted (Moser & Kalton, 1989:43; Oppenheim, 1992). Because it was to be self administered, the questionnaire had to be designed with particular attention to ensuring that the questions would be correctly interpreted. The questions therefore needed to be expressed in lay language, as far as possible, with simple working and unambiguous terms, free from technical terms to maximise the ability of people to give accurate answers. To maximise co-operation, I tried to ensure that respondents were aware of the importance of their views and of the relevance of the questionnaire to their water concerns. An emphasis was placed on this in the covering letter. The main challenge was in containing the length of the questionnaire. Surveys which are too long tend to have low response rates, yet the temptation is to ask everything that might be interesting. Attention had to be paid to avoid 'respondent fatigue' and to encourage 'quality' completion of answers. Following a pilot run of the questionnaire[2], a balance had to be struck between collecting brief responses which could be used quantitatively and longer responses which would be valuable for qualitative analysis and for improved interpretation.

Sample. A self-administered 10 page questionnaire, together with a covering letter and a pre-paid envelope, was sent to 337 stakeholders in the Lark area. The principal goal in selecting the sample population was that the full variability of views on water justice would be represented. The range of stakeholder groups and interests in the Lark area were identified during the pilot studies. As the aim of the questionnaire was to explore the ideas of the 'water community' of the Lark, only those who had a

[1] The questionnaire was adapted slightly when sent to NRA staff by removing, for example, sections dealing with opinions on and experiences with the NRA.

[2] Trial and error is an unavoidable part of questionnaire design (Moser & Kalton, 1989:47). Draft copies were sent out for expert comment before piloting on 11 representatives of the sample range outside of the catchment itself . The overall theme was understood and confirmed as relevant and topical by all pilotees and the overall structure was well received. Different respondents reacted positively or negatively to different questions, but there were none which received unanimous rejection or that respondents felt uncomfortable answering. However, several problems emerged which were easily dealt with. For example: questions which invoked repeat answers, the level of detail required would demand too much time, terms which were poorly understood, occasions where oppose/support was thought more relevant than 'fair'. Some respondents felt that the question was not applicable to their particular stakeholder group or felt that they had insufficient experience to be able to make judgements. It was impossible to make all of the questions relevant to all of the stakeholders, but the instructions to the questionnaire were written so as to encourage respondents to answer questions as best they could and emphasised that no specialist knowledge was required. Rather than inducing the contemplation and free response hoped for, some of the open questions were skipped by respondents indicating that they needed to be more specific or else dropped.

connection with, or interest in, water issues were sampled. The questionnaire did not seek comparison with the views of the wider or non-water aware population in the Lark as water management issues concerning the latter are likely to be different to those of licensed abstractors; e.g. hosepipe bans, water company salaries etc. which are beyond the scope of this study. The sample population can be defined as water resource abstractors and 'water-aware' non-abstractors. The full population of *abstractors* were included - sourced from the licensing data base of the NRA[1], plus the register of domestic well users held by the local district council of St Edmundsbury. The *non-abstractor* groups were formed of other stakeholders drawn from local environmental and conservation group members and staff, angling groups, the boating association, agricultural representatives, planning staff in local authorities, some business interest groups, and water resources staff of the area office of the NRA . Table 4-6 below shows the composition of the sample. (p142)

Structure, aims and rationale of the questionnaire . The main aim of the questionnaire was to investigate perceptions of the degree and nature of water problems, and following arguments made in Chapter Two, to establish whether support for demand and supply strategies (i.e. the acceptability of change required for sustainability), could be predicted by judgements of the regulator and the current management system, and whether these judgements could, in turn, be predicted by 'water justice beliefs', and stakeholder type (see Figure 4-5). Ajzen (1991:4) suggests that attitudes are evaluative, and can represent disposition to act favourably or unfavourably towards an institution or event, for example[2]. Attitude measurement is a standard instrument used to gain insight into what people feel or believe (Robson, 1993:255). Attitude measurement may be both qualitative, identifying statements or traits that characterise an attitude, or quantitative, using scores on a scale (Ajzen 1991:14). The intention was to examine the relationship between variables as shown in Figure 4-5. Designing attitude and belief statements requires prior knowledge of the issue or institution to be evaluated. Such knowledge was gained through the interview process, and a study of water allocation policy and strategies.

There are five main sections to the questionnaire (see Appendix 1):

[1] I had established that NRA would supply the names and addresses of all abstractors within the three surface units covering the Lark Valley. Although the full population of licence holders were to be targeted, the coverage would only be as precise as the NRA data base and I had been warned that it was not always strictly up to date or accurate. A handful of applicants who had been refused licences were included.

[2] The intention here is descriptive rather than prescriptive. Ajzen's theory of planned behaviour introduces several variables which qualify the attitude to behaviour relationship (Ajzen, 1991: Ch.6).

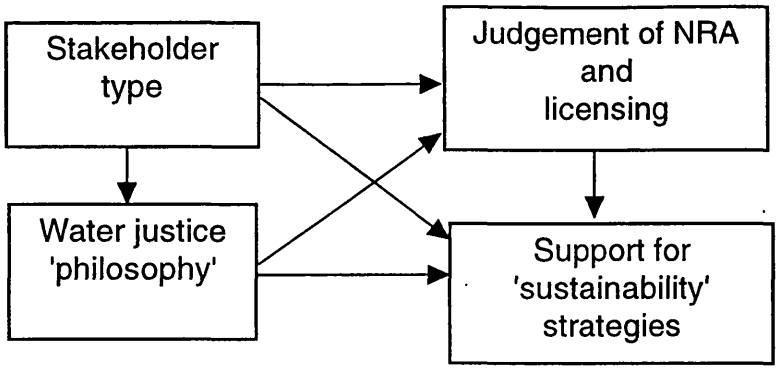

Figure 4-5: Relationships to be tested using questionnaire data

1. Your Concerns about Water
2. Your Use of Water Resources
3. Ways People Think About Water
4. The Fairness of Water Management in East Anglia
5. Difficult Decisions in the Lark Valley

Section One: 'Your concern for water'. Following standard practice (Moser & Kalton, 1989:346), the opening questions were ones which the respondent should have little difficulty answering and should inspire interest to continue. This section asked respondents to classify themselves into a stakeholder group and to indicate their concern for water scarcity and conflict. Open questions allowed respondents to indicate their general feelings about water problems and so created a context for the remainder of the questionnaire. The basis for people's opinions will depend to a certain extent on what they 'know' of the system, the degree to which they feel that there is a resource problem and what has caused it. Also significant would be how important water issues were to the respondents. One question aimed to test factual knowledge by asking about the ownership of water.

Section Two: 'Your use of water resources'. These questions characterise abstractors by licence size, need for water, and recent experiences. It introduces the idea of fairness in considering their licences.

Section Three: 'Ways people think about water'. This section aimed to characterise the 'water culture' in the catchment. The first question asks respondents to rank the importance of different water uses. The second question asks respondents to rate their agreement/disagreement with 26 statements designed to reveal what Syme refers to as a 'water philosophy' (Syme & Nancarrow, 1996)[1]. The final statements used were a mixture of those used in similar studies conducted in Australia and the

[1] Identifying statements which show an 80% agreement should indicate the general cultural approach to water allocation (Syme & Nancarrow, 1996:14).

USA but adapted for the East Anglian context (Lynne, Million, and Wilson, 1990; Syme and Fenton, 1993; Syme and Nancarrow, 1996), and items which emerged from issues and viewpoints that I came across in the field. The statements reflected different types of equity concepts (such as equality, proportionality and procedure) (Rasinski, 1987), and environmental and water justice beliefs which reflect a range of principles relevant to water resource management; for example, perceptions of rights to and ownership of water and responsibilities to society[1] (Hayward, 1995; Wenz, 1988) (see Table 4-4). Respondents were asked to rate agreement or disagreement with 26 items on a 5 point Likert scale (Moser & Kalton, 1989:365)[2].

Section Four: 'The fairness of water management in East Anglia'. The questions in this section investigated judgements of the NRA and the licensing system using open and closed responses, and a second attitude scale of 14 items worded in both a 'for' and 'against' direction. These 14 items were adapted from some of those used by Syme and Nancarrow (1992) as well as including issues identified in the field. Respondents were asked to comment on whether 'fairness' had improved and, because fairness is relational, to indicate how they considered that other groups 'faired' under the existing water management system.

Section Five: Difficult decisions in the Lark Valley. This section explored attitudes to a range of demand management and supply augmentation strategies identified from NRA strategy documents as options for achieving sustainable resource allocation and use (NRA, 1994b,c). The aim was to determine the levels of acceptability of limiting availability and changing attitudes to use. Respondents were asked to rate whether they supported or opposed the strategies according to a five point scale, and also to give the reasons for their opinions. Other questions tested responses to various scenarios likely to occur with resource stress. A final set of questions was used to indicate socio-economic characteristics of respondents.

Non-participant observation

Observation, by obtaining information directly, compliments both the self reporting of beliefs or action, and the use of reports compiled by others. According to May, the use of an observational technique:

> *... leads to an empathetic understanding of a social scene. It excludes, over time, the preconceptions that researchers have and exposes them to a new social milieu which demands their engagement.* May (1993:114)

[1] I am not attempting to test for the presence of all theories of justice inclusively, or to label the justice beliefs found according to an established justice type. Indeed, Wenz (1988:310) ends his study of justice theories with the conclusion that no one theory is flexible enough to accommodate all our considered views about how particular matters of justice should be decided.

[2] Moser and Kalton (1989, Ch.14) and Robson (1993) give a detailed account of the use , rational and validity of attitude scales.

Table 4-4: Questionnaire items which represent different notions of equity

Equality

- All users have the same rights to water
- It is not fair that one neighbour may have a permanent licence while the other can not get one at all
- In water allocation all types of users should be treated equally
- Neighbours should have the same conditions on their licence, even when their abstraction has a different impact on water resources

Proportionality

- Existing abstractors with large licences should forfeit some water for new applicants
- Water should be allocated to maximise the benefits to the community as a whole
- Water should be cheaper for important uses

Procedural

- I don't care how decisions are made as long as the right people get enough water.
- It is impossible to have a decision making process which is fair to everyone
- If the public are fairly consulted I am happy with whatever allocations are decided

Sustainability and environmentalism

- It is important to think now about the water needs of future generations
- There is a moral obligation to involve all sections of the community in water management decisions
- Water can only be allocated for human use after the basic needs of the environment have been satisfied

Others: Rights, efficiency, economic good, common good, uncertainty, utilitarianism ...

- Cultural values and tradition should be taken into account when making water management decisions
- First come first served is the best way to allocate resources
- How much people are prepared to pay for water is a good way of deciding who has rights to it
- If I have a licence that I no longer need, I should be allowed to sell it to someone who needs the water
- If people live in a water scarce area, they should pay more for water if it costs more to provide it
- If water is allocated for the environment, environmental groups should pay for it in the same way that other users pay
- It is not right for businesses to go short of water to protect the needs of the environment
- Present licence holders have a greater right to water than newcomers
- Profits should not be made by those supplying or managing water resources
- Water licences should be targeted to encourage economic growth, rather than given out according to 'first come first served'
- Water resources should be regulated by a public body
- Water resources should never belong to private individuals
- Water should not be bought and sold as an economic commodity

Direct observation was used in this study to collect data on a case study of conflict over water resources. I attended a 3 day public hearing in July 1996 into an appeal against a licensing decision by the NRA. An industrial applicant was questioning a decision by the regulator to embargo new abstraction in the Lark catchment, while the domestic water supply company was holding on to rights to water that it was not using. The hearing was dealt with by the Planning Inspectorate of the Department of the Environment and was attended by the NRA, the industrial applicant and representatives of the local water company. Alongside official submissions by the industrial applicant and the NRA, extensive fieldnotes taken during the hearing and interviews with the parties concerned were used to explore the representations made by each, in particular the 'justice foundations' of the claims made, how those claims were argued through. To focus on a particular social event was useful for observing the how the arguments made by different stakeholders were played out and addressed in a shared context.

Documentary and archival research

Documentary sources were used for a variety of data needs, principally:

- to construct a water resource profile of the catchment - both availability and use
- to identify the legislative duties of the regulator, the structure and nature of the regulatory and water resource management system and the principles upon which it is based
- to identify policy changes and incidents of conflict over water resources allocation
- to examine the arguments, rationality and notions of equity within policy, and the operational strategies of the NRA.

The main documentary and archival sources used were the local licensing data held by the NRA, Parliamentary Acts, and national, regional and local water policy documents[1].

To understand how the licensing system was judged in the Lark catchment, an overview of actual licensing was required. Licensing data are of use for quantitative and qualitative analysis. All abstractions from surface and groundwater over 20 tcma

[1] An attempt was made to analyse local press at the Bury Library and Suffolk County records office for coverage of water resources issues, but having spent two days in the above archives I was disappointed by the newspaper coverage and decided that little reward was to be gained relative to the time required to track down the data. Two clippings were found from the East Anglian Daily Times (1989): June 21; "*Conserve Water* call as supply crisis looms" in which 'selfish' gardeners were blamed for jeopardising supply of high-ground customers and June 29, "Authority in bid to stop water theft", about farmers who were stealing water and impacting on water quality and the environment.

require a licence under the Water Resources Act 1991 which may specify daily or annual amounts, as well as flow or level conditions. Most abstractors are required to meter their abstractions and complete an annual return (April to March) giving details of actual abstraction. The NRA stored these quantitative data on a computer data base. Although licensing data are in the public realm, annual returns for individual licences are not readily available. I did negotiate access to the archived licensing files, and obtained licensed amounts and returns classified by 'use type' for the period 1989-1995[1]. No previous analysis of licensing data for the three surface water units was available and I intended to use the database to provide a resource context for the research which was not available from other sources[2]. The data extracted from the NRA database, although available in electronic form, proved to be far from user-friendly and difficult to format. Files were not easily transferable into a spreadsheet in a form that allowed the data to be easily manipulated. Analysis was, for example, complicated by the following:

- where a license was an aggregate of different sources, the aggregate amount abstractable was repeated for each source so that the summing of licensed amounts was impossible without duplication
- many licenses were dual purpose which means they would be counted twice
- data supplied as 'new licenses' for a particular year also contained 'renewed' (i.e. not strictly new) licenses which were indistinguishable
- data supplied as 'revoked' licenses, included expired time-limited licenses, as well as licenses given up for any other reason and so were indistinguishable
- the NRA could not guarantee that all 'returns' had been entered up to date
- time-limited licenses which had already expired, but were awaiting renewal were not included in the data although abstraction continued.

Many of these points were discovered only after long periods of time spent on the data. In Appendix 2 to this chapter, I have therefore included some of the results that were obtained with explanation and interpretation where possible[3]. The data do permit a useful representation of patterns and trends.

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[1] Domestic use from private wells was not included in this data as most fall below 20 tcma.

[2] As will be explained in the following chapter, a resources report was available for the groundwater unit of the Lark, but this did not correspond exactly to the area covered by the questionnaire.

[3] I wish to point out that the licensing staff at the NRA were extremely helpful in providing the data. As is often the case though, it was necessary to know what existed before being able to negotiate access to it. I believe that, having learnt the lessons with the data files, a return to the licensing data would prove more fruitful. However, the advice of the staff was that analysis of the data would require ploughing through the pages and pages of printed output by hand to overcome the difficulties that I have listed. As

Qualitatively, access to the licensing *archives* provided a useful source of information on conflicts between individual abstractors and NRA through the analysis of documentation such as correspondence with licence holders or their representatives, and NRA consultees. Information was also provided by licensing staff on recent applicants, potential and existing abstractors whose applications have been rejected, or deferred, due to an embargo. They also recorded informal enquiries where formal applications were deterred. Documentary sources, including internal memos and minutes of meetings, were useful for information about the way past events were constructed at the time, particularly in providing evidence of relationships, attitudes and reasons for decisions within the NRA. Content analysis of such documents permits investigation of the communications that people have already produced (Frankfort-Nachmias & Nachmias, 1992, Robson, 1993:Ch10). There had been only a few incidents of conflict in seven years which involved any extensive documentation, but these incidents provided scenarios in which to frame constructions of water justice that were emerging, or as Mitchell puts it to illustrate "*how the general explanatory principles manifest themselves in the course of some ongoing set of events*" (Mitchell, 1983:203). Correspondence over a licensing dispute indicated how the outcome was arrived at. Inferences were made from the language used, the level of understanding, consultation processes adopted and the information sources referred to. Particular attention was paid to the adoption of different ideas of fairness to legitimate claims and decisions.

Other NRA documentation of use were policy and strategy documents. Nationally, the NRA produced many publications explaining its policy and operations. These were useful for describing the development and adoption of strategies and their rationale. The NRA also produced a number of policy documents within the region which outline both the principles which guided its policy and implementation and the legislation which directed it. Also, each catchment had a Catchment Management Plan[1], which although the unit of analysis is geographically wider than the research area for this study, did enable the area to be set in its regional context. Through all of these documents, 'official' and established notions of fair water resource management were investigated. Complimented by interview data with NRA staff, I was able to construct a recent policy history for the Lark which had not been recorded elsewhere.

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the data were to provide contextual detail and were not crucial to the thesis, further analysis was abandoned.

[1] These plans outlined in detail, issues for the core functions and approaches for dealing with them (Chandler, 1994).

IV Data Analysis

Interviews

Where interviews had been tape-recorded, full transcripts were made (although fine details of intonation and timing were not included). Where they were not recorded, fieldnotes were used. The schema of analysis followed is described by McCracken (1998). The objective is to determine categories for and relationships between the assumptions, perceptions and rationalities that are contained in the respondents' understanding of the particular topic being discussed. This is done by a process of reading and re-reading the texts in order to see patterns in the data, and the simultaneous use of memoing to record insights, and analytical ideas that emerge and require further exploration (Miles and Huberman, 1994). A method of *coding* was adopted. Firstly, at an emic or descriptive level, noting on the transcripts themes of interest that the respondent referred to during the interview, or where clear references to concepts being researched were made. Strauss describes this level of grounded analysis, driven by the material itself, as 'open coding' (Strauss, 1987; Strauss and Corbin, 1993).

Once this had been done for all interviews, an initial mind map or flow chart was attempted of all the codes in order both to winnow and identify any relationships between them (Cook & Crang, 1995). Strauss's (1987) paradigm was found to be a useful guide for this process. This paradigm consists of ordering codes into four sequential categories: *conditions, contexts, strategies* and *consequences* to develop a sort of story line within which patterns can emerge (Strauss and Corbin 1993:122). A second stage of coding was performed using new, more etic or 'external' categories which had emerged from these patterns in the data, and initial codes were either abandoned, 'put to one side', or 'promoted'. This step was repeated several times. Codes used are listed in Table 4-5. Throughout this process, notes were made on the growing interpretation and meaning being implied by a code. In this way, responses were becoming linguistic evidence of categories of perceptions, arguments and rationalities, and these categories were becoming characterised.

Notation. In the empirical chapters, *interviewees* are identified as 'NRA1, NRA 2, Farmer A' etc. Labels given to questionnaire respondents are according to their stakeholder type. Where a quote is given from a transcribed interview the speaker is given in square brackets. Two dots within a transcription denotes a pause, a three dots in round brackets, (...), denotes a phrase or word that has not been included from the original for reasons of clarity and likewise square brackets denote information that

Table 4-5: Coding of interviews

allocation	blame	cause	change
change	community	conditions	conflict
context	drought	duties	environment
expectations	expertise	fairness	judgement
justification	market	perception of others	perception of rights
problems	response	risk	science
tool	trust	uncertainty	

has been added by the researcher also for clarity. A comment by the author is identified as 'ND' where included.

Questionnaire

Responses. Table 4-6 shows details of the number of questionnaires forwarded to each stakeholder group and the number returned. The categories of stakeholders are as originally assigned. Of the 337 questionnaires, 153 were returned in all, with 124 completed satisfactorily to give a response rate of 39.5% which was considered as good given the length of the questionnaire and that the survey was by post. The fact that the questionnaire was sent out during the dry summer months (in June/July) probably assisted in encouraging a healthy response rate. Ninety three abstractors and 54 non-abstractors returned a questionnaire.

Respondents were asked to classify themselves according to membership of one or more of 12 groups, in order to allow, for example, for agricultural users who were also conservationists etc. Table 4-7 shows the respondent types classified in this way (which differed in many cases to the pre-survey classification). For the purposes of subsequent analysis it was necessary to reduce the number of the categories of stakeholders by combining some which were thought to have similar interests (such as agriculture users and agricultural representatives). A decision was made to proceed with analysis on the basis of the primary classification of each respondent only. Given the small sample size, statistical analysis would not bear the large number of categories that would be created by taking account of combinations of first and second or third classifications. However, it was decided to recode agricultural users into two separate categories of *irrigators* (only 3 of which were non-agricultural, a golf course, for example) and *non-irrigators*, as these were hypothesised to hold differing views, and the groups remained relatively large. This also meant that the 'environmentalists' category included only those belonging to conservation or environmental groups, but not the 17 other stakeholders who classified themselves as

Table 4-6: Questionnaire sample and response rate

Stakeholder Groups	No. sent	*No. returned
Abstractors (full population)		
Agricultural	173	71
Domestic well users	34	11
Industrial/business	28	14
Recently refused applicants	3	0
Water company staff	6	3
Total	244	99
Non-abstractors		
Environment/Conservation groups: *(members/staff of Suffolk Wildlife Trust, Suffolk Preservation Society, CPRE, FoE, Greenpeace,)*	33	22
Recreationists: *(Anglers Groups, Boating Association members)*	22	11
Agricultural reps/advisory groups: *(NFU, CLA, FWAG)*	8	5
Business groups *(Bury Chamber of Commerce, Confederation of British industries)*	5	2
NRA staff *(Water Resources Function)*	10	5
Local Authority staff *(Planning and Conservation)*	8	4
OFWAT *Anglian region*	2	1
Other	5	4
Total	93	54
TOTAL	**337**	**153 (45%)**
Number returned as in correctly addressed or duplicated	23	
Number posted correctly	314	
Number completed successfull[y]		**124**
Response Rate[2]		39.5%

* Gross (and approximate as in some cases responses were non-traceable).

[1] Net of illegible responses (1), those returned uncompleted (5), and duplicated targets (17), and those that had an incorrect postal address (6)

[2] Percentage of correctly mailed questionnaires which were correctly completed.

conservationists by second choice. Table 4-8 shows the final classifications that were used for analysis.

The questionnaire was intended to investigate the beliefs of those individuals likely to hold views on water issues. This salience was confirmed in Question 2 which assessed the degree of concern for water issues. Ninety five respondents (77%) answered that *'water management issues were important to me'*, and only 5 (4%) said that they were '*not particularly concerned about water problems'*. Forty nine respondents said that they were members of an environmental group, and 51 said that they belonged to an organisation representing their views on water.

Table 4-7: Respondent profile for questionnaire survey (count)

Groups according to self classification:	Prior category	2nd or 3rd selection
Agricultural users	52	
Agriculture non-irrigators		17
Irrigators - all types		45
Environmentalists/conservationists	18	17
Recreationists	11	2
Industrial or non-agri business user	11	0
Domestic well users	10	4
Local authority or Gov. employees	6	3
Agricultural rep.	4	1
Water supplier	3	0
Industrial rep	1	
Horticulturist		7
Other	3	1
NRA	5	
NRA consultee		2
Total	124	

Table 4-8: Compacted respondent classifications for analysis

Stakeholder Group - n=124	Count	% of Cases
Irrigators	42	34
Environmentalists/conservationists	19	15
Agriculture non-irrigators	16	13
Domestic well	10	8
Recreationist	11	9
Industry & business (+reps)	12	10
Local authority/government	6	5
Environment Agency staff	5	4
Water company staff	3	2

For the attitude scales in the questionnaire, a large number of *no opinion* responses were given. For some questions, this was to be expected to a certain extent because of the different degrees of experience different stakeholders would have had with the licensing system. For example, 18% reported having no contact with the NRA. The voluntary admission that they had no opinion, in spite of being concerned, can been seen as a evidence that the respondents were seriously engaging with the issues represented. However, 64% of respondents felt *confident* or *very confident* in answering the questionnaire, and only 13% felt *unsure* or *very unsure*. Nine respondents said that they had appealed (either formally or informally) against an NRA decision (3 business and 6 agricultural users). A further 14 had been refused a license (3 business users and 11 agricultural users). It can be concluded

Table 4-9: Water sources for surveyed abstractors *

	river	groundwater	drains	storage	spring	well
permanent	8	19	7	3	1	1
temp	6	14	2	2		

*respondents may have more than one license

Table 4-10: Licenses by volume

volume permitted (n=56)	Number of abstractors
less than 10 tcma	8
10-20 tcma	6
20-50 tcma	7
50-125 tcma	12
>125 tcma	15
Not sure	8

Table 4-11: Type of license

n=58	Number	% of license holders
Permanent	31	55
Temporary	21	38
Don't know	4	7

that the questionnaire was successfully targeted and that the responses represent the views of those with a strong interest in water management issues in the Lark area.

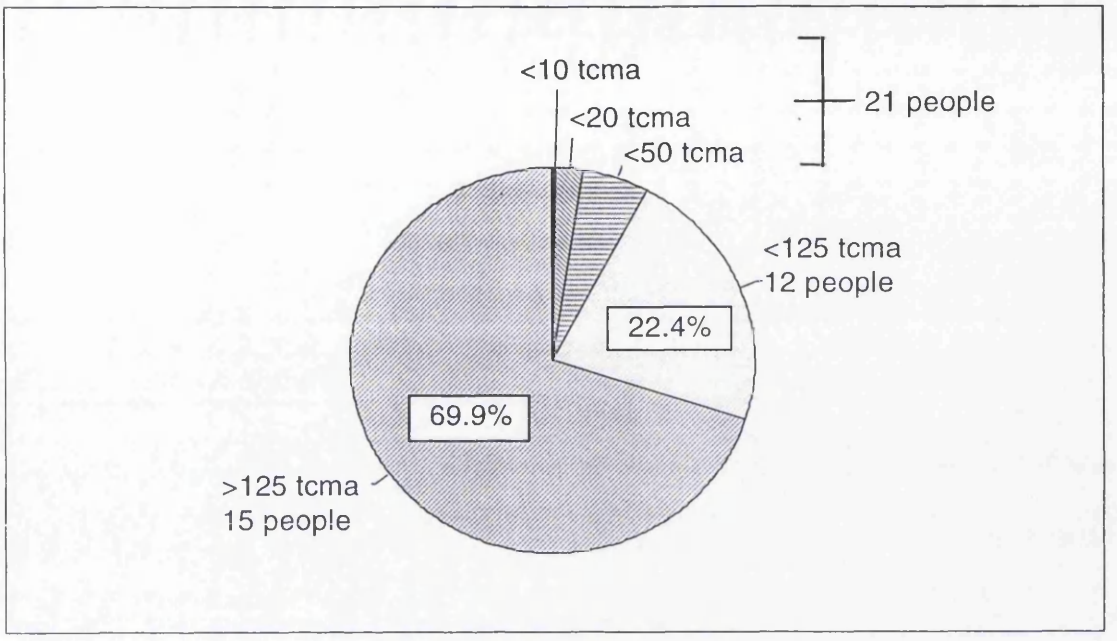
A representative sample of the population of the Lark was not expected. Indeed, the respondents proved to be predominately male (84%), and a substantial number had been educated to degree level or employed with some degree of management/ ownership responsibilities. The average age of respondents was 51 years, with a range from 25 to 80 years. The average number of years for living in the Lark area was 31 years. Of the farmers, 37 were owners and 9 rented their farm, with farm size averaging at 338 hectares, and ranging from small holdings of 0.3 hectares to large estates of 1000 hectares. The percentage of the farmland irrigated ranged from 1 to 100%, averaging at 59%. The largest business respondent had 450 employees.

Table 4-9, Table 4-10 and Table 4-11show the types of licenses held by respondents. Apart from mains water users, the majority of abstractions were made from boreholes (63%), and a quarter of abstractors used the river as a source. Eight respondents had an on-farm storage system and 7 used fen-drains. Over half the respondents reported having permanent licenses to abstract. Figure 4-6 is a rough indication of the distribution of water amongst license holders. Fifteen abstractors, of the 48 responding, had access to nearly 70% of the water[1].

The extent to which non-response biases results will depend on how different the non-respondents are to the respondents in the characteristic being measured. Qualitatively, it matters only if the non-respondents hold certain views on equity that are not represented among the respondents. Quantitatively, however, non-

[1] This was estimated using top of the range amounts and included public water suppliers.

Figure 4-6: Distribution of licensed water amongst questionnaire respondents



respondents will bias any representivity, for example, associating certain preferences with one stakeholder group. It might not be correct, for example, to assume that non-respondent farmers have the same views as the respondent farmers, but this remains unknowable in this study. A second round of mailing was done to non-respondents and this was successful in eliciting 25 more completed questionnaires. Overall, very useful data were collected for quantitative analysis[1]. The open questions generated data, useful in their own right as well as informing interpretation of the quantitative responses which might otherwise have been open to ambiguity.

Conclusion

Analysis in the empirical chapters comprises a writing through of local experiences of resources stress and policy developments in the Lark Valley in the context of shifting attitudes, changing institutional approaches and drought events. The aim is to show the extent to which conflicts in the Lark have been characterised by different perceptions of fair water resource management. The methodology described above has enabled me to investigate water resource problems and the expectations of water management by various stakeholder groups in the Lark.

Chapter Five reveals the principles, set within legislation and policy, which have shaped the established notion of fair water resource regulation in this country. It shows how NRA staff attempted to translate these principles as challenges emerged

[1] Responses were coded and fed into the SPSS package for quantitative analysis.

during the early 1990s. Chapter Six tells the story of water resources from the point of view of four different stakeholder groups: the water company, an industrial user, environmentalists and agricultural users, as it was for these groups that the data collected revealed especially distinct arguments and rationalities. In particular, the perceptions and concerns of the former three groups allow a framing of the reasoning and claims of the agricultural users - the largest group of abstractors by number, and the abstractors most affected by regulatory restrictions. The third empirical chapter, Chapter Eight, uncovers the 'justice beliefs' which reinforce and influence their judgements and attitudes to water management and use.

Chapter 5

Running water: the NRA and 'fair' water resources management

Introduction

The licensing system in England and Wales emerged three decades ago against a background of relative resource plenty, less concern for pressures on the environment, a common property view of water, and a technological/engineering fix approach to solving resource problems. The National Rivers Authority (NRA) was born during a period of change in all of those factors, but much of the legislation on licensing remained essentially unchanged from the first Water Resources Act of 1963. Since the NRA's formation in 1989, water resource issues have been characterised by prolonged drought events, increased pressure on resources as demand began reaching local supply limits, and the strengthening of the discourses on sustainability and economic rationalisation that have influenced notions of what 'better' water resource management might be. These changes were described in Chapter One.

The main objective of this chapter is to identify how the concept of 'fair' water resources management was construed within the institutional framework and mechanisms for allocating water resources; principally within the regulation of abstraction through the licensing system. How in practice, did the NRA manage to implement the old licensing system, designed to share out and manage water resources, under these new contexts?[1]

At the national level, the NRA responded to the changing context in which it operated through the policies and strategies it developed in order to fulfil duties and responsibilities that had been set within legislation. The NRA's *Water Resources Strategy d*ocument, published in 1993, stated it's principal water resources aim as being:

> *to manage water resources to achieve the right balance between the needs of the environment and those of the abstractors* (NRA, 1993:1).

The 1994 national Water Resources Development Strategy (NRA, 1994b), entitled 'Nature's Precious Resource'[2], set out three principles which 'in recognition of

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[1] The focus of this thesis is water *resources* management. This is not intended to be a comprehensive review of the NRA's licensing duties but focuses on issues that were identified by staff as salient or contingent to their execution of those duties. Other duties of the NRA such as flood management and navigation are not covered.

[2] A third key publication specific to the Anglian region is the regional Water Resources Strategy

uncertain futures' would guide this aim: *sustainability*, *precaution* and *demand management*. It is these principles which defined the NRA's institutional culture and practices at the time of this study, and it is within these principles and other statutory objectives, that the concept of fair water resource management for the NRA is formally located. Licensing practice itself, which is the main tool for the execution of these water management principles, was also guided by a set of more specific principles, set in legislation and translated into the NRA's *licensing* objectives.

The core argument explored in this chapter is the question of how water was managed to achieve the 'right balance' between the needs of the environment and abstractors. Analysis will show how this fundamental concept has been institutionally defined. It will also show how its translation, in the context of everyday decisions at ground level, proved difficult. The chapter will describe attempts by the NRA to bring the environment into the balance, and how, as a result of this movement towards sustainability, the principles upon which licensing was based came to be contested. In addition to documentary sources (national statutory documents, and NRA national, regional and local policy documents), another level for uncovering the fairness of the licensing system comprises the experiences and accounts of local NRA staff. The analysis here draws on interviews with NRA staff[1], correspondence, and other written data on staff interactions with stakeholders to reveal their experiences with licensing legislation, the rationalities they used to account for change and to justify their strategies[2].

The chapter is divided into three sections. The first section gives a brief introduction to the licensing system and the regulatory system for water resources. An overview is then provided, in table form, of policy changes and events at the local level of the Lark Valley. These frame the stories in this, and the following empirical chapters. An introduction to the sorts of equity issues that will emerge in this chapter is presented next through a description of some general comments by NRA staff, and a table which summarises the equity concerns discussed.

In section two, the general principles behind water *allocation* and *availability* are explored, followed by a description of the principles that guide the actual handling of license applications and the issue of licenses. The clash between inherited problems,

document entitled 'Water Resources in Anglia: a sustainable strategy for secure water supplies and a better environment' (NRA, 1994c).

[1] Ten staff in the regional and area offices of the NRA; water resource managers and engineers, licensing and conservation officers.

[2] The views expressed by interviewees are not claimed as NRA policy, but reflect the understanding and experiences of the staff who implemented that policy. There will have been policy developments in existence at the time of this study which are not discussed where they had not actually been carried through to catchment level

new ideologies and a period of exceptional drought precipitated the need for a clarification of the NRA's duties and its working relationship with abstractors and other stakeholders. This chapter will show that while being restricted by historical precedent in some aspects of its work, there was considerable scope for interpretation and dispute in the implementation of water resource regulations. For this reason, it is particularly interesting to trace the development of the rational for the decisions made through the NRA's early years. This is explored in the section three of the chapter through a case study of how the drought of 1989-92 was experienced in the Lark Catchment. This will illustrate how the NRA's policies and strategies were developed at a local level.

I The licensing system and the Lark Valley

Prior to 1963, water resources abstraction had been controlled through riparian rights, common law or statutory intervention. A licensing system for allocating and managing rights to abstract water, controlled by River Authorities, was introduced under the Water Resources Act of 1963[1]. New legislation provided for 'licenses of right', i.e. permanent rights. This authorised abstractions which could be demonstrated to the River Authorities as having been made in the five year period up to 1965 (Streeter, 1995). These licenses were not subject to the conditions and controls of later licensing application procedures. Subsequent applications for abstraction rights were allocated on a 'first-come-first-served' basis, and in 1969 charges were set to cover the costs on a regional basis of administration and any necessary resource enhancement. From the beginning, applications for new abstractions, specifying purpose, amount and location, had to be advertised and were open to public objections[2]. By the 1970s, time-limited licenses were beginning to replace the licenses of right in some areas[3]. This is discussed below.

In spite of the radical restructuring of water management during the 1980s[4], and the political, economic, social and environmental complexity which accompanied the privatisation of the water industry, the general system of abstraction licensing (except for some minor amendments) was unchanged. The creation of the NRA as environmental regulator followed strong arguments for the independent regulation of

[1] Twenty nine River Authorities were formed in England and Wales controlling all uses of water at the river basin level.
[2] The applicant had to advertise the application in the *London Gazette* and in a local newspaper and display details near the location of the proposed abstraction. An abstraction license could only be applied for if the applicant either occupied the land associated with the abstraction or had right of access to it.
[3] Around two thirds of the current 48,000 licenses are licenses of right (DETR, 1998).
[4] Including the transfer of the water industry from the public to the private sector. For a detailed recent history of water management in the UK see: Kinnersley (1988), Maloney & Richardson (1994).

the environment, and its duties and powers were set out in the Water Resources Acts of 1989 and 1991[1]. From the beginning the NRA projected itself as *Guardian of the Environment,* drawing on the wide public sanction of environmental concern. In line with this mandate, the NRA was charged with the protection of abstraction rights, *as well as* being required to take action to conserve and enhance the aquatic environment[2]. This meant that the notion of *right* balance had to shift. It had originally been socially motivated, i.e. between different abstractors, but had come to include, at least for the regulator, the environment as a new actor in the balancing equation.

However, as this chapter will show, a smooth transformation of working practices to meet what was essentially a redefinition of the notion of 'fair' water resources management was hindered by several factors. First, licenses of right that essentially meant a first-come-keep policy restricted the ability of the NRA to adjust to new ideas of environmental justice that were emerging with the sustainability rhetoric. Second, a period of extreme shortage due to drought occurred. Third, the problematised image of water management following privatisation of the domestic sector and arguments concerning the economic rationalisation of water supply engendered conflict. This chapter will show how the tensions between historical licensing policy, the demands of abstractors and the objectives of the regulator were exposed in the Lark catchment.

How was it in the Lark?: an overview. Table 5-1 shows a chronological overview of the main policy and resource events salient to the management of resources in the Lark catchment. The table summarises what the Anglian NRA did in the Lark and why from 1989-95 in an attempt to manage 'balance' between conflicting demands. There were different management policies for three water resource systems in the Lark Valley area: groundwater abstractions (groundwater unit 8), surface water abstractions in the valley (surface units 37 and 38), and surface abstraction from drainage channels in the fens (surface unit 39)[3]. The analytical framework used in this chapter is based around two main components of the NRA's water resource management function: the granting of abstraction licenses and the control of abstraction during drought. Through this framework, key events and the processes in the six years 1989-1995 and the relationships that structured them will be explored[4].

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[1] Water Resource Act, Chapter II, Part II. This was recently amended in the Environment Act of 1995

[2] The water resource duties and responsibilities of the NRA were consolidated in the Water Resources Act of 1991 and later modified in the Environment Act of 1995. Besides water resources its other separate functions were flood defence, water quality, fisheries, recreation, navigation and conservation. See NRA (1993:8) for a list of its duties and powers.

[3] Shown in Figure 4-2, p112.

[4] Younger staff told me that they were not very aware of the historical context of their work. This would impede their understanding of the expectations of the applicants, how their licensing decisions might be received and so how they should be communicated. I also found technical staff who were not fully aware of the situation regarding licensing backlogs. Senior staff said that they did not have the time to reflect on

Table 5-1: The balancing of resources: a chronology of resource availability and licensing policy in the Lark area

Year	Policy/ Temporary Strategy	Rationale
1963	Licenses of right and first come first served policy established: Water Resources Act	Need recognised to establish rights and protect existing users
1974	Anglian Water Authority formed	
1970s	The use of time-limited licenses began	Uncertain of hydrology, backlog of license applications
1976	Low flow conditions on some new surface licenses began (later on renewed licenses)	Stimulated by environmental problems resulting from drought of 1976
1980s	Summer surface licenses no longer available	
1989	Formation of the NRA Drought began	Water Resources Act
1990	August: 100% ban of surface water abstraction for irrigation from River Lark, its tributaries and fen drains. Hosepipe ban implemented by Anglian Water	Drought causing low flows in Ely Ouse pond (area impounded by Denver Sluice). Section 57 restrictions.
1991	Water Industries Act Water Resources Act	Consolidation of legislation
1991	June: Amber alert for restrictions July: 100% restriction on surface water spray irrigation imposed August: 100% irrigation ban for groundwater abstraction along river zone 50% restriction on all other groundwater spray irrigation	Continuing drought Precautionary approach for environmental protection
1992	Embargo - on new licensing of groundwater abstraction across whole Lark groundwater unit. 'Early Warning' system for spray irrigation constraints introduced Voluntary, 50%, all season spray irrigation restrictions agreed with abstractors Cessation limits to be placed on all new surface water licenses and renewals.	NRA study (Barker, 1992) of resources of Lark groundwater unit showed groundwater fully committed, and in deficit in upper part of catchment. Drought continued Based on flow at the Denver Sluice.
1993	Cessation limits on surface abstraction	
1994	Winter surface and groundwater abstraction licenses still available	Ely-Ouse Catchment Management Plan, Regional Water Resources Strategy Document and National Water Resources Strategy published
1995	Embargo on new summer surface abstraction in the South Level Fen pending results of resource study.	Suspicion of over licensing in the pond area. Summer Drought
1996	Environment Agency formed. 80% voluntary restriction on spray irrigation	Environment Act 1995 Drought continued

What's fair and why?: staff perspectives. How did the staff view the fairness of the system in which they operated? An overview of the perspectives of the staff clearly shows the way in which the notion of fairness is construed at the operational level of

more recent events in terms of, for example, producing a report of the on-going drought; '*we are too busy managing it to write about it*'.

the NRA. On the whole, the NRA staff judged the licensing system to be fair and reasonably successful. Some staff whose jobs involved only day to day operations admitted that they gave no time to reflecting on how things *ought* to be working. But all felt they were constantly endeavouring to improve and review the way that they operated. Most were confident that fairness *was* a principle that governed their everyday practice, although they were well aware that aspects of the system were regarded as unfair by abstractors and other interest groups. One officer remarked:

> *We get the odd phone call where people are unhappy because they have used up their license and they want more. And we have to say no. If one person got it all the others would want it. That's why we have a licensing system so that we can control it.* [NRA4]

Many staff judged fairness in terms of treating all abstractors in the same way and giving no preference: '*we have to treat a big farming company the same as a small holder, and ICI as a two man band*'.

However, at the same time as operating to this principle, interveiwees recognised that fairness sometimes would mean having the flexibility to take into account the different circumstances of very different users: *'let's say that ICI wanted to changed their licence. We would probably attack it on a long term basis when thinking about their need. Whereas for a small company we might look at things from a yearly basis'*. The legislation both required and allowed some degree of interpretation on the part of the regulator: *'it is in our hands to balance this fairness thing as far as the legislation allows'. **Balance*** is a key fairness concept in the NRA's rhetoric. As one water officer put it: '[T]*here's a view that when you get it right, (...) that when you have your licensing policy right, you get it in the neck from every body - equally'*. This represents a classic notion of fairness; treating 'likes' similarly and 'unlikes' differently.

The water resources officers were not aware of 'fairness' being an explicit concept within legislation. One officer related the fairness of NRA duties and powers to the democratic system of government from which they had evolved. In this sense, it was felt that the fairness of regulation was dependent on principles being established centrally, being consistent and not left to local value judgements. He commented:

> [Fair] *It's not a word that appears in the legislation. End of story. And if there is any concept of fairness, that to us has been taken into account when the legislation is adopted because that has had the widest consultation of all - the consultation that goes into a parliamentary act. (...) We operate strictly according to legislation. Admittedly there are grey areas, and we put a policy stamp on that. But that's our guide and that's where the fairness comes.* [NRA2]

He continues:

> *Fairness is not a concept that enters into our general run of the mill day to day business. Not that we are unfair people but we are a regulator. Regulators implement um , .. regulations that are given to them by government. It's government that has the idea of fairness. (...)You suddenly can't take an adhoc decision to do things a little bit differently (..). You can't do it.* [NRA2]

Two interpretations of fairness emerge from these comments by staff. The first is situated in their *everyday procedures and activities.* As the analysis in this chapter will reveal, the staff saw the legitimacy of their decisions and actions as being based in their professionalism as scientists and civil servants, and in their expertise and knowledge at the local level. Second, the fairness of what they do is derived from national legislation. Fairness lies at the level of the *policy objectives which govern resource management.* The range of fairness issues and concerns inherent in water resource management which will be discussed in the remainder of this chapter are presented in summary form in Table 5- 2.

II Principles for licensing abstraction

The right to abstract water is dependent upon, and determined by, a set of principles and objectives which represent society's notion of what is a just water allocation system. These principles are implemented through the issuing of licenses; i.e. within the procedures for *assessing the availability* of water and the validity of a license application, and within the rights implied by the license. In addition to *allocative* fairness is the notion of a fair management system embedded within the license *application procedures*, the details of the *charging mechanisms*, and the *operational strategies* of the regulator. This section is thus divided into two parts: the first looks at what principles determine the right to a license and what is established by a license, and the second looks at the routine procedures involved in administering the licensing system.

i. *General principles of allocative fairness*

The NRA's water resources aim, as stated in many of its documents, was to achieve[1]:

> *the* right *balance between the needs of the environment and those of abstractors* (NRA, 1994c:3).

Other allocation concepts appear in its documentation:

> *a* proper *balance needs to be struck between the impact of water resources development on the environment and the* reasonable *use of water by customers* (NRA, 1992b:3);

[1] Emphasis mine.

Table 5- 2: Summary of equity concerns and issues identified by NRA staff

What is Fair?	Why?	General Principle
Legislation	Emerges from democratic parliamentary system	procedural - political
Balancing human versus environmental need	No discrimination, all needs recognised	equality
First come first served	Unbiased, not ad hoc	procedural
Reasonable need criteria	Avoids wastage	moral - efficiency
Environmental impact assessments	Better environmental monitoring	better informed - common gain
Catchment Management Plan	Catchment wide impact considered	procedural - better informed, consistent
Revocation	Protection of the environment	common gain
Compensation	all abstractors pay for individual's loss - costs shared	gain to all
Irrigation bans	The uncertainty of effects on environment	precautionary principle
Selective irrigation bans	Hydrologically assessed protection of the resource	scientific rational
What is Unfair?	**Why?**	**General Principle**
First-come-first-served	Results in inefficient allocation	moral - inefficiency
Licenses of right	No grounds for differential treatment	unjust discrimination
Hoarding	Deprives others	inefficient, unsocial
Slackers	Unlicensed flow out of rivers, burden carried by all	unjust discrimination
Point of abstraction and area of application conditions	Inflexible, prevents innovation	unnecessary control
Cessation clauses	All licenses have same condition independent of size and impact	unequal treated equally
Compensation	Public money for local gain	opportunity cost of financial resources
Environmental impact assessment	Costly given the risk of refusal Individual applicants vary in their ability to carry out investigations	discriminates against smaller applicants
Accusations of bad water management	Social attitudes and scientific understanding have changed	fairness principles culturally specific
Advertising applications and variations	Time consuming, costly with little gain	costs to individual out weighs benefits to all
Delayed processing of applications	Loses revenue for water resources function	
Restrictions	Public lacks understanding of hydrological reasons for selective constraints	perception of discrimination
Irrigation bans	Abstractors' dependence on water	level of risk unacceptable
Discriminate irrigation bans	Effect neighbours differently (as hydrological effect is different)	social inequality
Revocation	Business's based on access to water	breaking of expectations

> *an environmentally sustainable water resources strategy (...) aims at ensuring that* legitimate needs *for abstraction are met in a way that is environmentally sustainable* (NRA, 1994b:4).

The way that these normative concepts, originating in the wording of legislation, are operationalised in practice is through licensing decisions. How were staff to interpret what were *legitimate* needs, or a *proper* balance when issuing licences?

The 1992 technical guidelines for licensing in the Anglian region states the NRA has a duty to strike an '*equitable' balance between sustaining the water environment and satisfying the needs of abstractors'* (NRA, 1992a:1). 'Equity' has also appeared in national strategy documents: *'Because of competition between various interests, it is essential that the NRA keeps a firm hold on the management of water resources so that an equitable allocation of water resources is ensured between abstractors and to meet environmental objectives*' (NRA, 1992b:3). How has 'equitable' allocation been defined in practice ?

Following the introduction of a licensing system, the most fundamental principle of fairness governing water allocation in England and Wales has been *'first-come-first-served'*. In practice, this meant that water resources 'allocation' was not actually determined by the NRA, but was demand lead. As one senior water officer said, '*the NRA does not make value judgements on where the water is going*[1]. The staff saw their own decisions as being legally and technically driven.

> *It is hard for the public to understand but the NRA cannot differentiate between the worth of water allocations. Should water be allocated from race courses to potatoes?* [NRA6]

> *Every time we say that someone can not have a licence because there is no water left they think it is unfair. And they'll say to us "but that river has water in it" and we say, "yes and we intend to keep water in it for other abstractors and the environment". And that's .. you know .., and our stance is regarded as unfair. That's just people having a different perception of the balance, if you like.* [NRA2]

Although 'allocation' was to a large degree demand lead, the NRA had a duty to ensure that granting any new license would be consistent with certain statutory objectives - to which the first-come-first-served principle was subservient. Any value judgements had been predetermined within licensing legislation (Water Resources Act, 1991):

- to protect aquifers and surface waters from over-commitment and ensure abstraction does not have an *unacceptable* effect on existing abstractors and environmental waters
- to secure the *proper* use of water resources
- to have regard to *reasonable* needs of all abstractors

[1] Emphasis mine.

- to *conserve* water resources
- to augment and/or redistribute water resources, where appropriate to meet water demands and *appropriate* standards of *reliability*.

In accordance with these objectives, the Catchment Management Plan (CMP) (NRA, 1993a:5) for the area in which the Lark valley is located[1] stated that an abstraction license would only be issued if an application met the following general conditions:

1. there is *sufficient* water available
2. the need for water is *justified*
3. all *rights* of existing users are protected
4. the water *environment is not unacceptably* affected

It is clear that many of the NRA's guiding objectives consist of meta-concepts, i.e. they are open to interpretation. In many cases they are not clearly defined in legislation but have been established through NRA policy - often at the regional level. As such, and as this study will show, their interpretation has often evolved retrospectively and as a result of being challenged. It is within the implementation of normative principles in practice that we find how 'fair' water resource management was construed. An exploration of four concepts contained within the above conditions will inform an institutional understanding of fair water resource management within the NRA, and will show that central to the staff's notion of fairness was a perception of their own professionalism:

- *availability*
- *environmental need*
- *reasonable need and proper use*
- *appropriate reliability.*

Availability

A policy document for the Lark groundwater unit was produced in 1992 (Barker, 1992) following more than two decades of increased licensing, and two successive summers during which parts of the River Lark dried up and the water environment was put under great stress, surface flows and groundwater levels fell, and deteriorating river quality culminated in mandatory summer abstraction restrictions. Rising demand, mainly for public supplies and irrigation, was being met from the aquifer and many groundwater licenses were due for renewal. Following an examination of resources, the report declared the groundwater resources of the area to be 'fully committed'[2]. An embargo on increases in groundwater abstraction was put in place and this policy was reconfirmed in 1994 when it was incorporated into the Regional Water Resources

[1] The Ely-Ouse Catchment Management Plan (NRA, 1993a).
[2] This was a study of the resource balance of the groundwater unit and so did not extend to the fenland.

Strategy (NRA, 1994c). Licenses for surface water abstraction during winter remained available and on-farm winter storage was being encouraged.

Condition 1 above states that for a license to be granted 'sufficient' water must be available. How was 'sufficient' determined in the Lark Report? The Report (Barker, 1992) states that long term average available water resources are allocated first to meet environmental needs and then for abstraction. The Report assessed the available water resources of the catchment using hydrological models[1] for the groundwater unit, and balanced these against the amount already licensed for abstraction and the amount deemed necessary for the environment, i.e. for river and estuary flows, and to support wetlands. The amount left in a dry year is then available for licensing. The Lark study found a nominal surplus in the catchment as a whole and, a deficit in the Upper Lark sub-unit where more water had been allocated than was available. This means that if any new water becomes available, it is not reallocated to abstraction but is allocated to environmental need.

What knowledge informed the decision that there was no more water available and what normative assumptions were implicit? The two judgements to examine are what determines *total available* resources, and how is *environmental* demand determined? The accuracy of the scientific methods used to calculate the total amount of water resources available from the aquifer for direct abstraction, and for the river and the aquatic environment, depends on the rainfall data and the accuracy of the recharge mechanisms employed. The author of the Lark Report felt that the river flow and groundwater models were adequate but in need of improvement (Barker,1992). The Report used 1970 to 1989, i.e. non-drought year data and it was recognised that the data needed to be updated. The significance of this hydrological assessment lies in the degree to which the NRA was able to defend confidently the abstraction embargo. The principles that define the calculation, and that of environmental need, become more contested when, as in the Lark, the conclusion is that the groundwater unit is fully committed and no more abstractions are permitted.

In the UK the limit on total resources must be seen as socially constructed; due to decisions that determine whether financial resources are allocated to water resource augmentation schemes such as storage reservoirs, transfers or demand management technology, for example. The NRA did not want to be considered as a developer of resources. Its duty under the Water Resources Act 1991 was only to take such action to augment resources as it considered '*necessary and expedient*' and it would not

[1] The study used 'Wrights Methodology' (an area-specific, quantitative method) and a Regional Groundwater Model.

finance the development of resources that would benefit one class of abstractors and not others (NRA, 1994b). In 1994, the Regional Water Resources Strategy (RWRS) outlined the NRA's view on resource availability in the region, along with best estimates for future demands and improvements (NRA, 1994c). The strategy identified the need for a new major storage reservoir for the Anglian region, though not required until the year 2006[1]. Although it is up to private water companies to plan and promote the reservoir, the NRA would be involved in licensing the capture of the water resources and the national *Water Resources Development Strategy* states that it will favour schemes which 'benefit all classes of abstractors' (NRA, 1994b:13). The NRA staff I interviewed considered availability problems to be a local issue rather than a national level problem. One manager commented: *'availability in one area is only constrained by financial resources when water could be brought in from another area; availability is not an absolute problem as potential users have the option to buy water from the public water supply company and that's very much a live issue at the moment*[2]. Locally, there is an NRA owned transfer scheme across the Anglian region (completed in 1971). This runs from the Ely Ouse Catchment, in which the Lark is situated, to Essex; water from the River Lark is feed into the Cut Off Channel which is part of this transfer system (see Figure 4-2). Transfer schemes were considered by the staff to be generally unpopular: '*Particularly we take water from Norfolk for the Essex scheme. And that's resented locally as that's perceived to be unfair because it's 'our water'.*

Environmental need

How was the environment incorporated into the balancing of needs for resources? Two environmental decisions form the basis of licensing policy. The first is calculating the allocation of water to meet environmental need in order to assess the amount of remaining resources available for licensing, i.e. there is a need to define the quantity that should be reserved for the river system from the overall available resource. The other is assessing the degree of impact of a new licence on the environment; i.e. how much flow reduction is acceptable?

In the Lark report (Barker, 1992), the 'in river needs' are defined as:

a) the aquatic and riparian communities
b) the requirement for effluent dilution
c) the needs of surface water abstractors
d) navigation
e) the flushing of silt.

[1] Two sites were identified, both outside the Lark area, one of which was discounted in 1995.
[2] This will be discussed in the next chapter.

However, there were no objective criteria as to what is an acceptable flow regime for the river's needs. The 1991 Water Resources Act did require minimum acceptable flows (Mafs) to be set, but by the time of the Lark Report, the ecological and hydrological studies that were necessary for defining the minimum water levels, flows and quality required to sustain the 'desired' ecosystem had not be carried out[1]. Instead, and in accordance with wide-spread practice, the required flow was taken as equal to the naturalised (or 'hands-off') 95 percentile flow (less the effluent discharges into the river)[2]. It was this 'hands-off' flow that was protected within licensing policy[3]. One senior manager remarked:

> *We measure flow. We don't measure level and velocity, but what the habitat needs is level and velocity, and weed cover in some straights and things like that, and we are trying to build up a method that builds from that. So we will be ..hopefully ..looking at determining environmental objectives. Then comes the science and out the other end we hope comes a flow regime.* [NRA1]

The NRA has a statutory duty to 'protect and further' the conservation of flora and fauna when carrying out its duties, and '*will asses the likely impacts of its management regimes before work is carried out*' (NRA, 1993a:40)[4]. The most recent '*Technical Guidelines for Licensing'*, an internal NRA manual, stated that the extent of temporary river depletion which was '*tolerable*' was '*a matter for local judgement*' (NRA, 1996:9). For wetlands, these guidelines state that it is necessary to avoid '*unacceptable effects'* which in most cases would mean constraining licensing near to a site so as to protect the conservation management objectives set by the specific status of the site.

The RWRS acknowledges that 'proper' allowance for the environment involves value judgements (NRA,1994c:Ch6). It states that water to sustain the needs of the water environment is "*a demand in its own right, to be met subject to proper*

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[1] There was no legal definition of 'Mafs' and they had not yet been set by any NRA region. By 1994, the Anglian NRA had undertaken an environmental survey containing a species list for plants and birds within each 500km section of river within all main river corridors, but it had not been fully analysed (NRA, 1993a:42). This is known as the Rivers Environmental Database.

[2] This is the flow which would have been exceeded 95% of the time without abstractions and was given in the Lark policy document as 42.88 tcm/day for the main river (Barker, 1992:17). It is considered to be an approximation of the quantity needed from the aquifer to preserve minimum flows in the river. This is not scientifically based, and varies greatly as a proportion of average flow in different rivers. It is now generally accepted that the variability of flows as well as high flows, rather than simply a low flow cut off point, are critical for aquatic habitats.

[3] More recently, 'River Flow Objectives' including 'Environmentally Acceptable Flow Regimes' have been suggested as a replacement for 'hofs' and 'Mafs' (Petts et al, 1995)

[4] The NRA has a statutory duty to conserve and enhance landscape and archaeological features associated with water. Archaeological sites most likely to be affected are those sensitive to changes in groundwater. The Breckland area alone contains 177 Scheduled Ancient Monuments. The CMP says "*river valleys form an important component of the landscape and the aesthetic as well as the ecological value of these areas is considered when assessing the impact of any NRA activity*" (NRA, 1993a:44).

considerations of reasonableness and worthwhileness" (NRA, 1994c:26), i.e. it is not merely a constraint on abstraction. It suggests an equitable approach to environmental management reflecting the fact that there is no objective understanding of what is natural. It states that "*environmental change should be managed in a way 'which achieves the best overall balance of interests, not the greatest benefit to any particular one*" (ibid). It also acknowledged that the 'natural state' of rivers is difficult to define given the dynamic nature of natural systems and the effect of human influences on the landscape. Some rivers are negatively affected by abstractions while others benefit from artificial recharge. The RWRS stated that research was underway to establish River Flow Objectives that would lead to a 'rational' way of identifying flow regimes to support river ecology (NRA, 1994c:31).

It was with the publication in 1994 of the national Water Resources Development Strategy, '*Water: Nature's Precious Resource*' (NRA, 1994b), and the RWRS, '*Water Resources in Anglia*' (NRA 1994c), that the NRA began widely employing the rhetoric of 'sustainable development' for its management of water resources. The latter strategy document interprets environmental sustainability as implying "*that there should, at the very least, be no long-term systematic deterioration in the water environment due to water resources development and water use*" (1994c:12). Also it insisted that long term abstraction plus '*proper allowance for the environment*' should not exceed long term replenishment - a principle that it states had, in fact, been implicit since the 1963 Water Act. Some of the staff I interviewed felt that water resources management had always been about 'sustainability', even if under a different guise, as uncertainty, and environmental protection had been acknowledged in water resource calculations. A manager remarked:

> *As a word* [sustainability], *I've picked it up more recently. As a word, it's been since about 1990ish. As a concept its been around in water resources very specifically for a lot longer and .. in the way that we have planned .. as I was involved in water planning. It came in .. into my consciousness about in 1983. But it had been around in the Water Authorities for longer, and in other people's consciousness. But in my consciousness from about 1983 as a concept.* [NRA1]

This manager felt that a precautionary response to uncertainty had been a typical rational for action in the past:

> *They were so overwhelmed by applications in the late 60s and early 70s and they didn't know how to calculate the hydrology of it all so they just gave time-limited licenses - a 'watch and see'. (...) So that was sustainability in a different way. It actually results in sustainability because (...) we can ask them to reduce their quantity or add conditions that makes them less reliable but adds to sustainability in water management. Gradually, over the region there were more time-limited licenses but spray irrigation has always been time-limited. But it was not through a*

> *sustainability concept, I think, to begin with. I think it was through a .. 'we don't quite know how to handle this'.* [NRA1]

The RWRS says that where knowledge is incomplete, the NRA will err on the side of caution in issuing licenses and that in all cases a 10% planning margin is taken into account when assessing resources availability[1]. Some officers felt that water had been allocated 'sustainably' ever since calculations had begun to include an allowance for river needs[2]. The Anglian region had been more advanced in this respect than in other regions:

> *Whether we got the numbers right is a different matter, but sustainability as a concept .. started to my knowledge in 1983. I think for a few others it was around longer. In other regions they do talk about it, but their numbers for the environment aren't as great. I think we allocate more .. I think we have been more sustainable over here.* [NRA1]

> *(..) what we were saying is that we have to keep the river, because there is an environmental demand as well as an abstractors demand. I can't remember at the time which was more important...by ranking of it...but the methodology implies they are equal.* [NRA4]

> *This region was a little unusual in that its previous licensing policy did have the environment written into it and our practices did protect the environment, but that wasn't the case everywhere. And that was a change that came about during the 1980s so that by the time the NRA was formed in '89 most people that came from the water authorities felt that more consideration should be given to the environment and the NRA was set up low and behold for that reason.* [NRA2]

Some of the staff of the water resources function acknowledged that their concern with day to day business did not allow engagement with wider issues such as the meaning of sustainability. One manager felt that there were different internal cultures within the NRA with different approaches to the environment; in particular '*younger staff who work from a culture of integrated environment concern, and the older staff with alternative historic backgrounds such as the engineers*'. An NRA conservation officer I interviewed, for example, did engage with the normative and subjective dimension to environmental sustainability and offered a wider understanding than balancing numbers:

> *It depends on how you define fair doesn't it? We'd say that it is fair to protect the environment - we are protecting it for everyone. Others would say that it doesn't really matter whether x species go extinct. My bottom line for sustainability is the sustainability of the biodiversity of the planet. (...) Democratically, people may say that it is not worth having something*

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[1] The next chapter will show that the levels of precaution within which the NRA operated were being questioned - in the main by farmers.

[2] A senior DoE water officer also felt that 'sustainability' had been long present in water resource management because of explicit ecological concern: '*I enclose some pages from the WRB report to illustrate the fact that the Water Resources Broad only recommended water resources developments that retained river amenities. The word "sustainability" was rarely, if ever, used in those days, but many of the ideas were there. There was a strong ecological section within the Central Water Planning Unit which was the successor body to the WRB*'. Perscom: Colin Wright, DoE, 1995.

> *and that may apply at a local level. But globally we have responsibility to protect species and nature.* [NRA3]

He acknowledged the tensions between local priorities and duties to 'distant others' that he felt must be taken into account in our assessment of what is acceptable. This officer was particularly concerned that listening to 'local voices' might lead to 'unfair' outcomes if wider, non-immediate, responsibilities were not taken account of.

> *It gets complex and more and more subjective...you know what is an acceptable decrease in trout population? The thing with flows and water resources there are lots of interaction between flows and quality so it is complex. What objectives are we trying to protect? The Precautionary Principle still requires practicalities. Our understanding is limited. Money is limited and decision comes down to economics, and then a subjective consensus.* [NRA3]

This view contrasts with the ideas of staff in the resources function who have a mainly operational and technically orientated perception of the decisions they take.

Reasonable need and proper use

The NRA had a duty to secure 'proper use', but 'proper' had not been defined in the legislation. Various interpretations have been offered. The RWRS suggests that 'proper' use might mean '*the best balance between all the conflicting demands*'. In the CMP and the Licensing Guidelines, '*securing*' proper use seems to be interpreted as a duty to enable all '*reasonable*' uses. A senior resource manager at the NRA headquarters stated that "*in practice, proper use has been taken as the requirement that resources should be licensed to meet no more than the reasonable needs of a user, including reasonable projected demands*" (Streeter, 1997). Clearly the concept of 'reasonable' is as equally contestable as 'proper' and critical in mediating different claims to water.

The 'reasonable need criterion' is practised as an appraisal of an abstractor's intended use of the water, judged in terms of generally accepted water requirements for the proposed activity; for example, a calculation of the needs of a crop, or a particular production process. The duty to conserve water implies that 'reasonable need' must entail no excessive wastage of water. The CMP states (NRA, 1993a:60):

> *The NRA must decide on whether the future requirement for water meets reasonable needs. The consideration of alternative supplies or demand management must be shown as well as consideration of recycling.*

Section 15 of Water Resources Act 1991 states that the NRA must '*have particular regard to the duties of water undertakers*' in circumstances where their own duties and powers are likely to affect those of the undertaker. *Particular* is not defined, and as one water officer said:

> *It's very particular wording. That's not defined. I think that as a body we tend to take the view that that relates to long term planning, provision of information to OFWAT and government through various channels. (NRA1)*

For public water supply (PWS) it was considered reasonable to allocate water for needs up to 20 years ahead (NRA, 1993a:60). This is because water companies require long planning times for the large investments in water resource provision. The allocation of water therefore usually exceeds current needs which means that they are accused of 'sitting on water' while availability for others is constrained. The CMP states that the water company must have demonstrated effective demand management and reduced leakage to economic rates before new licenses are granted but this is only a recent development in practice (NRA, 1993a).

For industry, the NRA would consider the needs of the particular processes used, generally up to 10 years ahead, and the expected life of the plant[1]. For agriculture, the requirements for water needed with respect to the type of crops and soil conditions, or stock types and numbers, were taken into account, again for needs up to 10 years ahead (NRA, 1993a:60). Irrigation requirements during years between the driest and 5th driest year in twenty were considered reasonable. The NRA did not take into account issues of land use change[2], or comparisons between the effectiveness of irrigation in different areas (Beel, 1995).

Thus, the reasonable need criterion is not used for a comparative assessment of license applications, and regardless of the *relative* 'reasonableness' of concurrent applications, licenses are considered according to the first-come-first-served principle. A *more* efficient industry may lose out to a less efficient production process if its license application was received later. This obviously leaves the licensing process open to criticism on the grounds of inefficiency - not just in terms of economic efficiency (i.e. which process resulted in a higher financial return per unit of water) but in terms of productive efficiency, i.e. not *minimising* overall wastage of the resource.

Rights and reliability

Licenses of right, granted in perpetuity, have created significant difficulties because under changing circumstances, be they climatic or social, the regulator is unable to reassess rights to abstraction. Earlier analysis (in Chapter Four and Appendix 2) suggests that in 1995 around half of licenses in the study area were still 'permanent' (Table 4-11 and Table A2-1). NRA staff were aware that the licenses of right were considered unfair. They are perceived to have encouraged hoarding of water as, in

[1] In Chapter Six, the question is raised as to whether the NRA had sufficient specialist expertise to asses crop requirements and the water requirements of modern industrial processes.
[2] Changes in cropping practices will affect the water available for recharge and runoff.

some cases, the quantities licensed were in excess of the quantities subsequently abstracted which has tied up resources that could have been used by others. As competition for water has increased, and because of the principle implicit in the licensing system that the right to abstract water is associated with land ownership, the asset value of many licenses has increased considerably, adding as much as 30% to land values (Rees et al, 1993). An interviewee described the local situation:

> *...there are licences around the place that are heavily under utilised - lets leave water companies aside. That's because a farm, an industry whatever, has changed their pattern of operation and they may take only a fraction of the water that they did, but they hold on to the licence because it's an investment in the future - adding to land value. Again that's perceived of as unfair.* [NRA2]

Even when water is no longer required by a licensee, it is unlikely that the water will be returned into the system through voluntary variation or relinquishing of the license. In addition, levels of abstraction were authorised in excess of that which would now be considered sustainable in environmental terms. In consequence, licenses of right have contributed to low flows in rivers, the draining of wetlands or more unreliable yields.

One staff member questioned the fairness of prior appropriation.

> *One thing that I do not think is fair to the planet or to the population in general is that we allocate resources on a first come first served basis. (...) it's not fair because it means that we have allocated this much away and there is no more left. Yet we might have an essential use coming around the corner. Because of global warming perhaps.. or we are drying out in this region...and that we might need it more for public supply or for a particular essential industry. So the system is not fair. I mean, it might be fair in the way we are allocating it, (...) if the process is fair then that's all right; the current process of applications might be considered fair, but actually in the long run it might not be.* [NRA3]

He recognised that fairness is important for resource management in a procedural sense, but that sustainability also requires another kind of fairness. He was concerned that resource allocation needs to be holistic in the long term and allow more flexibility to adapt to necessary, or desired, changes. What is 'optimal' allocation can change over time. As legislation deems that existing users be protected, questioning the fairness of an existing allocation requires an examination of the fairness of allocations made in the past.

Because insufficient incentive existed for license holders voluntarily to revoke unused parts of their licenses, and because resources in many areas were not fully resolved, the time-limiting of licenses was introduced. In the Anglian region, new abstraction rights began to be time-limited in the early 1970s. Time-limited licenses were not automatic, but gradually became standard practice as studies of resource

availability became more and more necessary. Such licenses had become the norm by the mid 1980s in some areas. A Policy Implementation Guidance Note[1] issued in 1992 stated that time-limited licenses were applicable when there was uncertainty regarding the potential impact of the abstractions[2].

> *In this region we are increasingly giving temporary licences. Er, where we've, I mean if you look at taking water from an aquifer let's say. The first borehole has no impact but the more boreholes you put down the more you take it becomes progressively more impact. So you don't have to worry about it as you start. As time goes on though, you get into areas of increasing sensitivity, so you get more sophisticated in your analysis and your model.* [NRA2]

The time-limited licenses gave the NRA the ability to reconsider resources availability and the future option to refuse a license renewal if problems were experienced. In practice, refusal has not happened but conditions have been placed on licenses as they have come up for renewal (described below). This water manager gave a more recent rationale for the use of time limits, and pointed out that just as it is possible to consider permanent licenses as unfair, others may regard a temporary license as unfair:

> *It'll tell you in there* [an R&D document] *that you don't burden future generations with the judgement of this generation. That you can review it through time as social, political and economic bias changes and that can be reflected in licences. Er, there could well be a body of opinion which says that's not right, because "I make my company's investment on the basis of now, and you make them on the basis of changes in 10-15 years time".* [NRA2]

However, water resources are not owned by the licensee, only the legal right to abstract is granted, and neither the amount, nor the quality of the water, is guaranteed. As the manager explains:

> *Another example of perceived unfairness worth thinking about is that a licence is no guarantee of quantity or quality. Um, local people feel that they should have a guaranteed supply of water for their money. The answer is that because we are dealing with a natural commodity we cannot ever guarantee that it will fall when you want it and where you want it. Nor can we control many of the influences on water quality. (...) When people get an abstraction licence, they get a letter from us explaining that it's not guaranteed, ...but they probably don't read it.* [NRA2]

For time-limited licenses, the right to abstract remains until the license expires, in which case it is renewable unless it is revoked by the regulator before it expires, in which case compensation is payable. Any license, including licenses of right, that has not been used for seven years may be revoked by the regulator upon which the licensee loses all rights and no compensation is payable. In areas such as the Lark

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[1] Water Resource/001

[2] Potential climate change was excluded as an 'acceptable uncertainty' at this time.

Valley where there is an over-commitment of resources, any water that is returned in this way would not be relicensed but would be allocated to address the environmental deficit.

As well as permanent and temporary licenses, some unlicensed abstraction is viewed as unfair. Abstractions which are gravity-fed such as for land drainage are exempt from licensing. In the Anglian region, an example of the latter is a particular type of drainage from the river into the fenland channels and then into the fens through 'slackers'. This has been judged as unfair because of the lack of control by the regulator:

> *It is also not fair.. there is a mechanism where rivers are allowed to flow into drains or dykes and these flow back into fields and it's difficult to licence these slackers. Water flows can change daily and we have no control over it and so don't know what's happening.* [NRA4]

> *We now have a view on them [slackers]. We don't necessarily agree that they are unlicensable, but it's a fact of life that they haven't been; well, that reverse transfer is necessary because the fens dry out because evaporation exceeds rainfall.* [NRA2]

Although one-off abstractions up to $20m^3$, domestic and agricultural abstractions of less than $20m^3$ a day and trickle irrigation are currently exempt from the need for a licenses, an alternative view is that there is still too much licensing:

> *It doesn't make much difference in resource terms so we could perhaps relax licensing and everyone would feel the benefit* [NRA4]

This would mean increasing the maximum amount permitted to be abstracted without a licence, thus reducing the number of licences which the regulator had to administer and reducing operational costs. The logic is that the majority of licences actually have very little impact, being negligible in size compared to the largest 10% of licences[1]. In fact, 90% of licences in the Lark use a total of only 19% of water in this catchment[2].

This alternative view reflects the fact the NRA nationally had begun to adopt a generally more 'business like' approach and to take on board discourses of economic rationalistion (although at the local level, this development did not arise in discussions with the staff). The NRA strategy document states that: "[D]*evelopment of the water resources function in a business-like way is an important activity in the coming years*" (NRA 1993b:17). This included improved standards of service provided to the public, and efficiency and expertise in the execution of its duties (1993b:16).

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[1] The government has been exploring the 'deregulation' of licensing in a recent review (DETR, 1998). They have suggested that *all* uses below $20m^3$ be exempt so as '*to treat small abstractors more equally*' and remover 20,000 small abstractors from the system (ibid:33).

[2] See Figure A2-4 in Appendix 2.

> *Achieving a balance between the needs of the environment and those of abstractors is not new. What is new is the emphasis which is placed nowadays on the needs of the environment, the institutional framework within which water resources are used and managed and the increasing attention being given to demonstrating value for money.* (NRA, 1993b:17)
>
> *Public confidence in the independent enforcement of standards will only be retained by an arm's length relationship. The fair attribution of NRA costs to beneficiaries is also important here - to ensure that public funds are spent where they should be, namely on work carried out for the government on behalf of the nation as a whole.* (NRA, 1993b:20)

As part of this improvement, the use of economic principles gained increasingly important ground in resource planning and management discourse as the following comments indicate:

> *The use of economic cost benefit analysis, amongst others, offer a rational approach to the balancing process* (NRA, 1993b:2),
>
> *Economic instruments may be developed to assist with the realisation of an environmentally sustainable water resources development strategy* (NRA, 1994b:13)

The basic principle of fairness within the licensing system is the fact that a license ensures that no one else can take or '*derogate*' the water granted under the license. The staff perceived this as the fundamental principle of the licensing legislation:

> *Protected rights are absolute. The legislation was there to protect rights more than any other single thing. They* [abstractors] *want that protected at all costs, because it's fundamental to their business. What they have paid for for many years and have invested in is fair.* [NRA2]

Derogation was not meaningfully defined in the legislation. The CMP suggested that a 2% impact on reliability or cost would be *'tolerable'* (NRA 1993a:12). When licensing an abstraction, levels of service for appropriate reliability are different for different users. It was left up to the applicant to accept the degree of reliability predicted, but not guaranteed, by the NRA (NRA, 1992a:5)[1]. In some cases, the reliability of an abstraction will be limited by conditions attached to the license (see below). Levels of reliability determining licensing in the Anglian Region are:

- For PWS[2] - a hosepipe ban on average not more than once every 10 years; the need for voluntary savings of water on average not more than once in 20 years; the risk of rota cuts or use of standpipes on average not more than once in 100 years.
- For spray irrigation - there should be risks of shortages not more than once in 12 years on average.
- Industrial and agricultural - no specific targets.

[1] Derogation was permissible with the consent of the person derogated, but in practice, staff reported that the buying out of protected rights by agreement between abstractors has not been common.
[2] Operational standards are given by OFWAT for PWS.

The above exploration of the concepts of *availability, environmental and reasonable need, proper use, and appropriate reliability* have revealed the formal principles that determined 'fair' limits to the exploitation of water and who had access to it. In the next section, I point to some of the practical and procedural characteristics of the licensing system through which the formal notion of fair water resources management is operationalised.

ii. *Fair procedures and fair management*

The judgements of the NRA staff, and the fairness concerns that they were aware of, will be discussed through the following management practices: license applications, charges, consultation, conditions, monitoring, and responses to resource stress.

License applications

Legislation says that the NRA should deal with an application for an abstraction license within 3 months. This became increasingly difficult for two reasons: renewals of many time-limited licenses were due simultaneously, and growing competition and the increasing need for certainty about a licence's impact made applications more difficult to resolve. The CMP states that, the NRA "*will give prior and equal priority to existing protected rights to abstract and to established environmental needs before allocating any further water for abstraction*" (NRA, 1993a:60). Effectively, when a time-limited license expires a new one is applied for and the conditions attached to it need to be reassessed.

By around 1994, the backlog and the increasing complexity of the applications was leading to a compromise of the first-come-first-served principle.

> *People say it is first come first served, but it's not. If two come in at the same time, it will be the one who is less complicated, i.e. the one that a decision can be made over fastest, that will win. That might disregard how much effort someone has put into an application, so it's unfair.* [NRA4]

> *Things, applications, are becoming more complicated and imaginative. We are having to use more time consuming methods for sorting out applications* [NRA6]

In response to this greater complexity, and more pressing duties on the staff during periods of drought for example, routine tasks such as license application processing would slip behind schedule. The regulator has to write to the applicant for permission for an extension when required. In such cases, while waiting for their renewals to be processed, abstractors were able continue to abstract without being charged the license fee. At the time of this research, this bureaucratic failure was resulting in loss of revenue to the NRA.

Increasingly, the NRA were expecting applicants to supply more information on potential impacts of their applications. The application process was thus also delayed when applicants had done insufficient groundwork before their application, or if their application forms were incomplete[1]. One of the staff felt that being required to submit an environmental impact assessment with an application was resulting in more fairness as decisions would be based on better *scientific* understanding and validation.

> *But more and more we asking for environmental assessments on relatively small licenses...and this is very positive where fairness comes in .. that we are trying to assess the environmental impact a lot more accurately than in the past.* [NRA3]

It was suggested by a different NRA officer, however, that this requirement for more information had also introduced an element of *unfairness*. An abstractor may be granted a license if they can prove to the NRA that an abstraction will have no unacceptable impacts either on the environment or on existing abstraction rights. He remarked:

> *One thing that might be unfair is that the large companies can afford to take the risk of doing investigations to prove that water is there. It comes down to the risk that they take. They stand a better chance of proving us wrong.* [NRA4]

The question was raised as to whether it would be fairer therefore, if impact was calculated on a strategic level, and paid for by public money as it was for the 'good of all'. Alternatively, because '*that's public money going towards a farmer making profit*', some interveiwees wondered whether the burden should fall on those who benefit directly from the extra science required to grant a license?

Another point of unfairness that was raised was the complications involved in varying a license[2]. The variant would have to advertise and pay a fee. In East Anglia, there is a very flexible system of leasing land for farming and the licensing system was not considered able to cater for that degree of flexibility. Applicants refused a license, or a variation, or who find conditions unacceptable, have the right to appeal to the Secretary of State (see case study in next chapter).

Finally, since the embargo on new licenses in 1992, potential abstractors were usually informed during a first enquiry that applications would not be successful. Since the embargo had become common knowledge, fewer enquires were being made. If applications were not being made, assessment of the nature and extent of any impact

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[1] Seminars were run to advise NFU staff and agents who work on behalf of farmers on the importance of the details in the application process.

[2] 'Varying' refers to changing the location of water application, moving a borehole, altering the quantity of water or changing the named licensee.

of setting limits to water would be very difficult. Equally, estimating latent demand and taking it into account in long term strategy would be more difficult. As a result, since 1995 the NRA had been attempting to record initial enquiries. At the time of this study, the applications of 17 potential abstractors in the area had been declined due to the embargo; applicants included a golf course, a football club, a private domestic supply, a hospital, and other industrial and business users.

Abstraction charges

The charging scheme for water abstraction, determined by legislation has been blamed for the difficulty in changing water use behaviour (RSPB, 1995; CPRE, 1991; Rees & Williams, 1993), and therefore is viewed by some people as inappropriate and unfair. For the last 30 years or so, charges have been based on licensed quantities only to the extent that the authorities needed to recover the costs of their water resources activities, and without making any profit on a yearly basis[1]. This has resulted in charges that provide no real incentive for abstractors to use water more efficiently or to alter their licensed quantities to match their actual requirements. The cost of a license *application* included a nominal application fee to the regulator of £100 and an additional cost to the applicant of about £250 for advertising the details. Further costs could include an environmental assessment and an assessment of third party effects. Above this, there was an annual fee according to a standard unit charge (in £ per 1000m^3) related to the water resources expenditure for each region. In the Anglian region, the unit charge for the year 1995/96 was £13.94/1000m^3. There was a small element of marginal cost pricing in assessing charges; a banding related to source, season and loss was applied to the volumetric standard unit charge. The bandings are, however, national rather than according to local conditions, or the impact of individual licenses. Three factors apply:

> Source factor: where the NRA had built infrastructure to support supplies, e.g. transfer systems which enable greater security of supply to the abstractor, license charges carried a weighting of 3 times the non-supported licenses.
>
> Season factor: during the summer (31st March-31st November) when water is relatively scarce, abstraction charges are weighted to reflect greater impact and to provide incentive for winter storage. The premium is 10 times winter abstraction.
>
> Loss factor: some uses of water return a large proportion back into the system, such as sand and gravel washing. Others are incur high losses e.g. spray irrigation. The later incurs a factor of 1.7 times the charges for public water supply.

Abstractors were thus paying in proportion to their impact on the resource and on the environment, and except for irrigators, all abstractors have paid for licenses under the

[1] The NRA's latest and revised Scheme of Abstraction Charges had come into effect in 1993.

same charging scheme whether they are small holders or water companies. (Abstractions of less than $20m^3$ were not charged for.) The Water Resources Act 1991 states that '*no undue preference*' or '*undue discrimination*' must apply. The opinion of two senior NRA managers[1] was that: "[T]he *NRA must ensure that all users have a fair share of new developments, but also pay their fair share for the cost of protecting the water environment*" (Swinnerton and Sherriff, 1992:15). For irrigation, a special split tariff applied consisting of a basic charge of 50% of a fee calculated according to the *licensed* amount, plus 50% of a fee calculated according to the water *actually* abstracted. Thus, some incentive existed for not abstracting the maximum permitted. This differential treatment of agriculture abstraction is explored fully in the next Chapter.

Consultation

What role did consultation and participatory decision play in the 'procedural fairness' of the NRA's assessment of water availability and licensing decisions? Routine consultation with the NRA took place at the regional and the catchment level mainly through select committees representing different interests, open invitations to comment on draft strategy documents such as CMPs, and was principally advisory in nature. At the regional level, a Regional Advisory Board was made up of one executive member from the national board, plus the Chairs of the Regional Flood Defence Committee, Regional Fisheries Advisory Committee and the Regional Rivers Advisory Committee. These committees consisted of representatives of different interest groups including representatives from the Local Authorities, agriculture, industry, environmental and angling groups. There were no forums in Anglia dealing exclusively with water resource issues, so consultation on water allocation policy had been overshadowed by issues such as land drainage or pollution. In periods of resources stress however, single sector Drought Liaison meetings were held.

Policy on water availability was set through the NRA's strategy documents and CMPs. A consultation draft of the RWRS (NRA, 1994c) was put forward for public discussion in 1993; 15 meetings were held around the region attended by over 500 (invited) people. Over 500 copies of the RWRS and 5000 leaflets inviting comments were circulated. One hundred and fifteen organisations and individuals responded[2]. Although, the RWRS acknowledged that 'proper' allowance for the environment involves value judgements, the document did not engage either with methods for the

[1] Managers in the national headquarters of the NRA.
[2] The results were published in 'Water Resources Strategy: report on public consultation, NRA, Peterborough, December 1993.

resolution of value judgements or the redefinition of primary resource management objectives.

The value of consultation in increasing commitment to NRA objectives is explicitly recognised in the CMPs. In 1993, the consultation document for the Ely Ouse CMP set out the conflicting demands at the catchment level. Catchment Management Planning was designed to "*create a consistent framework within which the diverse responsibilities of the NRA can be applied within a catchment in a co-ordinated manner*" (NRA, 1993a:2). Its first objective was *management effectiveness*; pulling together all the separate NRA functions and improving communication between them. The plan compared the uses and status of the water environment with *'relevant'* standards and targets set in legislation. Any shortfalls were presented as *'issues'*. After consultation, the final plan included actions for improvements - areas of work and investment proposed by the NRA. Its second objective was to increase *public acceptability*, but as one water officer described '*it's still a pretty much top down approach*'. According to the Forward written by the Regional General Manager, the CMPs were meant as a "*vehicle to achieve improvements in the water environment*" and comments were invited so as to *"allow input from others and provide commitment from all parties to achieving action in important issues'* (NRA, 1993a:i). Again, there is no mention in the CMP of how conflicting values and priorities might be resolved and it lacks engagement with social values and goals. Nor is there a discussion of the 'appropriate environmental standards' that it seeks to enforce. There is reference, however, to future generations:

> *Catchment management assists the NRA to use its authority and work with others to ensure that the rivers, lakes, coastal and underground waters are protected and where possible improved for the benefit of future generations.* (NRA, 1993a:1)

The CMP document was instrumental in its approach, reflecting consultation at the implementation stage of policy rather than the making of policy. It was thus useful in listing problems and solutions and identifying the deficits in technical information concerning key hydrological processes, but was of little value in confronting value conflicts. This perhaps reflects the *operational* rather than *normative* view of fair water management within the NRA, and either a lack of awareness of, or willingness to confront, value conflicts over water abstraction.

For routine licensing, there were statutory consultees concerning licensing decisions. For example, a Code of Practice written into the 1989 Water Act had imposed new duties to consult with a wide range of environmental bodies on all

license applications likely to affect conservation sites. However, this did not change the actual basis for licensing decisions in legislation or in practice. One manager said:

> *We did do our consultation in a different way. But it did not change our decisions on individual licensing. And it did not change our decision on how to do the calculations as to what the overall resources were.* [NRA1]

What changed was the degree of consultation. But this had not dealt with the legitimacy of the water 'allocation' system itself and the calculation of resource availability came down to scientific judgement alone.

As for contact with individual abstractors, one staff member differentiated between those who wanted to change the *status quo* and those who defended it. There was a group of politically loud and coherent farmers that the NRA dealt with regularly:

> *Now, they are the ones we tend to get involved with. The ones who will pursue things by letter, who will pursue the argument. A lot of other farmers will moan and groan, not even at us but at their friends. It's those people we never get a chance to meet and it's difficult because there are too many so we tend to get to meet their representatives .. maybe the top 50 and there'll be another 1000 out there that we can just never meet really, other than our enforcement guys, and our field officers gradually getting the message over that way.* [NRA1]

Support for consultation among the staff that I interviewed did not seem to reflect an explicit ethic or immediate objective of greater participation and consultation, rather it had a more pragmatic purpose of aiding the achievement of operational objectives and avoiding conflict. One manager felt that consultation was useful to better *manipulate*, as well as to better understand what motivated, abstractors; commenting '*so I think it is social manipulation (laugh) ..you have to understand people and [their] panic!*' It was recognised that greater co-operation and the facilitation of productive relationships would be essential for the successful implementation of environmental decisions, and the same manager went on to say:

> *I mean, we can impose environmental decisions, or rather, we make decisions on environmental grounds. The only way it will actually work is through these farmers working with us as well* [NRA1].

I found several examples where consultation and negotiation with individuals had been used, and fairness clearly had been a consideration during procedures for dealing with problems and explaining decisions[1]. As will emerge below however, the process was often one of 'decide-announce-defend'.

[1] For example, an industrial user who was refused a license following the embargo had the option of a supply from a water company. A delay of two years was expected before a water company could connect a supply to the site. Because actual abstractions in the catchment were less than licensed abstractions, essentially an 'under use' of water, and following agreement with a water company over their likely abstractions, the NRA was able to secure a more 'proper' and 'fair' use of resources by granting a temporary license to the industrialist. The NRA informed by letter, all other applicants who had been refused a license, explaining the reasons for their decision.

Conditions

The conditions on licenses work to achieve the statutory objectives for water management which have been discussed above and reflect how water allocation is constrained. The details on a license set the following basic conditions according to statutory requirements:

i. the amount of water which may be taken
ii. the period in the year when it may be taken
iii. the purpose for which it will be used
iv. the land on which it may be used
v. the name and address of the abstractor
vi. the duration of the license
vii. the source of the supply.

Rather than being 'universal', different conditions apply to different types of licenses in the same catchment. Abstraction from rivers, for example, will usually be stipulated by daily rates or even hourly rates, and groundwater abstractions by seasonal or annual rates which reflects the impact on the water source. In addition to the statutory conditions listed, and in order to protect the environment and existing abstractors, licenses may contain cessation flows or levels which come into affect during drought situations when, for example, river flows drop below a particular level. Their importance was particularly recognised in the Anglian region as a result of the 1976 drought, although less onerous conditions had already been in use. They were more stringently implemented following the 1989-1992 drought. A comment by one manager verifies the important role of professional judgement in much of the NRA's policy: '*often these restrictions are put on when water resources have been put under stress and we have learnt something*'.

From 1992, cessation clauses were applied to all *new* time-limited surface water licenses, or to *existing* licenses (both PWS and spray irrigation) as they were renewed, or when an abstractor applied for a variation to their licence[1]. Conditions are generally applied to surface water licenses (except in the case of wetland protection), as the effects of groundwater licenses on river flows are slower and more difficult to ascertain. In the Lark valley, this means that in effect only spray irrigation licenses are subject to cessation conditions (as there is only one surface water industrial abstractor). Also, because of the time lag between policy decisions and licenses coming up for renewal, conditions can take many years before they actually come in to effect and so, again, a situation exists where the licences in a catchment can have

[1] When a variation is applied for, the regulator reviews the whole license.

different conditions[1]. Finally, licenses of right also do not have cessation conditions attached and this too is perceived as inequitable.

An equity issue arises as to whether the *same* cessation flow or level should be applied to *all* surface abstractors, or whether new applicants should be expected to suffer progressively more stringent conditions. According to the staff, in many other regions the cessation clauses have become tighter over time so that newer licenses are less reliable, but the Anglian region has generally been more consistent and had a more evenly distributed approach to conditions than other areas. The CMP reports that the latter is considered as more equitable as well as being more practical to implement. All time-limited, surface licenses in the Ely Ouse catchment have the same condition related to the flow at Denver sluice[2] in order to protect the river and downstream users.

Another relationship between scale and fairness was suggested by a manager who remarked that:

> *We have taken the decision to determine licences and conditions through our 26 area offices* [rather than nationally]. *Now, you could argue the pros and cons of that ... but what it does do is probably give the best opportunity to take into account the local circumstances but built into that though is the risk of inconsistency. That's a whole other battle.* [NRA2]

Although national consistency may have been lost, there had been a gain in fairness as local consistency had improved. It was also felt that the Catchment Management Plans had lead to a more equitable application of conditions:

> *In the past, the environmental impact of an abstraction was only considered very locally. Now, it is fairer as the impact is considered according to the situation across the whole sub-catchment. So, restrictions are more evenly distributed. Also where there is a Catchment Management Plan, there is more consistency in decisions. We can act from a consistent standpoint; not just rubbing away at local bits. It allows consistency rather than relying on individual memories or expertise of staff.* [NRA5]

Here, a more consistent and holistic approach to measuring the impacts of abstraction on the environment and on abstractors at a catchment level was considered fairer than an assessment at a very individual and localised level.

An alternative argument pointed out by the staff was that new licenses can have the effect of bringing forward the arrival of the cessation condition for existing abstractors. Because of the perceived unfairness of this situation, and where it was thought to be significant, the NRA *had* responded by making some individual licenses

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[1] A further possible condition for groundwater licenses is known as the 'Lee Valley Clause'. This was used when derogation was uncertain and the applicant agreed to sort out problems if they arose.

[2] These are: March to August equal or less than 113.652 tcmd; September to October equal to or less than 318.226 tcmd. There are local flow conditions for licenses in the River Kennet (4.32tcmd) (NRA, 1994c:29).

conditional on a very local threshold for river flow or water levels. This required some abstractions to cease in advance of others, therefore making the license less reliable. However, a comment was made that reduced reliability could be positive in providing more incentive to invest in winter storage thereby relieving pressure on summer abstraction.

So, there was a fairness dilemma connected to scale. Spreading the burden of conditions catchment wide i.e. more thinly might be considered fairer but could be at the cost of taking local conditions into consideration. Also as one officer said:

> *Being consistent is a fairness principle, but this has to be weighed against local flexibility and responsiveness.(...) Any tightening of regulations should be carefully targeted. There is no need to impact on those small licenses that don't matter.* [NRA6]

In the Lark, the same cessation condition is shared by all licenses and is not in proportion to effect on the resource, in spite of the fact that 81% of potential water abstraction is allocated to 10% of licenses[1].

Monitoring compliance

The NRA's attitude to monitoring and the norms of monitoring that had been established over time indicate expectations of procedure and 'management style' important to the success of the licensing system. During the 1980s, license enforcement was minimal and, although it had slowly increased, by 1995 the Anglian Region NRA employed only 21 enforcement officers who made 2,000 visits a year, to monitor approximately 10,000 licences[2]. The officers' duty was to fisheries and navigation, as well as to water resources. In general, their approach was to target more frequently those who were already using a large proportion of their license, or abstractors most likely to impact on the resource or the environment.

Illegal abstraction was thought by staff to be relatively rare - a figure of 99% compliance was quoted, and staff felt that there was less 'corruption' than in other regions[3]. Even so, the staff were unsure of the effectiveness of the enforcement because of the difficulty of securing a prosecution:

> *It is too difficult to get around to everybody to look at their meter[4], and we have to actually catch people in the act. They can say that their meter broke down. We usually have to make an appointment to go in. Every year*

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[1] Figure A2-4 in Appendix 2.
[2] *Perscom.*
[3] A licensed abstractor exceeding their permitted amount needs to be distinguished from unlicensed abstraction. In the case of the latter, where no new licences can be granted and the area is over abstracted an illegally abstracting business risks collapse once 'discovered' as their only option might be to buy water from the water company at much greater cost.
[4] Measuring the amount abstracted was a condition of a license. The license holder is responsible for the installation and maintenance of the meter.

> *the abstractors have to submit returns*[1]*. If we notice that they are getting close to their license limit we will monitor them. We cannot even prosecute them if their returns are too much .. because it's not our evidence!* [NRA4]

Fines were thought to be too low to be a deterrent (£5,000 maximum) given the gains to be made from irrigation during a very dry period, for example. In any case, the NRA's general approach was not to secure prosecutions. Historically, the management of resources was *'as much about measuring flows, rainfall and levels as it is about monitoring compliance'* and enforcement had taken a back seat. A manager commented:

> *Prosecutions are a last resort. They might be needed in order to publicise that you are doing it, but as a principle, um, ..we have what are called Enforcement Officers. The way they enforce, ... no I can't really say much about our enforcement policy as that's something that shouldn't get out. But basically they are not there to 'nick' people. If there is a big impact and it's a flagrant breach, in other words someone's really suffered, yes we would prosecute. But for smaller technical infringements we would try and work with people.* [NRA2]

The fact that the NRA preferred to regulate in a manner that avoided cheating it in the first place emphasises the significance of trust and fairness in the system; a large degree of self regulation was an integral and fundamental part of water regulation. The 'sustainability' of water resource management relied on this social contract. This suggests that if the introduction of new management strategies were to create new social relations, expectations and norms, and the outcome was a breakdown in trust, sustainability would be compromised rather than advanced.

Responses to resource stress: varying licenses

The introduction of time-limited licenses and cessation clauses was not retrospective. They could not therefore resolve the problems that the NRA had inherited with licenses of right, which in some areas, such as the upper Lark, had lead to unsustainable levels of licensing. Within existing legislation, the NRA had several options for retrospectively restoring the balance between available resources and authorised abstraction, including: licence revocation, negotiating the relocation of boreholes, substituting surface for groundwater abstraction and encouraging winter storage reservoirs.

The staff were aware of a tension in reallocating resources to the environment: balancing fairness towards the environment for the good of all, with fairness for the individual abstractor with historical rights. On the one hand it was argued: 'a*t the moment the licenses of right are unfair to the environment and to future planning and*

[1] 'Returns' are a record of actual abstractions which license holders had to submit, usually yearly, to the NRA.

the proper allocation of water resources'. On the other it was argued that: 'w*e are looking at the pinch points where significant impacts have been identified, to see if we can do alternative things without disadvantaging the owners of licenses'.* This is particularly apparent with the option of revocating or varying those licenses known to be causing environmental damage, because compensation must be paid. The licenses are, in effect, viewed as property with acquired financial value. The compensation payments would come out of the Water Resources Account (which is made up from abstraction charges across a region); that is, from the public purse, and so in effect, would be born by all abstractors. As a result, revocations have not taken place, and as one officer commented: '*it boils down to pound notes at the end of the day'.* Instead, the NRA has usually negotiated with an abstractor to relocate the abstraction point, or to reach voluntary agreements over variations in abstraction.

> *We've got an agreement with them that we have a model and they will alter their takings from the borehole depending on the model predictions. So they have held on to their licence, and we haven't had to pay compensation so we have a very good working agreement. Fortunately it is very technically based, and we have a sophisticated model that they believe in. So that tends to be the way we've done it rather than by being 'rambo' about it.* [NRA2]

Preferring negotiation, at an individual level, to punitive or costly regulation, illustrates the advantage to the success of the licensing system of positive judgements of the regulator by abstractors.

This section has described some of the fairness principles and concerns that characterised abstraction licensing. The staff were working with the concept of *balance,* and with a faith that fundamentally the licensing system was a fair system. The third section of the chapter acts as a case study that contextualises further the principles, issues and judgements of licensing discussed above.

III Rationales for, and experiences of managing drought

This section begins with an account of the rationale given by NRA staff for their decisions and the strategies implemented to deal with the water resources shortage which occurred just after the formation of the NRA. Staff also describe the responses by abstractors to these strategies. This is followed by a discussion of NRA policy responses from 1992 onwards.

i. *The 1989-92 drought: an early challenge*

During drought periods, historically considered for planning purposes as a 1-in-50 year shortage, low summer rainfall is coupled with peak demand for water, especially

if temperatures are unusually high (Wilson, 1996). Especially if exacerbated by low rainfall during the previous winter, environmental stress such as low river flows and aquifer levels, necessitates constraints in the use of water for human activity. To resolve environmental and water supply difficulties during the drought of 1989/92, the newly created NRA was forced on to a fast learning curve regarding the priorities for water management. Under the 1989 Act, the NRA was given the powers to take action during drought to protect both the needs of water undertakers and the environment. As one officer put:

> *The fairness will come from looking at the Water Resources Act and seeing that we have to have particular regard to the duties imposed upon water undertakers. (...). Er, but we only have to have due regard to the desirability of conserving the environment.* [NRA2]

Clearly to balance these two priorities, the NRA required the complete co-operation of the water companies. To control the abstraction of a water company the NRA would have had to apply for a special drought order, issued by the Secretary of State for the Environment[1]. Water companies could also apply for drought orders to increase abstraction. Although the NRA could advise the Secretary of State, there were no statutory provisions regarding balancing the needs of the water company against the environmental damage resulting from further abstraction. Any NRA objection would also have been constrained by a statutory duty which stipulated that public water suppliers provide supplies to *all* their customers. This has been interpreted to mean constraints cannot be imposed on abstractions by water undertakings, and underpins the NRA's relationship with the water companies (Williams, 1997).

In the Anglian region, a drought order was issued in 1989 and in 1990 to reduce flows in the Ely Ouse to support the refill of storage reservoirs of the Essex Water Company (DoE, 1997). Two more drought orders were needed in the region to augment rivers to ensure PWS supplies. Relations with the water companies were generally co-operative and the NRA made extensive use of interbasin transfers and river regulation to support depleted resources. Co-operation was lacking however, over demand control, which reflected the fact that the water companies and the NRA had different objectives (Kinnersley, 1988; Maloney & Richardson, 1994). In 1990, the NRA found the newly privatised water undertakers, in this case Cambridge Water Company and Anglian Water, initially unwilling to upset their customers by implementing conservation measures such as hosepipe bans that were expected before other drought control action took place[2]. The NRA were unable to impose hosepipe bans and the water companies appeared reluctant to act to protect the

[1] Section 131, Water Act 1989
[2] Eventually, 3 million customers were affected by hosepipe bans by 1991 (Thomas, 1992).

environment.

The only restrictions that the NRA could apply without a Drought Order was the control of irrigation abstraction through compulsory restrictions limiting or completely preventing irrigation during exceptional drought periods[1]. This they would do to protect the environment, but memos and internally circulated papers reveal that they were not keen to restrict one set of users to conserve resources for the benefit of others. One memo stated that: '*it is not considered appropriate for the NRA to judge which abstractor is the most deserving of water supply*'. Because the NRA and the water companies were not acting in concert, and in the context of the highly unpopular privatisation of the domestic supply sector, internal papers circulated to managers show that the NRA were aware that this had lead to public perceptions of the NRA being unable to fulfil its role as environmental protector. Also, given the imposition of irrigation bans, it appeared to the public that the NRA were unable to, and could not be trusted to, regulate equitably.

In addition then to the cessation conditions written into abstraction licenses to limit or prevent abstraction when flows or levels fell below predetermined thresholds, the NRA was able to control *irrigation* abstraction through compulsory restrictions (referred to as Section 57 restrictions).

> *The irrigation can take place if their water is there. That's the only decision we can make.* [NRA1]

There are only limited peaks in demand from direct industrial abstraction which, in any case, generally returns a large proportion of water back to the system as effluent[2]. Section 57 was to be used where there were either no conditions on licenses to limit abstraction (e.g. on Licenses of Right), or where the situation was so extreme that existing license conditions were inadequate. The restrictions could entail a reduction in volume, a limit on abstraction during certain times of the day or a total ban. The restrictions could be used selectively as the impact of peak demands on river flows depends on the source of the abstraction, and in most cases restrictions would effect only surface water irrigators.

Two significant principles are inherent in these restrictions. The first is that peak demands will not always be met, implying that environmental protection takes priority when necessary. The second is that it is fair in principle to apply restrictions a) only to

[1] These powers originated in the 1963 Water Resources Act and were incorporated into Section 57 of the Water Resources Act 199. Irrigation is controlled because all water is lost from the environment through crops or evaporation. A proportion of most other uses is returned e.g. through effluent. PWS takes about half of its supply from reservoirs and about 90% is returned to rivers are after use.

[2] During the summer, the need for effluent dilution can result in a peak environmental demand (Wilson, 1996).

irrigation as this is the most 'consumptive' use, and b) proportionately, discriminating according to impact on the resource. The NRA was not able to discriminate according to other impacts such as financial or employment. These points will be developed in Chapter Six.

Rationale for strategies

1990 was the first time that powers to restrict irrigation were used as a winter drought, plus very high temperatures, combined with the growth in summer irrigation levels that had occurred over the previous decade. Surface water irrigators experienced a 100% ban. One manager felt that because of insufficient scientific understanding, both ecological and hydrological, many decisions were driven by precaution and/or external pressures to act. Action was mainly lead by the NRA's 'duty' to environmental protection.

> *So we were able to achieve environmental protection i.e. stabilising the levels. If we didn't it would just go down and down to a point where .. well, we didn't know actually at what level there would have been environmental damage. We stopped in both years, we stopped them* [irrigators]*; we gained control and there was no environmental damage. But we never did get an answer to the question 'at what levels do you get this environmental damage?'.* [NRA1]

This manager describes how NRA actions were not based on any certainty about what the effects of the drought would be. Judging their decisions as successful or fair had to rest on the fact that the environment did not, in hindsight, suffer permanently.

> *Well there was no, I'm quite sure, no environmental damage in the Ely Ouse. But in many areas there's* [usually] *a considerable depth of water, but we were taking it below levels that we'd ever taken it before and so there was quite a worry about what might happen. And there was just no flow at all in the main river system, other than what was going out into the fen. I mean there was certainly no big flow down into the river system. And there could have been a lot of eutrophication or something like that. That might have occurred. We might have ended up with blue green algae blooms. So then there is that question about did we act too hastily. You know, was there a requirement for it? Nobody could ever come to an answer on that.* [NRA1]

In spite of the lack of a scientific basis for restrictions, the staff were under pressure from environmental concerns both within the NRA and from external environmental organisations '*to do something*' and, as described above, the only thing they were able to do quickly was to restrict irrigation.

> *In the Lark it was our own fisheries team coming back saying there are problems and you must do something about it. And I think we were put under pressure by our own other departments and the only thing we could do was to stop irrigation. That was the only means that we had. Now, we did not erm, .. analyse .. quickly, er what the effect .. whether ..we were unable to analyse what the effect of that ban would be. Would there actually be a benefit? But we did it. We actually stopped them. (...) But our management came under pressure from outside organisations.* [NRA1]

One water manager felt that there was a danger that long termism had given way to pressures to deal with more immediate problems. This reflects the higher expectations placed on environmental management, such as instant action to produce more water, that can actually threaten sustainability.

> *It can be causing damage but you can't do anything about it. And that's where panic happens in the NRA, in organisations; that people can not sit by and think that they can do nothing. You know, .. we can get to the moon, so why can't we do something about this .. well we can't. So things dry out naturally and you can't do anything about it, but humans cannot accept that.* [NRA4]

An influx of new people into the countryside with higher expectations of the '*natural state of the water environment*' was blamed by one manager for the pressures to respond: '*the river-side properties have been bought up by people who don't appreciate high flows and low flows and the cycle*'. Differing conceptions of acceptable limits and different understandings of what nature is about and acceptable limits to environmental degradation had gained more voice. Such claims were felt often to be ignorant of how the local water environment worked historically: '*people perceive things to be unfair even when it's due to an ignorance of the law, or how the water system works*'. One manager remarked for example:

> *I think that society is expecting more rivers to flow at all times, whereas nature does allow them to stop. And I think that's where we will have a battle with sustainability. Our methods in the long run are allowing, we believe, sustainability, but that does not guarantee that in a dry or extremely dry year it will not dry up.* [NRA1]

So strategy developments were recognised by senior staff as having their origin in wider socio-economic changes and in new social attitudes emerging from the green movement as much as any technicalities of a failed resources planning system or changing weather patterns.

> *I don't think we were ever criticised in the 76 drought for allowing rivers to dry up. But it must have been the Green 80s. At one point we were coming under pressure from the Norfolk lobby, that wasn't necessarily Norfolk people but barristers from London living in Norfolk.* [NRA1]

In 1991, the drought continued and the severity of its impact on the River Lark was increasing. Over a short drought period, groundwater abstractions do not impact on river flows fast enough for restrictions on them to be worthwhile. In 1991 however, there were concerns that, if the drought continued beyond the summer into the winter, the summer abstraction from the aquifer would potentially lead to long term damage to the river ecology. The NRA had the power to ban any irrigation that effected inland waters, so, in addition to the 100% bans on surface irrigation, restrictions were imposed in August 1991 on groundwater irrigation near to the river

which would intercept base flow over the following weeks (refer to Table 5-1). Abstractions ten miles away, at the edge of the aquifer, were not expected to impact significantly on the river until February, and '*well, we hoped that it will have rained by then*'. A decision was made on hydrological grounds and a 2km 'ribbon' of restrictions along the river was considered to be proper and fair, rather than a ban across the whole catchment.

> *We had to be absolutely sure of the hydrological reasons that we were doing it. And we did, we always thought it through and it was usually thought through quickly. You had to do it in an hour or two, or in a day. But it would have to have a hydrological thought process as to what we were trying to achieve.* [NRA1]

Eventually, a 50% ban was extended to all irrigation from the aquifer, alongside a 100% ban within the 'ribbon'.

Stakeholders' reactions to drought strategies: perceptions of the NRA staff

The 1990/91 restrictions were the first occasion that the mandate of the regulator to manage resources to protect the environment was put to the test and realised[1]. A senior water manager explained how past rationale for water management decisions was now being challenged, principally through greater expectations of certainty. Although restrictions had not been used before 1990, the knowledge that total bans were possible had meant that to some extent, calculations on the total availability of water resources could be based on normal to dry conditions rather than severe drought. This was a form of risk analysis. The trade off between the risk of restrictions which were supposed to be rare, and having more water available during the more common 'normal' years, was made in favour of the latter. As well as yearly calculations, the NRA had to make judgements about acceptable daily rates of abstraction which, because of the levels of uncertainty involved with irrigation behaviour, were essentially risk management decisions:

> *The other thing is that in some areas it is impossible to do real hydrology of course for spray irrigation. Because if you assumed that everybody was taking their daily rate today you'd have about four irrigators on a length of river. But they don't work like that. Except in a drought when they do all take it at the same time. But usually there are different crops and some are doing it on a Monday and some are doing it on Tuesday and its like this and so ..we have assumed ..umm ...far less than the conditions of the daily rate will be taken at any one time and have allowed more people to be irrigators.* [NRA1]

In practice, decisions were made on an assumption that less than the daily rate of abstraction actually licensed for would be taken. The farmers were '*given the benefit of the doubt*', as one manager explained. Such risk taking was possible because of

[1] This was followed a few years later by the moratorium on new licenses.

the existence of the power to restrict.

Formerly then, it was felt that the unreliability of water was accepted as a natural hazard of weather patterns, and the levels of 'built in' unreliability were seen as 'socially fair'. However, in times of resource stress, the NRA's 'duty' to environmental protection, meant that costs were inflicted on certain abstractors.

> *The problem was in the drought that we suddenly used these bans and everything crawled out of the wood-work thereafter I think* [laughs]*. And I think it was the environment that gained because we said 'the environment is suffering and we must do something about it'.* [NRA1]

The growth in dependence upon irrigation however, meant a greater conflict between the need for more water at a time of year when there was a lack of it. Sudden bans were no longer acceptable. The staff felt that unreliability, uncertainty and risk had become less acceptable to the farmers, and also less acceptable to environmentalists. These changed attitudes and increased expectations were leading to more conflict and perceptions of greater unsustainability.

Perceptions of unfairness became conspicuous. Farmers in particular, because they had not been sufficiently aware of the powers of the NRA to ban irrigation and because their businesses had become dependent on water, were frustrated that they had not been able to prepare for such a situation. A manager observed:

> *Going back to unfairness, the only people that we can stop irrigating is spray abstractors. Then they go down the street and see people washing cars and we can't stop that. Golf courses always get mentioned but can be spraying their fields with mains water. They are protected until the water companies get desperate. Then the first thing they do is ban hosepipes and non-essential uses.* [NRA4] [1]

Another manager explained the NRA's understanding of fairness:

> *Now I think the farming community will tell you that it's patently not fair* [restricting irrigation]*. Because we are restricting them taking water at a time when they most want it to have impacts on their crops. We will tell you that, well, .. if that were to continue, some people, because of their geographical location, would have had good supplies while others would have run out. So, naturally unfairness would have come in there then. And we'd say as well that had that continued, it wouldn't have been fair on the environment, so somehow we have to strike a balance between their need and the environment. Because we were on the verge of quite nasty environmental incidents, if irrigation had gone on at that level. We had one huge fish kill; just a fraction of what it would have been if it had continued.* [NRA2]

[1] The reverse could also occur. Normally, not all abstraction for irrigation was banned and also some irrigators used water from on farm storage reservoirs. So it would be possible for irrigation to take place when the watering of gardens with hose pipes is banned. Public understanding of water management is perceived to be poor. The two systems, water supplied by water companies and water that is directly abstracted, are not differentiated by much of the public:

> *Yes people say to me that I must have had a terrible summer because of all those hosepipe bans! No the public doesn't understand the way the water industry works, even intelligent people.* [NRA2]

The 1991 restrictions which affected the groundwater abstractors were especially problematic and badly received. There was more '*political concern*' than had followed actions of the previous year when 200 or 300 surface water irrigators across the region had been banned and '*there had been hardly a murmur in the political arena*'. A water manager offered two explanations:

> *So it was a very thin strip close to the river, but it happened to have in it people who know how to make a fuss. You know .. they know the political people to talk to.(...) That was 1991. Kicked up a fuss. Why did they kick up a fuss, but the previous year they hadn't? I suspect that it's more to do with soil types and the crops they are growing.(...) I would imagine some farmers didn't do too well. In the Lark area it was on the Breckland; the light sandy soil so their crops died. I think that's what the main difference was* [NRA1].

The restrictions were judged inequitable on two counts: the farmers had not been given notice, and the restrictions affected farmers differently. The manager explained that the farmers had felt that they should all have been treated in the same way across the catchment or region. However, the legal remit of the NRA was to act according to hydrological effects. A blanket ban would have resulted in a judicial review. This manager argued that what the NRA did was fairer than restrictions based on being neighbours.

> *"We all want to be tret* [sic] *the same", but we were being quite specific, catchment by catchment so we would have different drought restrictions in different neighbouring, .. I mean at some point we draw a line on the map and there's a farm on one side of the line and another farm the other side of the line, but one has got its source from over here, you know from miles away in the River Nene, and somebody else has got their source in the River Ouse or something but there is a line between them which is the catchment boundary. Now they cannot tell that, .. you know, they are neighbours and want to be treated the same, whereas we are saying we have got to be equitable in terms of treating you within your hydrological unit. It is unfair to ban somebody next door just because they are next door. You can only do it on hydrological reasons.* [NRA1]

One water officer explained the different farmers' judgements of and reactions to the restrictions in terms of the different impacts that they personally experienced. From the staff point of view, individuals felt that they were consistent in their handling of the problem in a way that they considered to be fair. There is a tension between the complexity involved in adapting policies to make them more 'fair' on an individual or local impact basis, versus the simplicity of restrictions which are based on a universal principle, often generalised but consistent and seemingly non-discriminatory hydrological basis. The NRA was not in a position to take into account how restrictions might impact inequitably on different farmers. Their concern was with procedural fairness, and not with the complexities of social or economic impact. Throughout the analysis in this research, this insight emerges as a key element in water resource conflict.

ii. *Policy responses*

The perceived inequity that had characterised the drought response strategies in 1990 and then in 1991 was recognised at all levels, and policy meetings between the DoE, the water companies, MAFF and the NRA were held to identify more equitable solutions. An early warning system for restrictions was developed. At the same time, a group of irrigators had got together to challenge the NRA and to find an alternative to irrigation bans. Negotiations with the NRA eventually lead to the implementation of a system of voluntary agreements on reduced abstraction.

Early warning of restrictions. In an attempt to correct the unfairness associated with the lack of notice for agricultural restrictions, cessation clauses were to be written into *all* new and renewed licenses. This was considered more fair as farmers would be aware of the levels of reliability when accepting a license. In addition, an early warning system for restrictions was devised in the Anglian Region in partnership with MAFF. This was publicised in a leaflet[1] which suggested actions that farmers could take when restrictions were imminent, and explained what actions the NRA would take. The policy was as follows. In late winter, the NRA would issue a statement on the prospects of summer irrigation according to a forecast of good, moderate or poor water levels. Extra warnings on the situation expected later in the summer would be given in April. If restrictions were very likely, an 'amber alert' would be issued, giving farmers two weeks notice of possible restrictions of surface water use to a percentage of the daily licensed volume, and groundwater use to a percentage of their annual licensed volume.

This 'amber alert' system, first used in the Lark Valley in June 1991, did not have the effect that was hoped for. The farmers responded by taking more water rather than less. One water manager accounted for this as the farmers' responding to stress; '*their rationality disappearing in panic*'.

> *We have issued it* [amber warning], *but have not been totally comfortable with it. (...) And I think what it is, is psychology comes in to it, and we have to understand .. umm .. panic you know the stress. I don't know if it's panic psychology or whatever it is .. but people in the cold light of day are rational. But, when there's a drought and when it's their business life, water suddenly becomes more important and some of the rationality disappears and they are starting to say 'well we are going to be cut off anyway, we'll take more water now'. So they don't see this warning as if you cut back you can have a real effect and stop us* [the NRA] *doing it* [restrictions]. *They actually see that it's just a two week warning and they are going to do it. They actually cause it to happen. That's where the danger lies.* [NRA1]

So the farmers perceived the amber alert not as a warning, but as an indication

[1] MAFF, 1992, "Good Irrigation Practice - Make Every Drop Count".

that restrictions would happen even though it was their own response that would determine the need for restrictions. They had little faith in the efficacy of the strategy. This is a typical 'Prisoner's Dilemma' situation where self interest as an individual is perceived as being in conflict with the self interest gained from group co-operation. Their expectation was that others would take the water even faster and induce restrictions, so that restrictions were inevitable no matter what they did. Lack of knowledge of what others might do created a 'social uncertainty'[1]. Co-operation was not perceived as the way to avoid the risk of loosing their crops. The NRA was challenged with improving stakeholders' 'faith' in its regulatory strategies, so that demand could successfully be reduced when necessary. This is particularly interesting when contrasted with the voluntary co-operation irrigators eventually negotiated, and which is discussed next.

Voluntary restrictions . A different approach to coping with the drought was developing in the Lark Valley. This approach proved to be successful for both parties. The main difference was to be the influence of social relations and cultural expectations. Social norms and perceptions of fairness worked to the advantage of the regulator and the regulated.

In direct response to the 1991 restrictions, farmers convened a meeting of all irrigators in the catchment. A group was formed, calling themselves the Lark Valley Abstractors (LVA), which at the end of the summer negotiated with NRA to find an alternative, more acceptable procedure for allocating water and restrictions. (The perceptions and understanding of the situation from the farmers' point of view is explored in the next chapter). A voluntary reduction in abstraction to 50% of licensed amounts was eventually agreed upon. The farmers hoped to live without an interruption to their supplies and the NRA could operate with improved forecasting of resource use behaviour, i.e. that only 50% of the annual quantity would be abstracted. The voluntary restrictions were viewed as successful, therefore, because they increased certainty for both sides.

> *There were lots of meetings and the next year they said in 1992, they said 'we will voluntarily, at the beginning of the season, take 50% of our annual quantity, if you will guarantee that you won't restrict us. They never got a letter and they never got a promise. But they did get things like 'we will use our best endeavours not to do it'. And we could never have written that letter but we knew in our heart of hearts that we would never do it. They came to us saying that 'we will only ever take 50%'. Because even though they would have said 'even though we've got 100% and we'll never use it', they still have the right to take it. They come to us and say 'we are going to take 50% but we want to take it when we want'. Then we know the sort of quantity that is going to be taken.* [NRA1]

[1] See Biel & Garling (1995) and Wilke (1991) on the role of uncertainty in resource dilemmas.

Although there could be no formal guarantees, both because of legal rights of the farmers and the duties of the NRA, the arrangement relied on trust and the expectation that both sides would co-operate. The levels of trust and mutual expectations of proper conduct between the abstractors themselves and the improved perceptions of fairness meant that extra efforts were being made on both sides for a socially and ecologically sustainable regulatory regime.

The social/moral element behind the farmers' compliance was recognised by water managers. The NRA could not prosecute farmers for breaking the voluntary reductions, but the staff knew that relations with their neighbours would have the effect of policing and lead to better self-regulation. The staff believed that the farmers perceived themselves to be '*doing the right thing*' and that their expectation of each other in terms of compliance was positive. Their relations with their neighbours were at stake. So, social inducements and a social fairness norm, were found to be strong enough to shift considerations of self interest towards an emphasis on gains through the reduction in uncertainty.

Trust in each other was commanding, and this increased the legitimacy of any decision made by NRA. As mentioned above, a basic tenet of the NRA was that abstractors were willing abiders of regulations. The NRA did not see themselves as 'coercers'. The voluntary agreements were a way for the NRA to realise their duty to environmental protection, while at the same time, continuing the principle of self policing - of persuading not forcing. A manager explained:

> *What the voluntary thing does .. we are forcing them to cut back, but because it's voluntary, it's not the NRA forcing them to do it .. we are persuading them. But it's their idea and they are doing the right thing. They are being good neighbours and they do it. We can't prosecute them for not doing it, but they will fall out with their neighbours if they didn't do it. So they've all done it. So it's the ownership of the problem, so it has usually had quite a good effect and has continued the irrigation longer.* [NRA1]

The NRA contributed to the success of this approach by being able to respond positively to the initiative of the farmers who, in turn, felt as if they had responsibility for the situation. The farmers were taking ownership of the problem but still complying with the objectives of the NRA. This manager consistently emphasised that a large part of successful water resource management was 'human centred', needing an understanding of why people react and respond in the way that they do:

> *Certainly the word 'psychology' I've used, and we have to understand the psychology of people in those times, in order to achieve the ends I suppose.* [NRA1][1]

[1] This manager believed that farmers would water without any 'scientific' logic: "*Farmers do admit if you really get them on their own .. what they do is that they irrigate because their neighbour has started .. you know .. (laugh) sometimes there's not much science to it: 'well he's started so I'd better', or 'he's bought a*

The reality was that the NRA ultimately had the powers, and responsibility to exercise control of the use of the resources. The threat of a full and legal ban still existed, and the previous year's experience meant that the irrigators were aware that such as ban was a real possibility. The consequences of not using water wisely were still fresh in farmers' minds: *'they know that you can and dare to do it'.*

In 1990, the farmers had been defending what they perceived to be their rights and the use of restrictions had taken them by surprise. By 1995, staff felt farmers were aware that a license was not a guarantee of water and therefore a positive attitude to planning was possible. Although Section 57 restrictions did have to be applied again in 1995, the NRA was able to manage their implementation so as to minimise harmful impact on the farmers.

> *But in terms of influencing our drought actions, er .. this voluntary system .. and then the four day system of this year .. rather than just stopping, we then went ..."you can irrigate on these four days". We told them what days and what hours. We were very prescriptive about when they would do it and at this point it changed from a voluntary restrictions to section 57. So therefore it was what we said that went .. but it kept the irrigation going and crops like lettuces that would have died .. um but it was through listening to farmers...saying can you think of anyway of doing it?...can you go to four days?...and they said oh yes we'll do that. So the ideas sometime come from farmers.* [NRA5]

The 1995 restrictions were judged as positive by the staff because the environment was not damaged and farmers had voluntarily altered their use of water, i.e. they had been 'compelled' to self regulate their demand.

> *But we managed to control the level and keep irrigation going last year, such that I don't think it damaged their crops. I expect what they did was use water more wisely and therefore they concentrated the crops that they would put it on .. rather than irrigate without much thought. So we forced the concentration of, or forced them into concentrating the water, into where it was of most economic benefit for them and that's what they did. It means that they are more aware of resources. They are taking water more seriously. These farmers are no longer farmers they are businessmen, and water is a resource like manpower .. and a lot of them do forward planning because it's a big business.* [NRA1]

In July of 1996 there were 351 voluntary restrictions operating in the Anglian Region. Voluntary restrictions had become an important measure for avoiding the use of widespread compulsory bans, and the regulator was actively publicising the co-operative response of farmers to their appeals to conserve water[1].

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second irrigator so I ought to'. And it's nothing to do with what the soil moisture deficit is or anything like that". [NRA1]

[1] Environment Agency press release (046/96)

Conclusion

The analysis in this chapter began by identifying the institutionally construed ideas of fair water resource management of the NRA, and their origins in legislation. The perceptions of fairness of the NRA staff were revealed through the rationale they gave for the routine licensing procedures and strategies adopted in the Lark Valley. The chapter also described how a situation had developed in which the 'fairness' of those limits and the licensing system's response were being challenged. The pursuit of *environmental* sustainability was creating new tensions. This had been the case principally with strategies for meeting *existing demands* during the drought of the early nineties, but also, meeting, or rather not meeting, *new demand* was becoming a fairness issue. The two most contentious fairness issues identified here were i) that licenses in the same catchment could contain different types of conditions and suffer different abstraction restrictions; and ii) that the implementation of restrictions had initially been imposed without warning, according to a rationale that was not acceptable to irrigators.

This chapter has demonstrated the extent to which water resource management is a function of cultural decisions that determine 'fair' limits to the exploitation of water and who has access to it. These fairness norms were shown to be significant as barriers to effective regulation when they were not consistent with the expectations and notions of 'water justice' held by those being regulated. Examples were given which illustrated how important trust and voluntary compliance were to the success of the licensing system because of its reliance on co-operative self-regulation. The fairness norms embedded within the social relations of a stakeholder group were also shown to be significant in seeing co-operation reducing water demand at times of stress.

Three important themes emerge from this interpretation of the NRA discourses and practices. The first is an active renegotiation of the concept of *balance.* The second is the central role of *professionalism* in the staff's judgements of what they did. The third is the significance of *historical precedent* in affecting the success of 'sustainability' strategies.

Balance was identified as a key principle in the NRA policy documents which set out its objectives, and environmental sustainability concerned bringing the environment's claim to water into the resource *'balancing act'*. On its formation, the NRA's duties were legitimated through a moral mandate to '*guard the environment*' - for the common good. Balancing environmental and human need represents an

ethical rhetoric[1], i.e. a norm of environmental justice coupled with the right to *use* natural resources. NRA staff were faced with the need to revise their working practice to take account of these changed goals, but accounts of the actions they took were not characterised by an ethical rhetoric. In the main, the legitimacy of their decisions was seen as lying in their professionalism as *scientists* and *bureaucrats.* Thus their notions of fair regulation were located in scientific rational or recourse to legal duties.

Water management objectives were implemented by the staff as 'given' and fixed from above, as this was where any notion of fairness originated. Interviewees did not see it as their duty to make any normative decisions. Their idea of fairness was essentially **procedural;** about being unbiased as an institution and as individuals carrying out their duties. Fairness was largely seen in operational terms; being seen to be fair so as to prevent obstacles to their policy objectives. In general, the staff did not challenge the legal principles themselves, although they reported how others did.

Expert decisions were based on scientific rationality wherever possible, and precaution, where not. Science was mediated through staff's professional judgements which sanctioned a precautionary approach so as to protect the environment, and *then* the rights of users. Once resources came under stress environmental need was paramount. It was this basis of their work, i.e. establishing the *right* balance by understanding what the environment needed and protecting the rights to water of licensed abstractors, that had become more contentious at the local level. Many of the concepts contained in the NRA's objectives did require a degree of (normative) judgement as they were not explicitly defined in the legislation. They were, in fact, being defined over time within the dynamics of NRA practice. This level of ambiguity meant that culturally constructed and top-down concepts would be open to local contestation. Although public water supply abstraction is crucial because of the volumes involved, the water companies do not seem to have been a source of conflict. It was spray irrigation issues that had forced and shaped a new approach to water resource management and had lead to innovation in drought management. Change at the level of routine practice in the Lark catchment came about because of local level changes in resource pressures and social pressures. Local circumstances accelerated the drive towards sustainability by compelling the NRA to act with more precaution towards the environment and to resolve the consequential social conflicts.

[1] According to Aristotle, *ethical (ethos)* modes of persuasion one form of argument in the *art of rhetoric*; the others being *rational* and *emotional* (*logo and* pathos) (Corbett, 1990). Ethical appeals apply over matters about which there can be no certainty and opinions are divided (Corbett, 1990:80).

Successful (sustainable) regulation was shown not to be a function of the strategies and practices of the regulator alone. Local social relations between stakeholders were shown to be influential. When it was clear that the use of water by one abstractor would be at the cost of another, farmers agreed to limit their abstractions in accordance with expectations established within their community. This superseded any justification of claims in terms of individual rights established in a license. Although increased 'consultation' was seen by the NRA staff as more as case of getting the NRA message across than one of developing new strategies based in part on farmers' understanding, the system of voluntary restrictions seems to have been an example of social and resource sustainability. The subsequent distribution of restrictions, in time and space, were viewed as more equitable and more acceptable by farmers *and* NRA staff.

The final element in the analysis is that of **historical precedent**. In addition to the tensions between the scientific uncertainties and the necessity of having to assure the abstractors that regulatory strategies are justified, a tension emerged for the NRA between the principle of first-come-first-served and the need to set absolute resource limits in terms of environmental need. The former is a principle of fairness that avoids *allocative* judgement, whereas the remit of *balancing environmental and human needs* is based on normative principles. Interpretations of allocative and management principles have been challenged by resource stress and changing cultural attitudes in specific geographic contexts while legislation has been relatively unchanging. The shift towards tighter environmental protection came up hard against established expectations and historical precedent in licensing practice. The NRA's reorganisation of working practices was constrained, in particular, by having inherited the licenses of right as an historical norm of fair appropriation of water. The aim to balance competing interests had been contradicted by duties that privilege one use over other claims. This matter has yet to be resolved given the scale of financial compensation required to rescind license of right.

By looking at the principles behind water resource management, the purpose of this chapter has been to provide a regulatory context for the rationales that stakeholders in the Lark give for their claims to water and their judgements of the water management system. The next chapter will show how these same events have been experienced by other stakeholders in the Lark Valley, and will explore further the extent to which the principles guiding the NRA in its allocation of water have been contested by stakeholders.

Chapter 6

Using Water: stakeholders' accounts of water resources regulation in the Lark

Introduction

Analysis in the previous chapter has suggested that the NRA's attempts at sustainable water resource management were initially hindered by historically established expectations regarding rights to water. Attempts by the NRA to implement its statutory objectives regarding environmental protection clashed with abstractors' notions of fair water resource management. It was suggested therefore, that cultural rationalities, i.e. expectations and experiences, have a role in advancing sustainable water resource management through their potential to hinder or support regulatory interventions.

This chapter has two main objectives. The first is to show that the principles upon which water has been allocated and managed are contested, and to identify the normative assumptions underlying this. An analysis of stakeholders' attitudes to the NRA and the licensing system reveals the different claims to water and rationales in the catchment upon which judgements of water resources regulation are based. I examine how water resource problems during the drought of 1989-1992, and the embargo on new licenses that came into operation in 1992, resulted in challenges to the fairness of the water management regime. The second objective is to identify what encompasses and defines the concept of fairness in water resource management for different stakeholders. This chapter draws on a quantitative analysis of questionnaire responses, as well as qualitative responses, and comments collected during interviews. Central to the approach is the analysis of water resource problems through the stakeholders' own arguments.

The chapter is divided into 5 sections. The first introduces the range of attitudes found in the catchment as a whole, and sets out an overview of the degree of support for the regulator and the licensing system. The following sections explore more closely the problems in the catchment as perceived by four main stakeholder groups, and identify their fairness concerns. I begin with the account given by the water company whose relationship with the NRA sets it apart from the other stakeholders; first, many of its senior staff would have been former colleagues of the NRA staff when the Anglian Water Authority (AWA) was in existence (before 1989); second, it

manages water resources on a regional level itself; and third its demand for water is subject to statutory duties, as well as influenced by financial and service regulation. In section 3, a case study of an industrial abstractor's claim for more water illustrates the foundations of charges of inequity and challenges to the regulatory system that are resulting from resource pressures. In this rural catchment, the majority of abstractors are farmers so it is their voices that, in section 4, dominate the account here. Finally, section 5 presents the fairness concerns of environmentalists and conservationists, returning us to the objective of environmental sustainability.

I An Overview of Stakeholders' Attitudes

The perspectives of the different stakeholder groups on fair water management may be understood in terms of the different attitudes towards the water problem itself, and the judgements of current regulation which are present in the catchment. Is there, for example, a 'management crisis' in the catchment, or are problems and conflicts confined to particular stakeholders in particular circumstances?

Views on water resource problems

Respondents to the questionnaire survey were invited to describe any changes in their concerns about water resource issues over the last ten years, and also to note any current or past conflicts that they were aware of involving water resources. Eighty-one respondents[1] (63%) described concerns they had, and 57 (46%) noted some conflict that they knew of. Respondents were able to describe a range of competition situations that reflected distributive and procedural equity issues and these are discussed for different stakeholders later in the chapter.

Respondents were asked whether they believed that water scarcity was a problem in the country as a whole, and in the Lark Valley. Only six respondents agreed with the statement that there is '*no scarcity in this country*' while 47% thought that '*shortage was a problem in the Lark Valley*'. What respondents believed to be the cause of water shortage problems in the Lark can be seen in Table 6- 1. Although more than half the respondents blamed weather patterns for water shortage (65%), there was a strong feeling that human causes were important. Nearly 40% perceived '*bad water planning*' to be a problem, 47% blamed irrigation, and 43% population

[1] Figures refer to responses given to the questionnaire survey as described in Chapter 4 and given as Appendix 1. The number of completed questionnaires was 124, although the number of responses to individual questions varies. It should be noted that, since the NRA had ceased to exist a few months before the survey was conducted, the regulator was referred to as the Environment Agency throughout the questionnaire. However, throughout the analysis I shall refer to the regulator as 'the NRA' since the experiences of the stakeholders would have been with the 'NRA' and the water resources function did not significantly alter with the name change.

Table 6- 1: Causes of water shortage (Q3[1])

Cause (n-120)	No. agreeing	(% of total)*
Population increase	53	43
Irrigation	56	47
Climate change	41	34
Weather	78	65
Bad water planning	45	38

*do not add up to 100 as more than one choice possible

Table 6- 2: Perception of causes by all stakeholders

	Cause* (row%)									
	n	population increase		irrigation		bad water planning		climate change		weather	
Industry & business	12	2	(17)	5	(42)	4	(33)	3	(25)	9	(75)
Water suppliers	3	2	(67)	2	(67)	0	(0)	0	(0)	2	(67)
Domestic well	9	4	(45)	6	(67)	2	(22)	4	(44)	3	(33)
Environmentalists	18	9	(50)	10	(56)	7	(39)	6	(33)	15	(83)
Local authority	6	4	(67)	5	(83)	3	(50)	3	(33)	4	(67)
Recreationists	10	2	(20)	9	(90)	5	(50)	2	(20)	4	(40)
EA staff	5	3	(60)	4	(80)	0	(0)	0	(0)	5	(100)
Irrigators	41	18	(44)	9	(22)	17	(45)	18	(44)	25	(61)
Agri-non irrigators	15	9	(60)	6	(40)	7	(47)	6	(40)	11	(73)
Total agreeing (% of total)	119	53	(43)	56	(47)	45	(38)	41	(34)	78	(65)

*more than one choice possible

increase. Differences between stakeholder groups can be seen in Table 6- 2. The most frequent cause identified by domestic well users, recreationists and local authority staff was irrigation. Among business, agricultural users and environmentalists the most popular answer was the weather, i.e. naturally imposed limits. A difference in attitudes among stakeholders groups is suggested.

De jure, water is a common property resource in England and Wales, i.e. it is not privately owned by individuals. However, in practice there is little difference between rights to abstract (through licenses) and *de facto* ownership. Table 6- 3 shows the perception of water resource ownership for all stakeholders. Half the respondents did select public ownership, but only just over half of these selected public ownership alone. So of those surveyed, 31% answered correctly (a similar percentage for all stakeholder groups). The rest perceived water to be privately owned (21%), and 41% of all stakeholders believed that the water companies owned water. Water companies have licenses to abstract, store and supply water, but privatisation did not grant them ownership of the water resource itself.

[1] This refers to the question number in the questionnaire.

Table 6- 3: Who owns water resources? (Q6)

Water is...	No.	% of total*
Privately owned	26	21
Public owned	64	52
WCo. owned	51	41
Answering correctly	38	31

*more than one answer possible

Table 6- 4: What principle is important to abstractors regarding water use? (12)

		% responses*					
Priority	**Mean**	**1**	**2**	**3**	**4**	**5**	**n**
Security	1.34	78.1	15.6	3.1	0	3.1	64
Fairness	2.88	22.8	21.1	22.8	12.3	21.1	57
Cost	3.00	11.1	27.8	24.1	24.1	13.0	54
Quality	3.11	15.1	18.9	20.8	30.2	15.1	53
Flexibility	4.00	3.7	11.1	33.3	22.2	29.6	54

*1=most important, 5=least important. (Kendall's W= 0.3368 (51 cases) p<0.0001)

Table 6- 5: Influences on abstractors' use of water (Q9)

Influence	No.	%*
Efficiency	29	48
Environmental concern	15	24
Produce improvement	31	51
Avoiding restrictions	22	36
Problems obtaining supply	14	22
Switched activity	5	7

*of the 54 cases responding. More than one answer possible

These findings indicate that more than two thirds of people for whom water is a salient issue are not clear about its statutory ownership status. Confusion over the perception of user rights and of ownership are likely to influence fairness beliefs regarding responsibility for management, for regulation and for environmental protection. This will be especially problematic if stakeholders are unaware of the regulations and conditions under which *other* users abstract.

Abstractors were asked to rank the importance of *flexibility, fairness, security, quality* and *cost* for their use of water. A Kendall's test shows that there is a significant agreement in rank ordering ($\rho<0.00001$) (see Table 6- 4). *Security of supply* was the highest priority concern among abstractors in this survey, with over 90% ranking it as important or very important. Forty four percent rated *fairness* as a very important or important issue. *Quality* and *cost* were both rated as more important than *flexibility*[1].

[1] This contradicts the findings of other studies which have suggested that farmers place a premium on flexibility, due to pressures connected with the restructuring of agricultural policy in recent years (see Ward and Munton, 1992).

Abstractors were asked about their own usage of water. Seven percent of respondents reported a decrease in the amount they used, whereas half reported an increase. Table 6- 5 shows some influences on abstractors' use of water. Many responses reflect risk avoidance, i.e. use behaviour was influenced by avoidance of drought restrictions, and by problems obtaining the supply they wanted. Concern for product quality also influenced half the abstractors, whereas few (18%) claim to have altered their water use because of a concern for the environment. With regard to the impact of failing to secure sufficient water supplies, there were two types of responses. Some abstractors mentioned the adjustments that they would be forced to make and the negative impacts on their businesses. Others mentioned the anger that they would feel, emphasising that their claims to water were justified.

Attitudes to the regulator and licensing

One aim of the questionnaire was to assess attitudes to the NRA and to the existing licensing system. Nineteen respondents said that water management was generally *fairer* than management by the AWA during the 1980s (Q27). Positive comments mentioned the greater attention given to environmental issues, more openness and more professionalism generally, and interestingly, praise came from irrigators for the fairer handling of restrictions under the NRA than AWA. Ten respondents however, felt that management was *not* fairer. In particular, some stakeholders were concerned that there was now too much strain on the water resources system, too much reliance on self-regulation, and too much power in the hands of the private water companies.

Regarding the regulator itself, just over half the respondents surveyed (56%) were *satisfied* with the service provided to them, and 16% of respondents were not (Table 6- 6). Responses were not specific to stakeholder type; but those who were *not satisfied* were all abstractors with larger licenses. Table 6- 7 shows which stakeholders were satisfied with information provided by the regulator, and with the opportunity given to express their views. One dissatisfied local authority employee commented that the NRA's "*recent drought leaflet was rather basic and patronising and didn't give detailed information - water companies and environmental groups produce much better informed literature*". However, nearly 80% were satisfied with their experience in both cases. Since cross tabulation with stakeholder type showed no statistically significant difference, it seems that no particular group is more dissatisfied than any other over how they were dealt with by the regulator.

Stakeholders' beliefs about how fair the management system was to other user

Table 6- 6: General satisfaction with service provided by NRA (Q24)

n=82	No.	(% of all respondents)
Very satisfied	15	18
Satisfied	31	38
Neither	17	21
Not satisfied	7	6
Not at all satisfied	12	10

Table 6- 7: Specific satisfaction by stakeholder type (Q25/26)

	Satisfied with provision of information (n=81)		Sufficient opportunity to express views (n=63)	
	Yes	No	Yes	No
Irrigators	32	5	20	6
Other agriculture	5	3	3	2
Industry & business	10	3	8	3
Environmentalist	5	3	7	0
Recreationist	5	1	5	1
Local authority	3	2	4	1
Domestic well	3	0	1	0
Water suppliers	1	1	2	0
Total	**63 (78%)**	**18 (22%)**	**50 (79%)**	**13 (21%)**

groups are shown in Table 6- 8 and Table 6- 9[1]. All groups were thought by the majority of respondents to be *fairly* treated. An ANOVA test showed that there were significant differences of opinion between stakeholder groups over the treatment of nature, irrigators and domestic users, with division principally between those who use water for business purposes and those who do not (see Table 6- 9).

Irrigators and business users disagreed significantly with local authority staff over the treatment of nature; the latter feeling that nature loses out unfairly. Industry and irrigators disagreed significantly with recreationists over how fairly the system treats domestic users; the former believing that domestic users are treated *too fairly.* Also, some agricultural stakeholders, felt that domestic users were wasteful (Box 6a)[2].

Box 6a	
Recreationist	*Water seems to be used in the main for commerce. I see little consideration for the domestic user*
Agricultural rep	*Domestic use is wasteful and not enough is done.*
Irrigator	*Apart from hosepipe bans, if a river flows slowly the first people to be hit are irrigators by restrictions or bans. Water is wasted every day by domestic users.*

[1] Using a three point scale from **unfairly** to **too fairly** (the latter was used to imply unmerited positive discrimination or favouritism).
[2] Comments presented in this way (boxed) originate from responses to 'open' questions in the survey.

Table 6- 8: Perceptions of the fair treatment of water users (Q28)

Users (n=90)	don't know	unfairly	fairly	too fairly	Mean score*
	% of respondents	% of those with opinion			
Irrigators	21	21	59	18	1.96
Nature	32	20	63	17	1.97
Domestic users	20	11	73	16	2.05
Industry	28	3.2	70	24	2.20
Water Co.	31	1.6	39	59	2.57

*where 1=unfairly, 2=fairly and 3=too fairly

Table 6- 9: Mean fairness rating by stakeholder group†

Stakeholder (n=71)	Irrigators	Nature	Domestic users	Industry	Water Co.s
Industry & business	2.00	*2.38	*2.11	2.11	2.56
Water suppliers	2.00	2.00	2.00	2.00	2.00
Domestic well	*2.75	1.50	*1.50	2.33	3.00
Environmentalist	2.50	*1.40	2.00	2.00	2.25
Local authority/gov.	*2.67	1.00*	2.00	2.25	2.50
Recreationist	*2.75	2.00	*1.20	2.00	2.75
EA staff	2.00	1.80	1.80	2.00	2.40
Irrigators	1.63*	2.08	2.30	2.33	2.73
Agriculture non-irrigators	2.00	2.17	2.00	2.17	2.14
Between groups significance Anova p=	*0.0001	*0.0093	*0.0002	0.7692	0.1182

†mean scores where 1=unfairly, 2=fairly and 3=too fairly. * Significant at $p<0.05$ using Tukey's HSD test.

Irrigators were thought most unfairly treated overall (Table 6- 8): although this might be expected as the majority of respondents were irrigators. A Tukey's HSD test showed that there was significant disagreement over the perceptions of fair treatment for irrigators between local government staff, recreationists, and domestic well users who all believed that irrigators were too well favoured, and the irrigators who did not ($p<0.0001$)(Box 6b).

Box 6b	
Local authority	*On balance, there is too heavy an emphasis on irrigation interests. Although it is acknowledged that there can be difficulties in obtaining new licenses. Nature and the environment are the losers. Given the economics of water management it is difficult to see how this will change.*

There was notable hostility to the water companies who were thought to be more *too fairly treated* than any other water user. Indeed, interviews with NRA staff confirmed that the water companies had inherited an advantageous position. As the comments below show (Box 6c), attitudes towards water companies were mainly negative; a major concern was their annual profits which had been a subject of much hostile media coverage at the time of the survey. Also, irrigation restrictions are implemented

by the NRA, whereas hosepipe bans for the public are the domain of the water companies. This leads to discord when the two do not coincide; farmers feeling that agriculture is more important than the thirst of gardens.

Box 6c	
Agri user	*Water companies are not interested in local needs when they can earn more by selling water to other areas e.g. to Essex and Cambridge.*
Agri user	*Water companies are earning more but have less costs*
Agri user	*The water companies are a law unto themselves mainly driven by the profit motive*
Recreationist	*We are very concerned at the very high level of profits made by the water companies (who cut staff at the expense of efficient monitoring of water resources). Domestic users probably pay too heavily.*
Domestic well user	*I feel it is morally wrong for a basic commodity to be so expensive. Water companies should not be making so much profit while not meeting the standards required by their customers.*
Regulator	*Within the confines of the a tricky balancing act, all users are treated fairly but there may be a slight advantage to the water companies.*
Regulator	*Historically too much groundwater has been allocated to public supply*
Regulator	*The environment is precious and its socio-economic benefit is not fully appreciated. Historical relationship between water companies and regulation means that they have inherited an advantage*

The survey indicates that, quantitatively, there is no major perception that one particular user of water is treated unfairly by the water management system in the Lark. However, stakeholders were attributing problems to the 'inappropriate' activities of others, and to the incorrect priorities of the regulator. Different arguments characterised these feelings, and differences in attitude could, to some extent, be related to stakeholder group. For example, abstractors and non-abstractors clearly had different perceptions of where any fairness and unfairness did lay. These differences generate more potential for conflict over regulation.

On the other hand, 20-30% of respondents said they were unable to comment on the fairness of the system for other users. One farmer I interviewed remarked:

> *I would suggest that most people wouldn't know if industry or water companies were being treated fairly or not. I don't. Most people will know about their own thing but not about others.*

This lack of awareness of how regulations affect other stakeholders means that stakeholders are unable to view their own use in the wider context of the resource system. In order to make informed judgements of their own position, stakeholders need to know how other stakeholders' demands are dealt with in the catchment.

The degree of satisfaction with current regulation and management was explored using fourteen attitude statements on a six point scale of *strongly agree* to *strongly disagree* (see Table 6- 10). The 14 items were intended to measure support and confidence in the NRA and the licensing system[1]. Responses can be seen in Table 6- 11. Only 18% of respondents had reported having no contact at all with the NRA, yet 42% of all responses answered *no opinion* or *not sure* to this question. Forty one percent of stakeholders more frequently gave these responses than agreeing or disagreeing with the items (see Table 6- 11 and Table 6- 14); in spite of the majority in this survey indicating that they were concerned about water issues. The respondents who felt unable to express an opinion about the regulator's performance over water resources management, or to comment on licensing, were mostly non-abstracting stakeholders. This would suggest that their expressed concerns about water abstraction are not based on an understanding of, or familiarity with, how resource management actually works in practice.

Agreement with belief items. In order to compare the degree of agreement for individual items, responses were scored as follows: *strongly agree*=2, *agree*=1, *no opinion* and *not sure*=0[2], *disagree*=-1, *strongly disagree*=-2. This gave an agreement score for each item. The items are presented in Table 6- 11 in order of descending agreement. Only two statements were agreed with by more than 50% of respondents (items 1 and 2). For item 3, more respondents agreed than disagreed or had no opinion. There was roughly equal agreement and disagreement among those respondents indicating an opinion for items 4 to 11. More agreed than disagreed with statements 12-14.

Turning first to <u>support for the regulator</u>, 87% of respondents felt that the regulator was necessary in order to modify the effects of individuals acting in their own self-interest (item 1). (Those who did not agree were mainly irrigators). Thirty four percent thought it fair and 28% not fair that the regulator should have the power to decide on 'reasonable need' for the resource (item 4). (Business users and local authority staff were more likely to disagree than agree). Only 19% answered that the regulator was itself fair to all water users, and 22% answered that it was not (item 11). Twenty two percent were happy that the regulator balanced well the needs of the environment with those of people; 28% were not (item 9). There was also split opinion over whether the current system represented the respondents own interests: 29% agreed

[1] All items were coded for analysis relative to a positive direction to attitude.
[2] It was felt that the responses, 'No opinion' and 'Not sure', could not be distinguished sufficiently to merit different treatment during analysis. Essentially, they both indicated that no conviction was held either in support, or against, the belief item

Table 6- 10: Items measuring attitudes to the NRA and licensing (Q29)

1. The EA is necessary because otherwise abstractors would act in their own self interest
2. The licensing system is a fair way of managing water resources
3. There is too much politics involved in the allocation of water resources
4. It is fair that the EA decides what is a reasonable use or need for water
5. The system is unfair because many people cheat on their license terms
6. The public are sufficiently involved in licensing decisions
7. Influence and status helps in getting a license
8. I am confident about the scientific knowledge that the EA uses to make its decisions
9. The EA balances the needs of people and the environment well
10. The EA understands the needs of its users well
11. The EA is fair to all water users
12. The current water management system represents my interests adequately
13. The license application procedure is easy to understand
14. The EA gives licenses out too easily

and 37% did not (item 12), (40% of irrigators disagreed) and over whether the regulator understood the needs of its users (item 10): 26% agreed and 28% did not (more irrigators, industrial and domestic well users disagreed than agreed). Only 27% had faith in the scientific knowledge used by the regulator, whereas 29% were not confident (more confidence was expressed by water company staff and recreationists, and less by irrigators and local authority staff) (item 8).

So in summary, the data show that the majority of stakeholders of the Lark felt that regulation was necessary. A third felt that the regulator acted fairly, a third felt that it did not, and a third did not know or were unable to comment.

Moving on to the licensing system, 67% felt that the licensing system was generally fair, and 10% did not (item 2). However, nearly 35% felt that the allocation of water resources was too political (only 15% did not) (item 3), and 26% felt that influence and status helped in getting a license (32% did not)(item 7). Nearly a third of respondents (29%) thought that the public were not sufficiently involved in licensing decisions - this group was mostly made up of environmentalists, while another third (26%) felt that the public *were* sufficiently involved - these were irrigators (item 6). Stakeholders were also found to have different attitudes towards public participation in water decisions: some feeling that it can only be positive and others feeling that it would lead to uninformed interference. Twenty three percent of respondents (mostly domestic well users and recreationists) believed that too many abstractors were cheating on their license terms (item 5). Twenty two percent disagreed with this (irrigators, industrial users and water suppliers). Thirty percent thought that licensing application

Table 6-11: Beliefs about the current system (ordered by total score†) (Q29)

	Belief item (n=91)	strongly agree		agree		no opinion	not sure		disagree		strongly disagree		sum
		Count	%	Count	%	Count	Count	%	Count	%	Count	%	†
1	The EA is necessary because otherwise abstractors would act in their own self interest	46	51%	33	36%	8	3	11%	0	0%	2	2.2%	121
2	The licensing system is a fair way of managing water resources	18	20%	43	47%	19	3	23%	7	7.7%	2	2.2%	68
*3	There is too much politics involved in the allocation of water resources	17	19%	14	15%	29	22	51%	5	5.5%	9	9.9%	26
4	It is fair that the EA decides what is a reasonable use or need for water	3	3.3%	28	31%	20	19	38%	20	22%	5	5.5%	4
*5	The system is unfair because many people cheat on their license terms	11	12%	10	11%	25	30	55%	13	14%	7	7.7%	-2
6	The public are sufficiently involved in licensing decisions	6	6.6%	17	19%	22	23	45%	23	25%	4	4.4%	-2
*7	Influence and status helps in getting a license	12	13%	12	13%	18	24	42%	11	12%	18	20%	-4
8	I am confident about the scientific knowledge that the EA uses to make its decisions	7	7.7%	18	20%	22	22	44%	16	18%	10	11%	-4
9	The EA balances the needs of people and the environment well	4	4.4%	18	20%	26	21	47%	19	21%	7	7.7%	-7
10	The EA understands the needs of its users well	4	4.4%	20	22%	21	24	45%	12	13%	14	15%	-12
11	The EA is fair to all water users	0	0%	17	19%	24	32	59%	8	8.8%	12	13%	-15
12	The current water management system represents my interests adequately	2	2.2%	25	27%	21	10	33%	20	22%	14	15%	-19
13	The license application procedure is easy to understand	1	1.1%	17	19%	27	22	49%	13	14%	15	16%	-24
*14	The EA gives licenses out too easily	6	6.6%	5	5.5%	21	30	51%	19	21%	15	16%	-37
	Total (and percentage of all responses)	139	11%	285	23%	271	257	42%	184	15%	127	10%	

† calculated as follows: strongly agree=2, agree=1, no opinion and not sure=0, disagree = -1, strongly disagree = -2. Ten missing values were coded as 0.

*These items were reverse coded for analysis, but values shown here are for original responses

procedures were not easy to understand (item 13). Thirty seven percent of respondents (mostly business users and irrigators) thought that licenses were *not* given out too easily; only 12% respondents felt that they were (item 14).

The dimensions of support for the NRA and licensing. A factor analysis of the responses was used to indicate whether the items formed a reliable scale for evaluating support for the NRA and licensing. The communalities of the items were high or moderate, with the exception of item 13 (*The license application procedure is easy to understand*), so this was removed from the analysis. Table 6- 12 shows the communalities and four factors obtained from the initial reduction (with eigenvalues>1 and indicated by a scree plot). All items, except item 14 (*The EA gives licenses out too easily*), loaded highly or moderately on the first factor (>0.3) which accounted for 32% of variance. Item 14 was therefore excluded and the reliability of the remaining 12 items as a scale was tested and a Cronbach's alpha value 0.8190 was obtained which is good. So, after removal of the two items (both concerning direct experience with obtaining a license), the use of these 12 items together for evaluating the judgements of the water management system (the regulator and licensing) seemed valid, and were named the 'JUDGEMENT' scale.

The four factors were varimax rotated to determine any interpretable correlation between individual items, and to indicate any components of the JUDGEMENT scale. After discounting items that overlapped factors (Table 6- 13), the main factor could be interpreted as a component for judgements of the *fairness of the regulator* itself (33% of variance). The other factors, were the *need for regulation* (13% of variance), and *the degree of fairness* that the licensing *system* was able to uphold (9% of variance). The fourth factor was not easily interpreted:

Fairness of the regulator

- The EA balances the needs of people and the environment well
- The current water management system represents my interests adequately
- The EA is fair to all water users
- The EA understands the needs of its users well
- It is fair that the EA decides what is a reasonable use or need for water

Necessity for regulation

- The EA is necessary because otherwise abstractors would act in their own self interest
- The licensing system is a fair way of managing water resources
- I am confident about the scientific knowledge that the EA uses to make its decisions

Unfairness of the system

- Influence and status helps in getting a license
- There is too much politics involved in the allocation of water resources
- The system is unfair because many people cheat on their license terms

Table 6- 12: Communality and factors for items measuring support for regulation

Variable*	Communality
1NECESSARY	.68576
2LICENCING	.56308
3POLITICAL	.53001
4REASONABLE	.62831
5CHEAT	.54571
6INVOLVE	.77406
7STATUS	.67000
8KNOWLEDGE	.63677
9BALANCE	.65916
10UNDERSTAND	.65005
11FAIR	.64315
12INTERESTS	.63293
14TOOEASY	.68524

*numbered according to Table 6- 10

Factor	Eigen value	Pct of Var
1	4.30132	33.1
2	1.72156	13.2
3	1.14584	8.8
4	1.13553	8.7

Table 6- 13: Loadings following varimax rotation*

	Factor 1	Factor 2	Factor 3	Factor 4
9BALANCE	**.78223**			
12INTERESTS	**.76670**			
11FAIR	**.76036**			
10UNDERSTAND	**.70165**			
4REASONABLE	**.66572**			
1NECESSARY		**.82543**		
2LICENCING		**.68045**		
8KNOWLEDGE		**.64517**		
7STATUS			**.80240**	
3POLITICAL			**.69441**	
5CHEAT			**.58537**	
6INVOLVE				**.83129**
14TOOEASY				**.72467**

*loadings shown >0.45

These factors suggest that when judging a water management system, people will evaluate whether the regulator acts fairly, the need for regulation and licensing, and the ability of the regulatory system to ensure a level playing field.

Classifying stakeholder attitudes. Given the high percentage of 'no opinion' and 'not sure' responses, producing a categorical scale with three degrees of support was considered to be a more reasonable method of indicating an individual's degree of support than either using the scores on the JUDGEMENT scale, or calculating a mean score from their responses.

Applying a double weighting to a *strong agreement* or *strong disagreement* response, a count was made of the number of items a) agreed or strongly agreed with, b) disagreed or strongly disagreed with, and c) no opinion/not sure (zero score) for each respondent. Respondents could then be classified into three categories

Table 6- 14: Evaluations of the current system (Q29)

Evaluation	No of respondents	% (n=91)
PRO	32	35%
ANTI	22	24%
No opinion	37	41%

Pro= respondent selected a majority of 'agreements'
Anti= respondent selected a majority of 'disagreements'

Table 6- 15: Evaluation by stakeholder groups

		PRO		ANTI		No Opinion	
	N=91	Count	row%	Count	row%	Count	row%
Water suppliers	3	2	67	0	0	1	33
Irrigators	41	19	47	9	22	13	31
Industry & business	12	5	42	4	33	3	25
Agri-non irrigators	8	3	38	0	0	5	63
Recreationist	7	2	29	2	29	3	43
Domestic well	6	1	17	2	33	3	50
Environmentalist	9	0	0	3	33	6	67
Local authority	5	0	0	2	40	3	60

(labelled EVALUATION variable), according to whether they more frequently agreed with the statements (PRO), disagreed (ANTI) or had No Opinion. Table 6- 14 shows that 24% of respondents were ANTI i.e. not in overall support of the current system, and 35% were PRO and on balance, supported the current system. Of the individuals who *did* express an opinion, the non-irrigating agricultural users were mostly PRO, the recreationists were equally divided, and the domestic well users, environmentalists and government staff were mostly ANTI. Table 6- 15 shows that water suppliers, irrigators and industrial users, i.e. commercial users were most likely to be PRO. Those whose contact with the NRA was for licensing were more likely to score PRO than those with no contact, or those who were consultees (Table 6- 16).

Respondents were asked to comment specifically on how satisfied they were with the regulator's management of drought. More people were satisfied (46%) than were not. However, 36% were critical and 18% were unsure. Those who described themselves as satisfied and dissatisfied fell across all stakeholder groups. When the EVALUATION variable was cross-tabulated against 'satisfaction with drought management', a strong distinction was seen (Table 6- 16). Negative drought experiences clearly influence evaluations of regulation as a whole.

Through this quantitative overview, it is clear that water resource management **cannot** be said to be at crisis point in the Lark. About a third of stakeholders supported the current system and about a quarter did not. The data so far have

Table 6- 16: What factors influence EVALUATION of regulation?

	Number of respondents		
Contact	**PRO**	**ANTI**	**NO OPINION**
None	1	2	1
License application	10	5	8
License renewal	10	6	5
Consultee	3	4	10
Other	7	5	12
License size			
less than 10 tcma	1	0	2
10-20 tcma	3	1	2
20-50 tcma	4	0	2
50-125 tcma	2	4	3
>125 tcma	4	3	2
Cause			
Population	12	7	18
Irrigation	11	8	21
Climate	10	8	16
Weather	**23**	**14**	23
Planning	**8**	**11**	14
Drought management			
Satisfied	**18**	3	19
Not satisfied	9	**16**	9

shown that generally stakeholders believe that the regulator is needed, and are positive about the principle of licensing. They are less confident about how the regulator operates or whether the licensing system was working 'properly'. The fact that 59% of respondents could not say whether the regulator was fair to all users, and that many were unsure as to the nature of property rights for water resources, is perhaps an indication that respondents are not sufficiently informed. Their perceptions are likely to influence resistance to tighter water management and therefore conflict, so the regulator would stand to benefit from better informed stakeholders.

No particular group seemed to be more dissatisfied than any other, although those who rely on water for their income are likely to have different attitudes to those who do not. Abstractors are more likely to support the current system than other stakeholders, although large license holders seemed particularly dissatisfied. An initial hypothesis might be that the *status quo* has served abstractors well, except that is, when resources are under stress. More stringent attempts at environmental sustainability have had more of an impact on the large license holders, i.e. the

irrigators, but the strategies have not been enough to satisfy the recreationists and conservationists[1].

In the following sections of this chapter, I explore in more depth what underlies the attitudes of members of 4 stakeholder groups[2]. The rationalities that different stakeholders use to account for their views on water resource problems generally, and in the Lark context specifically, are described. Through their accounts of issues that have concerned them, the analysis identifies how 'water fairness' is construed. Accounts are presented in the following order: water company staff, industrial users, agricultural users and environmentalists.

II A Water Company's Interpretation of Fairness Issues

This section will outline how 'fairness' was interpreted by the regional water services company, Anglian Water (AW), as well as some local fairness issues within the domestic sector. It draws on interviews and questionnaire responses from senior employees of the company. An interview with the manager of the regional Office of Water Services (OFWAT) provided the perspective of AW's customers in the region. As a private company in a regulated industry, AW must operate its business to meet the requirements of its regulators and to serve the best interests of its shareholders and its customers. What 'fair water resource management' means is determined by these three objectives. Water companies were regulated by the NRA (and now the Environment Agency) overseeing environmental protection and managing water resources, while the Office of Water Services (OFWAT) is the financial regulator overseeing levels of charging and customer services, investment and the economic efficiency of the companies[3]. The balance between water as an environmental good and water as a commodity is determined by the regulators, but how the company seeks to translate its duties and cast its 'relationship' with water is a matter for its own business strategies and public relations objectives. This section shows that fairness issues for the water company are construed in two directions:

- how the water company *judges* the regulation in which it has to operate, and
- how the water company *is judged* and seeks to be judged by the public.

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[1] Government proposals to deregulate licensing would remove very small license holders from the system and allow regulation to concentrate more on the large abstractors who are more likely to impact on the environment and other users (DETR, 1998:33). Only domestic and riparian agricultural users are exempt when abstracting below $20m^3/d$. It is anticipated that this will be extended to all users, depending on local conditions.

[2] A brief profile of each group can be found in part 2 of Chapter Four.

[3] The powers of both regulators being subject to legal constraints under the Department of the Environment (now DETR).

Although the company's objective is to manage water for profit, how its need to consider the financial return to shareholders influences what it regards as a fair way to manage water was less often articulated by the informants to this study[1].

The company's access to water resources is controlled through the NRA's abstraction licensing system, and on the whole, AW[2] accepted that environmental regulation was 'fair'. They did not seek to challenge it, but accepted it because, as one manager remarked:

> *We are a regulated company, that's the system we work in. (...) I mean at the end of the day there has to be regulation. We all accept that. Um, to make it a national system is good. We like that. Um, to have some local accountability is good, we like that too.* [AW1]

This interviewee felt that AW had a very good working relationship with the NRA, not least because many of the staff had previously worked together as Anglian Water Authority. Further, he commented that unlike other stakeholders:

> *We tend to meet, perhaps, the NRA more as equals to the extent that we did actually work together at one time. When the NRA was formed it had to be formed by the Anglian Water Authority so there is much greater understanding by people like* [my boss]*and myself of the way in which the NRA see problems and the solutions they are looking for.* [AW1]

The only concern that was expressed was that the NRA was not sufficiently accountable for its decisions. Generally though, AW saw their dealings with the NRA very much in terms of negotiation, and mutually beneficial co-operation and openness.

> *And yes when we deal directly with the NRA, we would ultimately, I think we get a fair deal. We expect them to be hard on some issues. We don't get our own way. To some extent we manage to turn them and they don't always, er, perhaps achieve their own aspirations. They change because of the influence we have over them.* [AW1]

As well as NRA regulation, the water companies' operate within the legally binding conditions of a license to supply drinking water and sewage disposal services granted by the Secretary of State for the Environment, and regulated by the codes of practice set by OFWAT. For the company, it was in this arena, rather than with water resources, that one manager felt the more contentious issues were located, because scientific decisions were regarded as less emotive. The manager commented that:

> *With OFWAT, dialogue is more politically motivated than dealings with NRA. With the latter, there are not so many options so a solution has to be reached. But with OFWAT there are more routes to take, i.e. more political than resource options, and the solution is therefore emotive.*[AW1]

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[1] This may be because interviews were held with water resource and customer services functions who might be less 'corporatist' than staff dealing with financial issues.

[2] 'AW' is used to denote the approach of AW described by the employees surveyed for this study. Only one interview was tape recorded so most quotes here originate from that interview.

In spite of the financial controls from OFWAT, his view was that the existing system of regulation was preferential to being directly accountable to central government:

> *Regulation is now fairer than under the previous Department of the Environment. OFWAT may be telling the companies what to invest in, but before it was a much more 'stop go' situation depending on government budget. So planning was inadequate. From my perception, .. um .. it's better now that we have a regulator that gives us some planning advice, than when we were nationalised and the purse strings were held by the government.* [AW1]

AW's main concern was with how to operate within the constraints imposed by water resources, and the investment targets and charges and levels of service set by OFWAT[1], at the same time as pursuing their own objectives as a private company, channelling resources so as to maximise financial return.

Discussion in the rest of this section is based around two themes. The first concerns water resources management and regulation. The second considers service issues for which fairness concerns were critical to the company, and which largely defined AW's interpretation of fair water resource management. Together, the these issues reflect the tension for AW as both 'purchaser' and provider of water.

Resource issues

The water resources available to water companies for domestic and industrial supply are subject to abstraction licenses in the same way as all other abstractions. This means that as well as financial sanctioning by OFWAT, further resources development by AW is subject to the process of environmental assessment linked to the regulator's principles of environmental sustainability and a precautionary approach to abstraction. AW is now also subject to the ideology of demand management. The NRA's national strategy document stated: "*water companies must be required to achieve economic levels of leakage and metering before new abstraction licenses are granted for strategic development*" (NRA, 1994:19). AW believed that there was a need to develop additional resources to maintain security of supply, to improve the flexibility and efficiency of their operations and to cater for new local development (Green J, 1995[2]).

One manager surveyed felt that *'the NRA plays it safe and probably gives too much weight to the environment'*, whilst another senior manager I interviewed questioned the definition of '*acceptable*' levels of environmental impact and '*economic*'

[1] Investment targets have been driven by EU legislation, e.g. directives for drinking water quality (Directive 80/778/EEC: Quality of Water for Human Consumption) ,and waste water treatment (Directive 91/271/EEC: Urban Waste Water Treatment). Directives are listed in WSA (1995). See also OFWAT (1992a).

[2] AW employee

levels of leakage. He argued that fairness ought to imply that environmental objectives stood up to cost-benefit analysis. However, in its consultation paper on a framework for growth in charges for water supply (OFWAT, 1993), OFWAT had not included a method for calculating the cost of any environmental impact of a proposed development. Nor had it proposed any method for calculating the environmental costs and benefits of demand management, despite stating that distribution losses must be justified in terms of "*all the costs and benefits of leakage control, including environmental benefits*" (1993:4). This manager felt that the balance between the costs of managing demand and the costs of new resources development was likely to become more important as companies sought to increase their entitlement to water.

Regarding equity, the view was held that *'the matter of equity rests with the NRA, although in stating this all water undertakers have regard to the environment as a matter of inherent duty and care*'[1]. The NRA was unable to force water companies to invest so as to alleviate environmental problems caused by water abstraction but instead relied on their voluntary co-operation. Also, until the Environment Act of 1995, OFWAT was only able to advise and not require the water companies to instigate water conservation action. One significant equity issue that was mentioned was how environmental protection could be balanced with customer demand, at an acceptable price and level of service. A senior manager commented:

> *As the swing is pushed towards demand management and environmental gain, I wonder if the pendulum will swing too far.* [AW2]

He did not agree that water was a '*precious resource*', alluding to the title of the NRA's National Water Resources Strategy (NRA, 1994b) . But another manager suggested that no water undertaker would want to see more water removed than could be replenished, so *'of course water resource sustainability is a requisite principle'.*

Since its formation in 1989, AW's statutory obligations regarding the natural environment have mostly concerned water quality matters and issues within OFWAT's *Code of Practice on Conservation, Access and Regulation;* such as minimising the impact of the works it carries out in the course of its operations. The link between water conservation goals and demand management is more recent. Initially AW's concern for demand management was situated in the discourse of economic prudence rather than environmental protection. AW seemed principally to be engaging with economic sustainability in order to be 'financially fair' to its customers and shareholders rather than aiming to reduce abstraction for the sake of the

[1] In 1990 AW was the first water company to produce an environmental policy.

environment. This is to be expected given that OFWAT controls charging levels at the same time as defining the levels of supply service that the water companies must meet[1] and thus the volume of water resources that the companies must be able to supply. However, by 1995, in its third Environmental Report (AW, 1995), AW recognised that the "*water abstraction comprises one of our biggest potential environmental impacts*" and leakage and metering were mentioned as explicit tools for addressing environmental impacts. AW's submission to a House of Commons enquiry[2] into water supply in June 1996 stated:

> *In a region with many sensitive habitats, the development of new water resources to meet growing demands can pose environmental problems. It is against this background that Anglian has pursued, in recent years, policies of demand management and specific measures to promote water conservation* (Anglian Water, 1996:3).

This shows that, at an institutional level, the notion of what is 'fair' water resources management evolves over time.

Of concern to AW was the level of uncertainty involved in demand management. Although methods for forecasting future demands have become more complex, water resources management is based around the probability of historical meteorological events being repeated. In addition, it has been the increase in peak demand that has characterised pressure on domestic water supply in the 1990s and these are difficult to predict[3];

> *Yea, we rely on people stopping watering at night to some extent just to fill things up again for the next day. If they water in the day and at night we've got no rest at all. (...) People wanted three times as much water as they had been demanding at an average time during the year. And the investment hadn't been made in the pipes. And companies will tend not to get round to laying the pipes until OFWAT, if you like, allocates the income for that.*[AW1]

This manager questioned the levels of uncertainty that were considered acceptable:

> *We say we are going to achieve all these targets for water conserving and that implies that customers don't demand as much. But then, what if the customer doesn't take a blind bit of notice and we've not invested in the necessary works to meet their peak demand*? [AW1]

Another senior manager wrote of 'the nightmare scenario' for resource planners:

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[1] These are hosepipe bans, on average, once every ten years, a major publicity campaign requesting voluntary savings of water once every 20 years and Drought Orders imposing the use of stand pipes once in 100 years.

[2] See HoC Environment Committee (1996).

[3] Refer to paper by Wilson (1996) (an NRA Anglian region Water Resources Manager) on peak demand management.

> *With the NRA adopting a precautionary approach it can take several years before a license is determined and then it may have conditions attached which reduce the reliability of the abstraction, or may be time limited. The outcome for the company could be a combination of delay and uncertainty regarding future reliability. (...) The need to plan in advance, so well recognised by our forefathers, is no less relevant today and in many situations should be even more focused.* (Smith, 1995:11).

Although AW would not support a 'demand only' strategy, they did have an active commitment to demand management as evident in their awareness raising campaigns (television and radio advertising and interviews, leafleting, press releases etc.), and leakage and metering strategies[1].

As mentioned above, water companies have a statutory duty to ensure domestic water supply[2] but they still compete with other users for water, in that abstractions are subject to the same licensing procedure. However, AW's integrated network of supply and distribution (essentially a regional grid), and the number and size of the licenses that the water company holds means that its abstraction can generally be flexible enough to overcome resource problems. This means that it does not suffer in the same way as other abstractors when local restrictions or embargoes are in operation, and so its fairness concerns are less directly entwined with the claims of others for water resources. Also, drought mitigation was generally not a *'major worry'* for AW except when low rainfall extended to winter months, reducing aquifer recharge. Unlike other abstractors, water companies are able to apply for emergency abstractions if they believe that public water supply is threatened (through drought orders[3]).

> [The 1995 drought] *was a short intense, we are good at short intense droughts in this region because they happen quite frequently. What gets us is the very prolonged drought, year after year when our stores are depleted.*[AW1]

Even during the 1989-92 drought AW spent only approximately £25 million out of an annual budget of £250 million '*on a few extra boreholes and transfer pipes*'.

Thus, AW had not suffered from resource pressures in the same way as other abstractors, although one problem concerning agricultural use in the fens was referred

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[1] Leakage from the AW distribution system was 11.6% at October 1997 (or 18% if customers' own pipes are included) (Anglian News, October 1997); far below the national average for 1996 of 27.5% (EA, 1997). They have pioneered the use of high durability, low leak pipe in the UK and use one of the largest telemetry systems in Europe to identify flow changes, monitor its operations and assist in water conservation strategies. As well as proactive leakage detection, since 1992 the data on water usage from 2,000 domestic properties is logged every I5 minutes for its Survey of Domestic Consumption (SODCON). As well as focusing on system losses, its Water Conservation Steering Group began an 'AQUASAVE' project looking at the effectiveness and acceptability to customers of other water conservation initiatives such as waterless urinals and effluent reuse. AW's metering policy is discussed below.

[2] Under Section 37 of the Water Industry Act 1991, AW was under a general duty to: i) develop and maintain an efficient and economical system of water supply within its area and, ii) to ensure that arrangements have been made to provide supplies to persons that demand them.

[3] DETR and EA (1998)

to. During summer months, water flows into the fens through reverse drainage and is unregulated[1]. This water is used for agriculture. On occasions, the water company had voluntarily agreed to reduce abstraction in areas where flows were problematic. Although little financial cost was involved, it was felt that agricultural users should be '*sharing some of the burden*'. On the other hand, Table A2-6[2] indicated that AW was abstracting a larger proportion of its license in the lower Lark area, and it is likely that this would have affected summer availability for all abstractors through the faster arrival of cessation flow levels during dry years such as 1995.

The differential between licensed and actual abstraction by the water companies is usually large, as water companies were given a 20 year planning margin when licenses were issued. Because new resources are now unavailable, other potential abstractors in the area have begun to demand a redistribution of that water. This source of potential conflict will be illustrated in the following section in this chapter on industrial users.

One of my interviewees discussed the actual and potential conflicts between AW and nature conservationists. Their dealings with environmental interests operate within the two arenas that shape AW's notions of fair water resource management; regulation and public relations. For direct water resource issues, AW informs conservation bodies in the area of their plans, but the main forum for negotiation over regulatory issues was through the NRA. One manager remarked:

> *There is no point in me having a dialogue with an interested conservation body who's got a problem. You've got to bring the regulator in. Um, the regulator has ultimately to make a decision. And whatever I manage to reach as a deal may not be acceptable to them. So that's my way partly of .., if there isn't a fair deal at the end, it's the regulator that the objector has to go back to rather than to us.*

AW is then, able to pass environmental concerns regarding abstraction back to the regulator. At the level of public relations issues however, AW's dealings with environmental bodies was very active:

> *Um, but when it comes perhaps more to the public relations side we will deal with them directly. And we have various things that we .. we have competitions, to sponsor people we will take joint ventures on board. That from our point of view is fair. I mean we get something back from it, we invest money in it. We get the improved image. And whether they just think 'oh they are just throwing us a few pennies, not addressing the real problems'.. ?*

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[1] Through gravity fed 'slackers' - see Chapter 6.
[2] In Appendix 2.

AW now has a £5 million package of 'help measures' for a host of environmental projects for 'clean up', restoration and nature conservation. Many of the projects are to remedy the negative effects of abstraction and discharges from sewage works while others look at improving the natural and recreational value of AW's work sites[1].

Service issues

So, as a large company, AW had the flexibility to be able to work within the water resources system without too much difficulty. Its principal concern with fairness was through its role as a *supplier* rather than as *competitor* for resources. Although the focus of this thesis is on the latter, it is relevant to consider the service issues raised by the company. Ultimately it is AW's 'service objectives' which will determine the nature of the interface with customers, i.e. the water users, and it is this which will, to a certain extent, affect how customers are influenced in their demand for and consumption of water resources. The 'attitudes' of the water companies will have a strong influence on 'water culture'. AW's main concern was with customer perception rather than with regulation; the focus especially being on *'keeping costs down'*. An AW manager argued that public opinion was most important to the company because of the potential for public pressure to influence government towards even more regulation. Regulation might be *'misdirected or cause the company to lose even more control'*. He commented:

> *We deal on a professional basis with the regulators and er, hopefully they think we are fair about how we deal with them. But the customer, they have a much more black and white picture of things. And we don't have a good PR.* [AW1]

The levels of service to customers was felt to be the key indicator of fairness in the business. A manager remarked:

> *I think the water companies would say the service has improved to the customer. Whatever measure you'd use, we think it has improved in the past five years. And that is in itself is a good measure of fairness. (...) We did a lot of customer interviewing leading up to privatisation, to get to know where customers would back us, if you like, in our submission to OFWAT - what the customer needs and priorities were.* [AW1]

He felt that AW had slowly become more customer focused over recent years. In fact, the protection of customer interests was monitored by the regional Customer Services Committee of OFWAT (the Eastern CSC). Its duty was to identify customer opinion, advise the Director General of OFWAT, handle complaints on a day-to-day basis, and to liaise between the customer and the companies to find *'a fair resolution to a*

[1] AW even has an Employees Environment Scheme to encourage staff to work on projects which improve the environment, and locally is a member of the St. Edmundsbury Green Business Forum.

problem'. The CSC manager commented that:

> *Clearly we start from a customer's side. The customer is against a monopoly so to speak, so um, we always give the benefit of the doubt to the customer. But at the end of the day we obviously have to listen to the water companies and we try and come to a fair conclusion.*

For the CSC, one major fairness issue had been the level of charges. Although surveys by AW and OFWAT had shown that the majority of people were willing to pay more for improved services, affordability was identified as an important issue in the Anglian region[1]. AW believed that they ought to be judged as fair because they were *'not allowed to charge customers vast amounts of money, nor give shareholders uncontrolled amounts'*.

A 'fair' price for water is determined by the Director General's statutory duty to ensure the ability of the water companies to carry out their functions, as determined by legislation. One of the main principles set in charging legislation was that companies were not able to discriminate between any class of customers. Fairness has been interpreted by OFWAT as charges being (financially) cost-reflective. The resulting 'tariff rebalancing' has had several implications including different price rises for different users. Firstly, the average bill for metered and unmetered customers had to be made the same. Secondly, as each class of customer should pay what it costs to supply them, large customers (usually industrial) were charged less by volume. OFWAT states that this is not due to economies of scale in the abstraction, storage and treatment of water, but in the *distribution* system (OFWAT Information note 15, 1995). In the past, large users had been subsidising domestic customers by paying the same rate, but this subsidy was lost with the introduction of a suite of commercial or industrial tariffs. The 'cheapest' water is available to AW's two hundred or so very large customers (those supplied with over 50 tcma). AW is not allowed to negotiate separately with individual customers. As an OFWAT manager put it: *'differentiation is allowed but discrimination is not'*. This is an example of how the 'fairness principles' of two regulators may not always be compatible. The marginal environmental impact (i.e. environmental cost) of larger abstractors is higher, whereas an economies of scale argument is based on the relatively cheaper financial cost of water delivery.

A problem identified by the CSC was that the K setting was set as an average for the whole of the region covered by AW[2]. The costs of investments are spread across

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[1] Bills were higher than average for the UK *'because they don't get a lot of assistance from gravity here and there's a heck of a lot of pumping both for sewerage and water supply'*. Also the area is largely rural area, requiring a greater level of infrastructure per user.

[2] K is the factor above the Retail Price Index (RPI) which the Director General of OFWAT assessed[2] as fair for each water company to charge its customers in order to meet, for example, legally required

all customers so that although, at the time of this study, bills were to rise by RPI plus 1.5% on average, for some customers in the region charges had gone up by 7%. This led to perceptions of discrimination among domestic users. As an AW manager put it: '*Well, it's all in the same budget. The customer only pays one bill. Somebody in Southend is going to benefit from a new sewage works and the person in Grimsby is going to help pay for it*'. That, according to OFWAT, is fair.

Given the resource problems in this region, AW stands out as having had an active policy for installing meters. Unlike most other water companies, metering is Anglian Water's preferred system for charging; it has the highest take up rate in the country with around 28% of their domestic customers paying by meter by 1997 (Anglian News, June 1997). The industry average is 7%. Because of its metering policy and higher than average bills, AW was confronted by the controversial issue of low income, high water users suddenly finding that their bills had increased. A manager explained that:

> *The people that we have problems with are the lowest of income groups. It's a social issue. And the water industry is very sensitive to this. I think it is. But it feels it's not its role to go into social management. It's putting water as a necessity on the same basis as housing where special provisions are made along with other welfare aspects. (...) And the company line is, and I think I probably go along with this, is that it's something we are looking for a guide from politicians on. Because it's a welfare aspect no different from housing benefit and other things where income groups are under pressure* [AW1].

The CSC manager agreed: '*companies are not social institutions, they are set up to charge for water and sewage services*'[1].

AW argued that metering was a fair strategy not only because it relates charges directly to the amount of water used and discouraged wastage[2], but it offered customers a *choice* of payment method[3], and enabled both customers and the company to better *monitor* water use. One manager commented:

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environmental improvements. A major review of prices takes place every ten years or five years if the Director of OFWAT chooses. A review took place in July 1994.

[1] AW's SODCON study has shown that 70% of households benefit from metering, and those most likely to gain being those living alone such as pensioners and those on the lowest incomes.

[2] AW has found that the likely impact of metering on demand across the Anglian region is a 15% - 20% reduction, and 30% of peak demand.

[3] The customers have the choice to paying by meter or by the rateable value of their property. Initially metering had been compulsory but the policy was so unpopular that it had to be withdrawn. The CSC manager remarked:

> [The water companies] *acted in a pre privatisation manner, very paternalistic - 'metering is best, we are going to install a meter'. And by not really approaching customers as customers, a lot of customer resentment built up. (...) Customers don't like being told what to do in that way.*

In 1995, AW were installing about 70,000 meters a year and were oversubscribed (Green, 1995), but that still meant that universal coverage would take 15-20 years. A recent survey of 5,000 of its customers found that more than half thought metering a good idea[3]. One issue that was considered unfair by customers was that as houses with meters changed hands the new occupants had to pay by meter. Also,

> *Fairness is where we believe it is fair to the majority of our customers to install meters. But we accept that there are a minority of customers who will not find it fair. We adapt to some extent by saying that there is no compulsory element of paying like that when the meter goes in, although ultimately over a period of time we hope to see all customers on a meter* [AW1].

A general argument is that, by allowing customers to see how much they have used, and so to control their consumption and reduce their bill, metering was fairer than fixed bills. AW claims that on average, customers were saving around 15% on their bills. Strategically, reducing demand in this way also meant that customers bills would be lower because of the reduced the need to develop more resources. The company also gained through improved information on domestic water use. For example, all meters were read, even if not in use, so the company could compare how much water was used by metered and non-metered customers, and it also helped in leakage detection. One manager remarked:

> *We can make some political credit by saying, well look, people who have meters and pay by them are much more responsible than those who don't. We would have some figures to base it on.*

The CSC manager felt that there had been a change of culture in water companies since privatisation in that they had become more customer-orientated by providing new services[1]. However, she felt that companies had failed to market themselves sufficiently or take note of public perceptions[2]. The press had been especially important in influencing public opinion: '*It may be that the media is just so delighted at picking up anti-water stories that it wouldn't have mattered how hard the water companies had worked they couldn't have overcome this*'. Negative judgements of AW had been based around ideological arguments against privatisation, appeals during drought for conservation alongside large leakage losses, and charging strategies which, in practice, were differentiating households. In particular, public expectations of water supply was considered a problem by the CSC:

> *People expect a system that can meet any demand under any circumstances. And you can't cater for everyone turning on their sprinklers at the same time without phenomenal cost. You just can't do it*[3]*. (...) The vast majority of people are aware that we are pretty dry over here but nevertheless feel that they are entitled to an infinite amount of water. (...) Demand management is still alien to them and generates a lot of perceptions of unfairness.*

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all new properties are subject to statutory metering. The attitudes of all stakeholder groups to metering is discussed in Chapter Seven.

[1] Including for example, a free telephone line, special help for the elderly and disabled, and a monitored complaints procedure.

[2] A study by Tunstall et al. (1993) found that an essential factor in the public's willingness to pay for improved water services was their beliefs and attitudes towards the companies. Also important in perceptions of fair charges were an individual's beliefs about the environment and duties within society.

[3] In 1997, AW announced a package of spending to improve water pressure for 1,000 of its customers.

An AW manager gave me an example:

> *If someone is malicious in their intent, and some people do ring us up and tell us this. They do leave their hose pipe running all night just to spite the water company!*

He felt that public expectations were unfair, particularly when AW, rather than the NRA, were blamed for resource problems such as supply restrictions or over-abstracted rivers. This seemed particularly unfair because AW were managing supplies more successfully than other companies[1].

To sum up, AW have avoided many of the resource troubles of other water companies in recent dry years because they have benefited from a system adapted to a history and geography of dryness. These context-specific factors have also predisposed the Anglian public to be more accepting of demand management strategies than people in other parts of the country. Table 6- 17 summarises some of the issues which were salient to the water company in considering the meaning of fair water resource management.

Table 6- 17: Summary of domestic sector equity issues for AW

Issue	
Environmental objectives	Unfair unless meet cost benefit analysis
Focus on demand management	Problem of increased risk because of uncertainty of future demand
Water resources regulation by NRA	Accepted because of ability to negotiate and work for mutual gain
Metering	More choice and ability for customers to control usage More accurate information for resources planning Paying for what is used
Levels of service	Of concern to AW because of their potential to influence regulation if not met

Balancing the environmental and financial constraints on increased water use with the social and economic costs and benefits which accrue to a community from a new supply of water involves cultural choices. For AW, ideas of 'fair' water resource management are a matter of government regulation and of customer perception. Their idea of fair conduct is dictated by the need to comply with (and to avoid tougher) regulation. AW has been aided by the unequal relationship that the company has with

[1] In 1997, AW gained at least four awards in recognition of customer service, community and environmental responsibility and launched its Customer Charter guaranteeing standards of service. It was also shortlisted for an award for communicating its environmental policy to the public. However, a recent survey that it commissioned found that only 53% thought that they were getting value for money so charging is still an area of contention (Anglian News, May 1997). AW's leakage rates are among the lowest in the country and, unlike other water undertakers, they have managed to avoid the need for hosepipe bans since 1992.

the NRA relative to other interest groups, and the power that the water industry enjoys in the political policy making arena to influence the form and function of regulation. Issues of concern to AW regarding the implications of sustainability are firstly, the levels of uncertainty for water resource development and security that are acceptable; secondly, identifying acceptable levels of environmental cost, and thirdly *how* environmental impacts are to be costed. Informants felt that these issues were not being addressed sufficiently in the regulatory system. Demand management has been advocated in the interests of environmental and economic sustainability, but has meant that managing water resources has become an exercise in risk management. Regulation has meant that the water company has had to deal with increased awareness of the opportunity costs attached to water consumption. But it was felt that the public had not (yet) accepted that this problem had to be addressed, either with higher charges, a lower security of supply, or other new controls on consumption increases.

III An Industrial User's Perspective On Fair Water Management

Less than 10% of the licenses in the Lark are categorised as industrial (Table A2-1)[1]. Responses from this small group of industrial users in the questionnaire survey showed mixed attitudes towards the regulator. This is to be expected as the nature of their businesses and their interests and experiences are very diverse (from laundry to sugar refining). This section therefore uses a case study to illustrate how the principles upon which water resources are allocated and managed were being challenged by one commercial user of water. The description of an appeal against an NRA licensing decision reveals the discourses that are emerging to justify claims for water once a state of perceived 'competition' has been reached.

Analysis in the first section of this chapter showed that, of the 12 industrial respondents to the questionnaire, 5 were classified as PRO the current regulatory system, 3 were ANTI and 3 were 'No Opinion' (see Table 6-15). Many of the industrial respondents remarked that they were aware that water had become a far more 'precious' resource, but one mineral extractor commented that '*the Environment Agency are getting over-protective of the aquifer without justification*'. A laundry service felt that regulation had become fairer because there was *'more concern for the environment'*. One respondent felt that, compared to a main's supply, their abstraction was very cheap, whereas another did not accept that their business should pay more for abstraction because of their impact on the resource was negligible. Two

[1] Also, 10% of questionnaire replies (12/124) were from industrial users (see Table 4-8).

respondents questioned whether the regulator's understanding of the processes involved in their businesses was sufficient. This was a concern shared by farmers, as will be shown in section 4.

Industrial abstractors are not vulnerable to restrictions during periods of exceptional drought, other than surface water licenses which might be subject to cessation conditions. In the Lark, most industrial users are groundwater abstractors and most are situated in the upper Lark, abstracting from an area of the chalk aquifer where the river is vulnerable to low flows. Often large, industrial abstraction is for low-consumptive uses and river flows are highly dependent on the effluent that they return. Also, unlike PWS or agricultural abstraction, there is very little or no peak demand during the summer when pressure on resources is greatest. These differences mean that the notion of fair regulation by industrialists is likely to be based around concerns different to those of other stakeholders, although, in common with irrigators, water is, for them, a commercial raw material.

The aspect of a more sustainable water resource policy which is having an impact on industrial users is the embargo on new abstraction. Essentially, this forces businesses to turn to the private water supply companies to gain access to water resources. One industrial user, a fertiliser manufacturer, had failed to transfer the license for its site when the company changed hands in 1989. When that license expired, the application for a reissue in a new name had to be treated as a new license. As the application was received after the embargo, it was refused. The only option for the firm was to secure supplies from the water undertaker at a much higher cost than abstracting from their own licensed source. The economic consequences of such as situation forced another large company, a Maltings (hereafter referred to as PM), to challenge the basis upon which water has been allocated. I shall now discuss the issues involved in the case and examine the nature of the claims that were made.

PM's appeal through a public hearing was against a refusal by the NRA either to vary their existing abstraction licenses upwards or to grant a new license. PM required more water for an expansion of production at three sites in the Anglian region, one of which was at Bury St Edmunds. The details of this hearing by a Planning Inspector in 1996 are included as Appendix 3[1].

Essentially, the appeal centred on a request for the reallocation of water resources from the private water company to PM so as to maximise the economic return from

[1] The analysis draws on notes taken during a public hearing of the case, from documents submitted by both parties, and the final report of the Planning Inspector to the Secretary of State for the Environment explaining his recommendation that the refusal be upheld.

their use. The maltings were challenging the water undertaker's right to 'sit on' its unused license capacity, given that no new supplies were available to meet new demand (other than water purchased from Anglian Water). PM felt that it was '*unjust*' for them to be required to obtain a supply at a cost of 50 times more per tonne of malt produced, especially as water of the potable quality supplied by AW was not required. The difference in cost per year was about £225,000 (see Table-A3 in Appendix 3), and PM argued that they were '*being held to ransom by a monopoly supplier*', i.e. AW. Further, PM argued that any impacts on local employment that would result if its competitiveness was jeopardised, would extend out in to the local farming community which supplied it. The company believed that the NRA was not empowered, nor had the competence, to take account of socio-economic considerations. The NRA was using a criterion of '*reasonableness*' which, as it said itself, was not defined. PM argued that the NRA had no expertise in the maltings industry and remarked that *'staying in business'* was reasonable. They also commented that they had voluntarily reduced their water usage down to a minimum during the drought of 1976, not for economic reasons but from public spiritedness.

PM did not accept, if water was available to AW to supply PM with the amount required, that they should be denied the right to abstract it themselves; especially as they would be able to do so more efficiently because of leakage from the undertakers' pipes. In essence, they were challenging the first-come-first-served principle, and challenging the margin of security granted to AW in their license. Even though the NRA's own statement admitted that many of its techniques for assessing the resource balance were 'inadequate', PM was not challenging the NRA on technical grounds, such as expected environmental impact for example, but on the principles by which water was being allocated. PM considered that not only had the NRA failed to recognise all relevant considerations, but they were acting on an *inequitable* basis: the water companies were in the private sector, and so ought not to be treated differently to any other industry. The NRA were taking into account the long term investment plans of the water company, but not those of other commercial users. If, as the NRA admitted, financial considerations were not a matter for its judgement or within its expertise or powers, then where, PM asked, was the forum was for taking into account the economic issues involved in water resources? The company had approached OFWAT but they had not been able to help. They felt that these broader issues needed to be examined and determined by the Secretary of State.

The basis for the NRA's refusal of PM's application was the existing policy of no new abstraction from the Lark chalk groundwater unit. In fact, in the upper Lark where

Bury St Edmunds and PM are located, the unit was over abstracted. The policy that the NRA followed was based on protecting existing licences and the environment, and Section 57 of the Water Resources Act stated that it must treat all applicants equally. The NRA argued that, although their methods for determining quantities of water available were not perfect, as a regulator it had to arrive at 'yes/no' decisions using the best available techniques at its disposal. PM had argued that it had never been consulted over water planning, even though it is one of the largest abstractors in the area. The NRA replied that it had consulted widely and had asked the Confederation of British Industries to participate in the consultation for Catchment Management Plans but they had not replied. The NRA did not make approaches to individual companies.

Although PM's application was for a reasonable *use*, the NRA felt that PM's *need* to abstract from an over-abstracted aquifer, rather than use the mains supply, could not be seen as reasonable. Although AW was abstracting between 80% -96% of its licensed quantity, the NRA could not reallocate the unused portion of the license for a number of reasons. Firstly, to do this might encourage a 'use it or lose it' approach, resulting in increased abstraction and harmful local impact. Secondly, they did not believe that AW was hoarding water as a margin of 10% was accepted as a reasonable level of security. With regards to the uncertainties of forecasting demand, the NRA quoted their national water strategy document (NRA, 1994): "*the NRA does not consider that a long term strategy should be based upon a specific prediction of a particular demand forecast, but instead it should be recognised that forecasting is an uncertain process*". The NRA were concerned that, given the suspected amount of unmet demand in the catchment, a move to reallocate water from one user to another would set a precedent for more claims and would reduce the ability of the water company to make long term water manage plans. Thirdly, the NRA was not in a position to make allocations based on the economic value of water, and regarding the cost of water supply, the NRA's view was that the issue was one for OFWAT[1].

The NRA believed that its role was to facilitate meetings between PM and AW in the hope that a financial arrangement might be made between the two sides over the license, effectively a trading. Unless AW voluntarily offered to give up rights to the water, to impose a variation on AW's license would require compensation to be paid from the public purse. PM had argued that what was a *'proper'* allocation of water

[1] In April 1996, the DoE published a consultation document on encouraging competition within the water industry by creating more opportunities for large users to obtain supply services from alternative companies though 'inset appointments' (DoE, 1996a) .

should not be connected to the financial implications for the public purse. AW argued that its Asset Management and Business Plans had been based on the assumption that no additional groundwater resources were available for development. They had had to make alternative plans themselves for resources development because of this policy. AW could not reduce its current licences without either risking reduced levels of service or increased costs that would be passed on to its customers.

In his final report, the Planning Inspector took into consideration the appropriateness of the NRA's groundwater policy, environmental issues, and the 'reasonableness' of the argument on costs and competitiveness, inequity, derogation and precedent. He argued that the cost issue to PM was not a matter of 'overriding public interest', and would not warrant the imposition on the NRA of the cost of compensation arising from derogation to AW's license. He dismissed any arguments of inequity since PM had not been treated differently to any other applicant. The NRA were acting in accordance with their statutory obligations to avoid derogation. He found against PM.

What this case suggests is that is that the appeal system is not one through which the *status quo* can be effectively challenged. Rather it is a mechanism for assessing whether existing principles, legislation and policy were being correctly implemented. The hearing was participatory in its broadest sense, allowing views to be heard, but it was not a forum for discursive engagement on the validity of normative assumptions that have been determined elsewhere. The case is interesting in clearly highlighting that some normative issues over how to allocate water remain unresolved in the current system for the governance of water resources. While the *status quo* is being defended, the definition of sustainable water resource management beyond environmental sustainability is being avoided.

The NRA argument was based around its regulatory role; its duty to protect both the environment and other existing abstractors; the technical foundations of its groundwater policy, and the need to be fair to those it had already refused. The regulator is unable to take an holistic perspective, i.e. to include the socio-economic implications of its decisions. This might be questionable in terms of sustainability. Although the NRA attempted to be fair, its terms of reference were very narrow. The environmental regulator cannot reallocate water resources on economic grounds, but the moratorium on licensing is forcing a market for commercial water resources. If 'markets' are to fill the gap, how will they be regulated in a way that ensures that the multiple interpretations of sustainability are considered? Economic sustainability is based on utilitarian principles of maximising economic return, whereas cultural

Table 6- 18: Summary of equity issues argued by the industrial user, PM

Issue	Unfair because...
Embargo	Public Water Suppliers have been allocated too much water
PWS monopoly	Charges are considerably higher than direct abstraction
First-come-first-served	Ignores the socio-economic costs and benefits of water use Threat to local economy if business lost
NRA as a regulator	Lacks broad expertise in commercial issues Preferential treatment has been afforded one private sector over others, i.e. PWS

sustainability implies respecting existing norms, and social sustainability ensuring the means for continued community development. PM was not confident that the remit of the regulator, nor its expertise, was relevant or sufficient to ensure a '*just*' allocation of water. For PM, *'just'* implied at least *taking in to consideration* economic issues.

The questions raised by this case would include the following (see Table 6- 18):

1. Whether first-come-first-served remains the fairest way for resources to be allocated once there is closure, or whether other criteria should come in to play. Is it fair, for example, that the agricultural industry which employs many thousands of people should be restricted when its location is geographically tied, whereas an industry like a maltings, can in theory, be relocated to areas where water is more plentiful?

2. Is the entitlement of the water companies to have licences for amounts in excess of their duties of *domestic* supply fair? In fact, they have been granted licenses large enough to supply business demand. For this reason, other users feel that, in the words of a PM representative, '*a conspiracy has been taking place*' between the NRA and the water companies.

3. If the limit on resources was to be addressed with further development, the question would still need to be answered as to whether those resources should be supplied in the public or private sector. In either case, the marginal cost of supply would be higher than local abstraction.

I shall now turn to the issues and concerns articulated by the largest group of abstractors - agricultural users.

IV The Perceptions of Agricultural Users

In this penultimate section, an analysis of the views and arguments of irrigating and non-irrigating farmers reveals:

- their perceptions of the nature and causes of the water shortage
- their understanding of water conflict, and
- their attitudes and judgements of the water management system.

Farmers were keen to explain what they saw as the injustices of the regulations that the NRA was able to impose[1]. First, an outline is given of the water use experiences of farmers responding to the questionnaire survey.

i. *Water use experiences*

Box 6d gives a profile of the farmers who replied to the survey. Most had had some sort of contact with the NRA so comments here will generally be based on first hand and specific experience of the regulatory system. Abstractors were using a range of sources and held licenses of different status. They also represented all sizes of abstractors (Table 6- 19). All licenses larger than 10 tcma were for spray irrigation. Seven farmers (16% of those responding) were not able to give even a rough figure for the size of their license, and 12% did not know whether their license had any conditions. However, the majority of farmers were able to quote the details of their license, as would be expected in an area where water has become a salient issue, and where, as will be revealed below, the farmers have been concerned to reduce any uncertainty regarding their access to water.

An approximate calculation (see Table 6- 19) indicated that nine of the 44 farmers who responded to the survey were benefiting from 62% of the water. This distribution is significant in terms of their impact on the environment and the resource, and the 'equitable' allocation of restrictions. Abstraction by larger farms, by having a proportionally greater impact in the catchment, has a greater effect on the arrival of cessation level flows and the lowering of the water table. Yet as described in Chapter 5, restrictions have been applied according to proximity to the river of the abstractor; thus, in one sense, discriminating against smaller abstractors.

About two thirds of the farmers reported an increase in water use over the last decade. One farmer commented:

> *We started up with one borehole and built it up. We were lucky enough to apply for more and get it. We didn't realise how important water was to our business. Development around water has taken place in the last 25 years.*[Farmer D]

[1] Examples of the range of responses collected with the questionnaire survey are presented, and expanded through analysis of interview responses.

Box 6d: Profile of agricultural respondents

- 42 irrigating and 16 non-irrigating agricultural users replied to the survey.
- 47 had had contact with the NRA:
  20 were for new license applications,
  15 for license renewals
  4 were as consultees
  8 other
- 5 had no contact with the NRA since its formation (6 non responses)
- 15 were river abstractors (6 permanent, 6 temporary)
- 27 were groundwater abstractors (9 permanent, 12 temporary)
- 6 used the fen drains
- 3 had on-farm, winter storage reservoirs
- 22 held permanent licenses
- 18 held time limited licenses
- 4 were unsure of the status

Table 6- 19: Agricultural licenses by volume

Volume licensed (n=44)	Number of farmers	Volume %*
less than 10 tcma	6	0.3%
10-20 tcma	6	3%
20-50 tcma	6	7%
50-125 tcma	10	28%
>125 tcma	9	62%
not sure	7	-

*approximate value - calculated using 44 cases responding and maximum volume in range

Table 6- 20: Influences on farmers' use of water

Influence	No.	%*
Efficiency	24	47
Environmental concern	8	18
Produce improvement	29	65
Avoiding restrictions	20	45
Problems obtaining supply	16	36
Switched activity	2	5

*of the 44 cases responding. More than one answer allowed.

More than half the farmers accounted for this change by the need for improvements in the quality of agricultural produce. Only 5 farmers noted a decrease in water use, but half reported being influenced by the need for efficiency (Table 6- 20). Only 8 of the 44 farmers replying, however, mentioned being influenced by a concern for the environment. Generally then, any efficiency concerns are economically interpreted rather than being influenced by a more holistically driven awareness of the need for water conservation. One farmer remarked: '*irrigation enables farmers to maximise the benefit from their use of the land*'.

Forty five percent of respondents reported that the fear of drought restrictions had influenced their water use, and 36% reported experiencing some difficulty obtaining sufficient supplies. Nearly all farmers said that they had tried voluntarily to cut back on their use of water during times of shortage. Some irrigators had agreed to limit their abstraction in accordance with the agreement between the Lark Valley Abstractors and the NRA, (discussed in Chapter Five). Some said that they had switched to irrigating at night, and a few said that they had improved their targeting of water. Only one said that he had restricted his farming to growing the kind of crops that did not require irrigation. So, when shortage is viewed as an immediate problem, the farmers have attempted to make water go further to reduce their vulnerability to drought, but it seems that their ability to reduce their demand in the longer term has been more limited. This section of the chapter will show that, although the demand for water is being affected by the limits on imposed by the regulations of licensing system, it is also shaped by factors operating in a different direction; the quality demands of the food processing and marketing companies.

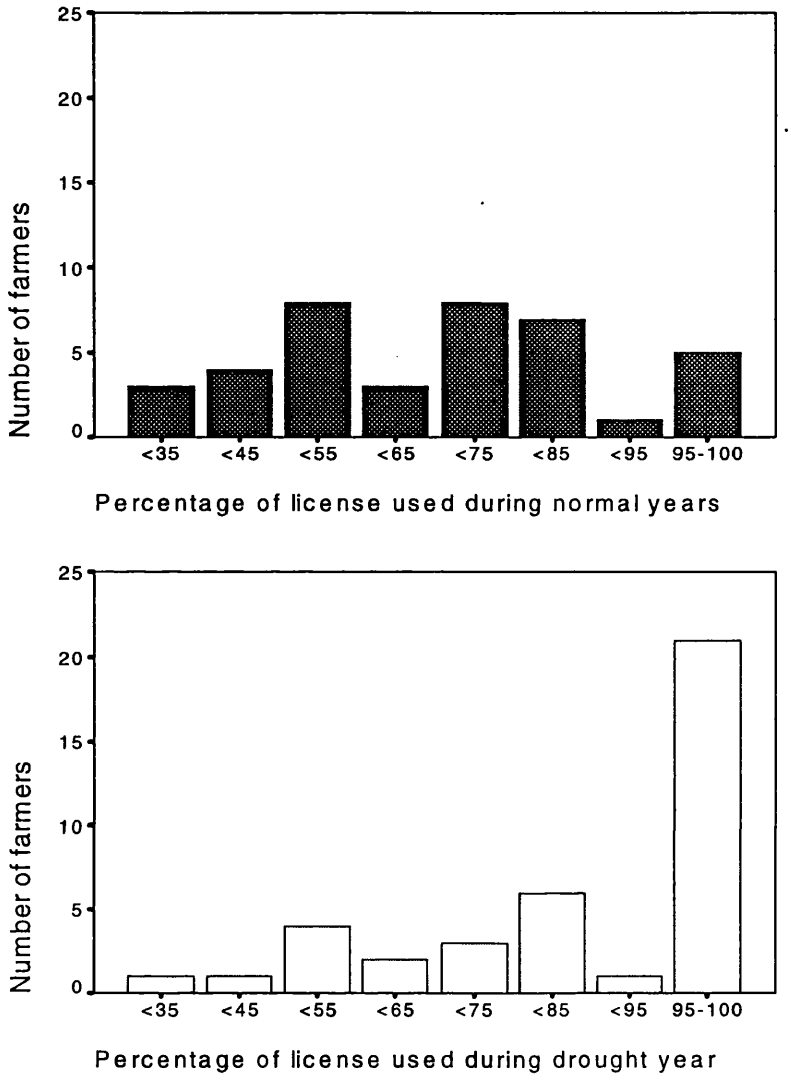
In order to asses how close actual abstraction has been to the licensed amounts, respondents were asked how much of their license they used during a normal year and a drought year (see Figure 6- 1). During an average year, just 5 farmers reported using their license to the full, and 26 normally used less than 75% of their license. Reasons why farmers would not use their full entitlement are varied. As well as crop rotation, or land being entered for set-aside, or being for sale, licenses of right issued in the 1960s and early 1970s may have been in excess of actual needs. Also, based on existing charges, an unused license of 15,000m^3 for irrigation is retained for a payment of only £165 per annum. More recent licenses have been tighter, granting water according to 'reasonable' need - deemed by the NRA as that required in the driest year in 20.

So, for most farmers surveyed, access to water does seem adequate for their existing needs during a normal year (although, of course, need and actual use will have developed against water availability). During a drought year however, half the farmers in this study reported abstracting the maximum permitted, with nearly three-quarters using over 75% of their license.

The equity issue introduced here is the competition that arises in closed catchments[1] for the water that is held by farmers as 'insurance' against drought years. If water is over-concentrated during normal years, it essentially ties up water that

[1] Those catchments, such as the Lark, where new licensing is embargoed.

Figure 6- 1: Extent of license use by farmers



others might put to use. Allocating that water to other farmers during normal years would, in theory, raise the aggregated economic return on water use as a whole. Because, by definition, the frequency of normal years is larger than the frequency of drought years, there ought to be a net gain.

A normative assumption in the system as it stands, however, is that that farmers are entitled to licensed-water as drought insurance, and thus the licensing system clearly favours those who do have access to water, at the expense of new-comers. This section will present farmers views on this issue. Rather than increasing allocative efficiency by revoking and reallocating that 'insurance water', the use of economic incentives in the form of the voluntary trading of water permits has been under consideration in policy discussions (Morris et al., 1996; Streeter, 1997). Winter storage also might introduce a 'fairer' situation. If farmers were able to rely on a farm

Box 6e: Reason for license refusal (Q 18)
No new licenses being granted.
It has been made known not to apply in some circumstances
Water shortage and reassessing use in the district
Water needed to dilute sewage effluent. Reduced the efficiency of pump and limited yield of root crops.
It might affect the water levels in Chippenham Fen which is leased to English Nature. Far more difficult to water crops at Chippenham.
Effect of license refusal
Refused license at Fredenham, went to appeal and won. A neighbour with a well for fish in a moat objected.
It limited production /expansion
Poorer crops
Restricted expansion and crops suffered from drought conditions
Couldn't grow the crops I wanted which needed irrigation
Loss of profit from reduced yields
Tried other means of getting water

reservoir to manage the risk of water shortage, then the normal year excess would be freed up to make water available for more claims, including that of the environment in over-abstracted areas[1].

Eleven farmers (of the 44 responding to question 18 in the survey) reported having a license application, or a variation upward, refused. In order to identify their understanding of the regulator's decision, they were asked to comment on the reason for the refusal, and the effect it had on their businesses (see Box 6e). Three farmers mentioned the embargo on new licenses and two referred to a specific environmental reason. Others said that it reduced their efficiency and the quality of their crops or that they had to consider another means of supply. Nine (of 11) had appealed, either formally or informally, against an NRA decision. This is a very high proportion of applicants not ready to accept the regulator's decision against them. (Attitudes towards the regulator are explored later in this section).

Forty five percent of the irrigators surveyed expected to need more water in the future and none expected to use less, indicating that water issues are unlikely to ease in the Lark. Farmers were asked what the effect might be of failing to obtain more water and some examples of their replies are presented in Box 6f. More considered reactions and adaptive behaviour might be expected in practice, but these statements are indicative of some farmers' attitudes to regulation. The viability of businesses 'depending' on water would be effected by restrictions on supplies, particularly if businesses were forced to purchase mains supply at significantly higher costs. Few

[1] The views of all stakeholder groups on tradable permits and on-farm reservoirs are discussed in Chapter Seven.

Box 6f: Views on capping water supply (Q11)
I'll tell you how much I'll need if you tell me how much rain there will be!
If we have a need and can prove availability of supply e.g. winter storage I think we should have it
We should all have as much as we need
OK if fair to all, but I was refused a license
Fury
Disappointment as we require water for our livelihood. Whereas no restrictions are placed on domestic or amenity usage.
Would endeavour to use more efficiently; trickle irrigation, use of booms.
Intensify in areas where there is water. Change crop type.
I would simply have to restrict the cropping.
Impaired produce.
Production would be limited to current levels.
Invest more in trickle irrigation.
Have to change business, putting staff out of work.
We would have to use mains at great cost which would effect profitability

farmers mentioned the possibility of adjusting their demand in some way by improving efficiency, for example.

One farmer pointed out the impossibility of predicting water use because of the unpredictability of rainfall. For the regulator, the 'conflict' between the need for irrigation at times of low rainfall makes their joint objectives of protecting the environment and securing reasonable supplies to abstractors difficult. Significantly, the farmers felt their claims to water were *strengthened* by a lack of rainfall, rather than the reverse. Some farmers did not accept the need to restrict supplies at all, showing a belief that farmers' rights to water are fundamentally justified and a degree of scepticism in the concept of limits to the resource.

The arguments presented above are an indication of the farmers' expectations for water management and their attitudes towards regulation by the NRA. Next, the foundations of their concerns and judgements are explored in more detail.

ii. *How farmers accounted for problems*

Table 6- 21 summarises the range of equity concerns in the agriculture sector that emerge from the accounts by farmers, and will provide the focus for discussion in this section. Water management issues that were either criticised or supported by the farmers are listed, along with a general principle that is implied by their opinion. The analysis that follows will show that:

- the risk of shortage and restrictions is a primary concern for farmers, yet the regulatory system was not meeting their risk avoidance requirements

Table 6-21: Summary of equity issues articulated by farmers

Issue	Unfair because...	General Principle
Restrictions	Agriculture not treated as an essential industry	Agriculture is a public good
	Preferential treatment given to other users	Farming is also a business operation
	The regulator was responsible for over licensing so should shoulder the problem not the abstractors	Those who have control should shoulder the problem
	Abstractors were lead to believe that the regulator was responsible for looking after the resources	Expectations were created and should not be disregarded
	Different restrictions on users from same source is unfair	Social equality
Embargo	There is enough water to go around	Water is an unlimited resource
	Have to purchase water from water companies at much increased cost	Privileged access for profit making water companies
Cessation conditions	Do not know the behaviour of other abstractors	Fairness is relational
	Too inflexible for farming needs	Fairness is situational
	Too much monitoring and paper work	Regulation which requires excessive resources (time) is unfair
	Only apply to surface water abstractors	Discrimination is based on impact but amongst neighbours is unfair
	Newer licenses are less reliable than older ones	Discrimination, even though impact is the same
Precautionary principle	Cost are too high and not based on 'good' science	Long term decisions based on lack of understanding is not fair
Communication	Non-availability of information and non-openness of decision making. Impossible to asses legitimacy and acceptability of decisions	Informed and understood decisions are fairer
Issue	**Fair because...**	**General Principle**
Cessation conditions	Other abstractors need to be protected	Equal opportunity to access
		Preservation of prior rights
	A license comes with risk	A degree of risk is acceptable/fair
	Over abstractions would endanger to wildlife and river environment	Environment should be protected
	Increasingly severe for newer licenses because they cause cessation limits to be reached sooner	Rights of senior users should have priority
Restrictions	Determined by hydrological impact	Those who are responsible should carry the burden proportionally
Night time irrigation	Minimises waste through evaporation	Inefficiency and waste are wrong
First come first served	Some degree of protected access makes investment possible	Security is required for investment
	Established businesses need protecting	The results of previous hard work should not be undone

- the pressures of a competitive and complex off-farm, food marketing system has strongly influenced their use of water and hindered their ability to loosen their dependence on water
- farmers argue that the fact that agriculture is an essential industry should effect water regulation,
- that agriculture is unfairly burdened with restrictions in relation to other stakeholders; and that those restrictions have wide economic and 'public good' consequences,
- that historical precedence should be taken into account

The problems and concerns articulated by the farmers are discussed here in three parts; first, the risk of shortage due both to the weather and increases in demand; second, their awareness of conflicts that have arisen; and third, the failings of the water management system in either preventing shortage or in dealing with it when it arises.

Beliefs about shortage

Many farmers mentioned their increased awareness of the preciousness and value of water (see Box 6g) [1]. Their concern with water shortage lay predominantly in the risk of unavailability for their crops and its commercial implications. There was little reference to the problem of over-abstraction causing environmental problems; very few mentioned environmental concerns at all. One farmer interviewed even said:

> *Surely the whole point about water is that there is endless water. We just need to use more energy to get the salt out of the sea. We don't need to worry about it compared with oil and energy.* [Farmer A]

Box 6g: Concerns for water shortage
Concerned that the chalk aquifer is being depleted too rapidly
Greater concern about future ability to abstract from boreholes
Water is becoming less available to those that require it, particularly irrigators
Availability problems more acute since 1990
Places on the farm which used to be very wet are no longer boggy
I am very concerned about availability of water for irrigation of agricultural crops.
Shortage more dramatic
I now treat water as a valuable commodity
More aware that it should not be taken for granted
Greater realisation of the pressures and problems - including water for domestic supply, severe drought etc.
Water has gone from being a seemingly inexhaustible resource to one of concern in extreme conditions

[1] A few farmers mentioned pollution as a problem; one still referring to the NRA officers as '*men from the board*' even though the Water Board ceased to exist many years before: '*I spoke to the River Board men this week and they said the Lark above Sicklesmere was the worst it has ever been and was not fit to wade or work in*'. Water may be very important to farmers in the 1990s but they have not all kept entirely up to date with the system that regulates it.

When asked to attribute a cause to the water problem in the Lark farmers responded in the survey as follows:

Table 6- 22: Causes of water problems as perceived by farmers

	n	weather	population increase	irrigation	climate change	bad water planning
Agri-non irrigators	15	11 (73%)	9 (60%)	6 (40%)	6 (40%)	7 (47%)
Irrigators	41	25 (61%)	18 (44%)	9 (22%)	18 (44%)	17 (45%)

As with other stakeholder groups (see Table 6-2), the weather was the least disputed cause, but how the shortage of rainfall was perceived and how it ought to be responded to, varied in the extent to which extreme weather conditions were interpreted as 'normal', or as evidence of climate change.

Box 6h: Concerns about the weather

Irrigation of crops more pressing issue in recent dry summers - however I am not one of those who believe this is the first sign of global warming.

The weather conditions have changed to very hot and not sufficient rainfall.

More concern due to much drier summers

Need for conservation due to lack of rainfall

Less rain: depression over poor rainfall and expensive costs of irrigation in order to feed dairy cows

An IDB representative commented:

> *Will it get worse? We might have been sat here in 4 years time presiding over 4 wet winters and 4 lousy summers. I doubt you will have picked this topic to study. I'm a great believer in a cycle of events and I don't think that there is. You can forget global warming. I think there is just local trends that are always there.* [IDB]

In addition to the *weather*, farmers' comments referred to the increase in demand for water (Box 6i). Blame was placed on industrial and domestic use, although nearly a quarter of the farmers did also blame irrigation (40% of the non-irrigating agricultural users) (Table 6- 22).

Box 6i: Demand problems

There is a far greater demand on water supplies plus there seems to be a trend towards hotter/drier weather throughout the year.

More concern due to population/domestic use

Increased use - not enough to go round at times

Anglian Water have become much greater abstractors in the near vicinity

The Lark Valley has been too heavily drained during the past two decades to allow several developments and also to bring more land into agriculture.

Too many licenses is a problem

We have upset the water table by using too much borehole irrigation

More people are irrigating, industrial use of water has increased, so becoming a scarce resource.

The off-farm, food processing and marketing system was given as another cause of the water problems, with pressures being greatest for farmers growing crops requiring a specific degree of quality each year, i.e. the potato and root vegetable market[1]. The pressure for quality from the food buyers, ultimately controlled by the bargaining powers of the food processors and supermarkets, dictates not only the amounts of water that the farmers require but also the time of the year that it is needed[2]. The prices that the farmers received for their product were dependent on the quality of the produce, with differentials of up to 300% (Williams, 1997). The large financial gains to be made from irrigation may explain the *'fury'* that one farmer said he would feel regarding restrictions that would jeopardise his crops. Two interviewees explained:

> *We don't irrigate for the fun of it ... we irrigate because we are trying to produce a produce of a quality and quantity which satisfies our customers and satisfies our contracts.* [Farmer D]
>
> *Until a few years ago if you didn't have water you just didn't get the yield; 10 tonnes per acre of potatoes instead of 15. Now it's not 15 tonnes its probably more. But now you could still end up with 15 tonnes that weren't worth anything because of the lack of watering at appropriate times, which is all to do with the quality issues.* [IDB]
>
> ND: *So is a campaign needed to stop people wanting pristine potatoes?*
> IDB: *There's a better chance of rewriting the Water Act! The supermarkets tell us what we want and they say they are responding to customer demand. But it's for the convenience of display and pricing. They want one price for celery; so they don't want different sizes.*

Food buyers expect farmers to produce to a consistent standard, and one bad season can lose a farmer his/her market. Relationships are built up between suppliers and buyers over time, yet poor quality produce jeopardises that relationship. In consequence, farmers felt that they were shouldering the risk of all the uncertainties of water availability imposed by the regulatory system[3]. Beyond their own businesses, farmers mentioned the impact on the UK market as a whole if they fail to supply. They felt that competition from overseas was a real threat and that once vegetables were imported, East Anglian farmers would lose their place in the market for good. It was felt that British spray irrigators were at a particular disadvantage compared with

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[1] For a description of how food production, retailing and regulation have increasingly influenced agriculture throughout the 1980s and 1990s see Marsden and Wrigley, 1994; Marsden et al., 1992; Williams, 1997.

[2] A recent thesis by Williams (1997) explains how the 'food network' has become structured so as to divorce supermarkets and processors from the environmental consequences of their decisions and demands.

[3] One farmer commented: '*Demands are higher. Anything substandard is worth half the price of something of quality. Once you lose a contract because of bad quality it takes years to build it up again. They go elsewhere. We have a business with a lot of people employed and it is essential to keep going. Other people in the world can produce it much cheaper (...) It's not just farming; the packing industry suffers too when crops fail.* [Farmer D]

irrigators in Spain, Italy and Greece where there was relatively little control over licensing[1].

The farmers' argued their claim to water through both *a social responsibility to satisfy the food market,* and *the need to maintain their businesses.* Their vulnerability to water shortage is a result of the dictates of the global food production system, and so their needs for water could not be conceived simply in terms of coping with the vagaries of weather. It is in the context of the large financial risks and gains, that farmers argue their claims in relation to others, and judge water regulations implemented in favour of the environment. The pressures for quality produce have been greater than the pressures to reduce water demand 'voluntarily'. In fact , farmers have been able to challenge the state water regulator more easily than the forces of the food economy.

Conflict and other claims on water

The way that farmers express their claims to water can be positioned amongst other demands and claims of other users and this is revealed in their comments on conflicts over water. Agricultural users' perceptions of conflict were wide-ranging: environmental-agriculture, industrial favouritism, urban–rural, large farmer–small farmer, recreation-agriculture, bribery, unfair charges and restrictions. The following comments (Box 6j) exemplify the feelings of many farmers that, relative to other uses, agriculture as an industry is unfairly treated:

Box 6j

In years of water shortage, agriculture has to carry a large proportion of the restrictions whereas they could be spread over all water users with less hardship to anyone user.

Apart from hosepipe bans, if a river flows slow the first people to be hit are irrigators by restrictions or bans. Water is wasted every day by domestic users. I believe farmers use only 1% of water consumption so should not be restricted as they are.

I believe that agriculture should be treated in exactly the same way as industry and treated as an industry.

Food is more important than flowers/lawns. We had to write-off 100 acres of late-scraper potatoes in 1991. Haven't heard of other industries suffering like agriculture.

Irrigators now employ a lot more people than in the past

In several of the farmers' statements, conflict was attributed to the regulatory system; because of what it permitted, or the way that it operated. Before looking more closely at the farmers' attitudes to the regulator, licensing and how they are treated, it is interesting to note how farmers feel that other stakeholders fared under

[1] Water Policy Officer, Country Land Owners Association.

the regulation of the NRA. Table 6-23 confirms that among irrigators there is a generalised hostility towards the domestic sector, with the perception that the regulator gave undue preferential status to water companies, while the irrigators themselves were being treated unfairly. One irrigator remarked:

> *Yes, if you take a snap shot then the water companies have basically had all the things their way and have done extremely well.* [Farmer B]

Non-irrigators did not indicate the same degree of perceived unfairness.

Table 6-23: *Mean fairness rating for other stakeholders

	Comment on:				
Comment by:	Irrigators	Nature	Domestic users	Industry	Water Co.s
Irrigators	1.63	2.08	2.30	2.33	2.73
Non-irrigators	2.00	2.17	2.00	2.17	2.14

*where 1=unfairly, 2=fairly and 3=too fairly[1]

The distrust of the water companies is illustrated by a conviction that they had been able to bypass any uncertainty about the negative effects of their abstractions. One farmer commented:

> *They very craftily got a license about 10 years ago which they have developed in the last two years. They have built a large pipeline from the Thetford area to Cambridge, and they wish to put more water down that pipe, we believe. We don't know where that water will come from. We believe it will come from the south, and that Sapitson catchment area is adjacent to the Lark, and nobody knows if the two are interlinked or whether one feeds the other.* [Farmer D]

This farmer went on to argue that water problems were a remit of political decisions by the water companies:

> *Basically they have taken all the water in this area and nobody else can have any water because its all technically gone. (...) The trouble is the reservoirs are politically unpopular which is why Great Bradley has not been built because it is politically unpopular. Not because it is impossible. It's perfectly possible. And there is lots of water that could have served all of Cambridge and other places but it was the easiest option to come to this area to get it.* [Farmer D]

This comment on the water company's need for more water illustrates a perception that, locally, farmers 'own' the water resources:

> *If we've got someone tapping into <u>our</u> reserves still further than we've got at the moment we will get in to the same problem as in 1991.* [Farmer B]

Farmer D argued:

> *And of course borehole abstractors feel that the aquifer is their reservoir. This is perfectly justifiable .. they collect the water by letting it run through their soil and it goes into the aquifer. Basically they have collected the water. They have spent a great deal of money abstracting it.*

[1] Implying undue positive discrimination

Another farmer argued that the run-off from and recharge through agricultural land meant that farmers were actually net contributors to water availability. He felt that farmers were actually '*guardians of the water supply*' by protecting everyone from land developers.

The environment was considered as being relatively fairly treated. Not one farmer mentioned a direct concern for the impact of any water problems on the environment, although some farmers surveyed expressed concern about the influence that environmentalists had had. As this farmer remarks:

> *One of the things that worries me is that people like English Nature and the RSPB have power without responsibility. Which is always bad. You've got to have checks and balances. And there could be a mechanism like the charity commission where these people can be tackled head on and English Nature should have to pay damages to people if it proved that they were wrong.* [Farmer A]

He continues:

> *The conservationists (...) have got pots of money. They can't just have these emotional, qualitative views. It's got to be measured in some way (...) they have got to contribute to that. And someone like the RSPB.. I hate birds.. [laughs] (...) they measure these things like how many wading things have come this year, and I think you've got to say whether that will happen, and whether the birds will go to Norfolk rather than Suffolk, and that's no great problem! (...) I mean the toads in the pond .. I'm not anti toads, but they seem to be given preference over people's jobs. And we are talking about jobs in this irrigation game.* [Farmer A]

Another farmer however, was aware that his understanding and judgement of the water issues for other stakeholders was too limited. He felt that all would benefit from greater dialogue:

> *Irrigators have started on the process with the Environment Agency but we haven't talked as yet with any conservation groups. They don't understand our problems and we don't understand their problems so that is another thing we haven't even started to tackle yet. I talked to a group of conservationists. They hadn't a clue what I was talking about. They didn't even ..they didn't seem to realise the problems we have. And the feeling goes the other way. (...) If there is a problem you need to understand the problem that the other side sees. You can get away from having a conflict with them, to having a discussion with them.* [Farmer B]

As well as with other stakeholders, there is a degree of perceived unfairness among farmers themselves (Box 6 k). References were made to the farming practices of 'other' farmers. In particular, the inefficiency of day-time relative to night-time irrigation and the wasting of water on the 'wrong crops was criticised. One farmer reproached the selfishness of farmers:

> *Farmers are behaving selfishly. They are watering crops like mad even though there is no need for those crops. There is no shortage. There is enough water in the Lark to serve its needs, if water was used more efficiently. We should only irrigate things that need it. We are being paid above the world price for sugar beet. It's just like buying money.* [Farmer C]

Box 6 k: Comments on other farmers
Big farmers' use of many irrigation machines affects small farmers' access to water
It concerns me that farmers are allowed to irrigate during the day causing maximum evaporation when if done at night maximum benefit would be obtained
Due to other agricultural license holders (not me) irrigating cereals which I think is wrong.
Ban irrigation during the day; there are lots of advantages to that.

The analysis so far has suggested that farmers water use practices are strongly influenced by risk management, that is, the need to manage their vulnerability to the powers of the produce buyers. Where the external economic pressures were not being counteracted by any other forces on water use control, over-compensating for a potential water shortage has resulted in a greater tendency for inefficiency and self-interest. Where farmers considered their water use in terms of the wider resource system, they were more likely to be influenced by competition rather than co-operation or compromise.

Problems with water regulation and management

In section one of this chapter, a quantitative survey of attitudes to the regulator and to the licensing system was described. Farmers' satisfaction with the level of service that they experienced when dealing with the NRA was on the whole quite high. Responses closely matched those of the survey sample as a whole, except there were relatively more farmers than other stakeholders who answered '*not at all satisfied*' (17% against 10%) (see Table 6-6 above and Table 6-24). Eighty six percent of irrigators were satisfied with the provision of information, and 77% with the opportunity to express their views. Non-irrigators were generally more satisfied than irrigators, but were less satisfied than irrigators with the provision of information and with the opportunity to express their views. This suggests that, although non-irrigators experience fewer problems, they did not feel as well informed. On the whole then, the farmers' interaction with the NRA staff was judged positively. Among the agriculturists, twice as many irrigators were PRO in their judgements of the regulator and licensing than ANTI[1] (refer to Table 6-15 above). Of those who were ANTI, none were the non-irrigators, but 20% of irrigators were 'ANTI'. Another 31% of agricultural users answered 'No opinion' most frequently.

In contrast, more negative perceptions of regulation were revealed in the *qualitative* responses gathered by the questionnaire survey and in interviews (probably because

[1] The PRO/ANTI/No Opinion scale was a based on most frequently given responses.

Table 6-24: General satisfaction among all agricultural users

n=47	No.	%
Very satisfied	8	17
Satisfied	19	40
Neither	10	21
Not satisfied	2	4
Not at all satisfied	8	17

they allow more specific experiences and opinions to be expressed independently of a general evaluation). The following comments (Box 6l) are an indication of the range of concerns that will be discussed below:

Box 6l: Problems with regulatory system

The Environment Agency is giving licenses for domestic use while forgetting existing users

Past capital investment for irrigation has become compromised by constraints on full use of licensed volume

We need to be able to manage water so we are not left high and dry

Concerned about poor water planning by the Environment Agency, reluctance to give information

Environment Agency should do more to save water

I believe that water management plans must improve at the highest levels.

Too short notice on irrigation restrictions

Our land was purchased with existing license. Wanted to increase hourly and daily abstraction but not annual quantity, but not allowed

Restriction on irrigation during season but we still have to pay 50% for water we are not allowed to use. The NRA gets it both ways.

License quantities being cut short during season due to lack of water - in the opinion of the relevant authority.

An understanding of farmers' views of fair water resource management is gained in the remainder of this section through a discussion of the following: i) their judgements of the regulator, ii) their attitudes to licensing, iii) to monitoring, and iv) to limiting resource use through license conditions, and v) to drought management.

Attitudes to the regulator. Many of the farmers' negative attitudes to the work of the NRA were based on their perceptions of its level of expertise as a whole. A distrust of the information that the NRA make use of meant that its decisions were often regarded as 'unfairly' cautious and protective towards the environment. Better and fairer management was therefore seen as attainable through more scientific knowledge and understanding.

Several farmers complained that the data on which the NRA made its decisions on availability was inadequate:

> *The statement I'd like to make is that there is really quite insufficient information available about the water availability in this area. I'm saying the authorities don't know. (...), a lot more work needs to be done, both in measurement and modelling once they've got the measurements. (...) I don't mind them saying we can't measure it at the moment and therefore we have to have caution but the onus is on them to measure it. As Lord Kelvin said in 1870 until you can measure things and express it in numbers you know nothing about it.* [Farmer A]

> *But still those licences [licenses of right] have limits so there's no excuse to say they didn't know they existed. But they didn't know at the time how much water they had to give away. And now the dickey bird is coming back to roost, basically they have been licensed up to the hilt or over licensed. Here, there is fair evidence that they have only just stopped issuing in time. We are certainly right up to the borderline of having adequate water.* [Farmer D]

Some were concerned that the conditions on their licenses or restrictions were not scientifically justified, and were unreasonably over-protective of the environment.

> *In 1991 when the River Lark started to run too slowly and was foul as well and they stopped us on the grounds that it was a polluted river, or should we say not diluted enough by water coming from the springs. And that was the grounds under which they stopped us. We considered at the time that it was incorrectly founded* [Farmer D]

Many of the farmers in this study did not believe the claims of the NRA regarding low flows, and it is implied that the farmers knew better. The implementation of the precautionary principle resulting from such a high level of hydrological uncertainty was not acceptable to most farmers. They did not accept that the costs of restrictions were outweighed by the potential gain to themselves or to society. Nor did they expect the NRA to have the skills to assess the costs and benefits sufficiently.

> *I believe that one of the problems is that the NRA doesn't have sufficient resources to do this technical work, therefore they need more money. And they probably need some people who are more skilled in some things than their existing staff. I don't mean that there is anything necessarily wrong with their existing staff but they need an addition of other skills. I would suggest that the users of water should be prepared to pay a bit more to fund this.* [Farmer A]

It could be argued that sustainability is aided when the wider gains and costs of environmental protection and resource regulation are perceived as *private* gains and costs. The regulatory system was failing in that respect. The negative judgements of the NRA's competence, and the lack of legitimacy for its decisions, was acting as a barrier to the acceptability of its wider objectives. As well as inadequate scientific expertise undermining the legitimacy of their authority, the breath of their skills was seen as deficient. The NRA staff were perceived as not understanding how farming worked; jeopardising what had been established with years of hard work.

> *They didn't understand problems, like the farmers need continuity of supply. They suggested at one time that all irrigation should take place in the day time. What terrifies me is that because they've got such power they think they understand about industries. There ought to be more time spent understanding the needs of the environment yes, but the needs of agriculture and industry.* [Farmer A]

It is implied that the regulator ought to be able to pay regard to the wider consequences of restricting irrigation, e.g. that of the common good of the 'UK plc'. Farmers frequently used this argument in their claims for water, but they doubted that the NRA took into account the impact on jobs, for example, when carrying out its duties.

A perceived lack of faith that the regulator '*knows what it is talking about*' undermines the legitimacy of its strategies. There was a split among farmers regarding night-time irrigation, for example. This strategy relies on farmers reducing the amount of water they apply to their crops to account for the reduced evaporation, but this requires a sophisticated level of detail and several farmers were not convinced of its benefits. The costs in terms of inconvenience to the farmer are high (such as moving equipment at night), whereas the benefits to the environment would not be large if the same amount of water was being applied. One farmer did not trust any of the claims about night-time irrigation and again wanted more scientific backing to the strategy:

> *I want to a see a paper that says if you irrigate during the night so and so ....Why is it so difficult to get this information? This would help solve this difference of view. Here there is a surplus of opinion over fact. (...) I don't think it's that people say 'oh I won't do it at night time it's a nuisance'. They say 'we don't think it will make much difference'. But if somebody proved it did, it would influence the situation. The NRA should be bombarding everyone with all this information. If it's true then why isn't the NRA, or the environmentalists, producing the evidence?* [Farmer A]

The farmers I interviewed were dissatisfied not only with the information that the NRA used, but their perception was that it was illogically and inconsistently applied. The NRA was criticised for not making people aware of the availability of information and for poor presentation of information:

> *We asked the NRA for a policy document that directly affects us. We were told that it did not exist at that time. There was no such thing as a written policy document on this particular issue. Now we've got it and it's dated 3 years after,.. no, written 3 years before we asked for it. And it's a policy document that directly affected us.* Farmer [B]

One farmer refers to asking for an explanation and being sent a page, then asking for more details and being sent 40 pages of '*rubbish*'. Access to information was also a problem (Box 6m):

Box 6m

The Environment Agency should have a morass of information that's available to everyone. It shouldn't be a question of information being secret. Information should be available to everyone

Usually fobbed off with the commercially sensitive information excuse whenever trying to obtain information on anything other than what involves us directly

Frustration at lack of information on other users.

Farmer B felt that if open committees made decisions, rather than individual licensing officers, then there would be less conflict. He wanted more consultation as he believed that farmers could be more accepting of a decision that they did not like if they understood the basis for it.

> *I would have thought that if the water thing is to progress there has to be more of that openness. The thing has got get more discussed and the NRA have to be more challenged with more openness.* (...) *One of the problems that we have is that the policy under which we operate we didn't know about. Nobody was consulted about it. (...) But having this dumped on you .. that's what gets people's backs up. And then you start the true conflict on the thing. Then you have to calm down from that, go back to the beginning again, .. and do the thing together.* [Farmer B]

Another farmer complained that the procedures for appealing against the NRA were inadequate and not widely understood, and he felt that the NRA was not being sufficiently monitored:

> *One of the problems on this is that everybody is scared to take the NRA to appeal. Which is why the system doesn't work properly. (...) There is no system if the NRA make a mistake, that they've got to pay the farmer.. that I know of. (...) Most farmers don't have any experience. And the other thing of course is that the cost of experts is very high. But it does mean that the NRA isn't challenged and just like English Nature, if any body of people aren't challenged they don't hone their standards up.* [Farmer A]

The appeal system was considered too expensive. One farmer estimated that because of the exploratory work required and legal fees required, it would cost £50,000-£100,000 to appeal against the cessation conditions on his license, the fees for which cost him £10,000 a year. The Lark Valley Abstractors' decision not to contest the NRA's banning of irrigation was also made on this basis:

> *And it was decided by a group of which we call our Lark Catchment Group, everyone who appeared at the meeting, that they would not fight the case because it would cost an unbelievable sum of money.* [Farmer D]

One farmer replying to the survey was sceptical of the 'proper conduct' of the NRA:

> *I used to own a farm. I wanted to irrigate so I got a license and paid 10K to drill the borehole. Then a neighbour complained and forced an inquiry. How? I do not know - bribery? It cost me £7,000 to win the case.*

So, from the perspective of these farmers, proper and fair regulation is perceived of in terms of the levels of competence of the regulator; the openness of decisions that are based on sound scientific knowledge and the capability of the regulator to take

into account the significance of farming beyond abstraction and the environmental issues. That *dialogue* is part of the process of fairness judgements is also clearly demonstrated in the responses given by the farmers in the survey when asked whether the 'fairness' of water resource management had improved and why. An equal number believed that water management was fairer under the NRA compared to the AWA as those that thought not. But as the comments below show (Box 6n), any improvement was particularly attributed to better communication.

The farmers who were interviewed generally felt that, since the improved consultations with the Lark Valley Abstractors, judgements of the regulator had improved:

> *Our contact as a result of the '91 fiasco has been very good. Notably the quality of water in the river is unbelievably better. Farmers contact with the NRA has improved no end.* [Farmer D]
>
> *It is generally accepted that the NRA in this region knowing that we are the driest and we have the biggest demand for irrigation and all that ..the NRA handle things extremely well. There was just odd pockets where there was the need for embargoes. And I think they've worked well on this.. on taking on board a voluntary approach, they seem to work.* [IDB]
>
> *If you have this structured situation, where people can say I don't like it but I can see that if I take this water out, a certain species will be extinct. I feel that there will actually be less conflict, and that that process has started.* [Farmer A]
>
> *People have stopped thinking that it is either 'them or us'. It's a mutual process; of finding a compromise. That's one of the big changes.*[Farmer B]

Attitudes to licensing. Generally, farmers in the catchment accepted the need for regulating access to water: "*There has got to be a degree of control, otherwise you would end up with a river with no water in it!*" [Farmer B]. However, the largest cause of frustration with the regulatory system was with the methods of implementing limits to water resources availability; through cessation conditions on licenses, drought restrictions, or the licensing embargo. Some farmers were only short of water during exceptional conditions, when restrictions on spray irrigation were imposed; otherwise their licenses are sufficient to meet their needs. But others, although finding their licenses *insufficient* to meet the new pressures to irrigate, especially during a drier than average year, were unable to increase access to water because of the embargo on licenses[1]. Another group of farmers were those whose licenses *exceeded* their needs, or were not used at all. These licenses had potential value, but the water was not transferable beyond their own land specified in the license.

Farmers readily blamed the regulator for not doing enough to ensure supplies and

[1] Described in Chapter Five.

Box 6n: Why management is fairer?

Since 1991, consultation and implementation of restrictions has been much improved. Better management of restrictions and fairer regulation.

Environment Agency consulted with users of water and worked out a system that was fair and manageable.

They work with the LVA[1] so that sudden decisions are not made and water use is planned for vital crops and not just cut off at a vital stage of crop growth

Yes, they will listen

They managed to provide water for irrigation in drought years through voluntary restrictions with farmers earlier in the season to provide irrigators continuously through the summer.

In so far as voluntary arrangements with LVA guarantees a licence at an agreed level for whole season. A good compromise.

Much better this year, but a bit haphazard in the past. Communication still poor at times i.e. notification of restrictions very last minute.

They are able to take a wider view over a bigger area

The NRA are more involved with the environment, whereas Anglian Water were major polluters themselves pre privatisation

So far so good, but I am concerned about greater and more arbitrary decision to restrict usage in the future.

creating the water problem by mismanaging the allocation of licenses in the first place. An IDB member remarked:

> *One of the things I would say is that, and I am not a share holder in Anglian Water, but if Anglian Water can go through the period that we have gone through sitting as it does on the driest part of the country, and it doesn't even have to introduce a hose pipe ban in the garden, then we have to say that if we have got problems with availability of water it is in the management of the resource rather than in the resource itself.* [IDB]

Abstractors felt that they were led to believe that the regulator would take care of resources, but they had been let down:

> *In the long term, it is up to the Environment Agency to provide sufficient water to allow full use of the quantities of water permitted to be used on all abstraction licences. Surely that is what licences are sought and granted for. Farmers should not have to suffer if a drought year leaves supplies low.* [Surveyed Farmer no. 110]

The feeling was that the responsibility for the problems ought to be shouldered by the regulator, rather than abstractors and users.

> *How has it suddenly got to a situation where there isn't enough water? The only reason can be that they've over licensed since the day they first gave you the original licence. Of course, it was understood that the NRA or AWA[2] was responsible for seeing that the water they licensed was not in excess of what they possessed. The fact that people are not having licences renewed would imply that they were overlicensing, .. or that they made one major calculation error.* [Farmer D]

[1] The Lark Valley Abstractors. A group of irrigators informed to negotiate with the NRA following the implementation of restrictions during the drought of 1989-92.
[2] Anglian Water Authority

The legitimacy of the NRA's practices, particularly those which imply 'hardship' for farmers, are hindered by the perception that historical licensing decisions by the Anglian Water Authority are to blame for current problems.

Much of frustration with the regulatory system can be explained by the complicated temporal and spatial specificities of managing water which determine availability. A farmer remarked: '*The more complex the system, the more arbitrary the decisions'.* One farmer perceived it unfair that he was refused an increase in the hourly and daily rate for his license when the annual amount would not have changed. This failure to understand the way in which abstraction impacts on a water source was common among the responses. A lack of awareness of the environmental risks and uncertainty connected with licensing impedes the acceptance of regulatory strategies. Farmers might not be expected to have an expert hydrological understanding or to understand the complexities of water management, but many were found to lack confidence in, or to have an unsatisfactory understanding of, the procedures and principles by which resources were allocated and managed. This would inevitably colour their judgements of the fairness of the regulatory system.

Farmers were asked about fairness of the 'first-come-first-served' principle of licensing. There are two temporal dimensions to this principle. First, is the initial allocation of water. Does *anyone* who applies for available water have a right to the resource or is there an alternative criterion to qualify eligibility? Second, should water, once allocated, not be reallocated? Does prior use grant permanent rights above later applicants who might better meet a new criterion? These questions have become salient in the catchment since the embargo on new licenses which is creating a two class agricultural system; those with access to water and those without. One agricultural advisor remarked:

> *Perhaps the more progressive thinking farmers who 20 years ago went out and got an irrigation license .. they are in a significant advantage compared to the guy next door who has to arrange his farm knowing that he can't irrigate anything.* [NFU]

Only one farmer questioned the 'first-come-first-served' principle, feeling that planning and management was lacking in the system.

> *I am not happy with saying that 'first come first served' is 'ipso facto' correct, because there has got to be more management in it. Not so much on a local scale but on a grand scale.* [Farmer B]

In current practice, when a *temporary* license expires a new license is granted, and to date, no renewals have been refused in the Lark area. Not surprisingly, the rights of *existing* users are strongly defended by farmers on that grounds that established businesses should be protected, and distinguished from any claims by newcomers.

> *People who are applying for the first time and have not built up a business around water; if there isn't enough water, I hate to say it but you've got to face the fact you cannot have a licence.* [Farmer D]
>
> *It's one thing having the water but you have to invest a lot of other money, and if you have a system where somebody can build up an enterprise for years and then somebody can suddenly take it away to be fair to somebody else ... I suggest that society won't work very well.* [Farmer A]

For most farmers, prior appropriation is an absolute principle because such established understandings will have led to business investments, and livelihoods would have been built around those assumptions. Ideas of fairness are built around precedent and common understanding. Perceptions of unfairness emerge when a regulatory decision challenges such understanding. Therefore the introduction of a new strategy, if it is to be acceptable, requires that new understandings are in place.

Attitudes to monitoring. Some farmers felt that the regulator should be paying more attention to abstractors who were acting 'illegally'. Violating a license is a criminal offence penalised by a maximum fine of £5000 a year per prosecution (not per license). Over the whole of the Anglian region, during 1989-1995 the NRA had not prosecuted any licensed abstractor for *over* abstraction or ignoring restrictions; prosecution was more likely for abstracting with no license at all. Farmers were not entirely convinced that the system was ensuring compliance. Only recently had monitoring become more evident. One farmer commented: *'Oh no no, the NRA never ever checked anybody's meters until about 3 years ago. The fact that you had a meter was totally irrelevant. The majority of people didn't have meters'.* Although, none admitted to cheating themselves, several farmers felt that it would be worth farmers violating their licenses. One remarked:

> *Basically people are law abiding. Only a percentage of them will do it. Let's put it like this, they will only do it officially. Supposing we were told, ..we have been, to stop irrigating and one of us said it's not worth it economically, I will go ahead and do it. Now, there is another way of doing it, which basically says the meter is broken, we'll have it out, and you don't put it back again. So you are violating your license by taking excess water. Now in the past this has gone on* ad infinitum. *But there is a distinction there between bending the rules and directly breaking the rules. If the NRA came and said 'Mr X, I'm sorry you know, you've been watering without a meter. You've got to get it fixed up.. don't do it again', and you went directly against them .. that would be completely breaking the rules. But bending the rules is considered to be fair game [laugh]. Which is not actually ethical, but it's practically what happens. (...) Oh you know, put the meter in backwards - instead of it going one way it goes the other!* [Farmer B]

A certain kind of cheating had been accepted. That the regulator was not actively monitoring, was taken to imply that cheating was an expected feature of the way things were managed. Another farmer questioned the logic of having meters which

were owned by the farmers and self read. Perhaps a system of self-policing had been viable in the past, but with new pressures on resources it was no longer so. However, it was also felt that notions of proper conduct for farmers were changing. Self regulation might be replaced by more 'community' policing:

> *I mean I've known in the past, farmers irrigating when they shouldn't have been and nobody has picked up the phone and said by the way I think you should have a look down here. But I think they would now, because I think they realise that the issue is so significant in terms of so many farming operations - without the water many of them would, of course, suffer tremendously.* [IDB]

Some farmers felt that if there was more monitoring, the regulatory system would be considered fairer, and that would encourage greater compliance of conditions and restrictions. This is a 'Prisoner's Dilemma' situation which, some scholars argue[1], can be solved with confidence about the co-operative behaviour of other abstractors. For a system to rely to a large degree on voluntary compliance, and people being '*basically law abiding*', abstractors require a degree of certainty about the behaviour of other abstractors, and about the attitude of the regulator to the actions of others. Self or 'community' policing is more sustainable, as it requires fewer resources actually to be spent on monitoring and prosecutions. For example, an agricultural representative described how the night-time irrigation system commanded a 'social' authority because of the certainty of compliance:

> *Night-time abstraction came up as a very useful self policing mechanism. The argument was one of whether, OK, instead of going .., as I say we went from full irrigation to half irrigation, and then half only on four nights, and somebody said would it not be better to have gone from half to a quarter and to have been able to do it at anytime? The answer from the farmers themselves was that night irrigation was by far the best. Everybody knew they could only irrigate between 7pm and 5am, and the fact is, they knew that was a wholly fair system because nobody could irrigate during the day and cheat the system and get around it. And you know, apparently if you drove around the fens, you set your watch by the time the irrigators went on. There was no irrigation going on during the day and then at 7 o'clock on the dot the spray irrigators burst into life. And so its a very good practical solution because the farmers are policing their own system, or the NRA's system for them.* [NFU]

Attitudes to license conditions. To date, the allocation of conditions and restrictions is a greater area of dispute among farmers than the allocation of licenses. It is only recently that license applications have been refused, and so refusal is not yet a common experience. Chapter Five described how the status of a license has generated an equity issue because of the application of cessation conditions. Time-limited, surface water licenses which cause relatively fast fluctuations in river flows carry a cessation clause whereby abstraction is not permitted when flows are too low

[1] See, for example, Berkes & Feeny (1990); Ostrom (1990).

at the Denver sluice. These clauses have not been applied to groundwater, or to permanent licenses in the catchment. Newer, time-limited licenses are therefore, far less reliable than those granted in perpetuity.

In the survey, most farmers thought that license conditions were 'fair' (Q16), while six respondents thought they were not. Ideas of fairness seemed to be related to risk assessment. Conditions are acceptable when risks are understood and judged to be in need of management. One individual commented that license holders accept the risk that comes with water use. Conditions which ensured opportunity of access to the resource for others and ensured that the river was protected were felt to be fair. Others who judged license conditions to be fair were those who had access to more water than they required. One farmer remarked that conditions were fair because they were *not* proportional to license size. Another suggested that it would be more practical to reduce all licenses, so as to avoid the need for cessations after significant expenditure had already been incurred on a crop[1]. For several farmers, the main concern was with the lack of flexibility caused by irrigation being tied to an area of land specified on the license.

One farmer considered it impossible to assess fairness without knowing what others were doing. For that abstractor, equity is clearly relational. Without knowledge of others, it is more difficult for stakeholders to have confidence in the fairness of a regulatory system; particularly if they feel that the system is disadvantaging them too much. This is relevant with cessation clauses. A cessation condition would come into effect independently of an *individual* farmer's use of water. Reaching the cessation flow depends on the aggregate effect of many abstractors. The incentive might be to irrigate so as to benefit before the clause came into effect, rather than to minimise use so as to delay the conditions. Again this is a 'Prisoner's Dilemma' which, as already suggested, the LVA seemed to have resolved through their successful agreement voluntarily to reduce abstractions.

Attitudes to drought and restrictions. When referring specifically to the handling of drought, the level of dissatisfaction with the NRA measured in the survey increased; almost 50% of the farmers surveyed were not satisfied (Q30). Some reasons given are listed in Box 6o. Restrictions on irrigation are applied only during periods of extreme shortage when cessation conditions are inadequate or do not exist[2]. They

[1] Similar in fact to the arrangement made by the Lark Valley Abstractors.
[2] Refer to Chapter Five.

Box 6o: Opinions on drought management
Different restrictions on users from same source is unfair
They stop one user and let a neighbour water crops because of different licence date issue.
Drastic termination of borehole abstractions was unacceptable.
Cutting off irrigators mid season means that all the earlier water applied is completely wasted as the crop is not brought through to harvest because of poor quality.
Unrealistic restrictions imposed
The Environment Agency has not got the powers to adequately deal with some water users
Earlier action should be taken plus tougher action against abusers
Drought planning has been mainly by the LVA. The NRA have little knowledge of reserves and only respond to shortage once it's happened
Water into the sea is a waste
Yearly we run out of water anyway
Too many recorded letters. Common sense should prevail at all times
Good communication needed
Agriculture should be regulated quicker. It's left far too long.
I expect that too little forward planning is done but it's not an easy job
They have no power to increase supplies
Do not make enough water available by increasing supplies from wetter areas in the north and west. It is the water companies duty to provide enough resources for the Environment Agency's needs.
As long as Anglian Water provides water then reality prevails

have affected all irrigators in the catchment; but to different degrees. Most farmers did believe that the logic of 'impact based' restrictions was fairest.

> *If you've got a problem. And person A is the biggest cause of the problem and man 10 is not, then man A has got to take the greatest responsibility. Which is basically a geographical responsibility. (...) Sorry but that is tough. In exactly the same way... as if this man has got a river running through his farm, that is good fortune and its bad luck on the bloke 10 miles away.* [Farmer B]

Their frustration was due to what they felt were unnecessarily unfair impacts of the restrictions which arose from bad planning and insensitive implementation. As well as the lack of faith in the scientific foundations of the NRA's decision mentioned above, the manner in which restrictions were implemented was much criticised. Unlike cessation conditions, restrictions are not written into individual licenses, so when implemented in 1991 without notice, they caught irrigators unaware.

> *Shall we say the NRA, I don't think realised until that day, what the consequences were of cutting people off just like that - bang. (...) And when we were cut off in 1991...we pointed out to the powers that be that the damage done was very considerable and we have a large catchment area here with about 64 abstractors.. the Lark Valley as an area and we estimated that it had done about £2 million worth of damage, just in our area alone. (...) They hadn't a clue at the NRA of the consequences of doing that. Lettuces are the same. They have to be in a cycle for Sainsburys who want them everyday - you water them in a cycle. Totally dependent on water.* [Farmer D]

The restrictions were considered unfair because of their inequitable effects, as well as their impact more widely. Farmers felt strongly that they carried a heavy and unfair

burden for the failings of the regulator. Several farmers express the view that, on the contrary, agriculture ought to be given preferential treatment as an 'essential industry'. It was felt that restrictions would be more equitable if spread over other users.

Restrictions can affect any abstraction for irrigation that the NRA judges is causing or might pose a danger to river flows. Among the farmers, some experienced a total ban, whereas others were only partially restricted. This led some to challenge the principles that determined the distribution of the burden of conditions and restrictions within the catchment.

> *Agricultural people compete with each other. And when you have a situation where certain areas, because of if you like drought conditions, there is an embargo on spray irrigation say, it goes beyond merely a group of farmers not having water. It destroys the whole competitive nature of their business. If they were all effected in the same way and there was national drought and everyone would just say we've got to put up with it.. then I think that becomes a little bit more acceptable. But where it really gets people where they are in a certain catchment where there is an embargo and from their farm they can see the spray irrigators working on the horizon.* [IDB]

In some areas, because restrictions have been applied according to a hydrological rationale, neighbouring irrigators have been affected differently. Farmers perceived that decisions were made arbitrarily and this caused much frustration. The NRA had clearly not communicated the reasoning behind the 'line' determining restrictions in a manner that convinced the farmers of its legitimacy.

The actual impact of the restrictions depended on whether a crop demanded irrigation early or late in the season. This also created a sense of inequity, as one farmer put it: *'it's those that require it in July. The July crops have used it all up for the rest'*. Another remarked that:

> *We had even orchard growers who hadn't yet used any water at that point in July.. in order to conserve water for when they needed it. To conserve their license, which they perfectly legally had, to use at a time when they wanted it for - when the apples are formed. So suddenly those people got cut-off having not used a drop!* [Farmer D]

Farmers were penalised in spite of acting within their legal entitlement, and being competent in the planning of their water use. Further, the restrictions were viewed as incompetent because of the waste of the water that had already been applied to crops that would not survive without more irrigation.

In this situation, resource regulation, in serving the sustainability objective of environmental protection, was in conflict with a different relationship to water; one that was both economically and culturally established. For the farmers, there had been no 'balance' in the NRA's approach.

This section has explored equity concerns within the agricultural sector and the normative assumptions about fair water resources management that have shaped the farmers responses to regulation and their claims to water. The most significant factor affecting ideas of fair water resources management was the farmer's instrumental notion of water. The water problem in the Lark was perceived in terms of restrictions on their own use of the resource, and therefore as one of governance.

The origin of water as a *natural* resource was secondary to the farmers' relationship to it as a business commodity. The responses of the farmers in this study, did not engage with any conflict between their use of water and the needs of the environment. There was very little awareness of sharing water with the environment, nor mention of any sustainability motive,and some farmers felt their claims to water to be strengthened by drought. This suggests that for the majority of the farmers, environmental conservation was a separate issue from the input of water into their businesses, and that the environment was considered the regulator's responsibility, along with balancing the demands on water. With the granting of a license, the farmers expected the regulator to have taken account of all the environmental requirements, and so any subsequent derogation was therefore the responsibility of the regulator. The regulator was seen as providing a service; that is, being responsible for supplying water according to the license granted. A belief that a license granted ownership of the water was widely shared among farmers.

Although there was overall support for regulation, farmers' perceptions of their water problems being caused by inappropriate and unfair regulation explain their criticism of the NRA and the licensing system: unfulfilled expectations regarding its availability, a lack of faith in the expertise of the regulator, and the relative rights to the resource reflected in regulation. Conflict with the regulator was mostly based around distrust of the NRA's assessment of the degree and risk of derogation which formed the basis of conditions, restrictions and overall water availability. This distrust was a result of a perception of poor scientific data, and poor understanding of farming issues, exacerbated by poor communication and a lack of openness.

The problem was also articulated in terms of the pressures of the food purchasing system in determining their 'need' for water. Farmers' relationship with food networks means that the fairness of restrictions was judged in terms of the effect on their ability to manage risk. Their assessment of that ability was partly dependent on being assured of the actions of other abstractors and of the potential actions of the regulator. Restrictions that farmers could plan around were more acceptable and meant that the environmental sustainability objectives of the regulator were less

challenged. As well as an instrumental attitude (the needs of their crops and their businesses), the farmers' claim for water was characterised by reference to their contribution to the common good and their social responsibility, i.e. the utility of agriculture (food production, employment, countryside stewardship). For these reasons, some farmers felt that agriculture merited special treatment. The basis of their claims, also strengthened by 'rights' acquired through historic expectations, can be summarised thus:

- Irrigation maximises the return from the land.
- Undeveloped land allows aquifer recharge.
- Agriculture is a special case because it is an essential industry.
- Important industry for 'UK plc'.
- Investment is only encouraged by granting secure permits.

Although the financial implications of restrictions were a central concern, where restrictions were 'inevitable', farmers were concerned that they be 'fair'. A social, as well as an instrumental fairness norm was, therefore, also important. When they felt confident that other farmers were complying and that there was no preferential treatment (as with the case of the Lark Valley Abstractors), farmers were willing to accept a 'fair' share of the burden of reduced abstraction[1].

The next short section explores the final group of stakeholders, environmentalists, whose views on what is meant by *fair water resources management* generally contrast with those of farmers.

V Environmentalists' notions of fair water resources management

Environmental and nature conservation campaigners have long worked on water issues including reservoir construction, water quality and more recently in the 1990s, the threat to rivers and wetlands from over abstraction. These groups have together challenged a water management system which protects the aquatic environment under normal conditions, but permits river and wetland ecosystems to be damaged during periods of '*exceptionally*' low rainfall when water companies may apply for drought orders to abstract extra water, if there is a threat of a '*serious deficiency of water supplies*' (FoE, 1996b)[2]. There are no guidelines as to what constitutes an

[1] In the case of the LVA, this was an equal percentage of their licensed amount.

[2] Section 74, Water Resources Act, 1991. A more recent EA/DETR report detailing drought orders and permits states that "*the Environment Agency has particular duties associated with water supply. Therefore, in extreme situations, where there is a serious threat to continued supplies which is likely to impair the economic or social well-being of peopling in the area, and all reasonable measurements have been taken to manage demand, the Environment Agency accepts that drought permits may be necessary which have significant impact on the environment*" (DETR, 1998b:13).

'exceptional shortfall' in rainfall and NGOs are concerned that the frequency of drought orders has been increasing (FoE, 1996a).

The NGOs have also challenged the 'fairness' of licenses of right on two grounds: firstly they are out of date because they were granted without correct attention to environmental need, and secondly, they conflict with the regulator's duties to protect the environment (RSPB, 1995; Drury Hunt, 1997). Although in the Anglian region many licence applications now have to include an environmental assessment, licences of right mean that in some places the environment has no protection if conditions change. As described in Chapter Five, the regulator has the powers to revoke licenses causing environmental damage but the requirement to pay compensation means that this has not happened. Although the NRA would, if possible, seek a voluntary agreement, a key fairness concern among environmentalists was that the regulator was restricted by the requirement that society should pay private individuals for something that was which was a common, not a private good and was given away free of charge. A review of licensing legislation was being demanded (Beardall, 1992; RSPB, 1995; FoE, 1996b). A report on water management problems by the Wildlife Trusts of the Anglian region for example, argues that: "*there should be a planned strategic allocation of abstraction licenses, rather than first-come-first-served procedures*" (Beardall, 1992:88). The report, however, does not specify by what alternative principles water should be allocated.

Some environmental groups have supported the potential for using of economic incentives to reduce water demand (RSPB, 1995; Rees and Williams, 1993; Morris et al, 1996). Demand management is considered as essential, and these NGOs believe that water should not be considered as a 'free resource' with charging policies that do not reflect the opportunity cost to the environment. Economic mechanisms are accepted as reinforcers of regulation when they are 'fair'. FoE, for example, qualifies its support for using metering to influence consumer behaviour: "*Domestic metering places all the responsibility for water conservation primarily on the water consumer. (...). It is our view that everyone is responsible for water conservation, but that some methods are fairer and more effective than others in different circumstances.*" (FoE, 1996b:11).

The need for demand management has been lobbied for strongly (CPRE, 1991). Friends of the Earth have argued for 'local supplies for local needs', as meeting demand would amount to: "*areas exporting their over-abstraction problems to other areas, without tackling the core problem of rising and unsustainable water use*" (FoE, 1996b:7). Their arguments are principally about making sure that a 'proper' balance is

established in legislation, and is achieved or redressed in practice through tighter or 'better' regulation of abstraction and, in particular, of water supply companies. For the environmental groups, a 'proper' and fair balance is defined by the conservation of biodiversity (FoE, 1996b; RSPB, 1996; Drury Hunt, 1997). This is central to sustainability:

> *The use of water resources can only be considered sustainable if the ranges and numbers of species and the quality and extent of habitats are maintained at a favourable status and in many cases enhanced.* (RSPB, 1995:9)

These NGOs' approach to sustainability might be considered as more holistic than that of the NRA; the achievement of environmental sustainability is being approached alongside an engagement with the need for economic and political transformation (e.g. RSPB, 1995; Rees and Williams, 1993). Campaigning groups discuss biodiversity in terms of ecosystems having fundamental value as a resource for human use by current and future generations, and in their own right. CPRE write:

> *It is important to protect water resources from over-abstraction or supply related development not only because of the intrinsic value of the landscape and ecosystems which are supported but also because the quality of the environment underpins social and economic objectives.* (CPRE, 1996:2)

At the centre of the argument is environmental need, and the *positive* environmental duties[1] of the regulator to ensure that the integrity of the water environment is safeguarded. Environmental need should be the delimiter of water resource management. CPRE's response to the Anglian NRA Water Resources Strategy document (CPRE, 1993), for example, shows that they felt the NRA were neglecting this duty. CPRE were critical of what it saw as the NRA's underlying philosophy of balance as giving similar considerations of reasonableness and worthwhileness to the environment as to other demands, and its assertion that the conflict between the environment and human needs was 'irreconcilable'. Environmental requirements should not compete with other uses, nor be judged, as they have been, on the grounds of '*reasonable need and worthwhileness*'. CPRE write that this over simplifies the multidimensional nature of sustainability because humans need and value a healthy water environment, whereas human demands for a cheap and inexhaustible supply of water *should not* be viewed as genuine need (CPRE, 1993).

Essentially, the environmental interest groups have argued that the NRA's remit of being the 'Guardian of the Water Environment' conflicted with an approach based on 'balancing' different needs. For them, fair water resources management *prioritises*

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[1] For example, the NRA has a duty *to "promote the conservation of flora and fauna which are dependent on an aquatic environment"* (Section 2, Water Resources Act, 1991).

Box 6p: Concerns of environmentalists and conservationists: causes of water problems
More concern due to lack of action
The Environment Agency should concentrate on conserving supplies
Nationally high percentage of leakage.
I have reported overflows and leaks and nothing done for months
Land use changes and failure to conserve water
Privatisation of the water industry
Domestic supply not cut off when river levels have suffered
People's attitude to water
More irrigation - often in daytime
Irrigation is the most visible abuse of resources - watering during rain etc. Other things are less obvious.
Too much water is used to irrigate crops on Breckland soil for crops which if normal economics prevailed would not be grown in the area. They are only grown because of the completely ridiculous farming policy in this country.
Increased drainage due to land use changes has reduced recharge and increased runoff which is not collected.
Drainage and flood relief are two major causes of ecological decline of wetland sites
Drought legislation which allows the environment to be 'sacrificed if necessary'
Global warming
The only shortage is due to dry weather
Gravel extraction has totally changed the area - now too many lakes.
Pollution problems from the air base.
Accidental pollution problems from British Sugar.

rather than *balances away* environmental need. As a local interviewee remarked to me: *'You can't balance. It's either one or the other. There is no compromise between farmers and wildlife. People have been trying to find one for years but there isn't one*'.

Notions of fair water resource management by NGOs at the national and regional level are clear. What of perceptions at the local, catchment level? Responses to the questionnaire survey by individual environmentalists and conservationists, and interviews with representatives of environmental groups show that water problems are felt to be a result of failed water management and human demands as much as the physical scarcity of water due to weather and 'natural supply' (see Table 6-2). The concerns and conflicts expressed by environmentalists and conservationists local to the Lark are listed above (Box 6p)[1]. Their perceptions of the causes of water problems show a tendency to blame the human mismanagement of the resource, including agricultural use. Their perceptions of the effects of this are listed in Box 6q. It is worth noting that their comments are strongly informed by local knowledge and experiences

[1] It should be noted that this category of stakeholders (19 respondents) was pretty eclectic, including professional, governmental and non governmental, conservationists, 'amateur' wildlife experts, local nature conservation campaigners (e.g. the Lark Valley Association) and campaigners on wider environmental issues (e.g. Friends of the Earth).

of specific sites. In contrast with the farmers, they do discuss water as a natural resource 'in situ'.

As with farmers, there were many comments suggesting that the NRA did not have sufficient information and that their competence was questionable. As one interviewee, an amateur wildlife enthusiast, commented: '*I don't think they know enough. Even their geology maps were wrong*'. He felt that the precautionary principle was the only 'proper' option. Another interviewee, a wildlife charity employee, felt that without a '*system for actually knowing what to take, what can be sustained, what the wetlands need (...) we don't know what is sustainability*'. She remarked that '*the NRA have some excellent ideas, but a lot of the time they lack either money or the resources or they lack the legal teeth to do anything*'.

Those who felt that legislation was disadvantaging the environment, also felt that the value of any increased levels of consultation was being undermined and often *'a waste of time*'. Fairness to the environment had to come through improved legislation: '*if there is a committee on which sits the water companies, farmers and the NFU, there is no way that committee will come to any decision so there needs to be a better legal system set up*'. An example given of inequitable policy was the fact that domestic users are '*supposed to have hosepipe bans, only once every ten years, while the environment can suffer any year*'. One interviewee felt that the NRA was acting *'unethically'* by not protecting the environment sufficiently and by supporting agriculture that was inappropriate for local conditions. He remarked:

> *The only way they can issue licenses is by draining the ponds and rivers, and to me that isn't ethical. You know, you can't do that. I don't see their problem. Just say no, no , no. No more roads, no more new towns. There isn't the water here. Just leave it as it is.*

There have been no major environmental 'battles' in the Lark sub-catchment; the main water conflicts have been low flows in the River Lark itself. The river had run dry in the upper reaches during periods of drought, and there was a general concern for water dependent sites of special conservation interest such as the SSSIs managed by English Nature and the county wildlife sites managed by Suffolk Wildlife Trust, as well as the cathedral gardens in the town of Bury St Edmunds (Figure 4-2). Cavenham Heath SSSI in particular has been categorised as at 'medium risk' from nearby PWS and agricultural abstraction (English Nature, 1996). The Brecklands are also considered to be at risk from excessive abstraction[1]. There was concern that, as well

[1] A conference organised by English Nature was held to investigate the management of the Brecklands: *Breckland: looking to the future*, Bury St Edmunds, October 1995.

Box 6q: Effects of water problems as perceived by environmentalists
Local nature reserves have been ruined due to over-drainage and over extraction lowering the water table. Springs and streams have dried up and river levels lowered unreasonably.
Low levels in Lark and Linnet.
Impact of shortage on landscape and gardens
There appears to be less water in the Lark. The Alder Carr in the park used to flood twice a year (Oct and Jan) and this no longer happens or is more irregular.
Had not realised until last few years the dramatic impact of falling water table and intense drainage on the ecology of the valley fens.
Became much more aware as I started working in the Brecks. Droughts have also made it more obvious.
Increasing concern - several serious incidents of spillage into Lark. Water in river has declined in quality.
On going conflict between water usage/drainage and fen levels at several sites around Mildenhall
Washing of cars, caravans, and wheelie bins still goes on when tress are obviously in distress. Old trees take several years before the stress shows.
Environment versus public water supply, industry and agriculture
I have expressed my concern over an application to abstract water from the Cavenham stream and the River Linnet
Low flow in summer then smell and bad quality. Canalisation causes poor wildlife habitat
There are plans to extend navigation which will cause problems for trout fishing and biology of the river.

as formally recognised areas of natural beauty and interest, areas with less or no statutory protection were facing threats due to pressure on water resources which could too easily be overlooked. However, some respondents to the survey did believe that environmental regulation had become more professional, that the importance of water was more recognised and that the environment had moved up the agenda.

Generally, as with the farmers, there was a feeling that communication was poor, as the following comments demonstrate (Box 6r). People felt ill informed about how water management was being handled locally:

Box 6r
The ordinary water user is not really aware of what the NRA is doing - we are aware of what Anglian Water is saying to us.
Communication with the public is still poor – professional knowledge and public perception are not balanced.
Notice of restrictions have not been well publicised especially when or if they are lifted or reduced.
People are disgruntled because they have to take the NRA's word for it

This latter comment was quite typical. Although the NRA listened to objections, environmentalists felt that it was actually '*free to make its own decisions*'. For this reason, it was perceived that fairness would result from decisions made according to a generally applied policy at catchment level, rather than in accordance with the

impact of an individual license. This is also perhaps a reflection that water is seen as an integral part of an environmental 'whole' rather than a divisible resource.

In summary then, the perceptions of *un*fairness for environmentalists and conservationists centred around the NRA's principle of balance, the fact that statuary obligations are undermined by out of date legislation, and that legislation is not wide reaching enough. Equity for the environment is, in the absence of better scientific understanding, embedded in a stricter precautionary principle.

Conclusion

This chapter began by exploring attitudes in the catchment to the regulator and to licensing system. The box below summarises the key findings (Box 6s). Some differences between stakeholder groups were found which suggest that commercial water users were more in support of the current regulator than other groups. This finding is developed further in the next chapter. The lack of awareness among approximately a third of respondents regarding how regulations affected other stakeholders would suggest that stakeholders might not be able to view water resources in a context beyond their own claims. An EVALUATION variable (PRO, ANTI and No-Opinion) was calculated for respondents to the questionnaire survey. This will be taken through to further analysis in Chapter Seven below.

The chapter went on to explore the issues and experiences that have characterised and influenced the notion of fair water resources management for the different stakeholders in the Lark. The ways in which claims to water are justified, were discussed, and it was clear that the principles upon which water has been allocated and managed were being contested. After a long and detailed chapter, here I draw together some key findings on the perceptions and attitudes of the different stakeholder groups.

Three main themes have emerged from these data as salient to a path to fair and sustainable water resource management. I label these as: *balance, precedent,* and *the nature of water.* These normative concepts explain the different expectations, understandings of and challenges to regulation among stakeholders, and are fundamental in understanding perceptions of fairness. For all the stakeholders groups, regulation was accepted as a means to fairness, and greater fairness was seen as lying within *improved* legislation, rather than a removal of it. However, what 'improved legislation' might mean was interpreted differently by different stakeholders.

Box 6s: Summary of attitudes to water management (discussed in section one)

- Nearly 40% of respondents perceived 'bad water planning' to be a problem, 47% blamed water problems on irrigation and 43% blamed population increase.
- Twenty four percent of respondents were classified as ANTI, i.e. not in overall support of the current regulatory system, and 35% were PRO.
- Twenty three percent of respondents believed that too many abstractors were cheating on their license terms.
- Eighty seven percent of respondents felt that the regulator was necessary in order to modify the effects of individuals acting in their own self interest
- A third felt that the regulator acted *fairly*, a third felt that it did not, and a third did not know or were unable to comment.
- According to a factor analysis, when judging the water management system, people will be evaluating whether the regulator acts fairly, their perceived need for regulation and the validity of the licensing system, and the ability of the regulatory system to ensure a level playing field.
- There were significant differences of opinion between stakeholder groups over the treatment of *nature*, *irrigators* and *domestic users*, with division principally between those who use water for business purposes and those who do not.
- Between 20-30% of respondents were unable to comment on the fairness of the system for the other user groups.
- More than two thirds of people for whom water is a salient issue are not clear about its statutory ownership status.
- Nearly a third of respondents thought that the public were not sufficiently involved in licensing decisions - these were mostly made up of environmentalists, while another third felt that the public *were* sufficiently involved - these were irrigators

Chapter Five explained how 'balance' was a key principle in the NRA's concept of sustainable water resource management, and that the NRA's remit was to bring the 'environment's claim' to water into the resource 'balancing act'. My research has found that 'balance' was interpreted differently in different discourses; i.e. that 'balance' meant different things to the different stakeholders. Farmers were happy with the balance that had been set by *historical precedent*, and expected this balance not to be upset *in favour* of the environment. The authority of the regulator was rooted in historical precedent. Farmers' perceptions and attitudes were very much affected by their experiences of the drought of 1989/92, because their concern with the fairness of regulations was in terms of the rationality, impact and distribution of restrictions rather than with initial water allocation. They had felt unable to respond innovatively to the strategies that the regulator had adopted to tighten environmental protection. Being unable to respond, added to the level of business uncertainty that farmers were experiencing. The irrigators did not expect such a level of uncertainty from the licensing system, and in particular, protested strongly an inequity that irrigators were penalised so as to protect the resource for *all* abstractors. The insensitivity of the NRA to farming practices contributed to a degree of distrust of the competence of the

regulator, which was compounded by a lack of scientific certainty. Farmers felt that any NRA inadequacies could be overcome with more scientific research; maintaining the 'balance' required 'better' science to prove that their claims were just. This reflects their expectations of knowledge and the nature of expertise.

A second way to fair water resource regulation was perceived by the industrialist, farmers and environmentalists to be improved communication. The example of the Lark Valley Abstractors case allowed an alternative legitimacy to tighter restrictions to be established that was responsive to local social norms and expectations. This suggests that more openness and communication would enhance the feeling of 'being in it together' and would improve a more holistic view of water. However, any fairness concerns seemed to be as much about the rational behind decisions, as about the procedures of decision making.

Environmentalists did not support the notion of fairness as equal balance for all, expecting environmental need for water to be given priority. They argued that, because legislative precedent had defined the balance, it was still tipped against the environment. Although the balance was destabilised by events at the end of the eighties (commodification discourses, privatisation, drought, a sustainability imperative), this momentum for change was up against the precedent of the licenses of right system. This meant that the NRA had been trying to readjust the balance with one hand tied behind its back. For many environmentalists and conservationists, improved legislation and greater fairness therefore implied a challenge to 'first-come first-served' allocation. Unlike the farmers, they tended to accept uncertainty and the limits of scientific expertise, and expect uncertainty to have more influence over decisions - i.e. the NRA were not adequately responding to the *precautionary principle*. The environmentalists' support for more 'communication' and open decision making was in order to bring about a more widely debated catchment level policy to determine licensing.

'First-come-first-served' was also being contested by another abstracter type; an industrial user. This challenge was on different grounds. Their argument was founded in an economic principle; of reallocation so as to maximise economic return. They were not arguing a case for a water market, but for improved regulation, which in their terms meant the regulator having greater expertise and a wider remit than environmental sustainability, so as to be able to take into account social and economic objectives in their regulatory practice.

For the water company, fairness concerns regarding water management were less directly entwined with the claims of others users for water resources. AW's principal

concern with fairness was through its role as a *supplier* rather than as *competitor* for resources. Their concern for 'balance' in regulation was significantly lead by issues of customer service. For AW, notions of 'fair' water resource management were matters of government regulation and customer perception.

Perceptions of the' nature of water', clearly has implications for expectations of water regulation. For the farmers water is first and foremost an insurance-good for them and an input into their business - a resource to be utilised to the full. For those stakeholders for whom water was a business input, a capitalist, self interest motive was evident. This was explicitly articulated for the farmers at an individual level to their protect business. For farmers, the role of water resource management, and therefore of the regulator, is perceived as being to reduce unpredictability, and to ensure the security of their supply. Farmers did not engage in arguments of allocative efficiency, unlike the industrialist's case. The water company's self interest in water was more corporatist; their relationship to water was commercially lead by the motive to serve shareholders by serving customers. All three commercial users did also assert a public service principle in their claim to water. For the environmentalists, as expected, water was considered as a good integral to both environmental and social well-being.

The next chapter uncovers the 'philosophical' and economic *water justice principles* upon which the differences between stakeholder groups are based.

Chapter 7

Fair Water: evaluations of management strategies and fairness principles

Introduction

The principles of demand management have been key within the discourses on environmentally and economically sustainable water resource management which began gaining strength in the UK in the early 1990s at the level of policy makers and campaigners[1]. Demand management principles entered into policy and regulation objectives, replacing the existing 'supply-fix' focus, and a new regulatory culture began to emerge which was widely sanctioned in England and Wales by a range of interests groups. Debates shifted from whether it was a necessary course of action to how it could be achieved[2]. Demand management is essentially a doubled edged approach; enabling a constraint on new supply by bringing about a rationalisation of demand. However, while new licensing and regulation were being increasingly constrained by an emphasis on tighter environmental protection and on better supply management, little attention was paid to the influences on the demand for new licenses or to rationalising existing water allocation, and licensing legislation itself was not reformed. Although receiving much attention and commitment in policy discussions[3] (RSPB, 1995; DoE, 1995,1996b; HoC, 1996) the use of economic instruments to influence resource use behaviour, has not been introduced into normal practice to any notable extent other than some metered charging for PWS by water supply companies.

Preceding chapters have shown that water problems stem not only from physical scarcity, but also from a tension between historic water management approaches and legislation, and current policy objectives. New policy objectives while resolving some conflicts also create new ones. Water management strategies have, at the same time as (inadequately) dealing with existing environmental problems, come up against more complex challenges and conflicts due to greater pressures on the resource,

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[1] With the publication for example of the Government consultation document 'Using Water Wisely" (DoE, 1992b), and CPRE's 'Water on Demand?' (1991) and 'Water for Life' (Rees and Williams, 1993). In 1993 a National Centre for Demand Management was created by the NRA. The government's *Biodiversity: The UK Action Plan* :93 (DoE, 1994a) and *Sustainable Development: the UK Strategy* (DoE, 1994b*:* chapter 8) also both highlighted the need for demand management of water.

[2] CPRE (1991); NRA (1993, 1994,1995); RSPB, 1995; DoE, 1995; OFWAT, 1993.

[3] In 1992, the UK government asserted that economic instruments should be used to deliver environmental policy objectives such as the conservation of water and waste reduction (DoE, 1992a).

occurring in a changing political, economic and cultural context. The analysis in Chapter 6 has shown that the present licensing system has led to different perceptions of inequity by different stakeholder groups. There were calls, based in economic, social and environmental arguments, for a review of the first-come-first-served licensing system, or of the way in which resources are allocated during periods of exceptional resource stress. There will be many political, physical or economic reasons why a particular strategy is, or is not, viable in practice, but this study has focused on the perceived *acceptability* of water management by those with a local interest.

In this chapter, the attitudes of stakeholders to different management strategies are identified. The aim is to explore whether their attitudes and perceptions are likely to act as a 'cultural' barrier to change that policy will need either to accommodate or address. This chapter will begin in section one by quantitatively and qualitatively reviewing support in the catchment for a range of water management strategies. A second aim is to characterise the 'water culture' in the catchment. Section two thus identifies which fairness principles underlie the stakeholders' beliefs about water allocation and management, and their equity judgements. In section three, final analysis tests whether support for strategies can be related to those 'water justice' beliefs, and also assesses whether attitudes to the current system, the regulator and any potential for conflict are associated with the differing notions of 'water justice'.

I Attitudes to Management Strategies

Water resource management strategies can be classified according to a number of objectives. One objective is the fulfilment through water allocation of statutory or otherwise established principles, or social, economic or environmental goals. Tools available to a regulator include mechanisms for either the initial allocation of *new* resources, or for *reallocating* existing abstraction rights. Resources may, for example, be reallocated to different uses so as to specifically improve the *efficiency* of the use of existing supplies. Existing resources may be *relocated* geographically to address regional deficits. An alternative objective may be to *increase* the total amount of water available for human use by capturing and storing new resources.

This section will present an overview of respondents' and interviewees' attitudes to the range of supply increasing, supply managing, demand managing and reallocating strategies listed below[1]. It will then look in more detail at the arguments which

[1] These were identified during the early stages of the research as relevant to the case study.

underlie opposition or support for them. Finally, a factor analysis further characterises how the questionnaire respondents were making their judgements of those strategies.

Allocation and reallocation
- revocation of unused licenses and licenses causing environmental problems
- pooling of licenses
- encouraging the use of less water
- trading of licenses
- incentive pricing for abstraction
- domestic metering

Relocation
- regional transfers
- national grid

Supply increasing
- reservoirs
- on farm storage

An overview of attitudes to strategies

When the stakeholders in the Lark were asked to indicate whether they prioritised increasing supply or maintaining current levels of use, the majority of respondents selected the latter, as Table 7- 1 shows. The water company staff however, preferred that water companies develop new supplies, and half of the industrial users preferred the supply options. Below I show that the support given for supply-augmenting strategies was strong when they were considered individually. Supply augmentation and demand management can be perceived as complimentary, rather than mutually exclusive policies. Alternatively, this may be an indication that for many of the stakeholders, the issue of water management is confusing. (Some respondents certainly gave contradictory responses to questions).

When stakeholders were asked their preferred mechanism for allocating resources

Table 7- 1: Resource development preference

Preference (n=118)	**No. supporting**	**(%)**
We should adapt the way we use water to match the limits on current water availability	74	63
Private companies should pay for the development of new resources in response to demand	27	23
Government is responsible for ensuring that there are always enough supplies to meet any demand	17	14

Table 7- 2: Resource allocation preference

Preference (n=111)	**No. supporting**	**(%)**
Any new resource should be sold in a water market to the highest bidder	5	4.5
Any new resource should be allocated by first come first served	9	8
Allocation decisions should be made by an independent 'water court'	97	87.5

(Table 7- 2), overwhelming support was given for the idea of a *'water court'* in preference to *markets* or the *first-come-first-served* licensing principle. The possible nature and form of this 'court' was not explored in the survey, but this response clearly indicates a need for more detailed research into the forms of procedural justice that stakeholders would find most acceptable; not just for arbitration once conflict has occurred, but as a means of anticipating and avoiding conflict occurring as implied by this question[1]. All respondents who did chose the *market* option were irrigators or water company staff. Support for the *license* option was only from other license holders, i.e. industrial and agriculture users, whereas *all* the non-abstractors chose the *water court.*

The questionnaire survey also explored the support and opposition within the Lark catchment for a selection of management strategies[2]. Quantitative results are shown in Table 7- 3, while the qualitative responses are discussed further below. Only one strategy, the *trading of licences*, commanded more opposition than support (45% against 27%) from questionnaire respondents. All non-abstractors were opposed or answered 'don't' know' to this strategy. Irrigators, industrial users and regulator staff were divided, and the water company staff were all in support. This division among stakeholders characterises much of the analysis that follows.

For all other strategies, support outweighed opposition. Support was strongest in the catchment for *using less*, *farm storage* and *metering,* but for other strategies opinion was more split. The supply strategies, such as a *national grid, a reservoir* and a *regional transfer* were supported by around 70% of respondents, and opposed by less than 16%. The split was not found (by a one way anova test) to be significant across stakeholder groups.

Other strategies received at least 20% opposition. Challenging existing allocations through the revocation of *unused licenses* or *licenses causing environmental damage* received a lot of support (55+%), but more than 20% of respondents opposed these two strategies. For *withdrawing unused licenses,* Tukey's HSD showed significant disagreement between irrigators who were opposed, and environmental and industrial users who were in support ($p<0.0001$). For revoking *licenses causing environmental damage* significant disagreement was again seen in the opposition from irrigators and

[1] A 'court' might imply for example a specialist judicial or local government body, or a citizens' jury approach where technical specialists and 'lay' people give evidence, or a body of elected representatives. Maass and Anderson (1978) have described a 'water court' system in Valencia, Spain made up of locally elected representatives of abstractors who make seasonal decisions on water allocation. Handmer et al., (1991:260) also describe how in Australia there is a long tradition of locally elected representatives participating in water management decision making.

[2] See Question 31 in Appendix 1.

Table 7- 3: Support for each management strategy

Strategy*	Strongly support %	Support %	Don't know %	Oppose %	Strongly oppose %	Mean†	n
Use less	42.5	50.8	4.2	0.8	1.7	1.68	120
Farm storage	39.2	49.2	7.5	2.5	1.7	1.78	120
Meter	35.6	47.5	6.8	6.8	3.4	1.95	118
Grid	27.7	47.1	13.4	10.9	0.8	2.10	119
Reservoir	23.1	46.2	14.5	12.0	4.3	2.28	117
Transfer	15.3	49.2	19.5	15.3	0.8	2.37	118
Withdraw unused	20.5	42.7	13.7	15.4	7.7	2.47	117
Revoke-environment	14.3	41.2	21.0	15.1	8.4	2.62	119
Increase charges	14.4	40.7	16.9	23.7	4.2	2.63	118
Pooling	5.9	31.1	42.0	18.5	2.5	2.81	119
Trading	7.8	20.7	26.7	29.3	15.5	3.24	116

* ordered by 'strongly support + support', † where strongly support=1, support =2, don't know=3, oppose=4, strongly oppose=5

the support given by local authority staff, recreationists and environmentalists ($p<0.0001$).

Similarly, more than 20% opposed the *pooling of licenses* and *increasing charges,* which were supported by 37% and 55% of respondents respectively. Tukey's HSD showed that for *increasing charges*, the split in opinions was again significant between the irrigators who did not find charge increases acceptable, and regulator staff, recreationists and local authority staff who did ($p<0.0001$).

I explore below the rationale that informants gave for their support or opposition to these 11 strategies. Seven are discussed under the heading of *allocation, reallocation and demand management,* and this includes economic mechanisms; two under the heading of *relocation;* and two under *supply-increasing* strategies (all percentages stated below for support and opposition are taken from Table 7- 3).

Allocation, reallocation and demand strategies

Comments by stakeholders on the principles for allocating or *re*allocating water are considered here. I begin with comments on regulation that allows licenses to be withdrawn by the regulator in two circumstances: when a license is unused, or when environmental damage is occurring due to abstraction. The latter is essentially about *re*allocating water to environmental need. Next, a licensing system which allows licenses to be 'pooled' so as to redistribute water more flexibly among a group of users is considered. This is followed by comments on attempts to actively *reduce* water use generally. Finally, support or opposition among informants to 3 economic

mechanisms are discussed. These include the trading of licenses, incentive pricing for abstraction, and domestic metering.

An alternative to first-come-first-served allocation, which under the current licensing system uses a principle of 'reasonable need' as the criterion for 'rights' to abstraction, would be to use a more 'discriminatory' allocation. For example, a criterion of minimum economic return could be used, or the pursuit of a particular environmental or social objective such as employment, food security, species protection etc. One farmer commented that:

> *It is one of the questions on the license form - how you are going to use the water? But how do you actually quantify it; .. totally financially, job wise or environmentally? (...) The Water Boards*[1] *think that it is essential that people bath 3 times a day. I think it is unquantifiable quite honestly.*
> [Farmer D]

As well as through the *initial* allocation criteria, the *re*allocation of existing licenses to meet a specific objective, is an option. The majority of agricultural abstractors in this study were against reallocation; there was a very strong belief in '*first come - keep it*' among them. The industrial abstractors, as in the maltings case presented in the last chapter, were however, arguing for a more 'economically rational' re-allocation. Identifying a criteria that would maximise the 'common good', as a replacement to first-come-first-served, would require significant institutional and legal reform . As one farmer put it: '*who would decide that cows were more important than lettuces*?'. The regulator would require expertise in discriminating according to the criteria chosen. Alternatively of course, there are arguments that the common good, and sustainable resource use, is maximised through the invisible hand of the market.

Revocation. Two reallocation options currently available to the regulator are the revocation of licenses that are unused, and the revocation of licenses in order to ensure environmental objectives are met. If a license remains unused for 7 years, the claim to an abstraction right ends. In catchments which are over committed, such as the Lark, any revocation would be allocated to offsetting shortfalls in environmental requirements rather than re-allocated to new applicants. Support in the Lark catchment for the withdrawal of licenses was found to be based on the potential for more effective use of the water by new users or the environment; for example:

Box 7a	Support for the withdrawal of unused licenses
Domestic well	*give to those who will use it*
Environmentalist	*could release licenses for other applicants*
Environmentalist	*as water levels are falling it will reduce further impact*
Irrigator	*this would be fair*

[1] Again, this farmer 's reference to the regulator as the 'Water Board 'shows that many stakeholders are not up to date with current water management.

Opposition, mainly from agricultural users, was more varied.

Box 7b	Opposition to license withdrawal
Jeopardises flexibility	
Agri	*may be only a temporary non-use*
Agri	*circumstances may require use of the license at a later date*
Agri	*may only be a temporary cropping change*
Agri	*ignores the need of business to be flexible and change*
Agri	*they maybe strategic reserves*
Rights	
Irrigator	*decision to use or not should rest with license holder*
Irrigator	*if you have a license you should be allowed to keep it*
Agri-rep	*affects land values- wrong to take away*
Environmental good	
Environmentalist	*unused licenses protect sources and benefit the environment*
Irrigator	*if not used, not hurting anybody*

Some opposition was based on the perceived right of the licensee to have control over water use once allocated, and stakeholders also felt that the need by businesses for short-term adjustments should be considered. One farmer commented that it was particularly unfair for irrigators, because of, the split tariff for the license fee meant that he had contributed a lot financially to have access to water even when he had not used it:

> *The argument of the NRA is that they would like it back in the kitty and maybe distribute it, but they* [irrigators] *pay for it 50% up front. The NRA now realise how valuable it is. I don't really see why it should change. They have paid for it all this time .. and in fact it is jolly lucky for the NRA that they haven't used it, in a funny sort of way .. it's a saving grace! We'd run out water much sooner!* [Farmer D]

Another argument was that if unused water were to be reallocated to an active user, in a water stressed catchment it would contribute to the earlier arrival of cessation conditions. Another issue was that if licenses are withdrawn because of environmental derogation, the regulator must pay compensation, although as explained in Chapter Five this has rarely happened. One issue raised by stakeholders was whether or not private individuals should be compensated from the public purse for the loss of a public good (water), in order to provide a public good (environmental protection). Suggestions were made that an increase in license charges could fund the compensation, but this raises the question of whether those licensees not benefiting directly should have to pay[1]. In many cases, an alternative course of action is possible, such as a reduction in the license volume, or the relocation of a borehole

[1] Some arguments here tie in well with observations by Munton (1995) on the resentment felt by landowners towards externally imposed constraints on land management. He quotes Bromley *"It is a strategy of Libertarians to sanctify the status quo, demand compensation for any attempts by the state to change it, and to then mount an attack based on the size of the public purse"* (Bromley 1991:7 in Munton 1995:273).

with the costs being shared across various interests.

Box 7c	Support for revocation to avoid environmental problems
CLA	*water supplies must be sustainable*
Domestic well	*because they are causing problems for future generations*
Environmentalist	*the environment is national resource that has already suffered depletion – environmental problems are indicators of future crisis for humans.*
Irrigator	*should penalise people who do not appreciate their responsibility to the environment*
Local authority	*action is necessary to safe-guard the environment for future generations but regard must be given to compensation*
Agriculture	*without water no form of life can exist*
Environmentalist	*to protect wildlife*
Environmentalist	*the environment should have priority*
Environmentalist	*wetland habitats are becoming a scarce resource -biodiversity*
Environmentalist	*drainage to the environment ultimately damages us all*
Golf club	*too many small rivers drying up*
Recreationist	*the environment is suffering enough already*
Recreationist	*because we must care for the environment above all*

As the comments above illustrate, support for revocation of licenses causing environmental problems was given by individuals within all the stakeholder types, although mostly by non-abstractors. Specific reference was made to sustainability, inter-generational equity and a duty to care for the environment. In contrast, one farmer was against revocation arguing that nature would 'adapt' (see Box 7d). There was a range of reasons why people, mostly farmers, were opposed. Some commented that the economic and social consequences would be too high, while for others the responsibility for the problem and the solution lay with the regulator. The comments revealed that for some, improved management meant increasing supplies, while for others it meant improved consultation and decision making procedures to asses priorities.

Box 7d	Opposition to revocation to avoid environmental problems
Agri	*because it will destroy existing businesses*
Agri	*historical perspective is important*
Industry	*loss of jobs*
Agri	*causes financial hardship because of investment*
Agri	*adverse social and cultural interests*
Agri	*business could have been built up on the good faith of the license*
WCo	*cost benefit analysis needs to be done*
Agri-rep	*cant take away livelihoods*
Irrigator	*the license was granted in the past. It's not the license holders' problem.*
Irrigator	*the problems of the EA are often self inflicted*
Irrigator	*if more water was made available when needed this would not be a problem*
Industry	*liaison and discussion about problems is preferable*
Irrigator	*better to support the environment artificially*
Irrigator	*the environment changes continually and can adapt*

License pooling. As mentioned in previous chapters, a significant quantity of the water that has been allocated and licensed for use by the agricultural industry is not being used while other abstractors are constrained by a lack of water. The 'pooling' of licenses involves co-operation amongst a group of farmers to distribute water between them so as to improve allocative efficiency. It may or may not involve economic transactions between the farmers, but would require more flexibility in licensing conditions to allow variations in the location of water application. A transfer of the whole, or part of, a license to a designated person for use in the same catchment, for a specified and temporary period is supported by the NFU (1993). An alternative to pooling *existing licenses*, is for farmers to collaborate financially in schemes to make more supplies available[1]. An IDB representative that I interviewed made the following comment[2]:

> *Looking to the longer term, I think farmers would like to see perhaps more flexibility in the way the system is operated because the way that water is allowed to be used is quite restrictive- for reasons that I can appreciate. I think that there needs to be a lot of talking done with NRA and indeed between farmers themselves, to see how farmers between them can co-operate. I think that there is room for improvement among farmers themselves but that can only come with, you know, the NRA hopefully deregulating the system a little bit in terms of, you know, at the moment a farmer can not say to his neighbour I've got 5 million gallons spare, you can have it. He can't do it.* [Agrirep1]

Farmers were in support of pooling because meeting more of their needs in this way would allow them more control and improve efficiency. Box 7e. illustrates some of the stakeholders' comments.

Box 7e	Support for pooling of licenses (37%)
Irrigator	*more efficient use of water between individuals who have existing licenses*
Irrigator	*would move water to where its needed*
Irrigator	*allows flexibility of management*
Agri	*may improve efficiency*
Agri	*makes best use of limited resource*
Agri	*if it's voluntary, it's the fairest way of ensuring efficient use*
CLA	*may be a fairer way of distributing water*
Environmentalist	*likely to lead to maximised uses of all licenses*
Environmentalist	*easier to administer common interests*
Environmentalist	*will help in wise planning*

For those who opposed pooling (see Box 7f), there was concern about control over the resource. Some farmers felt that the difficulties in co-ordination would unfairly

[1] See Streeter (1995) for a description of the Arreton Valley Water Group comprising 12 farmers who have co-operated to increase their aggregate water efficiency, and (Streeter, 1994) for other examples. Also, Bamford (Bamford, 1996) descries how 70 irrigating farmers collaborated to have a water transfer scheme installed to the Lincolnshire fens from the River Witham.

[2] The Environment Act 1995 has enabled the IDBs to organise and administer water management and distribution within their areas.

Box 7f	Opposition to pooling (21%)
Impractical	
Agri	*the less committees the better*
Domestic well	*difficult to see this working in practice*
Domestic well	*good idea but difficult to co-ordinate*
NRA	*in drier years may not be beneficial for total licensed quantity to be abstracted*
Industry	*has too many practical problems*
Agri	*it doesn't solve the shortage problem*
Agri	*water is a vital resource so needs long term use planned*
Industry	*abdication of responsibility*
Unfair	
NRA	*may exclude small abstractors*
Irrigator	*would still create same unfairness*
Irrigator	*good idea but too much unfairness*
Irrigator	*how to manage fairly?*

result in winners and losers, and especially problematic would be the different status of licenses held by farmers hoping to work together. Most opposition expressed concern over the practicalities, and the impact if an increase in the total amount abstracted from the catchment were to result.

Water conservation. Although feelings that supplies should be managed to meet demand were strongly expressed in the comments on some of the other strategies, the majority of respondents were also in favour of '*encouraging people to use less*'. Box 7g shows the range of rational for supporting a reduction in consumption. Wastage was clearly perceived as being a big problem that needs to be addressed by changes to out dated and inappropriate practice, and by involving people directly. Some comments emphasised the preciousness of water, while others mentioned the need to balance demand and supply in order to avoid conflict. Many comments concerned the behaviour of *other* users who waste water. This public support and private resistance is a typical hurdle resonating in many issues of behaviour change for sustainability. There was less than 3% opposition to conservation and this was from agricultural users. Two reasons were given: because encouraging people to use less '*just wouldn't work*', and because using water was '*healthy*'.

Trading. According to neo-classical economic theory, economic mechanisms such as a system for trading water permits, incentive charging for licenses and volumetric charges for domestic supply should improve allocative efficiency among competing users and reduce demand by encouraging conservation and productive efficiency. In the early 1990s, 'proper' water use and management was being increasingly

Box 7g	Support for encouraging people to use less (93%)
Agri	*wastage should be avoided whenever possible*
Agri	*people take water for granted, and too much is wasted*
Local authority	*too much water is wasted due to lack of information or thoughtlessness*
Local authority	*people are wasteful and don't see the value of water*
Recreationist	*too many people waste too much water*
Domestic well	*if we can others can.*
NRA	*domestic gardeners are very wasteful*
Irrigator	*people should use water more efficiently including farmers*
Irrigator	*more efficient use of water would benefit everyone*
Agri	*precious resource, not enough to go round at times*
Environmentalist	*to conserve supplies*
Environmentalist	*water is not an infinite resource*
Environmentalist	*we need to understand the value of water*
Industry	*helps long term resources*
Environmentalist	*need to promote awareness of valuable resource*
Environmentalist	*a scarce commodity should not be wasted*
Environmentalist	*make best use of what's there rather than expensive alternatives*
Environmentalist	*our concept of water use is poor and out of date, building design through to land use planning can change the amount of water needed*
Irrigator	*to make water go further*
Environmentalist	*reduction in overall demand would reduce conflicts*
Environmentalist	*everyone can help*
Agri	*customary practice needs changing*
Domestic well	*because 50% of the population suffers from big brother syndrome and can't think for themselves*
Agri	*we need to involve people*

interpreted as requiring a move to greater economic efficiency, that is, more efficient use of both water *and* financial resources in the long term. For example:

> *Economic analysis will reveal the most efficient use of the increasingly scarce resources within an overall strategy for sustainable use.*
>
> (NRA 1993:4)

> *There is no way of ensuring that our water resources are properly used, properly defended and properly shared unless they are properly priced*
>
> John Gummer, Secretary of State for the Environment, 1994[1]

Thus, discussion concerning the feasibility of trading abstraction licenses has been increasing as stress on resources has grown and the inefficiencies in licensing have become apparent (DoE, 1992b; Rees et al, 1993; Morris et al, 1996). The rationale for a water market is the increased economic efficiency and derived aggregate social welfare gained from voluntary reallocation of resources from lower-value to higher-value purposes[2]. Given that those seeking a new or increased license might return a higher value in use than an existing abstractor, in a closed catchment both seller and buyer should gain from the development of a market that mobilises the availability of

[1] Quoted in Drury Hunt (1997:18).
[2] Discussed in Chapter 3.

limited resources. A study by Rees et al (1993) concluded that allowing the reallocation of licenses between users would achieve major efficiency gains and that, because of the pressure on resources, tradable permits would particularly benefit abstractors in the Southeast of England. Earlier analysis (see Figure 6-1 and Appendix 2) has suggested that there is significant potential to relocate existing allocations of water in the Lark catchment[1]. However, once a license has been granted there is little incentive within the current licensing system for farmers to consider the opportunity cost of any water that they have rights to. Their own entitlement is perceived as being assured and there is no reward for passing on unused water, only loss of security. Under existing regulation, a limited form of trading has been possible in that a new license applicant might come to a consenting financial arrangement with a third party whose existing rights would be derogated were a new license to be granted. Furthermore, an unofficial market had been taking place through the leasing of land by farmers to sub-contractors, usually specialist growers and commercial pre-packers, along with a premium for its associated water rights. A study by Williams (1997) found that some farmers in East Anglia had obtained water licenses in the late 1980s with the specific intention of capitalising on their position as land owners through sub-contracting.

Comments by stakeholders reflect these arguments. Support for trading in the catchment was expressed only by existing abstractors. Replies in Box 7h call for more allocative efficiency, but there is also a perception that abstractors themselves would be better managers than the regulator and that trading would allow water to be valued more realistically. A farmer commented:

> *We do believe that if the source of the abstraction can remain the same there should be an opportunity to trade, down a pipe. (...) Well the sale of water is the same as anything else ..oil you know ..if one is prepared to pay ..if there's enough. Well, since it is difficult to move around at an economic rate a market will only exist in a restricted area. Well, why can't I send my water to Ipswich? If it's economic to pipe it, or to sell it to a water company I think that's totally fair.* [Farmer D]

However, reflected in this farmer's response are some of the normative assumptions that *are* implicit in trading; notably that licenses imply property rights, that a license holder may profit from the trade of the water resource, and that the highest bidder is the most deserving of the water. The existence of water to trade is also a result of the normative assumptions within the licensing system that for security against drought, existing license holders are entitled to 'sit on' water required for a one in 20 driest year. The farmer also said that licensing was the '*best*' system and that a regulator

[1] See also Williams (1997).

Box 7h	Support for trading of licenses (29%)
Agri	*water needs to be used where it is needed*
Agri	*it helps different needs*
Agri	*a license is a license no matter who uses it*
Agri	*efficient*
Agri-rep	*best use of resource for best return on investment of water*
Irrigator	*it helps serious irrigators who are short of water (but not money!)*
Irrigator	*more efficient than the EA taking decisions for us. More freedom. Good if linked with pooling.*
Irrigator	*would establish value of water supplies*
Irrigator	*it will reflect the fair price of water supplies*

was '*absolutely necessary*'. Support for the trading of water does not excluded support for the regulation of water resource use. The regulator will continue to be perceived as the guarantor that the 'water' asset is protected, by for example ensuring that the total permits did not exceed catchment capacity.

Irrigators, industrial users and the regulator staff were divided in their views, and the water company staff were all in support of trading. All non-abstractors were opposed or answered 'don't' know', but the majority of stakeholders in the Lark catchment were against the idea of tradable permits. The range of comments against are shown below (Box 7i).

Box 7i	Opposition to trading (45%)
Principle	
Environmentalist	*would generate the wrong attitude to supplies*
Agri	*water should not be traded*
Environmentalist	*if a license isn't needed it should be GIVEN up*
Irrigator	*seems tacky*
Environmentalist	*makes a license into a commodity*
Regulation concerns	
Agri	*opposed because of scarcity value*
Irrigator	*if you give up license you never get a new one*
Industry	*difficult to organise and administer*
Domestic well	*this could cause much more graft than there is in the present system*
Local authority	*licenses should be regulated by the EA.*
Domestic well	*opportunity for foul play*
Industry	*need a proper system of control*
Agri	*the EA would not have the same control*
Agri	*lack of control for the common good*
Irrigator	*because the EA would lose control*
Environmentalist	*would lose control of use*
Environmentalist	*licenses need monitoring*
Recreationist	*the person receiving the license like this may have greater need of water and not keep to the terms originally intended*
Environmentalist	*could lead to profit or loss*
Environmentalist	*would lead to maximum use of all licenses*

Irrigator	*only if point of abstraction remains the same*
NRA	*would increase water use*
Environmentalist	*licenses should be assessed on an individual basis*
Inequity	
Agri	*concerned about monopolies being formed*
Irrigator	*big companies swallow up smaller ones*

As long as water is a common good and not privately owned, it is the permit to abstract that can be sold or temporarily rented out, and not a permanent right to the water resource. Those who view the license as a strictly regulated allocation of the right to put a common resource to use, do not accept that this should be extended to include the right to pass it on to alternative uses, to make a profit from its commodification, or effectively to grant *de facto* ownership rights. Their beliefs rest in the principle that water is and should remain a public good, and that trading would work to alter attitudes to water unfavourably.

As with pooling, one fairness issue concerns the impact of abstracting previously unused water due to the financial incentive provided by a market. Allocative efficiency might be at the expense of reduced environmental flows or derogation to other licences, and with licences of right there would be no means of preventing this happening without compensation. Some stakeholders who are opposed to trading feared that the regulator would lose the ability to control abstraction and allocation. For these people, a concern for regulation overrides efficiency concerns. Some degree of ring-fencing of trading would be needed to take account of the importance of local recharge in maintaining the local water balance. In areas where over abstraction was a problem, the regulator would have the option of buying up water as it became available.

Extra abstraction would also cause cessation levels to be reached sooner for all abstractors during dry years; so those losing out would be other license holders. Rather than increasing security this would, in fact, place many farmers, even those who were not even involved in any trading, in a position of greater uncertainty during periods of shortage. The benefit of tradable permits goes mainly to those who already hold licenses in excess of what they require for themselves, unless farmers are prepared to sell water that they *would* otherwise use in order to secure a higher return. Essentially, those already with licenses would receive a windfall. Those without an abstraction license, relying totally on the market for their water, would find themselves with an increase level of insecurity relative to obtaining their own license because availability would be less guaranteed. This makes a market system

unattractive to most farmers:

> *You'd never get anybody to invest like that because if you happened to be in competition totally and you then weren't going to get any water, you'd be stuck; well and truly.* [Farmer B]

Also, those farmers who viewed abstraction rights as an insurance policy against drought, rather than a profit-maximising resource, would not be keen to let go of any water that they did have. This confirms the findings of a recent study by Morris and colleagues (Morris et al., 1996) which concluded that, given the benefit to be gained from holding on to licenses because of the uncertainties of availability and the demands of the food processing network, in practice very little trading of water permits would be likely. Their study also suggested that farmers would find it difficult to determine the financial value of water used for irrigation and so would be disadvantaged if they were not able to obtain relevant data on the economics of irrigation in order to guide their participation in a water market.

There are equity concerns expressed over the problems that would occur due to differential access to capital and the buying power of large firms in the food industry; smaller businesses would be disadvantaged. The previous chapter revealed that, for farmers, fairness implied a 'level playing field' which contradicts the unequal distribution of opportunities that is inherent in a market place. A study by Rees et al (1993) suggested that trading should be restricted to irrigators to avoid potential monopoly problems if water companies were to be players, and confined to a particular geographic area to limit problems with the relocation of return flows which occurs once use is not tied to the location of abstraction. A study by Whatmore et al. (1990) poses another issue linked to altering water usage; that is, the restructuring of rural areas that might result if water was to be reallocated across sectors. Land rights changes have been integral in rural restructuring and it is possible that if, as in the USA, non-agricultural users make successful bids for water rights a similar effect would occur.

Thus, although economic sustainability would be advanced through a more efficient allocation, this would have to be balanced against perceived costs to environmental and social sustainability. As prevailing cultural principles and attitudes regarding the nature of water would be challenged, some process for arriving at a system that was politically acceptable would be needed.

License charges: incentive pricing. In Chapter 5, charging principles for licensing were described. Charges are based on the licensed quantity rather than amount of water actually abstracted, and do not reflect the economic or environmental cost of

water use. The low price of abstracted water offers little incentive to water efficiency. Increasing either the total license charge, or shifting to a tariff so that all or part of the license is charged on volume, would, according to standard economic theory, reduce demand through rationalised use and shift resources to more efficient users. The economic signal given could reflect the marginal cost of supply and the opportunity costs to other users. Alternatively, Rees and Williams (1993) suggest a damage avoidance cost scheme which reflects the precautionary principle and would be more politically acceptable[1].

Incentive charging has been considered as an option in the NRA's and in government policy documents (NRA, 1994b, 1995; DoE, 1995), but would have required a change in legislation before the NRA could recover more through license charges than its year-on-year expenditure on water resources management.

In the questionnaire survey, farmers were asked about their license fee. Twenty nine farmers (65%) felt that the cost of their license was fair, and 30% said that they would accept a doubling of that cost. Other studies on the economics of water for agricultural use in England have found a willingness to pay for water by farmers ranging from 7p to 30p per m^3 depending on crop type (Rees et al, 1993). This compares to the current charge for raw water which falls between 0.0001p and 7p, and between 40p and £1 for potable water. One farmer acknowledged the good value for money when compared with a mains supply. In fact, the cost of water averages at around only 7% of total irrigation costs for direct abstraction and 4% for groundwater abstraction (Weatherhead et al, 1994).

It was felt by some that the charging system could be used more to encourage use patterns which benefit everybody in the long run, such as night time irrigation which although more efficient, is inconvenient to the farmers:

> *The way of charging for licenses is very unsophisticated. If it was proved that night time irrigation was much more efficient, (..) you have to have a new system for charging for licenses so that your meter is read automatically by the NRA. Then you charge so much for night and day. What I am saying is that the whole question of charging is not done in a way to influence what would help everyone.* [Farmer A]

More sophisticated charging mechanisms could allow farmers to be compensated for the costs involved with 'good' behaviour. Responses to the survey suggest that targeting regulatory resources at improved monitoring would be popular because it would encourage good practice.

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[1] The basis of damage avoidance charges is to reflect the costs of enhancement mechanisms for meeting minimum flow levels and other stream objectives in license charges for particular units of abstraction.

Box 7j License fee increase is *acceptable* to farmers because:
the NRA could use the money on water storage to provide security of supply
for security of supply
water is more valuable - I need security of supply
to guarantee supplies
ok within sensible limit if funds are used to secure more supplies
provided the charges are put in to good effect e.g. water recycling projects
the fee is so low and has been for years

Box 7k Support for an increase in license charges by other stakeholders	
Environmentalist	*will encourage conservation*
Domestic well	*wastage would be cut down*
Industry	*promote water use efficiency*
Local authority	*acts as a tax on wastefulness*
Recreationist	*any means of conserving supplies must be encouraged*
Environmentalist	*should reflect real costs*
Local authority	*hopefully it would lead to improved water management*
WCo	*will allow more investment in resource development*
Domestic well	*they can afford more*

The reasons that farmers would support a license fee rise are shown in Box 7j. One farmer felt that an increase in license fees would benefit everyone if it allowed the NRA to better carry out its duties, including the faster resolution of problems and less conflict. An increase would appeal to the fairness perceptions of farmers if they were to sense some social gain from it, i.e. if it were fed back into problem solving and lead to an level expertise and efficiency of the regulator. This could result in improved levels of faith in the regulator, so a license fee increase need not be seen purely as an economic incentive to reduce demand.

However, members of other stakeholder groups emphasised the need for incentives for demand management (Box 7k). The study by Rees et al (1993) suggested that increasing license charges would, rather than have an impact on total demand, be likely to affect agricultural decisions in the short term, such as timing of irrigation. Williams (1997) also found investment in irrigation systems at the farm level to be so high that it was unlikely that farmers would be responsive to small increases in licenses charges. Farmers had to irrigate so as to cover that investment. When the returns on their crops are so dependent on quality, the financial losses which result from not irrigating mean that it is unlikely that farmers would not be responsive to increases in the unit cost of water. Rees et al (ibid.) suggested however, that in the long run, agricultural demand would be price elastic and that demand in the industrial sector would take even longer to respond to price because of the generally larger

Box 7I: Unacceptability of a license fee increase *to farmers*

it costs enough now
maintenance of machinery already costs a lot
I had to pay for a borehole to be sunk to find water and pay for power and equipment to pump it.
have had to pay a lot over the years, even in wet years
amount paid should be ample to cover admin costs
it doesn't cost the NRA anything for the water we use. it only has to cover admin.
no guarantee of supply
NRA don't provide any service
the license procedure should be made much simpler
water not managed well enough to justify increase
what benefit is gained from paying double. we still need the water?
it's a natural product
I don't use it
no one enjoys paying more for less
rationing should not be by artificial pricing
don't believe it will do anything for conserving water
no one wastes anything that cuts into profit so no
businesses just pass on cost to consumer
water should be free as it falls from the sky
existing license holders should not have to pay for a problem
water is allowed to go out to sea and wasted at the Denver sluice during winter and spring for 8 months of the year which could supply all the irrigation needs in this area.
the NRA must get its act together first

sunken capital costs. A report by the NFU remarked on using incentive charges to influence farmers:

> *To move to a system in which charges reflect not the licensed volume but the volume actually used has obvious attractions in terms of further encouraging water conservation, but also raises some difficult questions. A key one is how it would interact with the principle of 'licensed entitlement'; another is the ability of abstractors to respond to the incentives.*
>
> (NFU, 1993:4)

My research suggests that farmers appear to have a perception of license charges that is connected to their understanding of the role of the regulator. They view the regulator as providing a service, and therefore the license fee as a service charge. This suggests that, rather than a reduction in use, their response to an increased fee would be to expect improved management; i.e. an increased security of supply.

Box 7I shows the range of reasons given by farmers who argued that an increase would *not* be acceptable. Those who do not use all or part of their license feel that they are paying for nothing. This reflects the belief that a license grants a right of ownership to the water rather than a right to use it. On the other hand, paying a license fee can be seen as buying an insurance against drought. Farmers therefore, are not happy to have paid for water during the years that they, in fact, used very little, only to be restricted during the years that they actually needed to irrigate. They feel

they have rights to water when they need it because they have been paying into a communal system. Their judgements of regulation are tied up with the degree of risk management that they expect it to provide.

Some say that extra costs would be too much of a financial burden and that abstraction is costly enough, or they feel that nothing would be gained for paying more. Many comment on the unsatisfactory service provided by the NRA.

> *I would say that there are other ways that the NRA could get money. They could process the licences a good deal more efficiently. Because they have got so many outstanding, all of which they are not getting revenue from. One of our 4 licenses up for renewal has been in the NRA for the last 18 months and we used it last year without paying any money, and we're going to use it this year.* [Farmer B]

The delays in processing licenses contribute to negative views of the regulator. If the main point of contact between farmers and the regulator is for license applications and renewals, the applicants will be left with a perception of incompetence and inefficiency if that process is badly managed. One farmer commented:

> *Anyway, I suspect that they are not very efficient as it is. They put in many hours these junior technical people and the result is not as it should be. Because they've got to spend money on looking at a license in order to bring it forward. It might pay them to use an outside consultant to do it.* [Farmer A]

Although not a very common view, one farmer even remarked that it '*falls from the sky so should be free*'.

Some stakeholders felt that prices have no conservation effect, particularly as costs will simply be passed on to consumers (see Box 7m below). Industrial users, for example, saw license charges as taxes, so any increases would have to clearly reflect amounts used rather than a license fee, in order to be accepted.

Box 7m	Opposition to licence fee increases by other stakeholders
Environmentalist	*will eventually be reflected in prices*
Environmentalist	*not sure that making it more expensive is the only answer*
NRA	*may be damaging to small businesses*
Industry	*taxation strangles the economy - industry needs less restrictions*
Industrial	*charge more for the water not for the license*
Industry	*increasing costs does not usually have desired effect*
Industry	*cost would be passed to customers so no*
Industry	*accept a gradual increase, not doubling*
Industry	*quarry industry consumes little*
Domestic well	*education is more important - small businesses could fail*

If an increase in license charges were to form part of a demand management strategy by the regulator, it would appear from this survey that farmers would only find this acceptable if there was an associated increase in security of supply. Otherwise,

opinion is that it would be unfair, principally because of perceptions of poor water management that stem from a belief that water is essentially a cost free, natural resource and the regulator does not provide any service other than the administration of licences. Abstractors would be prepared to pay for risk avoidance but, as with markets discussed above, the effect on water use behaviour is unlikely to be in strict accordance with economic theory.

Domestic metering . Following public consultation carried out in 1991, OFWAT concluded that paying according to use was the '*most popular choice expressed by customers ... the fairest solution*' (OFWAT, 1992b). The Director General of Water Services commented that it was "*neither economically or environmentally justified to meet all possible demands for water when the customer is not charged for additional use*" (OFWAT, 1993:I). However, the issues around domestic metering in the 1990s, perhaps more than any other, exemplify the political and cultural nature of the water debate at the level of the household in the UK. Arguments against metering concerned affordability and the social costs of water poverty[1] and groups such as *Waterwatch* and the *National Campaign for Water Justice* formed to represent the 'victims of privatisation and of unfair metering'[2]: the two issues became entwined in the minds of the general public. The use of water pricing to secure an environmentally sustainable water management situation was superseded by social justice issues, and lost in the political debates of water as a public versus private good. The effect was to impede the cultural change required for the acceptance of a transfer from flat rate to volumetric charging.

In the UK, the coverage of domestic metering is highest in the Anglian region and metering is an important part of Anglian Water's demand management strategy. In the Lark, more support was expressed for domestic metering than opposition (see Box 7o). '*Paying for what you use*' is viewed as fair in principle, as well as deterring wasteful use. This strategy is also viewed by respondents as being important for changing attitudes to water and raising awareness regarding its value.

One or two respondents in each stakeholder group expressed opposition (Box 7n). They felt that as a basic need, water should not be available according to ability to pay because this discriminates against those with less wealth. Opposition also lay in

[1] Such as increased risk of disease and public health problems: Save the Children (1995); OFWAT & DoE (1992), Rees (1997). Hills et al. (1997) argue that to make metering fair, it needs to be recognised that large efficiency gains only apply at high level of usage where consumers have a choice over usage. As social justice issues relates to the total bill, a fixed charge, rather than a metered amount, should reflect social justice concerns.

[2] From campaign literature.

Box 7o	Support for domestic metering (83%)
Recreationist	*we believe people must pay for the amount they use*
Irrigator	*so people pay their fair share*
Agri	*paying for what you use is fair*
Agri	*discourages waste*
Agri	*waste happens when it is free*
Environmentalist	*awful lot of wastage*
Agri	*makes people more responsible*
Environmentalist	*great incentive to avoid waste and appreciate water*
Environmentalist	*will encourage conservation*
Industry	*promote efficient use and cost awareness*
NRA	*people must become more aware of values of water*
Environmentalist	*obvious step to increasing awareness*
Agri	*increased awareness of resource scarcity*
Irrigator	*everyone needs to be aware of their consumption*
WCo	*raises awareness and promotes conservation*
Agri	*people will conserve if conscious of paying for it*
Environmentalist	*the situation where one pensioner pays more than a house of six is totally absurd and unjust*
Irrigator	*we have, so everyone should have*
Irrigator	*it is right to encourage people to be careful*
Local authority	*the current policy is correct but I do not perceive domestic users to be the real problem*

the idea that as peak use causes most problems, burdens should be concentrated on that, rather than the costs being spread over all users, and also that it was not domestic use that was causing resource problems.

Box 7n	Opposition to metering (10%)
Environmentalist	*water is a basic human need and should not be allocated on the basis of money*
Domestic well	*its not fair as the rich get more water*
Domestic well	*look at agriculture first*
Agri	*not needed as most users detest waste anyway*
Irrigator	*dislike this sort of policing*

Relocation strategies

The above section discussed strategies to prevent *increases* in demand through regulatory and economic tools to encourage the reallocation water to more efficient users. Stakeholders in the Lark were also asked to explain their support or opposition to the geographic relocation of *existing* supplies to meet demand in other areas through a national grid and regional transfers[1].

Comments in support of both strategies were varied in their reasoning and cut across all stakeholder groups. They indicated a belief in water as a public good at a national level, and that more would be gained by all from sharing. Fairness was

[1] The EA also operates several transfer schemes in co-operation with water companies to improve the condition of low flow rivers caused by over-abstraction.

expressed in egalitarian terms and the idea of ownership was rejected. Some stakeholders were concerned with efficiency and security of supply; there was support for making water more available and using any excess that was not being put to use already. These comments did not engage with the need for limiting demand, and there was no mention of the practical and scientific obstacles to transferring water.

Box 7p	Support for a national grid (75%)
Fair	
Agri	*whole country benefits*
Agri	*because the west of England is wetter than here*
Agri	*equal supply of water throughout country*
Agri	*some areas have too high rainfall and some too little*
Agri	*this is the driest area of the country*
Agri	*the east suffers from a rain shadow effect and the west has more than it needs*
Agri	*we need a national strategy*
Agri	*so that it would be more evenly spread over the UK*
Agri	*need to move water to where it is most beneficial*
Agri	*fairest way*
Agri	*to even out the available resource countrywide*
Agri	*I feel that areas with excess should subsidise those without*
Domestic well	*we may receive as well as give*
Irrigator	*water is not owned by different areas*
Domestic well	*I consider water to be a public good*
Irrigator	*equality for all users*
Recreationist	*this would probably be the fairest for all*
Domestic well	*the only way to be as fair as possible*
Environmentalist	*low environment impact*
Environmentalist	*this form of action has constraints but it is preferable to a dry river bed.*
Irrigator	*might relieve pressure on rivers*
Environmentalist	*if economically practicable could help some areas, provided that it did not hurt others*
Practical, efficient, increase supply	
Agri	*more water for all*
Domestic well	*it works for electricity so why not water?*
Domestic well	*if gas etc. can be piped underground all over why not water?*
Domestic well	*to ensure supply*
Agri	*making max. use of the country's water*
Agri	*could be cost effective given existing network of waterways*
Industry	*there is a need for more resources*
Irrigator	*so that we aren't short in dry seasons*
Irrigator	*we should have had one long ago*

Fairness was not the issue for opponents of the grid or transfers. Those who opposed talked more in terms of 'limits', and against simply problem-shifting. Comments were made that a national grid would be 'unsustainable', particularly economically. They felt that a solution is to be found, at a regional or local level, through improved management.

Box 7q	Opposition to national grid (12%)
WCo	*problem not big enough to require this*
Agriculture	*would increase problems elsewhere*
Environmentalist	*national resource with finite limit*
Local government	*water from different areas has different qualities and properties not necessarily appropriate for the ecology of one area other than the source*
NRA	*local resources could be balanced against local need by better management*
Environmentalist	*the only shortage is due to lack of management*
	development should be restricted where there is not enough water to meet needs
Environmentalist	*too expensive : not sustainable*
Environmentalist	*very expensive - only last resort*
Recreationist	*would cost more than a reservoir*

It was felt that transfers would not address the problem of the finiteness of resources in East Anglia and the need to address demand. A concern was also expressed that 'local' water was being transferred to the city of Cambridge. This referred to the piping of water by Anglian Water from Thetford, in the north of the Ely Ouse catchment, to Cambridge. The issue raised was that legislation paid attention to the availability of water at the point of abstraction, but ignored where water was to be used or consumed.

Box 7r	Opposition to transfers (16%)
Domestic well	*not until we manage what we have first*
Environmentalist	*against engineering solutions*
Environmentalist	*we each need to be as self sufficient as possible*
Environmentalist	*virtually all of East Anglia is already near, at or above sustainable limits*
Irrigator	*there isn't much water in East Anglia anyway*
Irrigator	*just transfers the problem*
Irrigator	*just deprives other areas at a later date*

Supply increasing strategies

Two options for directly increasing supply were commented on by respondents to the questionnaire: reservoirs constructed by water companies, and on-farm winter storage reservoirs. As described in Chapter Five, the NRA had a duty to take such action to augment resources only as it considered 'necessary and expedient' (Section 19, Water Resources Act), and so it was not ultimately responsible for providing additional resources. The regulator is able to enter into agreements with water undertakers to make further resources available but would expect beneficiaries to meet the costs involved. The NRA's National Water Resources Development Strategy states that:

"*The NRA considers that the exact balance between year to year farming practice and investment decisions to manage the risk of failure of supplies are matters for individual*

Box 7s	Support for reservoirs (69%)
Local authority	*reservoir is over-due to help regulate supplies during periods of drought.*
Irrigator	*allows adequate reserves for difficult times*
Environmentalist	*as long as it was done sensitively and didn't draw water from vulnerable sites and rivers*
Domestic well	*avoid future shortages*
Environmentalist	*prevent over abstraction during hot summer months*
Irrigator	*safeguards risk of water being restricted or cut off in the summer months.*
Agri	*seems like a good idea if supplies are stretched in the summer*
Recreationist	*should be built now as will be needed in the future.*
Agri	*because planning authorities still want more housing development*
Conservationist	*can be filled in winter periods*
Agri	*current stocks are insufficient*
Irrigator	*if resources ran out the EA would have to provide this at their own expense. Isn't that what we pay for?*
Domestic well	*If the area is to grow, we must have more water - but not in my backyard!*
Agri	*to meet demand*
Irrigator	*to provide water when needed*
Irrigator	*to store otherwise wasted water*
Irrigator	*increasing supply is good*
Agri	*needs are growing and the EA must provide the back up*
Agri	*the area needs it because too much is exported*

Box 7t	Opposition to reservoirs (16%)
Environmentalist	*depends on environmental impact*
Industrialist	*difficult and expensive*
Environmentalist	*high environment impact*
Environmentalist	*depends where*
Environmentalist	*if winter rainfall is low, any extra abstraction to fill a reservoir would effect other licenses*
Environmentalist	*no immediate need*
Environmentalist	*reservoirs will create new demand and agricultural need may decrease because of crop prices*
Agri	*prevention is better than cure*
Agri	*waste of land*

irrigators" (NRA, 1994b:30). Some agriculturists believed this wrong:

> *The NRA should be a provider. They are too busy tweaking tiny details of licences.* [Agrirep 2]

Reservoirs. Support and opposition to supply reservoirs were found among all stakeholder groups (Box 7s and Box 7t). Support was mostly based on perceptions that, in future, supplies will be inadequate and the risk of shortage should be avoided.

> *Seriously, there are so many real needs for water. You cannot have a city like London without having reservoirs. And incidentally, as a tangent, one of the things that is going to happen in the next 25 years is the hugeness of cities - I've been told that Jakarta is going to be 25 million and Mexico city will double. Whatever people say there is going to be a need for reservoirs.* [Farmer A]

Some were advocating that all needs be met, and others perceived that any water not captured before going out to sea was a 'waste'. Alternatively, for others the concern was to mitigate the negative impact of existing abstraction. Opposition, as well as being due to environmental impact, included the concern that more demand would be created as a direct result of a reservoir, and that to fill it would cause a negative impact on other abstractors. Alternatives such as storage within the natural aquifers in the area, or controlling demand, were preferred.

On-farm winter storage. is seen by National Farmers' Union as the most effective solution to water shortages for farmers (NFU, 1993). This is because of the increased supply security and increased ability to meet quality standards for produce. By 1995, over one third of the total volume of water used for irrigation nationally was stored during the winter in farmers' reservoirs (Stansfield, 1997), although 90% of all water used in 1995 still came from summer abstraction (Weatherhead et al, 1997). The NFU estimates that if just half of the licensed surface water abstraction in the Anglian region was replaced by winter abstraction, the volume saved would be equivalent to one fifth of that consumed for public water supply (NFU, 1993). They also believe that the collection of 'surplus water' following heavy rainfall in April and late summer should be permitted, so that 'summer abstraction' should be classified according to river flow or levels and not the arrival of April 1st.

On-farm storage is not viable for all farmers because of capital constraints or soil type, for example. In the sandy Breckland, the soils are very light and there are few valleys. Reservoirs have to be dug out and then lined which pushes up the cost to £7,500 per million gallons stored[1]. This means that even a small farm reservoir (of 12 acres and 50 million gallons) is likely to cost £100,000, and a large one £500,000 upwards. There are land costs (at around £2,000 an acre) and power costs, as well as construction costs. Although the NRA's charging scheme makes water cheaper in the winter, it is an insufficient incentive by itself to compensate and encourage winter storage, in spite of the substantially reduced impact on the environment. On-farm reservoirs are not likely to be economic for small farms. They cannot be considered therefore, as an entirely equitable solution to the lack of new licenses, and because water which has been previously abstracted for storage in a reservoir is not subject to drought restrictions, large farmers who are able to afford reservoirs and whose farms have suitable topology, are able to avoid suffering irrigation restrictions. Recently, the Environment Agency made winter storage even more attractive by allowing the

[1] Costing supplied by local farmer.

reservoir to be stipulated on the license as the area of application for the water so that subsequent use of that water is less restricted by location.

An argument has been put by farmers that, as an incentive, they should be compensated for the costs incurred for winter abstraction and storage through a government grant or through substantially decreasing winter abstraction charges.

> *I suppose if the farmer is heavily investing, you know it's a lot of money for a farmer to put in, and he is catching that water. I think that's quite fair and reasonable actually. It's not as if he is taking a chance with anybody else and hoping that you know the river in the summer will be full enough to take his share* [Agrirep1]

Many farmers feel that it is unfair that no grant aid is available as their investments are contributing to the common good of environmental protection, and that they provide a direct benefit to other abstractors, including water companies, by delaying the on-set of cessation clauses and water stress generally during the summer. The NFU endorses this view and has called for grants from government to encourage the construction of on-farm winter storage reservoirs consistent with the principle that: "*grants are appropriate to encourage actions that will alleviate environmental problems*" (NFU, 1993:1).

Support for on-farm reservoirs comes from the whole range of stakeholders (Box 7u). Again, many stakeholders perceive that any water flowing out to the sea to be wasted which, in fact, fails to recognise the complexity of estuarine ecosystems. The benefit to other abstractors and to the environment through the potential to release 'summer' water to the environment is recognised. There is also strong support for an ethic of 'self-help', and a belief that this strategy encourages abstractors to take responsibility for the security of their supplies. Opposing comment received from farmers and environmentalists, show a concern that only wealthy farmers are able to benefit from reservoir construction (Box 7v). Smaller farmers have neither the necessary land nor financial power. There is also a concern that the water problem will simply be shifted in time and space, or that rather than being an alternative to summer abstraction, winter abstraction will encourage farmers to expand their water dependent acreage (Rees and Williams, 1993).

In summary, the analysis so far suggests that the majority of stakeholders generally accept the principle of demand management and charging for what is used, but less so the trading of water. The breadth of support for supply increasing strategies however, indicates a perception in the catchment that such strategies are, or ought to be, viable options. While people perceive this to be so, they are likely to be less accepting of limits and shortage of resources. Next, I show that the rationality behind

Box 7u	Support for farm reservoirs (90%)
Agriculture	*interrupting flows to the sea must be OK*
Agriculture	*storing water that would have gone out to sea and been wasted*
Irrigator	*water would otherwise go out to sea; so it will reduce the rise in sea levels!!*
Agri	*reduces wasteful drainage*
Irrigator	*less risk of restrictions*
Environmentalist	*to protect other sources*
Agri	*would release water from agriculture for other uses e.g. environment*
Environmentalist	*reduces high summer abstraction peak.*
Environmentalist	*to restrict abstraction from rivers*
Agriculture rep	*way forward if current weather trend continues*
Domestic well	*the best way to use winter rainfall*
Environmentalist	*low environmental impact*
Environmentalist	*environmentally positive*
Environmentalist	*makes environmental and economic sense*
Environmentalist	*they should be encouraged to give up some of their licensed summer abstraction in return for winter abstraction*
Agri	*supplies will not be available without self help*
Agri	*makes people self sufficient*
Agri	*must encourage self help*
Environmentalist	*support farmers taking responsibility*
Local authority	*if done in an environmentally friendly way it could have a benefit on nature conservation*
Irrigator	*grant aid should be provided*
Irrigator	*only if economically viable or with a grant from the EA.*

Box 7v	Opposition to farm reservoirs (4%)
Irrigator	*favours the richer farmers*
Irrigator	*small farmers can not afford this so its not a solution*
Irrigator	*if we all had reservoirs it would just move the problem from the summer to the winter months*
Environmentalist	*impractical and expensive*

these attitudes to the strategies may be explained in terms of a general attitude towards changing water management practice.

Characterising support for different strategies

An exploratory factor analysis was used to identify whether the support of individual respondents for the eleven strategies (listed in Table 7- 3) could be characterised. Two strategies presented low communalities and were dropped from the analysis; these were reservoirs and metering. This is likely to be due to the wider debates these strategies have attracted which have made them more complex and politicised issues than the other strategies. Factor Analysis[1] of the remaining strategies, and then a varimax rotation of the two factors identified from the scree plot (Figure 7- 1),

[1] Principle components analysis with means replacing missing values.

Figure 7- 1: Scree plot: factor analysis of support for strategies

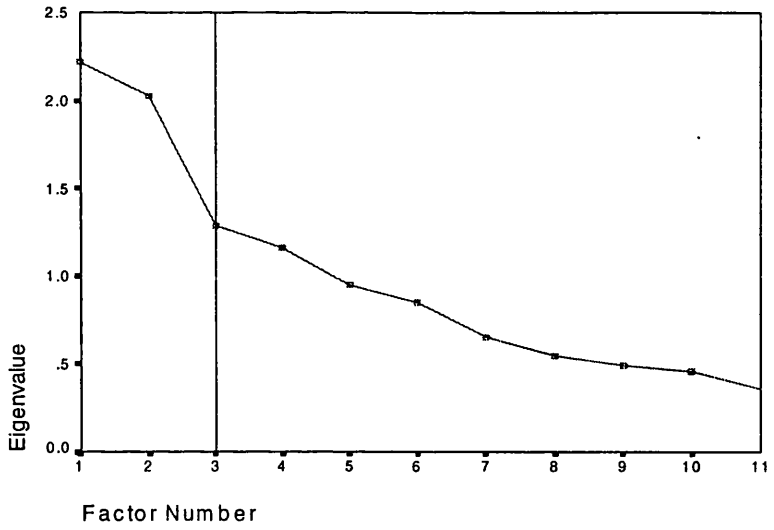

Table 7- 4: Varimax rotation* of strategy factors

	Factor 1: Interference	Factor 2: Status Quo
WITHDRAW UNUSED	.79256	
CHARGE MORE	.75133	
REVOKE FOR ENVIRONMENT	.57550	
USE LESS	.51998	
FARM STORAGE		.48381
TRANSFER		.76390
TRADING		.60768
NATIONAL GRID		.55350
POOLING		.49323

*Loadings listed >0.45

produced two interpretable factors (Table 7- 4). The two factors, accounting for 44% of the variance, indicate that support for strategies could be explained in part by an attitude to changing existing practices. The factors were labelled as a *Status Quo* scale and an *Interference* scale; both having reasonable reliabilities (Cronbach's α=0.5608 and α=0.6135 respectively).

Status Quo scale:	Interference scale:
National grid	*Withdrawal of unused licenses*
Regional transfers	*Increasing charges*
On-farm storage	*Revoking licences causing environmental problems*
Trading of licenses	*Use less*
Pooling licenses	

Status Quo scale

The items in this scale are strategies which would not require abstractors to address their existing usage of water. A one way anova test showed significant differences

Table 7- 5: Mean scores on extracted strategy scales*

Stakeholder	Status Quo score	Interference score
Water suppliers	**- 0.4580**	**- 0.3352**
Agriculture (non-irrigators)	**- 0.4486**	0.0672
Industry	**- 0.3226**	**-0.0029**
Irrigators	**- 0.1931**	0.7204
Environmentalists	0.1856	**- 0.7330**
Domestic well	0.2012	**-0.3781**
EA staff	0.5210	**-0.3095**
Local government	0.7184	**-0.8584**
Recreationists	0.7346	**-0.5350**

*Negative score indicates above average support[2]

between groups for the extracted regression factor scores on the *Status Quo Scale* (p=0.0160). The mean scores indicate that commercial users, i.e. water suppliers, agriculturists and industrial abstractors are more in favour, and other stakeholders are on average less supporting of, maintaining the status quo (Table 7- 5)[1].

Interference scale

The strategies in this scale are those which pose a challenge to existing attitudes to water use behaviour. Only agricultural users (irrigators and non-irrigators) showed above average opposition on this scale (Table 7- 5). A one way anova with stakeholder type showed that the differences between groups were significant for the extracted regression factor scores (p<0.0001), and Tukey's HSD confirmed that irrigators (opposing the interference strategies) disagreed significantly with environmentalists, recreationists, local authority staff and domestic users who were more in favour of change.

Summary.

A range of rationales were found to characterise respondents support for different management strategies. These are summarised in Table 7- 6. Although some support and opposition could be accounted for by membership of a stakeholder group, many rationales were shared by individuals across the groups. Where discord did exist, it was usually between abstractors and non-abstractors. This was confirmed by the descriptive statistics and the factor analysis.

[1] Note that these scores are relative to other groups, and that as factor scales are independent of each other i.e. measuring separate things, it is possible for an individual to score highly on each.
[2] This is because the 'strongly support' was scored as equal to 1, and 'strongly oppose' as equal to 5.

Only one strategy, the *trading of licences*, commanded more opposition than support. The 'new' ideas of trading and pooling, so far mostly discussed in policy arenas, received most 'don't know' responses. Many people in the catchment seemed unsure about these terms, or unsure about the issue involved. Also, a fifth of respondents answered 'don't know' to the revocation of environmental licenses. These findings might constrain attempts towards the increased use of market tools and increased environmental protection. The regulator would need to improve understanding of these water management options if local participation in and support for them is to be sought in the Lark.

Substantial support was shown for the supply increasing strategies. However, many respondents were aware that some strategies simply shift the problem in time, and in geographic and social space, and cannot be regarded, therefore, as advancing sustainability. Although many comments suggested that water should be relocated to where is it most likely to be used, there was evidence of a hierarchy of fairness beliefs. Targeting allocation for example, and maximising the return from water resources take second place to the protection of either historical or environmental rights. Most farmers would like the licensing system to remain as it is, with the option of entering a market for any surplus water. There was a strong ethic for water to be shared as a common good, but also that abstractors take responsibility for the security of their supplies.

Table 7- 6: Summary of support and opposition for water management

STATUS QUO Strategies	
Unfair because...	***Fair because***
National grid	
Shifts problem rather than addresses it Water is finite Too expensive	Water is a public good to be shared Shortage should be dealt with
Regional transfers	
Ignores local current or future need for water	Excess supply should be used
On farm storage	
Extremely high costs discriminate against smaller farmers May encourage expansion of irrigation	Increases farmers' security and responsibility for water supply Reduces water 'lost' to sea Relieves pressure on summer abstraction Should be subsidised as benefit falls to all in catchment
Pooling licenses	
Difficult to co-ordinate Lead to more abstraction Potential for unfairness to smaller abstractors	Improves efficiency and control for farmers Enables 'wiser' planning

Trading	
Increase the risks of cessation orders coming in to effect earlier	No negative consequences caused by a change in who uses the water
Increased uncertainty	Increases economic return
Benefits concentrated, costs shared	More efficient than planning by NRA
License is only a right to abstract and use a common resource, not a commodity	Will give water its correct value
Will increase abstraction	Water should go to those who can bid highest
Will weaken regulation	
Will undermine smaller businesses	
INTERFERENCE Strategies	
Unfair because...	***Fair because***
Revocation of unused licenses	
Prior appropriation implies continued entitlement	Proper to allocate resources to where they are needed
'Use it or lose it' is unfair. Licensee has right to decided	If used to reduce environmental impact
License has been paid for during years when not used	
Agriculture is not static	
Unused water is beneficial to environment	
Revocation of license causing environmental problems	
Economic and social consequences	Environment should be protected
Problems are due to 'bad' management	Environmental problems should not be passed to future generations
Nature can adapt	
Compensation for revocation	
Public purse should not compensate an individual for loss of a common property resource	Investment in businesses has assumed water availability
Incentive charging for licenses	
Abstractors already have to pay without using any water	More resources for faster resolution of problems
Service provided by NRA is inadequate	Paying for more expertise is fair
Would not effect the need for water	Incentives for more efficient practices needed
Costs will be passed on	Would make resources available to improve supply
Could affect viability of businesses	Would encourage more efficiency and reduce waste
Conservation	
Using water is 'healthy'	Wastage is wrong
	Value of water should be promoted
	A change in attitude and practice is needed by individuals
OTHER Strategies	
Domestic Metering	
Water is a basic need and should not be available according to ability to pay	Paying for what you use is fair
Peak use should be targeted	Wastage is wrong
Reservoir	
Winter rainfall is not unlimited	Future needs must be met
Creates new demand	Water not captured is wasted
Environmental impact	More supplies will reduce current pressures

II Fairness Principles in the Lark Catchment

An aim of this study has been to identify the nature of beliefs in the catchment regarding what is fair water resources management. The postulate is that 'water justice' beliefs and values will make up stakeholders' rationales towards water resources, and determine their expectations of water regulation. Chapter Six examined judgements of the regulator and the licensing system, and section one above looked at attitudes to various water management strategies. This section progresses that examination by identifying the 'water justice' beliefs that might explain and underpin those attitudes. I describe first how the stakeholders prioritised different uses of water, and second their ideas of fair drought management; namely their views on the 'right' allocation of abstraction restrictions. Finally, responses to 'philosophical' statements representing different notions or ideals of water justice are analysed and used to characterise the water culture in the catchment.

Prioritising water uses

Respondents to the questionnaire survey were asked to consider the importance of providing water for nine different uses and to rank them accordingly. A test for Kendall's coefficient of concordance showed that overall there was significant agreement among respondents over the following priority of allocation. Four use-groups can be identified in order of designated importance (from the means)[1]:

1. Local domestic supply	2. Existing agriculture	3. New agriculture	4.Gardening
	Local industry	Private wells	Leisure
	Environment	Non-local domestic supply	

Two points are noticeable. Existing agriculture is favoured over new agriculture which supports the first-come-first-served principle and stakeholders are distinguishing between local users and 'outside' users. A one way analysis of variance was used to test whether significant difference existed for the ranking of each use by each of the stakeholder types (see Table 7- 7) and a Tukey's HSD was used to identify which stakeholders were in disagreement. This revealed that irrigators emerged as a group most likely to conflict with others over priority allocations. A significant disagreement was found among stakeholders in ranking allocations to existing agricultural use and new agricultural use, the environment and gardening ($p<0.05$):

Existing agriculture: Tukey's HSD showed significant disagreements between recreationists and irrigators. Least support comes from recreationists and water

[1] These results may be compared with those of Syme and Nancarrow (1992). In different case studies in Australia, respondents most often ranked town supply first, followed by irrigation, the environment and then industry.

Table 7- 7: Mean rank for different types of use

Water Use	†Mean Ranking	*p=	n
Local domestic supply	1.55	0.1354	119
Existing agriculture	3.31	0.0264	117
Local industry	3.63	0.4825	118
Environment	4.04	0.0740	117
New agriculture	5.38	0.0006	117
Private wells	5.54	0.4613	117
Non-local domestic supply	5.79	0.1321	116
Gardening	7.41	0.0608	116
Leisure	7.75	0.4872	117

†1=essential, 9=least important. *Anova with stakeholder type

Kendall's Coefficient of Concordance (W): measure of agreement between rankers.

Cases	W	Chi-Square	D.F.	Significance
115	0.5318	489.2954	8	p<0.0001

suppliers. Others rank it between 3 and 4, except agriculture users who, as could be expected, rate it a high 2.7.

New agriculture: environmentalists and recreationists both significantly disagree with irrigators in their ranking of new agriculture. Most respondents who ranked this use highest were the agricultural and business users (many of the latter are agriculturally related in the Lark catchment). Other stakeholders ranked new agriculture at 5.5-6.5, but water suppliers, NRA staff and recreationists ranked it very low with a mean around 7.

Environment: Local government staff give a higher priority to the environment than other stakeholders (mean=2); recreationists, environmentalists and domestic well users next (mean=3-4), agricultural users and business users next (mean=4-5), with water suppliers giving a mean ranking of only 5.3 (note however that this represents only 3 individuals).

Gardening: Tukey's HSD shows significant disagreements between *irrigators* and *domestic well users* over the ranking of gardening ($p<0.05$).

Allocating restrictions: beliefs about fair drought management:

As well as with criteria and tools for determining the allocation of water resources, equity issues arise over the burden of restrictions during periods of water stress. As described in Chapter Five, the regulator implements restrictions according to hydrological impact and not according to social, economic or geographical boundaries. The question (Q32) shown in Table 7- 8 was used in the survey to determine peoples' attitudes to restrictions: i.e. whether they believed restrictions

should be shared equally by abstractors across the catchment, or only placed on those abstractors who were responsible for a detrimental impact on water levels or flows.

Table 7- 8: allocation of restrictions

Imagine that as a result of low rainfall, flow in the River Lark is unacceptably low. A reduction in abstraction is required. Two large abstractors, one industrial and the other a spray irrigator, are both in a strategic location, where benefit would be gained from cutting back their abstraction. Do you think it most fair if restrictions were...:	**Number supporting**
Shared EQUALLY by irrigator and industrialist	35 (29.7%)
Applied to INDUSTRIALIST only	3 (2.5%)
Applied to IRRIGATOR only	11 (9.3%)
Shared by LARGEST abstractors only	5 (4.2%)
Shared by all catchment abstractors EQUALLY	57 (48.3%)
Other	7 (5.9%)

An egalitarian approach was more popular than a proportional, or discriminatory, approach. Comments are shown below (Box 7w).

Box 7w	**Restricting both abstractors equally**
Irrigator	*restricting those two would seem fair and sensible*
Environmentalist	*seems most fair*
Industry	*a problem shared is a problem halved*
Domestic well	*the fairest way. Neither is more important than the other.*
Local authority	*can't see why one abstractor should have priority over another*
Irrigator	*both should have found alternatives by now, so none deserve sympathy*
Environmentalist	*it might depend on how essential the industrial use is i.e. what are they producing and what is being irrigated*
Agriculture	*large abstractors should be pressured to be more efficient and cut back. Should have to clearly demonstrate need and wise use (why don't irrigators spray at night?)*
Environmentalist	*Currently business location happens due to non-water reasons. Water must come into thinking. Would also need to consider which abstractor used water wisely.(i.e. reward wise users?)*
Domestic well	*I assume that abstractors have chosen their location because of the water availability. Others should not have to subsidise them.*

Those who preferred that both abstractors were restricted argued that this was most fair because other users should not have to 'subsidise' their impacts. The NRA's approach follows this principle, i.e. restrictions are allocated according to hydrological impact. Other respondents felt that the relative importance of the uses of water should be assessed, and others that the steps which the businesses could have taken to avoid or mitigate the situation ought to be considered. There was a perception by some that businesses are not yet taking water into consideration when making decisions; that they are not responding to natural resource conditions. Another way

that stakeholders judged the situation was to consider the nature and size of the effects that restrictions would have. Some irrigators and one environmentalist chose the industrialists to carry all the burden of restrictions because of the irreversible impact of drought on crops, and because of the perceived importance of food production (Box 7x).

Box 7x	Industrialist only
Agriculture	*both are doing a service to the community but food is more important*
Agriculture	*a short term cessation for industry would at worse cause a temporary shut down in production - a farmer would lose his crop and hence whole income for a year*
Environmentalist	*you can stop production in industry and then start again - dead plants do not revive.*

On the other hand, industry was favoured *not* to escape restrictions (mostly by non-irrigators) because of a perceived greater effect on employment, and also the fact that agriculture causes greater loss of the resource. The point was also made that agriculture is possible without irrigation whereas some industrial process are dependent on water (Box 7y).

Box 7y	Irrigator only
Industry	*more effect on employment if industry is hit compare to agriculture*
Agriculture	*in most industrial cases the water is used on a pass-through basis and is returned via drainage. Irrigation water is lost to crops or evaporation*
NRA	*proportional to the effect the abstraction was having on river. The industrialist probably makes a discharge back to river.*
NRA	*industrial processes are usually totally dependent on abstraction for viability. Irrigation has some flexibility as well as total loss of the resource*
Recreationist	*crops always grew years ago without irrigation - with 15% set aside now this land could be used to make up short falls.*

Some respondents felt that larger businesses should be targeted as they might be able to recover more easily from the effects of restrictions and because their abstractions have the greatest impact. However, the majority of respondents' notion of fairness was to share out the hardship equally among *all* abstractors (Box 7z). Seventy three percent of irrigators chose this option. The rationales underlying this were: a notion of a collective responsibility, a reduced and less fatal impact on individual businesses, that increased motivation to conserve would result, and that perceptions of fairness would be greater. Comments are shown in the table below.

Box 7z	All abstractors
Irrigator	*fairer to cut everyone by a little than 1 or 2 by a lot - but it should be remembered that a crop is a once a year event i.e. the farmer loses a whole year of production but industry doesn't*
Irrigator	*restricting one business (or two) severely could lead to redundancies*
Environmentalist	*the more widely the restrictions are spread the less the effect in any individual abstractor's business.*
Agriculture	*the more people restricted, the smaller the restriction and the less the disruption to commerce*
Irrigator	*hardship should be minimised to all users*
Agriculture	*equal, as life is unfair*
Recreationist	*equal restriction is the only fair way of dealing with such a shortage*
Environmentalist	*seems most fair*
Domestic well	*all, to be fair*
Environmentalist	*perceived as a fair approach - may not be the best for the river but it is most likely to achieve all round support*
Local government	*restrictions must be seen to be fair - across the board - singling out one or two could be seen as victimisation*
Irrigator	*restrictions should be spread as far as possible*
Irrigator	*restrictions should be shared out but JOBS should be a priority concern*
Irrigator	*all treated the same*
Agriculture	*all abstractors should share the pain*
Agriculture	*why should one business suffer more or less than his neighbour?*
Agriculture	*a catchment is a catchment so everyone has to be treated equally*
Irrigator	*water needed just as much by small man*
Irrigator	*share the responsibility*
Environmentalist	*all abstractors have a responsibility*
Industry	*one or two should not suffer for the benefit of all*
Irrigator	*if a licence was granted, why should location prejudice that abstractor under any circumstances, all abstractors contribute to the problem.*
Irrigator	*spreading the restrictions equally makes everyone think very carefully how they use water*
Agriculture	*until fresh supplies are urgently made available. What ever decision is made, jobs and income will fall*
Domestic well	*the needs of the public should be thought about before any individual commercial interests*
Local authority	*options need to be evaluated and the economic, social and environmental costs and benefits examined before making a decision*

Defining fair water management

The range of rationales given in the analysis so far indicates clearly that different notions of water justice exist amongst stakeholders. This section will characterise those different notions. Respondents were asked to rate on a five point scale how much they agreed with twenty six 'philosophical' statements[1] on water allocation and management. These are listed in Table 7- 9.

[1] This is a term used by Syme (1997). See below.

Table 7- 9: Principles for water management and allocation

	Principle
1	I don't care how decisions are made as long as the right people get enough water
2	Existing abstractors with large licences should forfeit water for new applicants
3	First come first served is the best way to allocate resources
4	How much people are prepared to pay for water is a good way of deciding who has rights to it
5	Cultural values and tradition should be taken into account when making water management decisions
6	Water should be cheaper for important uses
7	If people live in a water scarce area, they should pay more for water if it costs more to provide it
8	If I have a licence that I no longer need, I should be allowed to sell it to someone who needs the water
9	All types of users have the same rights to water
10	If the public are fairly consulted I am happy with whatever allocations are decided
11	It is important to think now about the water needs of future generations
12	It is impossible to have a decision making process which is fair to everyone
13	It is not fair that one neighbour may have a permanent licence while the other can not get one at all
14	Water licences should be targeted to encourage economic growth, rather than given out according to 'first come first served'
15	In water allocation all types of users should be treated equally
16	It is not right for businesses to go short of water to protect the needs of the environment
17	Neighbours should have the same conditions on their licence, even when their abstraction has a different impact on water resources
18	Water resources should be regulated by a public body
19	If water is allocated for the environment, environmental groups should pay for it in the same way that other users pay
20	Present licence holders have a greater right to water than newcomers
21	Water should be allocated to maximise benefits to the community as a whole
22	Profits should not be made by those supplying or managing water
23	There is a moral obligation to involve all sections of the community in water management decisions
24	Water can only be allocated for human use after the basic needs of the environment have been satisfied
25	Water resources should never belong to private individuals
26	Water should not be bought and sold as an economic commodity

Some items are derived from issues identified during local pilot work, while others are based on those used and confirmed as salient by Syme and colleagues in Australian studies (Syme and Nancarrow, 1992; Syme and Fenton, 1993; Seligman, Syme, and Gilchrist, 1994; Syme and Nancarrow, 1997). The researchers found that support for the philosophical principles did not vary across different case studies. It was thought

interesting therefore, to be able to contrast their results with those from this study[1]. (This will be done in section 3). The items represent the three main elements of fairness discussed in Chapter Two; that is *egalitarianism, proportional distribution,* and *procedural justice*, as well as ideas of *environmental justice* and *rights* and *responsibilities* to society (Wenz, 1988; Hayward, 1995)[2]. The aim was to reveal what water justice values and beliefs are influencing judgements of fair water resource management in the catchment, and to show that the different weights stakeholders accord to different principles lead them to disagree over water policy.

Only three survey respondents did not reply to this question, so the sample size was 122. The statements were first ordered according to their mean score, as shown in Table 7- 10 and Table 7- 11. They were given an *agreement ranking* according to the percentage of respondents agreeing or disagreeing. The first table shows those principles over which there was general consensus either in agreement or disagreement with the statement. The second table groups principles over which opinion was split. The responses to individual items were analysed to see where agreement or disagreement could be attributed to membership of a particular stakeholder group[3]. This was followed by a factor analysis of items which characterised the differences.

Consensus. One item, a fundamental equity principle of the sustainability paradigm, was agreed with by more than 95% of respondents: *it is important to think now about the needs of future generations*. Another principle was opposed by 80% of respondents: *how much people are prepared to pay for water is a good way of deciding who has rights to it,* and seven other principles were agreed with by more than 60% of respondents (see Table 7- 10). Three principles were disagreed with by more than 60% of respondents. From these 12 principles we see that in the catchment the following beliefs regarding water and its management have a large degree of support and are characteristic of the 'water culture':

- that water is a public good which should be used to maximise benefits to the community as a whole.
- that regulation is necessary
- it is right to allocate restrictions according to impact[4]

[1] The questionnaire rationale is described more fully in Chapter 4.
[2] See Table 4-2 in Chapter Four for details.
[3] All testing for significant differences among stakeholder groups used a one way analysis of variance followed by a Tukey's HSD test.
[4] It is interesting to note that in considering fairness at an 'ideal' level, there appears to be differences in support for the allocation of restrictions. The analysis in the previous section indicated strong support for an equal distribution of restrictions across the catchment.

Table 7-10: Agreements with justice principles - general accordance

Justice Principle %	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Mean[1] score	Rank /26	Agreement Rating[2]	n
It is important to think now about the water needs of future generations	75	20	2	2	2	1.35	1	high agreement	121
Water resources should be regulated by a public body	35	41	15	3	5	2.02	2	general agreement	120
Water should be allocated to maximise benefits to the community as a whole	26	53	16	5	1	2.02	2	general agreement	121
Water resources should never belong to private individuals	37	28	18	11	8	2.25	4	general agreement	122
It is impossible to have a decision making process which is fair to everyone	27	44	6	19	4	2.29	5	general agreement	119
There is a moral obligation to involve all sections of the community in water management decisions	25	38	22	11	3	2.30	6	general agreement	118
Water licenses should be targeted to encourage economic growth, rather than given out according to 'first come first served'	23	38	24	12	3	2.32	7	general agreement	122
Profits should not be made by those supplying or managing water	43	17	13	19	8	2.34	8	general agreement	119
Neighbours should have the same conditions on their license, even when their abstraction has a different impact on water resources	8	10	20	44	18	3.54	23	general disagreement	122
Water can only be allocated for human use after the basic needs of the environment have been satisfied	7	13	14	40	25	3.63	24	general disagreement	122
First come first served is the best way to allocate resources	3	7	16	32	42	4.02	25	general disagreement	120
How much people are prepared to pay for water is a good way of deciding who has rights to it	4	7	0	29	51	4.16	26	high disagreement	120

[1]Mean score calculated according to: strongly agree=1 - strongly disagree=5

[2] "high agreement/disagreement" = 80% or greater, of the sample strongly agreed or agreed/strongly disagreed or disagreed, "general" = 60-79% agreed or disagreed , "split" = spread of opinion i.e. less than 60% agreed or disagreed.

Table 7-11: Agreements with justice principles - split opinions

Justice Principle	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree	Mean[1] score	Rank/ 26	Agreement Rating[2]	n
It is not fair that one neighbour may have a permanent license while the other can not get one at all	25	32	24	15	4	2.41	9	split/agg	121
Water should not be bought and sold as an economic commodity	36	17	19	19	9	2.49	10	split/agg	122
Water should be cheaper for important uses	17	38	17	20	9	2.67	11	split/agg	122
If water is allocated for the environment, environmental groups should pay for it in the same way as other users	24	26	13	26	11	2.75	12	split/agg	121
I don't care how decisions are made as long as the right people get enough water	23	23	21	17	16	2.79	13	split	122
Cultural values and tradition should be taken into account when making water management decisions	4	33	39	16	8	2.92	14	split/agg	122
If the public are fairly consulted I am happy with whatever allocations are decided	7	28	24	29	12	3.09	15	split	121
If people live in a water scarce area, they should pay more for water if it costs more to provide it	10	30	16	21	23	3.17	16	split	120
In water allocation all types of users should be treated equally	11	16	24	39	10	3.20	17	split/dis	121
It is not right for businesses to go short of water to protect the needs of the environment	7	25	22	34	13	3.21	18	split/dis	122
Present license holders have a greater right to water than newcomers	7	25	19	30	19	3.28	19	split/dis	121
All types of users have the same rights to water	15	17	13	28	26	3.34	20	split-dis	119
Existing abstractors with large licenses should forfeit water for new applicants	8	14	26	26	26	3.47	21	split-dis	119
If I have a license that I no longer need, I should be allowed to sell it to someone who needs the water	11	23	8	24	35	3.50	22	split-dis	120

[1]Mean score calculated according to: strongly agree=1 - strongly disagree=5

[2] "high agreement/disagreement" = 80% or greater, of the sample strongly agreed or agreed/strongly disagreed or disagreed, "general" = 60-79% agreed or disagreed , "split" = spread of opinion i.e. less than 60% agreed or disagreed.

- that water is not a commodity belonging to private individuals and should not be distributed according to 'willingness to pay'
- that first come first served is not the best way to allocate water; targeted allocation to encourage economic growth is preferred
- environmental pragmatism (65% were against satisfying environmental before human need)
- there is general agreement that "it is impossible to h*ave a decision making process which is fair to everyone" . This would seem to* indicate that people accept that a degree of unfairness is inevitable, although there is also a general agreement tha*t there is a moral* obligation to involve the community in decisions.

The above list represents those traits which are strongest in the catchment. An individual respondent may not support all those beliefs. Some stakeholders will have very different attitudes. For example, the water company staff emerged as having different ideas of *water justice* compared with other stakeholder groups. They were found to significantly disagree with other stakeholders over 3 'consensus' items (using anova and Tukey's HSD). The water company staff were significantly less concerned with supplies for *future generations* than irrigators and environmentalists. They disagreed significantly with recreationists about *profit making,* and were more likely to agree with water allocation according to *ability to pay* than industrial users, recreationists, environmentalists and local government staff.

Split opinions. For sixteen principles, opinion was split (see Table 7- 11). These 'split' opinions in the catchment are those most likely to fuel conflict as there are notable numbers in both agreement and in disagreement.

Some stakeholders disagree with the following principles but *more 'agree':*

- *It is not fair that one neighbour may have a permanent license while the other can not get one at all*
- *Water should not be bought and sold as an economic commodity*
- *Water should be cheaper for important uses*
- *If water is allocated for the environment, environmental groups should pay for it in the same way that other users pay*
- *Cultural values and tradition should be taken into account when making water management decisions*

Again the public good concept is evident with support for targeted access to water resources to achieve social goals. Significant differences in responses were found to fall across stakeholder groups as follows (see Table 7- 12). Irrigators disagreed significantly with environmentalists over who should pay for environmental allocations of water. Local government respondents and industry were significantly against treating water as an economic commodity compared with the water company staff.

Table 7-12: Significant differences in justice beliefs between stakeholder types

Justice Principle	Agreement Rating	ANOVA: F prob p=	Differences found to be significant by Tukey's HSD (p<0.05) are between...
Sustainability			
It is important to think now about the water needs of future generations	high agreement	*0.0294	Water company staff against irrigators and environmentalists
Environment			
If water is allocated for the environment, environmental groups should pay for it in the same way that other users pay	split-dis	*0.0170	Irrigators against environmentalists
Prior			
First come first served is the best way to allocate resources	disagreement	*0.0050	
Present license holders have a greater right to water than newcomers	split-dis	*0.0079	
Existing abstractors with large licenses should forfeit water for new applicants	split-dis	0.0595	
Procedural			
If the public are fairly consulted I am happy with whatever allocations are decided	split	0.0335	
Economic			
How much people are prepared to pay for water is a good way of deciding who has rights to it	high disagreement	*0.0061	Water company staff against industrial users, recreationists, environmentalists and local government
Water should not be bought and sold as an economic commodity	split	*0.0142	Water company staff against local government staff and industry
If I have a license that I no longer need, I should be allowed to sell it to someone who needs the water	split-dis	*0.0008	Irrigators against recreationists, water company staff against environmentalists, domestic well users and recreationists
Profit should not be made by those supplying water	agreement	0.1227	Water company staff against recreationists
Water should be cheaper for important uses	split	0.0536	

* one way ANOVA shows that two groups are significantly different at the p<0.05 level.

The following have nearly a *bimodal split* between those who agree and those who disagree:

- *I don't care how decisions are made as long as the right people get enough water*
- *If the public are fairly consulted I am happy with whatever allocations are decided*
- *If people live in a water scarce area, they should pay more for water if it costs more to provide it*

The first two principles are clearly procedural issues. Half of respondents feel consultation or proper procedures are an important determinant of fairness and half do not.

Some stakeholders agree with the following but *more 'disagree':*

- *In water allocation all types of users should be treated equally*
- *It is not right for businesses to go short of water to protect the needs of the environment*
- *Present license holders have a greater right to water than newcomers*
- *All types of users have the same rights to water*
- *Existing abstractors with large licenses should forfeit water for new applicants*
- *If I have a license that I no longer need, I should be allowed to sell it to someone who needs the water*

Again, this shows more support for discriminatory allocation rather than equal treatment, and a lack of support for water as a commodity. There seems to be a differentiation between *new* water and *old* water with support for those who have water already having protected rights. Irrigators were found to disagree significantly with recreationists, and water company staff to disagree significantly with environmentalists, domestic well users and recreationists over the rights to sell water (Table 7- 12).

No opinion: For ten of the 26 principles, more than 20% of respondents answered that they had 'no opinion'. This is perhaps due to the idealistic nature of attitude statements where there is no way of expressing 'it all depends'. For one item, 39% of respondents had 'no opinion' and this is dropped from later analysis: *Cultural values and tradition should be taken into account when making water management decisions.* It is possible that this item was difficult to interpret for some people, or that it was not considered as salient or relevant.

Table 7- 12 summarises the principles for which there is a statistically significant disagreement among stakeholder groups. The analysis clearly indicates that commercial users of water tend to support different 'philosophies' to the other stakeholders. It also suggests that most the significant fractionalisation along the line of stakeholder groups is occurring over issues of the commodification of water.

Scaling of philosophical statements: factor analysis

The above analysis has looked at individual principles, but does not indicate whether there was any pattern to how individual stakeholders responded to the items; whether for example, those who are in agreement over one statement have also agreed over other statements. A factor analysis of the 5 point Likert scale will reveal any underlying structure comprising justice beliefs for water. Each factor describes a distinct type of water justice philosophy, characterised by a set of items which can be used to asses an individual's notion of 'water justice'.

Using principle components analysis nine factors emerged with an eigen value greater than one and accounting for 65% of variance. All communalities were above 0.5. Three factors, identified by Catell's scree test (Figure 7- 2), were retained for rotation. Table 7- 13 shows the item loadings following varimax rotation of the three factors.[1] These three accounted for 35% of the total variance, but formed easily identifiable factors[2]. The scales represent three distinctive constructions of water justice in the catchment: *Water as a Public Good, Fairness as Equality*, and *Water as a Commodity*. All have positive reliabilities (Cronbach's α=0.6037, 0.6268, 0.0783 respectively).

Public Good (Factor 1)

Those people who score high on this scale would be likely to agree with the following:

- *Water should not be bought and sold as an economic commodity*
- *Profits should not be made by those supplying or managing water*
- *Water resources should never belong to private individuals*
- *Existing abstractors with large licenses should forfeit water for new applicants*
- *There is a moral obligation to involve all sections of the community in water management decisions*
- *It is not fair that one neighbour may have a permanent license while the other can not get one at all*
- *Water licenses should be targeted to encourage economic growth, rather than given out according to 'first come first served'*
- *Water should be cheaper for important uses*
- *Water resources should be regulated by a public body*
- *It is important to think now about the water needs of future generations*

and to disagree with:

- *If people live in a water scarce area, they should pay more for water if it costs more to provide it*

This largest factor accounted for 17% of variance and the scale is compatible with data above suggesting that the predominant 'water culture' is that water should be managed as a public good.

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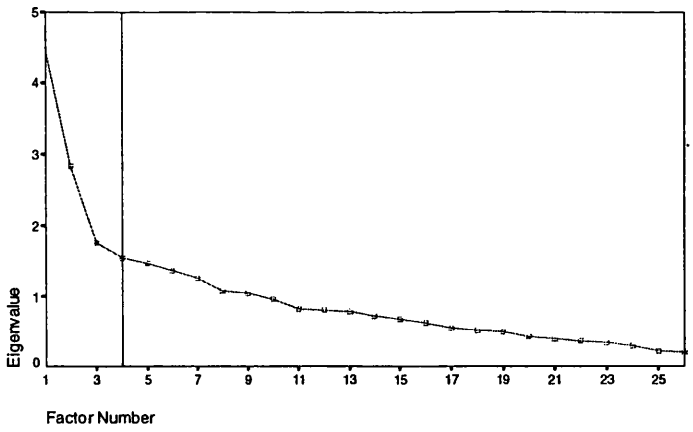
[1] An oblimin rotation was also performed which produced a similar factor structure with very little correlation between factors. This means that orthogonal (varimax) rotation is most appropriate (Kline P,. 1994:62)

[2] Items which loaded on two factors were used for interpreting the factor on which they loaded highest.

Figure 7- 2: factor scree plot



Equality (Factor 2)

The items loading on this scale indicate a belief in non-preferential treatment, including claims for environmental need, and less concern for fair procedures.

- *In water allocation all types of users should be treated equally*
- *All types of users have the same rights to water*
- *Neighbours should have the same conditions on their license, even when their abstraction has a different impact on water resources*
- *I don't care how decisions are made as long as the right people get enough water*
- *It is not right for businesses to go short of water to protect the needs of the environment*

This factor accounted for 11% of variance.

Commodity (Factor 3)

People who score high on this scale will believe strongly in first come first served, and in the right to sell a water allocation. They support allocation within a market. They do not have faith in public consultation nor do they prioritise environmental need.

- *If I have a license that I no longer need, I should be allowed to sell it to someone who needs the water*
- *Present license holders have a greater right to water than newcomers*
- *First come first served is the best way to allocate resources*
- *How much people are prepared to pay for water is a good way of deciding who has rights to it*

They are likely to disagree with:

- *If the public are fairly consulted I am happy with whatever allocations are decided*

This factor accounted for 7% of variance.

Three items did not load on any of the three factors (above 0.35):

- *It is impossible to have a decision making process which is fair to everyone,*
- *Cultural values and tradition should be taken into account when making water management decisions,*
- *Water can only be allocated for human use after the basic needs of the environment have been satisfied;*

Table 7- 13: Varimax rotated factor matrix*

	Factor 1	Factor 2	Factor 3
NOCOMMODITY26	**.73697**		
NOPROFIT22	**.72731**		
NOPRIVATEOWN25	**.63725**		
FORFEITLARGE2	**.59524**		
MORALINVOLVE23	**.53904**		
NEIGHBOURS13	**.53488**		
ECONGROWTH14	**.52623**		
IMPORTANTUSE6	**.42997**		
PUBLICREGULATE18	**.41860**		
PAYMOREAREA7	**-.36486**		
FUTUREIMPORTANT11	**.35244**		
ALLEQUAL15		**.69881**	
EQRIGHTS9		**.62428**	
CONDITIONSAME17		**.61844**	
ENVPAY19		**.57464**	.52083
PROCEDURENO1		**.51165**	
BUSINESSFIRST16		**.45044**	
CULTURE5			
SELLOK8			**.60119**
NEWCOMERNO20			**.55605**
PERMANENTOK3			**.52812**
COMMUNITY21	.41234		**-.50930**
CONSULT10			**-.45365**
PAYOK4			**.37091**
ENVFIRST24			
FAIRIMPOSSIBLE12			

*variable numbers refer to list in Table 7- 9. n=122. Loadings listed>0.35

and two items loaded on more than one factor so have not been included in factor descriptions:

- *If water is allocated for the environment, environmental groups should pay for it in the same way that other users pay*
- *Water should be allocated to maximise benefits to the community as a whole*

Comparing stakeholder groups

A one way ANOVA was performed for the mean scores on each scale against stakeholder type[1] (Table 7- 14, Table 7- 15 and Table 7- 16). The *Public Good* items gained most support from local government officers, domestic well users and agricultural non-irrigators and industrial users. However, the differences among all

[1] Using the regression method for extraction in SPSS.

Table 7- 14: Mean stakeholder scores on Public Good scale (p=0.2814)

	Mean*	Std Dev	No. of cases
Local government	-0.2806	0.99	6
Domestic well	-0.2753	0.64	10
Agriculture	-0.2515	1.11	16
Industry	-0.2251	1.08	12
Recreationists	-0.1841	1.18	11
Environmentalists	0.0210	0.72	19
Irrigators	0.1654	1.11	42
NRA	0.4384	0.77	5
WCo	1.2159	0.34	3

*Listed in order of support

Table 7- 15: Mean stakeholder scores on Equality scale (p<0.01)

	Mean*	Std Dev
Recreationists	-0.5077	0.99
Agriculture	-0.5000	1.13
Domestic well	-0.2700	0.95
Irrigators	-0.0863	0.94
Industry	0.1129	0.97
Environmentalists	0.4619	0.83
WCo	0.5230	0.81
Local government	0.6642	1.04
NRA	0.8474	0.55

Table 7- 16: Mean stakeholder scores on Commodity scale (p<0.0001)

	Mean*	Std Dev
WCo	-0.5703	0.47
Industry	-0.4740	0.97
Irrigators	-0.4227	0.94
Agriculture	-0.4223	1.12
NRA	-0.1371	0.27
Domestic well	0.1877	0.75
Recreationists	0.4782	1.17
Environmentalists	0.8119	0.44
Local government	0.9140	0.64

stakeholders were not statistically significant (p=0.2814) which suggests again that these items command general agreement and describe the prevalent notion of water justice.

The *Equality Scale* showed a small significant difference with p<0.01. Table 7- 15 shows that these items gained most support from recreationists and non-irrigating agricultural users. Scores on the *Commodity Scale* were also significantly different among stakeholder groups (p<0.0001), with the mean scores in Table 7- 16 showing that WCo staff, irrigators, industry, and agricultural users and the NRA expressed above average support. A Tukey's HSD identified significant differences between irrigators (agree) and environmentalists and local authority staff (disagree), as well as between industrial users (agree) and environmentalists (disagree). Commercial abstractors are more likely than other stakeholders to be in favour of trading any unused part of their licenses, less likely to prioritise environmental needs, and are less keen on public consultation. As one farmer put it:

> *It's not just a question of being fairly consulted but the proper technical apparatus in terms of measurement.* [Farmer A]

The analysis thus far would suggest that although there is a general water culture, opposed to commodification and in support of water as a public good, that is supported by some members of all stakeholder groups, there is a separate group of commercial licensees whose attitude to water management is different.

III Characterising Water Fairness Perceptions

In this final section, I bring together some of the quantitative analysis in this and earlier chapters in order to explore relationships between the different variables. By doing this, perceptions of fair water resource management will be further characterised and explained. The key questions being addressed are (variable labels are in brackets):

1. Are attitudes to the regulator and current regulation related to water justice beliefs? (EVALUATION and PHILOSOPHY)
2. Does judgement of the regulator and current regulation predict support for water management strategies? (EVALUATION and STRATEGIES)
3. Do water justice beliefs predict support for strategies? (PHILOSOPHY and STRATEGY)

The variables being explored are:

Concept	Variable	Type	Label	Refer to
Judgements of the current system	EVALUATION	Ordinal	•PRO •ANTI •No Opinion	Ch6.1.
Strategies supported	STRATEGY	Score on 2 continuous scales	•Status quo •Interference	Ch7.1.
Justice principles	PHILOSOPHY	Score on 3 continuous scales	•Public good •Equality •Commodity	Ch7.2.
Stakeholder Type	TYPE	Categorical	9 types	Ch4.3

1. Are attitudes to the regulator and water justice beliefs related?

A one-way Anova found a significant difference between scores on the Public Good scale for those who, regarding current regulation, were PRO, ANTI and No Opinion (see Table 7- 17). Anova does not indicate between which groups the significant difference lies but the results suggest that those who were PRO the current system were more likely to disagree with the Public Good scale than those who were ANTI, and those who were ANTI were more likely to support the Public Good scale[1]. Analysis in section one of Chapter Six above found that those who were PRO were

[1] Throughout the analysis a negative score indicates higher support than a positive score. This is because during initial data entry, codes were assigned from strongly agree=1 to strongly disagree=5.

mostly commercial users, those who were ANTI were a mix of stakeholder types.

Table 7- 17: EVALUATION v PHILOSOPHY : results of Anova

EVALUATION	Mean score Public Good scale	Mean score Equality scale	Mean score Commodity scale
PRO	0.2901	0.0067	-0.1900
ANTI	-0.5059	0.0816	-0.1175
No Opinion	0.0708	-0.0286	0.1193
Significance, p=	***0.0156***	*0.9160*	*0.4168*

The other relationships were not found to be statistically significant. A recent study by Cameron (1997:160) confirms the complexity of people's ideas regarding the commodification of water. He found that many people could see both sides over this issue. It appears here that those who were unable to comment on the current licensing system and the regulator (the 'No Opinions') need most convincing about commodification. The No Opinion group were found in Chapter Six to be a mix of stakeholders. These respondents were more likely to support items in the Equality scale.

2. Does judgement of the NRA and current system predict support for strategies?
The aim of this analysis was to discover whether support for certain management strategies (mean scores on the 2 strategy scales) was related to support for the regulator and the existing licensing system.

Table 7- 18: EVALUATION V STRATEGY: results of Anova

EVALUATION	Mean score INTERFERENCE scale	Mean score STATUS QUO scale
PRO	0.5382	-0.3058
ANTI	-0.1268	-0.1246
NO OPINION	-0.0212	0.1313
Significance, p=	***0.0245***	*0.1386*

The results of an Anova test indicated that scores on the INTERFERENCE scale could be explained in terms of support for current regulation. Those who supported the current system (PROs) were found to be significantly more likely to *oppose* the 'interference' strategies than those who were ANTI or No Opinion, with ANTIs expressing most support. The PROs gave more *support* than the others to the 'status quo' strategies (which, although not found to be significant makes logical sense). The No Opinion group showed least support for 'status quo' strategies.

3. Does PHILOSOPHY predict support for strategies?
Pearson's Product Moment Correlation was used to look at the correlation between

the interval variables measuring *water justice beliefs* and *attitude to management strategies.*

Table 7- 19: Comparing support for management strategies with 'water justice philosophy'

	PUBLIC GOOD	EQUALITY	COMMODITY
INTERFERENCE	**0.2937 (9%)** ***p=0.001***	**-0.2515 (6.25%)** ***p=0.005***	**-0.2386 (5.3%)** ***p=0.008***
STATUS QUO	0.0025 *p=0.978*	-0.0515 *p=0.570*	**0.4998 (25%)** ***p<0.0001***

Statistically significant correlations were found for the INTERFERENCE variable, although the correlation explains only a very small percentage of the variance:

A PUBLIC GOOD belief correlates *positively* with INTERFERENCE

An EQUALITY belief correlates *negatively* with INTERFERENCE

A COMMODITY belief correlates *negatively* with INTERFERENCE

Regarding support for strategies that maintain the STATUS QUO of water use and rights, only the COMMODITY variable was significant and explains 25% of the variance.

A COMMODITY belief correlates *positively* with STATUS QUO

This confirms that those who hold a belief in water as a public good are least satisfied with the current situation, and express more support for strategies which would bring about a change in water use and management.

Discriminant analysis. As a means of second checking the findings here, a discriminant analysis was also carried out for the 5 interval variables using EVALUATION and then TYPE as group variable. For reasons of brevity, the analysis here is not based around those results, but some of the main findings were confirmed. (The statistical output is included as an Appendix 4).

- A statistically significant discrimination was found between PROs and ANTIs on the basis of the INTERFERENCE and Public Good variables (p=0.057) (see Function 1 of the first discriminant analysis in Appendix 3).
- Amongst the stakeholder groups, a significant discrimination was found on the basis of INTERFERENCE and Commodification, between environmentalists, local government and recreationists, and irrigators, agricultural users and business users (p<0.0001). (see Function 1 of the second discriminant analysis).

Philosophical interpretation. The results of the 3 tests above are shown in the matrix in Table 7- 20. The findings compare favourably with some of those from the work of

Table 7- 20: Characteristics of water fairness perceptions in the Lark catchment

	Public Good	Equality	Commodity	Interference	Status Quo
Pro	**no**	no	yes	**no**	yes
Anti	**yes**	no	yes	**yes**	yes
No Opinion	**no**	yes	no	**yes**	no
Public Good				**+ve**	
Equality				**-ve**	
Commodity				**-ve**	**+ve**

Syme and colleagues (1997). Three different 'perception groups' can be differentiated based around the EVALUATION variable.

Statistically significant relationships are in bold

Perception 1: Those who are in support of the current regulatory system (**PRO**) were found in Chapter 6 more likely to be commercial water abstractors, along with some recreationists and domestic well users. This group was likely to be more in favour of strategies which maintain the **status quo** of water use than the interference strategies; to express stronger support for the **Commodification** philosophy than the Public Good or Equality philosophies; and to be opposed to more public consultation and special treatment of environmental need. The PROs were found to be least ambiguous in their characteristics.

In a study of attitudes to water management in Australia, Syme also concluded that:

> *(...) it could be said that in terms of perceptions of fairness of water processes in Australia at present, those who consider the processes to be "closest to fair"[1] are more inclined to believe in a water market, are less concerned about downstream users, have a lower belief in community justice and responsibility, and are less likely to agree with paying the full costs of providing water.*
>
> Syme (1997:2151)

Analysis in Chapter Six showed that the farmers' perception of the water problem centred on the risks and uncertainties associated with irrigation because of the restriction of spray irrigation during times of shortage. These perceptions distorted the farmers support for the NRA. At the same time, they supported the system of licensing (representing the status quo) because in principle it was meeting their needs and defending their existing rights to water. Their support of the licensing system in principle would suggest that conflict resided in the procedures and practices of the regulator following water allocation.

Perception 2: Environmentalists, government staff, domestic well users and

[1] A judgement of the fairness of the current system. Similar to the 'EVALUATION' variable here.

recreational users were more likely to be against the current regulatory system (**ANTI**) and more significantly likely to support a **Public Good** philosophy than the PROs or No Opinion groups. They were more in favour of strategies which challenge existing practices (**INTERFERENCE**) and significantly more likely than the other groups to be so. They expressed above average support for maintaining the status quo (so ANTI is a less definitive variable than PRO), but this was not found to be significant compared to the other 2 groups.

These results also mirror those of Syme and colleagues who write:

> *'It would seem that those who have a history of access to water for commercial use, or are more interested in business enterprise are more satisfied that their philosophies are generally being reflected in the current allocation systems. Those who tend to view the systems as being less fair are those who seem to be more interested in global views of community and environmental justice'.*
>
> *(Syme and Nancarrow, 1992:151)*

Perception 3: Those who held '**No Opinion**' were a mixed group consisting of all stakeholder groups. Where significant differences were found between the 3 EVALUATION groups, i.e. for the **Public Good** and the **INTERFERENCE** scales, the score of the No Opinion group fell in between the Pro and Anti groups. So members of this group are likely to hold less strongly defined water justice beliefs than the other groups. Although not statistically significant, they scored a higher support than average for an **Equality** philosophy and lower than average support for Commodity, and showed less support than the others for the Status Quo.

Conclusion

This chapter set out to address the following questions:

1. What attitudes do stakeholders have to different supply and demand management strategies?
2. What is the nature of the 'water justice beliefs' in the catchment?
3. To what extent is there a correlation between these *water justice beliefs*, *judgements of the regulator* and the incumbent licensing system, and *attitudes to strategies* for managing the water problem?

Section one began with a quantitative overview of the support and opposition expressed by stakeholders to a range of water resource strategies for dealing with 'water scarcity'. There was general opposition to trading, but a strong belief that allocative efficiency of water resources should be improved. There was no prominent demand for a water market or defence of the principles it represents. No such change in allocation *principles* were demanded, rather a more 'sensitive' implementation of the system that was already in force. Thus, if a method other than water markets

could be found to improve efficiency, it would be likely to command support. However, the eclectic understandings of *efficiency* would need to be recognised. Those who viewed the license as a strictly regulated allocation of the right to put a common resource to use, did not accept that this should be extended to include the right to allocate it to other uses or to make a profit from its commodification. Their beliefs rested in the principle that water is and should remain a public good and that trading would work to alter attitudes to water unfavourably. However, a group of commercial users felt differently and a general difference between the perceptions of some abstractors and non-abstracting 'users' of water resources was found in qualitative and quantitative analysis.

Finally in section one, the factor analysis showed that attitudes in the catchment towards strategies can be simplified into two types: support for strategies which would act to reduce demand from a water source, and for those which would allow current practices to continue by offering either more security of supply or access to supplies. Above average support for the latter was found among commercial water abstractors, and for the former, the non-abstracting stakeholders showed above average support which was found to be in statistically significant opposition to irrigators.

Section two began by looking at how stakeholders prioritised both the allocation of water and restrictions to different uses and users of water. Irrigators emerged as a group most likely to conflict with others over the prioritising of water uses. Attitudes to the allocation of restrictions placed little emphasis on scientific rationality. On the contrary, most of the abstractors and many other stakeholders preferred an equal sharing of the burden of restrictions. Alternative rationales suggested for the targeting of restrictions, in addition to hydrological impact, included:

- relative importance of the water use
- extent of earlier attempts made to avoid problems
- effect of restrictions on employment
- ability of business to recover from negative impacts
- the notion of collective responsibility
- reducing the fatal impact on individual businesses
- increasing the motivation to conserve
- not having to 'subsidise' the impacts of others
- concern for fairness
- proportional to size of license
- proportional to impact of abstraction
- proportional to the economic, social and environmental costs and benefits examined before making a decision

Lane (1986), in a review of what he terms *market justice* and *political justice,* suggests that *equality* and *need* are preferred distributive principles in a more 'political' decision

making system. Lane argues that in a market system *proportionality* is regarded as a more just distributive principle. This might suggest that were a market system for water to be introduced, farmers could begin to demand more strongly that restrictions were implemented proportionally, and therefore to demand more sound and accurate science as a basis.

An analysis of agreement with different 'water justice principles' next revealed that, again, most agreement amongst the respondents was for items which represented the idea of water as a *public good* which should be allocated so as to achieve social objectives. In addition to the public good belief, two other notions of fairness were found in the catchment which were labelled *equality* and *commodity*. Significant differences were found for scores on the latter scale between commercial users and non-abstractors (the former scoring more in support of *commodity*).

In section three, 2 distinct sets of fairness traits were identified which could be associated with a stakeholder's support for existing regulation. Those who supported the regulator and the licensing system were significantly less likely to support INTERFERENCE strategies. They scored a higher support for the STATUS QUO strategies and also scored more highly than average on the Commodity scale than others. For these respondents, mostly farmers, a support for trading is characterised by an expectation that the regulator will maintain the current 'playing field'. In contrast, stakeholders scoring higher than average support on the Public Good scale were significantly less likely to be supporting of the current regulatory system and to score more support for INTERFERENCE strategies. A third group of stakeholders who did express a strong opinion about regulation were found likely to hold fairness views that were a less defined mixture of these traits.

A theoretical postulate at the beginning of this study was that perceptions of a fair regulator and regulatory mechanism would result in people having more trust in the regulator as it attempted to introduce new strategies in the name of sustainability. However, what has been found in the context of the Lark valley is that those who gave more support for the existing regulatory system, trust the regulator not to jeopardise their existing rights. In contrast, it was those who did not support the regulator as it was that wished to see water management changed in ways that challenged existing principles. This suggests that if the regulator were to implement strategies which necessitated new attitudes and changes to established principles, it would not be popular with those who currently support it, but would be with those who do not.

Chapter 8

Conclusions

Introduction

The broad aim of this thesis was to explore tensions resulting from the implementation of polices for advancing sustainable water management and use. The context for this objective was the increasing stress on water resources that was extending even to temperate climates such as that of the UK, coupled with the institutional reorganisation and redefinition of water management in England and Wales. The thesis began in 1994, 2 years after one prolonged drought, and the year before the start of another. In addition, at the beginning of the 1990s, the environment as an official competitor for water had been boosted by the rhetoric of the sustainability paradigm. I sought to question what was implied by sustainable water resource management; was it possible that addressing one set of objectives such as *environmental* or *resource* sustainability, could lead to other predeterminants such as *social* sustainability being compromised? Thus, I set out to investigate how water resources management, in particular the allocation of water, was evaluated by stakeholders in terms of its outcomes, and whether the principles being used for this evaluation were compatible with the normative principles implied by the sustainability objectives of the regulator. In essence, this suggested an investigation of how water resources could be allocated so as to be fair in the context of increased contestation over how water should be managed. The research, within a small, rural water stressed catchment - the Lark Valley, addressed the following four key questions: i. What did different stakeholders understand to be fair water resource management, and how were claims for water justified? ii. What were the stakeholders' judgements of regulation by the NRA? iii. To what extent can water resources problems be understood in terms of different notions of fairness? iv. How important are these notions of fairness to the pursuit of sustainable water resource management?

The importance of the rationale for this thesis and the questions it addresses are highlighted by the attention that water resource issues have received at policy level since the study began. The following are examples. First, the *1995 Environment Act* placed a greater emphasis within the duties of the Environment Agency to consider the costs and benefits of sustainability[1] and the impact of its decisions on rural

[1] Section 39.

livelihoods. Second, in 1996 the DoE published '*Water resources and supply: an agenda for action*' setting out demand management actions for the water regulators water managers and users (DoE, 1996b). Third, in June 1996, the HoC Environment Committee also undertook a major inquiry into water conservation and supply as a result of the resource problems and social conflict arising from water supply and management during the 1995 drought. Among its many terms of reference was to investigate environmentally and economically viable ways of influencing trends in water use and identify measures most likely to increase the effectiveness of appeals for conservation (HoC, 1996). Included in its recommendations were greater accountability and transparency in the water resources planning process and more public awareness and debate. Fourth is an EU Framework Directive for Water dealing with the protection of surface and groundwater, the efficient use of water and the effectiveness of environmental protection (EC, 1996). Fifth, in 1997, the independent UK RoundTable on Sustainable Development published its report on freshwater (UKRTSD, 1997). It examined human impacts on the water cycle and the sustainable management of water resources. Finally, a review of the abstraction license system in England and Wales was begun by the DETR following a 'Water Summit' held in May 1997 by the Labour government shortly after their election. The review was to consider "*what licensing framework would be appropriate to enable issues which are now seen to be associated with water abstraction to be addressed most effectively. It will consider whether that framework should incorporate new economic instruments to facilitate optimum distribution and sustainable use of water resources*" (DETR, 1997b:1). The review announcement mentions fairness explicitly: the "*key aim of the abstraction licensing system review will be to ensure that abstraction licensing and related processes provide full protection for the environment whilst enabling fair and flexible arrangements for meeting properly managed demand for water resources*" (DETR, 1997b:1, emphasis mine).

I will now begin drawing together the key findings from my research and consider how they enhance understanding of sustainable water resources management and regulation. In section (i), I consider how the research has developed our understanding of what environmental and social justice and equity in water resources management means, given the interpretation which emerged from the reviews of the literature in Chapters Two and Three of this thesis. Also, in this section, I will suggest what has been learnt about the importance of equity for sustainable water resources management from my empirical research. I then move on in section (ii) to the

substantive and specific policy recommendations that have emerged from the thesis which address how water resources might be managed so as to be fair.

i. *A richer understanding of equity and its importance for sustainable water regulation: a comparison of stakeholders*

Two significant transitions within water resources regulation have been identified in this research. First, the notion of fairness inherent in water legislation, that of *balance, is being challenged.* Balance was originally a socially motivated concept, i.e. as a way of managing fairness between different abstractors. Now balancing is seen as being between abstractors and the environment. The focus for the regulator's discourse on water sustainability was environmental sustainability; and NRA staff needed to bring the environment in to the decision-making process during a period of shortage and increasingly vociferous abstractors, heightened environmental awareness, and a problematised image of water due to privatisation. The limits posed by sustainability policies (policies that have been added on to a pre-existing allocation system) are revealing expectations to water which challenge those limits. Abstractors have historically expected the regulator to defend and protect existing abstraction rights.

A second change revealed by this research is that when closure of the water resource occurs, much more is being expected of the regulator in terms of managing and allocating the resource. *Potential* abstractors will begin to contest water rights, and *existing* abstractors are required to defend their rights in a way not previously necessary. For example, while resources were available, first-come-first-served was seen as a fair way to allocate water. But events in the Lark have illustrated that limits on water resources were forcing a shift in what fair water resource management meant. The basis for water allocation was being challenged. In particular, the regulator was being expected to take *economic* considerations into account which are beyond their brief, and environmental considerations which are beyond their (legal and scientific) ability.

The NRA was limited to assessing its policies in terms of their effect on the aquatic environment and their operational efficiency. This narrow interpretation of sustainability at the local level conflicts with the holistic nature of sustainable water resource management encompassing different claims and understandings. At the same time, the NRA's other duties and existing legislation acted to hinder the importance it gave to environmental sustainability. Licenses of right, essentially a first-come-first-keep policy, have restricted the ability of the NRA to adjust to new

ideas of environmental justice that have emerged with the sustainability rhetoric. The research has revealed a gulf between historical licensing policy, the demands of abstractors and the objectives of the regulator.

I will now draw together findings about how equity concerns and different notions of fairness are shaped by the different ways in which water is construed and the different claims for water, and by expectations of the regulator and of regulation. Much of the discussion in the thesis centres around the differences between the industrial users, the irrigators and the environmentalists. Local authority and recreationists' responses to the questionnaire were, on the whole, in line with the views of environmentalists, while, as a group, the commercial users of water also held similar views. Many rationales were shared by individuals across the groups, but where dissonance did exist, it was usually between abstractors and non-abstractors.

How water is construed. The predominant view found in the catchment was that water should be treated as common good rather than a private good. The support for water as a public good conflicts with a strategy for sustainability based on private property rights. Those who view the license as a strictly regulated allocation of the right to put a common resource to use, do not accept that this should be extended to include the right to pass it on to other uses or to make a profit through trading. If the regulator were to attempt to introduce market mechanisms, for example, without seeking the understanding and legitimation of the stakeholders, it is likely to create tensions because of social and culturally ingrained perceptions hostile to the commodification of water. But stakeholders did argue for an improvement in the efficiency of allocation and use. There was strong support for an ethic of self-help and for a strategy to encourage abstractors to take responsibility for the security of their supplies. Thus, if methods other than markets can be found to improve efficiency they are likely to command support. There were mixed feelings about the use of economic tools. The introduction of trading, which would result in market prices, was viewed as fairer than incentive charging for abstraction which was seen by farmers, for example, as a tax. Most farmers would prefer the licensing system for water allocation to remain as it is, with the option of entering a market applying soley to any surplus water. A regulated market was favoured by those who have water to trade, whereas a regulated allocation was favoured by all others. The analysis also suggested that among non-abstractors, there was more preference for a system that allocates and targets water resources discriminately rather than according to first-come-first-served.

Within the public good position, there were clear differences regarding what kind of a resource water was and how, therefore, it should be allocated. The claims of an industrial user for more water were based around economic and social benefits that the use of water brings, or rather that are threatened by a lack of access. The farmers construed water as an instrumental resource; reflecting an instrumental understanding of natural systems i.e. how they are used and how they impact on their livelihoods. This is illustrated by such comments as: "*rainfall has decreased and I need to replace the loss*", and "*we should all have as much as we need*". As abstractors who already had licenses, they were concerned primarily with the stability of their access to water and defending 'their' water from new claims. Water is first and foremost to be viewed as a resource for business, rather than as an environmental good. The farmers' arguments were not employing the sustainability discourse of the regulator.

There is no evidence here that environmental problems are dismissed as such, but their concern is that the *impacts* of policy implemented in the name of environmental protection have not been sufficiently recognised and taken into account. The fact that farmers do not systematically experience a conflict with environmentalists has been illustrated by many studies into farmers' environmental attitudes. One example is a study by McEachern (1992) which showed that the apparently contradictory position of farmers' nurturing the land and exploiting it as a business asset was not seen as so by the farmers until they were faced with other views which contested their own. This was because they had customarily accommodated both needs as a matter of course. The farmers' claims to water drew on the natural justice bestowed on agriculture because of society's elementary dependence on it. This gave the farmers a strong sense of where they stood in the order of things and which they felt was not taken account of in drought management policy (McEachern, 1992). Fair water resources management for farmers is not about environmental equity. The critical issue for farmers is the sustainability of agriculture not sustainable agriculture[1]. The farmers defended their position not just in terms of their own livelihoods but in terms of the needs of society as a whole (hence the public/private good overlap within their rationales).

The environmentalists had a much more holistic view of water as part of the wider natural system. They feel that licensing has failed sustainability and regulation has

[1] Sustainable agriculture is that which is able to accommodate the values of society as a whole; which allows the desired forms of cultural and economic development and environmental protection. In the same vein, water resource management that does not sustain the rural livelihoods and cultures can not be called 'sustainable' (Thompson, 1995).

not addressed the common good sufficiently. That farmers and conservationists have different views on the same thing has been recognised in many studies of farmers' attitudes and values regarding nature conversation (Newby et al, 1977; Carr and Tait, 1991; McEachern, 1992). This study reveals that the same can be said about their understandings of water regulation. Finally, for the Water Companies, environmental protection could only be seen to be fair if it were underpinned by a cost-benefit analysis.

The nature of fairness in water resources management: attitudes to the regulator. It is clear from the discussion above that each stakeholder group was embedded in different interests and social processes and relations which have characterised their notions of fairness. However, I found that stakeholders did not, on the whole, refer very much to the claims and interests of others. They were not therefore positioning themselves within a 'communicative' catchment as might be implied by the ideals of catchment management or integrated waters resources management. The success of the Lark Valley Abstractors (LVA) is a highly significant exception; fairness norms, located within social relations of the institution of the LVA, were found to influence farmers' acceptance of voluntary restrictions on water abstraction during the extended drought of 1989-1990. Farmers were influenced by their perceptions of other farmers behaviour. If they feel that other users are not sufficiently being encouraged in careful water use, they will be more inclined to irrigate and exercise less control. They need to know that other farmers are complying and that there is no preferential treatment. In the case of the voluntary agreements, the farmers gained a sense of one farmer effecting things for others because of the new degree of pressure on resources. A reliance on codes of conduct - a socially negotiated idea of fairness complimented the forces of self interest necessitated by the survival of their businesses. This finding confirms the important role of negotiation for sustainability

The majority of stakeholders perceive the regulatory system to be fair and generally expressed support for it.. However, many stakeholders were not sure that it was working 'properly'. Equity was not just about the allocation of water and access to it. It consisted of concerns about the production of resource problems in the first place. Fairness concerns were found to be more about the rationale of decisions than the procedures of decision making. For irrigators, there was less concern about the nature of the regulatory tools than the methods of their implementation. The modes of enforcement of regulations were found (in the case of the LVAs) to be more important in achieving co-operation than the actual nature of the regulatory tools. Thus, procedural justice was more about 'proper' implementation than participation in

decision making. Farmers would be more willing to suffer the burdens of regulation and to view them as fair, if they felt that restrictions were competently arrived at. However, in the case when implementation was not considered acceptable, fairness was considered in terms of wanting better communication and dialogue so as to achieve contextual sensitivity on the part of the regulator.

Farmers supported the licensing system and defended it on the grounds of security and precedence. Their accounts and claims did not engage with the environmental duties of the NRA. For farmers, the role of the regulator had been taken to be 'guardian of their supplies' and water management by the NRA was seen principally as a service to their business as much as a function of environmental regulation. The need for a regulator was accepted and support for regulation was located in the farmers' perceived need for the control of abstraction to curtail excessive self interested behaviour that might effect themselves or others. Essentially a water license was viewed as an insurance against the effects of water shortage - acting as a risk avoidance mechanism. For farmers, the role of water resource management, and therefore of the regulator, is perceived as being to reduce unpredictability, and to ensure the security of their supply.

The degree of flexibility that is demanded at the farm level by the structure of the modern agricultural economy was being curtailed by water use restrictions. This added to the level of business uncertainty that farmers were experiencing and gave rise to a questioning of the authority of the regulator and its ability to deal with farming concerns[1]. Stakeholders' expectations of the regulator and their ideas of fairness can be related to *different* ideas regarding the nature of uncertainty. For the environmentalists uncertainty is endemic and they expected an improved application of the precautionary principle. In contrast, farmers wanted scientific uncertainty to be dealt with, so as to overcome the inadequate basis on which environment needs were being protected, and they were less accepting of a limit to expertise. The technical competence of the NRA was a larger part of fairness than any internalised moral values. The farmers positivist approach was similar to that of the NRA staff themselves whose notions of fairness were based in their professionalism as scientists. Where scientific justification was not possible, their recourse was to meeting their legal obligations which, as a product of a democratic political and legal system, were seen as having an objective authority.

[1] Uncertainty has been addressed in psychological research into individual behaviour (Dawes, 1988; Biel & Garling, 1995). People have been found to prefer outcomes that are more certain over those that maximise individual utility (Dawes, 1988). Uncontrollable events elicit more frustration, anger and stress and may lead the user to seek more control.

This research did show, however, that the 'moral authority' of the NRA was *undermined* by scepticism regarding its expertise. Many stakeholders viewed the NRA as unable to act in the interests of the wider common good; when the continued economic development and health of the region, for example, was seen as being unfairly sacrificed to environmental sustainability. A decreasing acceptance of leaving decisions to the judgements and risk assessments of regulatory staff would compromise its ability to be flexible to local circumstances. In addition, because the NRA had inherited the historical licensing practice, there was a perception that it was responsible for what happened in the past. This also hindered the legitimation of its own practices.

One characteristic of sustainable water resource management must be that it maximises voluntary co-operation with policies and strategies. To a large extent, the licensing system had historically managed this. Abstractors felt that their interests were represented by the system. However, once the environment became a contender for resources because of simultaneous increased resource stress and greater environmental awareness, the strategies being used by the regulator have been contested. Introducing *environmental justice* has lead to an obstacle in terms of perceptions about *social justice*. Even though it was agreed at the Rio Earth Summit that: *[I]ntegrated water resource management is based on the perception of water as an integral part of the ecosystem, a natural resource, and a social and economic good* (Agenda 21, chapter 18:3 - emphasis mine), this study has shown that the ability of the NRA to treat water as an economic good was very limited. At the same time, the main abstractor group did not relate to water as an environmental good. As people are likely to have a sense of priorities for water use, the NRA's inability to apply any comparative criteria to applications for water was difficult for the public to understand.

Perceptions of unfair treatment in the Lark catchment were that water companies had an advantageous influence over the NRA and were favoured in regulation relative to other stakeholders; and, among farmers, that agricultural use was unfairly subject to restrictions. Since drought affects different farmers differently, whether or not water resource management institutions should attempt to address these unfairness perceptions is difficult. It depends on whether the distribution of drought impact is accepted as a consequence of natural justice, such as geographic location, or if it is thought that impacts should be addressed by the social system of water regulation. Among the farmers in this survey there were arguments for both positions. What was clear is that once negotiation took place, the farmers of the LVA were willing and able to find their own acceptable solution to the impacts of drought and to the demands

made by the regulator. The members of the LVA agreed together on restrictions that were applied equally to all before they became necessary to any. They did not, for example, agree to allocate restrictions according to crop type and they did not talk in terms of allocation to the most efficient producer being the fairest. Clearly, stakeholders responses to management strategies were influenced by values and perceptions that are non-financial and that are part of the cultural context within which management strategies must operate.

The NRA's view was that it was consistent in its handling of drought problems in accordance with what it considered to be fair. It was not in a position to take into account how restrictions might impact inequitably on different farmers. Its concern was with procedural fairness, and not with the complexities of social or economic impact. For the NRA, there was a tension between, on the one hand, the complexity involved in adapting policies to make them more 'fair' but discriminatory on the basis of very local impact, and restrictions which are based on a simplified, but consistent and non-discriminatory, usually catchment, level hydrological basis.

The NRA response to the drought of 1990-1992 showed an approach whereby the abstractors were not seen as part of regulation, only objects of it. The fact that farmers did not behave as passive recipients of restrictions bought home to the NRA that the rational and non-rational responses of abstractors needed to be recognised in policy if sustainable drought management practices were to be achieved. The same applies to resources management. Regulation is the top down application of legal duties using nationally established regulatory instruments. The NRA seemed to view the farmers as the sole source of decisions of water use, rather than as actors incorporated into wider economic and regulatory networks. The NRA staff viewed their role as one of managing supplies, rather than managing use or demand; and indeed they did not have the expertise for the latter.

The review of equity literature in Chapter Two suggested that perceptions of fair water resources management affect judgements of a regulating authority and that likewise, judgements such as competence and trustworthiness affect the moral authority and thus the legitimation of the regulator. To conclude, a major finding of this research challenges the simplicity of this proposition. In the case study, those who supported the regulator more strongly, i.e. the farmers, were those whose 'understanding' of water and expectations for regulation least embraced the NRA's own objectives and the normative assumptions behind policy. Although the NRA's legitimacy was rooted in the moral mandate of being 'guardian of the environment', attitudes towards the first-come-first-served licensing system were more favourable

amongst agricultural users than environmentalists. Those who construed water as an 'instrumental' resource still trusted the regulator to continue representing their interests through a status quo approach to management. Over time, this may be a potential source for conflict.

Water justice was construed by the stakeholder groups in this study in three ways; either in terms of environmental justice, as institutional justice represented by the expectations set up by historical precedent, or as utilitarian justice whereby water should be reallocated from those that are 'sitting on it' to those that use it. Finally, there was a collective fairness norm in which the public ownership of water was favoured over private property rights.

ii. *How can resources be managed so as to be fair?: policy recommendations and conclusion*

The problems in the Lark catchment can, in part, be explained by disjunctures between strategies for environmental sustainability and the assumptions and prevailing practices of abstractors and stakeholders' expectations of the regulator. The pursuit of sustainable water resource management is creating actual and potential conflict, especially when existing norms of 'water justice' are challenged. The challenge for the regulator is how to deal with the perceptions of different stakeholder groups. The regulator may not be able to rely on recourse to fairness for its legitimation if its 'customers' hold very different notions of fairness. The recommendations for water policy and policy making that emerge from this thesis are discussed in terms of: the regulatory framework, the role of science and the challenge to developing a more deliberative institution to manage water resources sustainably.

The regulatory framework

It is clear that the regulator needs to gain an understanding of water abstractors as actors in many economic and social networks. These networks, as well as encouraging innovation, may place limits on the extent and speed with which adaptive responses to policy can occur. If farmers feel that the regulations recognise their particular relationship with water they are willing to negotiate. It was clear from the research that dialogue is part of the process of fairness judgements: any improvement in regulation was attributed particularly to better communication. The focus for the development of regulation should be on new modes of enforcement, especially how to encourage co-operation between regulator and regulated. Water resources management needs to capitalise on the role that perceptions of fair conduct inherent in social relations among abstractors can play in encouraging co-operation.

Advancing sustainable water resource management requires an historical contextualisation of expectations, and of what is perceived as fair and acceptable water resource management within a community of abstractors. It has been argued recently that environmental policy should be developed in a more context sensitive manner: "*Such contextualised management would be akin to the practice of model testing, revision and calibration in science, which often allows for implementation of understanding in relation to (new) local conditions*" (Trudgill and Richards, 1997:5). An important fairness issue for stakeholders was governance. Given that more 'localism' is advocated as a key factor in the transition to sustainability, Nagpol and Foltz (1995) suggest a new role for the state as a "*facilitator for communal self-reliance and consensus building*" (quoted in O'Riordan, 1997a:9). In such contexts, O'Riordan suggests that "*[C]itizens will be expected to act like socially responsible citizens, not individually self gratifying consumers*" (1997a:9). Securing sustainable water use will be as much a function of social relations and responses to inherited social norms, as it is a consequence of government intervention or market incentives. Yet until now, policy changes have been lead by the need to identify more appropriate *tools* of regulation. The regulation of water should be a partnership between the different claims on it. But, at present, there is no forum for abstractors to deliberate about, rather than defend, their positions. Neither the Catchment Management Plans nor the processes of appeal to the Secretary of State of the Environment allow for deliberation. The appeal system currently means that the regulator can only use 'objective' arguments. It does not enable historical precedent to be challenged even though social, economic and environmental circumstances have changed: outcomes are still bound by the existing framework. If the regulatory structure is to engage with the broader issues that are demanded by social sustainability, it will have to be more interactive with other social agents, as well as more flexible and more proactive in its feedback to policy makers. To have fewer conflicts, the regulator will have to change its communication with other agents from being educative and consultative to one of more inter-active dialogue.

Although ideas of fair water resource management can be attributed to individuals' interests, social mechanisms can be used to influence behaviour and co-operation, i.e. by activating the salience of the social norm within relationships among abstractors. Some psychological studies (Kramer et al., 1986) suggest that individuals who have a pro-social orientation will exercise constraint when they are made aware that a collective good is being threatened. Those with individualistic or competitive value orientations will respond by attempting to improve their own

outcomes. Thus, it would be wise for the regulator to make individuals aware of the effect of resource degradation on the grounds of self *and* collective interest. Studies have shown that enhancing social identification transforms peoples' motives to a more collective interest as it increases commitment to group norms and trust in others (see Tajfel and Turner, 1986). Introducing market-based solutions such as tradable permits may have the opposite effect unless accompanied a) by regulations which guard the collective interest and b) a process of dialogue which activates the collective norm. Economic incentives will need to work in tandem with regulated licensing which defends social expectations.

Further, if the regulator was to pursue a strategy of deregulation, i.e. removing small licenses from the system so as to concentrate on large problematic licences, the nature of its work would change. Licensing officers, experienced in dealing with unproblematic applications, are having to change to become problem solvers. Lack of specialisation/expertise by the regulator was raised again and again by stakeholders: this may reflect the past focus of the NRA on a technical/scientific approach to water management. Staff skills need to be enhanced and diversified to convince stakeholders of their ability to understand different perspectives and thereby enhance the legitimacy of the regulator.

Science and normative principles

There was a polarisation between fairness construed as more scientifically legitimated policy and fairness as more socially contextual policy. If scientific evidence can never be adequate, then the future will lie in policies which take more account of the latter; i.e. cultural ideas of what is fair will become more important. Again, this means that the implementation of policy set within national level norms will have to be locally negotiatiable and flexible. In addition, normative stances need to be made explicit. Although, actions taken by the NRA staff were instrumental, the legal basis for regulation entails a commitment to a particular set of values and ethical commitments. For example, levels of scientific uncertainty need to be made explicit and open to debate; what are reasonable, acceptable and fair levels of precaution when science is inadequate? Would irrigators rather not be allocated the water in the first place than be allocated it with conditions they dislike?

The LVA case confirms Cameron's (1997) findings that economic behaviour is determined by 'social structure, institutions, culture and ethical values' as well a production maximising values. Is a financial incentive more persuasive than a moral suasion of agreeing with fellow users that co-operation is desirable, required or

expected? The LVA example shows how socially negotiated codes of conduct can activate a more pro-social fairness norm that plays an important role in finding sustainable solutions to resource conflicts. As challenges to the regulators' decisions increase, more and more detailed information is required to ensure that decisions are as fair as possible regarding licenses. But, because there can never be enough science, and there can never be enough 'policing', it will require more than scientifically justified decisions to make a sustainable regulatory system.

All these findings indicate that water resources management would benefit from more deliberative strategies to enable normative assumptions to be identified. This implies a certain kind of decision making process that can engage with local issues and provide space for renegotiation at the local level.

The need for more deliberative processes

Martin (1991) suggests the concept of a 'communicative catchment' as the best approach to environmental care, arguing that stakeholders cannot take into consideration perspectives that they have not been confronted with. In this study of the Lark Valley, stakeholders were willing to accept a degree of unfairness as 'natural' and that an 'ideal' solution was not demanded. This would suggest that fairness can be negotiated to be as 'near as possible' and can provide an incentive to co-operation.

The need for deliberative processes in environmental valuation is increasingly advocated (see Drysek, 1990; O'Hara, 1996), especially as resources policy becomes more contested and less a matter to be solved through scientific modelling (O'Riordan, 1997b). Their objectives may range from a mutually acceptable outcome resulting from the reconciliation for different interests, to the creation of a new collective consciousness through processes of mediation (Smith, 1996; O'Riordan, 1997b). The aim is to improve trust and accountability, but also to allow different stakeholders to come to terms with each others positions. This is in contrast to traditional forms of 'top down' consultation which either dismiss local opinion as anecdotal, or involve attempts by the authority in-charge to accommodate the various interests (see Renn et al., 1995).

In conclusion, a commitment to improving the legitimacy of public policy through the development of communicative and democratic structures may offer the most practical means of mediating water conflict at a local catchment level. David Kinnersley (1994), a leading advisor in the UK and formerly Chief Executive of North West Water Authority, suggested that the initial goal of any water resources

management policy should be to create the circumstances in which the many potentially conflicting claims on water can be discussed and sound outcomes achieved. He cited new approaches to conflict resolution in the United States which '*foster a spirit of equality and mutual interests*' (Kinnersley, 1994:203) and argued that the development of good relations precedes sustainability co-operation. More than this, my research clearly demonstrates that an understanding of fairness constructions among different actors and the impacts of policy changes *precedes* those good relations. When bringing stakeholders together, their different constructions of, and relationships to, water and the regulatory system need to be made explicit[1]. By revealing value biases alongside one another, rather than in competition with each other, strategies can be designed around shared values. It seems reasonable that conflicts can be settled or avoided, not by expecting consensus, but by facilitating explicit bargaining and compromise. In particular, with the regulator acknowledging its role as surrogate stakeholder for nature, the needs of the environment for water can be communicated and negotiated in the context of many other stakeholders' relationships to water. In this way, perceptions of fairness can be brought into the balancing act that is sustainable water resources management.

[1] For a new ethic to make a difference, it needs to be both explicitly defined and incorporated incorporated into water policy. This has been achieved by the New Zealand government who, in overhauling its environmental law, attempted to integrate key concepts of environmental ethics and place a central emphasis on the relationship between humans and their environment into the new *Resource Management Act 1991*(Gunn, 1997). According to Gunn (1997) there is no pretence that the Act is value-free and "*it is a comprehensive and philosophically grounded statute: it is the first environmental legislation of its kind in the world*" (1997:118). The difference between the UK Environment Act and the NZ Resource Management Act is that the Environment Act requires only that sustainability be taken into account, whereas in the Resource Management Act all resource management decisions are subject to the requirement of sustainable management.

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Appendix 1

Questionnaire survey

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Water Resources Management in the Lark Valley

I would be very grateful if you could spare the time to fill in this confidential questionnaire on your ideas of fair water management.

- The questionnaire has 5 sections as follows:

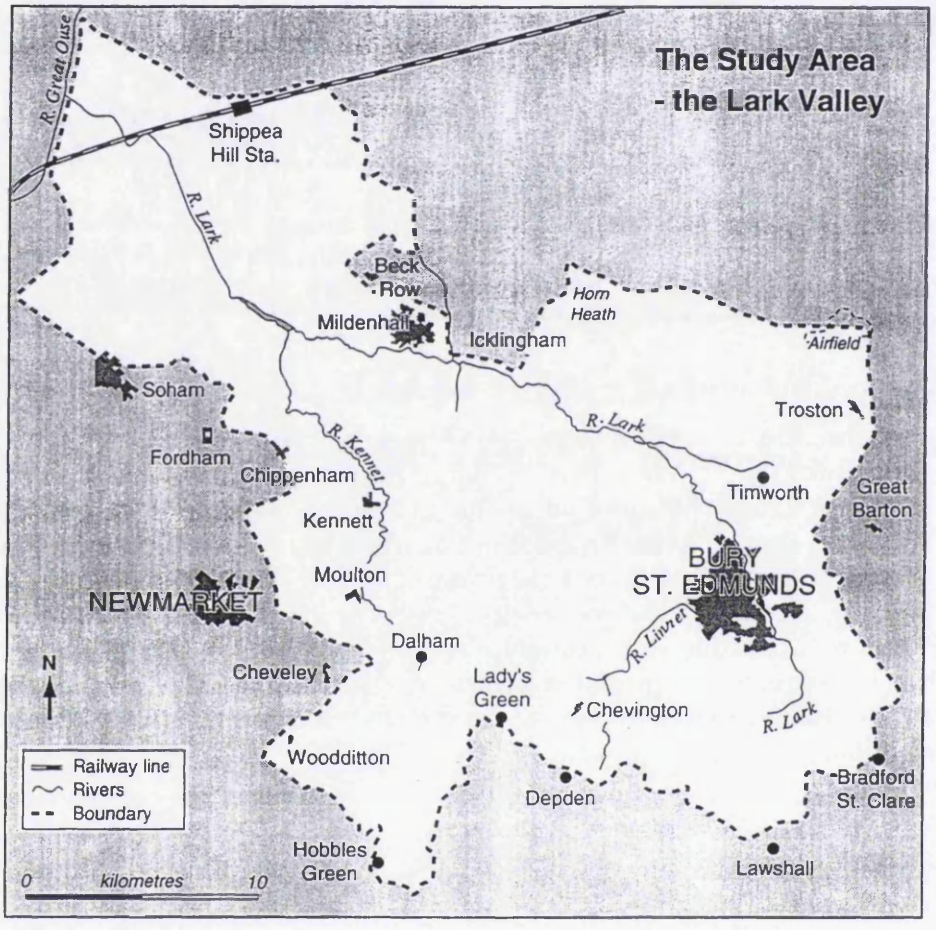
Section One:	**Your Concerns about Water**
Section Two:	**Your Use of Water Resources**
Section Three:	**Ways People Think About Water in England**
Section Four:	**The Fairness of Water Management in East Anglia**
Section Five:	**Difficult Decisions in the Lark Valley**

- Please note that I am interested in your opinions and beliefs. The survey does not require any specialist knowledge. If you feel that you do not have enough information to answer the questions, have a go anyway or skip the question.
- There are quite lot of questions. If you can not find the time to answer all of them, please just answer as much as you can.
- For reasons of familiarity, references to the National Rivers Authority (NRA) are retained in some places, although it should be noted that it recently been replaced by the Environment Agency (EA).

I thank you in anticipation of your help with this study which will form part of a PhD thesis. When you have completed the questionnaire please return it in the envelope provided to the address above within two weeks. As I am interested in getting as many views as possible, please return the questionnaire even if you have not been able to answer all of the questions.

This research is supported by the Economic and Social Research Council, Polaris House, North Star Ave, Swindon SN2 1UJ (Award No.R00429434081)

NOTE: **ALL INFORMATION SUPPLIED WILL REMAIN ABSOLUTELY CONFIDENTIAL. YOUR ANSWERS WILL NOT BE PASSED ON.**


The Study Area
- the Lark Valley
R. Great Ouse
Shippea
Hill Sta.
R. Lark
Beck
Row
Mildenhall
Hom
Heath
Icklingham
Airfield
Soham
Troston
R. Lark
R. Kennet
Fordham
Chippenham
Timworth
Great
Barton
Kennett
BURY
ST. EDMUNDS
Moulton
NEWMARKET
R. Linnet
Dalham
N
Cheveley
Lady's
Green
Chevington
R. Lark
Railway line
Rivers
Boundary
Wooddittton
Depden
Bradford
St. Clare
Hobbles
Green
Lawshall
0
kilometres
10

Section 1 - Your Concern For Water

Q1 **Which of the following groups would you regard yourself a member of? (You may nominate more than one option if you wish. Tick as many as apply)**

Irrigator.....❑	National government.....❑	Water recreationist.....❑
Agricultural water user - non irrigation.....❑	Local government.....❑	Conservationist.....❑
Domestic well user - indoor use.....❑	Industrial water user.....❑	EA staff member.....❑
Domestic well user - outdoor use.....❑	Other business water user.....❑	EA consultee.....❑
Live or work within the Lark Valley Catchment.....❑	Water company staff....❑	Horticulturist....❑

Other user or interest group (please specify): .....

Q2 **Which of the following sentences best describes your feelings about water *(you may tick more than one)***

a) I am **not** particularly concerned about water problems.....❑
b) Water management issues are important to me..... ❑
c) There is no water scarcity in this country.....❑
d) Water shortage is a problem in the Lark Valley....❑

If you ticked a) or c) go on to Q6

Q3 **What do you believe causes shortages of water in the Lark Valley? *(You may give more than one reason)***

population increases .....❑ irrigation .....❑ climate change .....❑
weather .....❑ bad water planning .....❑
Other.....

Q4 **Have your ideas and concerns about water changed in any way over the past decade?**
YES .....❑ NO.....❑ If yes, can you explain briefly how your feelings have changed and why?

.....
.....
.....

Q5 **Do you know of any conflicts or problems about water resources in this area, either now or in the past, involving yourself or others? Please tell me about them:** .....
.....
.....
.....
.....

Q6 **Please tick which you believe. *(You may chose more than one).***

Water is owned by private individuals	True.....❑	False.....❑
Water is owned by the public	True.....❑	False.....❑
Water is owned by the water companies	True.....❑	False.....❑

Section 2 - Your Use of Water Resources

NOTE: ONLY COMPLETE SECTION 2 IF YOU ARE A LOCAL WATER ABSTRACTOR. OTHERWISE PLEASE GO STRAIGHT ON TO SECTION 3

Q7 **Do you use water from .....?(you may tick more than one):**
Mains supply.....❑ River.....❑ Borehole.....❑ Other.....

Q8 **Has the amount of water you use changed over the last decade?**
Increased.....❑ Decreased.....❑ About the same ....❑

Please turn over

Q9 **What has influenced your use of water? (You may chose more than one option. Tick as many as apply)**

need for efficiency....❑ concern about drought restrictions....❑

concern for the environment....❑ problems with obtaining sufficient supplies....❑

need for improved produce....❑ switched activity or occupation....❑

avoiding drought restrictions....❑ other (please specify).....

Q10 **During times of shortage, have you ever voluntarily tried to cut back on your use of water?**

YES....❑ NO....❑... If yes how?.....

Q11 **Looking forward, do you expect to need more or less water?**

Less....❑ About the same ....❑ Go on to next question

More....❑ If you were unable to obtain more water, what would be your reaction and why? .....

.....

.....

Q12 **When thinking about your use of water, please indicate which of the following is most important to you (please write a number from 1 to 5, where 1 is the most important and 5 the least)**

Flexibility ..... Fairness ..... Quality ..... Cost ..... Security of supplies .....

For Licence Holders Only: About your licence (s)-

Q13 **For what total annual amount is (are) your licences? (tcma= thousand cubic meters per annum, mga=million gallons per annum):** smaller than 10 tcma (2.2mga)...❑

between 10 tcma and 20 tcma (2.2 and 4.4mga) ...❑ between 20 tcma and 50 tcma (4.4 and 11mga) ...❑

between 50 tcma and 125 tcma(11 and 27mga) ...❑ larger than 125 tcma (27mga)...❑ Not sure...❑

Q14 **Is it a permanent licence?** **YES....❑** **NO....❑** **Not sure ....❑**

Is it a temporary licence? **YES....❑** **NO....❑** **Not sure ....❑**

Q15 **Are there any conditions attached to your abstraction licence?**

NO....❑ *Go on to Q17* DON'T KNOW....❑ *Go on to Q17*

YES....❑ If yes, please describe the conditions as well as you can: .....

.....

.....

Q16 **Do you think that the conditions on your licence are fair? *(Circle the number you think is appropriate)***

1 2 3

fair don't know unfair

Why are they fair/unfair?.....

.....

.....

Q17 **Do you think that the cost of your licence is fair? *(Circle the number you think is appropriate)***

1 2 3

fair don't know unfair

Would you accept a doubling of your licence fee?..... YES....❑ NO....❑ Why?.....

.....

Q18 **Have you ever been refused a licence or an increase on your licence? NO....❑ Go to next question**

YES....❑ Can you say why this was and when? .....

.....

What effect did it have?.....

.....

Q19 **Approximately, how much of your total licensed volume of water do you actually use:...(%)**

in a normal year? .....%... in a drought year? .....%.....

Q20 **Have you ever appealed, formerly or informally, against an NRA /EA decision?** NO...❑ YES.❑

Section 3 - Ways People Think About Water

Q21 **Thinking about the benefits to society of using water in different ways, please rank the importance you would give the following uses - put 1 for the most important use, 2 for the next important use and so on until 9 for the least important?**

		private domestic wells	.....
local industry	.....	water for the environment	.....
water for gardening	.....	domestic water supply in this area	.....
existing agricultural use	.....	domestic water supply outside of this area	.....
new agricultural use	.....	water for leisure (golf courses, football grounds etc.)	.....

Q22 **Below are a number of statements describing various ways that people might think about water.**

I would like to know how much you agree or disagree with each idea. Do not think long on each one - just give your first thoughts. Tick the box which best describes how much you agree or disagree.

Scale: 1 = strongly agree 2 = agree 3 = no opinion 4 = disagree 5 = strongly disagree

	Strongly agree				Strongly disagree
I don't care how decisions are made as long as the right people get enough water	❑1	❑2	❑3	❑4	❑5
Existing abstractors with large licences should forfeit water for new applicants	❑1	❑2	❑3	❑4	❑5
First come first served is the best way to allocate resources	❑1	❑2	❑3	❑4	❑5
How much people are prepared to pay for water is a good way of deciding who has rights to it	❑1	❑2	❑3	❑4	❑5
Cultural values and tradition should be taken into account when making water management decisions	❑1	❑2	❑3	❑4	❑5
Water should be cheaper for important uses	❑1	❑2	❑3	❑4	❑5
If people live in a water scarce area, they should pay more for water if it costs more to provide it	❑1	❑2	❑3	❑4	❑5
If I have a licence that I no longer need, I should be allowed to sell it to someone who needs the water	❑1	❑2	❑3	❑4	❑5
All types of users have the same rights to water	❑1	❑2	❑3	❑4	❑5
If the public are fairly consulted I am happy with whatever allocations are decided	❑1	❑2	❑3	❑4	❑5
It is important to think now about the water needs of future generations	❑1	❑2	❑3	❑4	❑5
It is impossible to have a decision making process which is fair to everyone	❑1	❑2	❑3	❑4	❑5
It is not fair that one neighbour may have a permanent licence while the other can not get one at all	❑1	❑2	❑3	❑4	❑5
Water licences should be targeted to encourage economic growth, rather than given out according to 'first come first served'	❑1	❑2	❑3	❑4	❑5

Please turn over

	Strongly agree				Strongly disagree
In water allocation all types of users should be treated equally	❑1	❑2	❑3	❑4	❑5
It is not right for businesses to go short of water to protect the needs of the environment	❑1	❑2	❑3	❑4	❑5
Neighbours should have the same conditions on their licence, even when their abstraction has a different impact on water resources	❑1	❑2	❑3	❑4	❑5
Water resources should be regulated by a public body	❑1	❑2	❑3	❑4	❑5
If water is allocated for the environment, environmental groups should pay for it in the same way that other users pay	❑1	❑2	❑3	❑4	❑5
Present licence holders have a greater right to water than newcomers	❑1	❑2	❑3	❑4	❑5
Water should be allocated to maximise benefits to the community as a whole	❑1	❑2	❑3	❑4	❑5
Profits should **not** be made by those supplying or managing water	❑1	❑2	❑3	❑4	❑5
There is a moral obligation to involve all sections of the community in water management decisions	❑1	❑2	❑3	❑4	❑5
Water can only be allocated for human use after the basic needs of the environment have been satisfied	❑1	❑2	❑3	❑4	❑5
Water resources should never belong to private individuals	❑1	❑2	❑3	❑4	❑5
Water should not be bought and sold as an economic commodity	❑1	❑2	❑3	❑4	❑5

Section 4 - The Fairness of Water Management in East Anglia

These questions relate specifically to your experience and beliefs about water management in East Anglia.

Q23 Have you had any contact with the NRA/EA since 1989?

YES....❑ NO....❑..Go To Q30

If yes, was this for a new licence ....❑ as a consultee ....❑

a licence renewal/variation ....❑ other .....

.....

Q24 Were you satisfied with the service provided? (*please circle the appropriate number)*

1 2 3 4 5

Very satisfied neither Not at all satisfied

Q25 Generally, have you been satisfied with the information provided by the NRA/EA?

YES....❑ NO....❑

Q26 Were you given sufficient opportunity to express your views?

YES....❑ NO....❑ Not relevant....❑

Q27 Do you think water management is generally fairer nowadays with the NRA/ Environment Agency compared with the 1980s when resources were managed by Anglian Water Authority?

YES....❑ NO....❑ NOT SURE ....❑ Why? .....

.....

.....

.....

.....

Q28 How fairly do you believe that the different user groups are treated by the water management system in East Anglia?

Are any of the following treated.....:	Unfairly	Fairly	Too fairly	Don't know
Irrigators	❑	❑	❑	❑
Nature	❑	❑	❑	❑
Water companies	❑	❑	❑	❑
Industry	❑	❑	❑	❑
Domestic users	❑	❑	❑	❑

Please explain your beliefs:.....

.....

.....

.....

Q29 The following questions ask for your beliefs of the Environment Agency (EA - formerly NRA) and licensing in East Anglia

Scale: 1 = strongly agree 2 = agree 3 = no opinion 4 = disagree 5 = strongly disagree 6 = NOT SURE

	Strongly agree				Strongly disagree	NOT SURE
The EA is fair to all water users	❑1	❑2	❑3	❑4	❑5	❑6
The EA is necessary because otherwise abstractors would act in their own self interest	❑1	❑2	❑3	❑4	❑5	❑6
Influence and status helps in getting a licence	❑1	❑2	❑3	❑4	❑5	❑6
The licensing system is a fair way of managing water resources	❑1	❑2	❑3	❑4	❑5	❑6
I am confident about the scientific knowledge that the EA uses to make its decisions	❑1	❑2	❑3	❑4	❑5	❑6
The EA gives licences out too easily	❑1	❑2	❑3	❑4	❑5	❑6
The system is unfair because many people cheat on their licence terms	❑1	❑2	❑3	❑4	❑5	❑6
The public are sufficiently involved in licensing decisions	❑1	❑2	❑3	❑4	❑5	❑6
The licence application procedure is easy to understand	❑1	❑2	❑3	❑4	❑5	❑6
It is fair that the EA decides what is a reasonable use or need for water	❑1	❑2	❑3	❑4	❑5	❑6
There is too much politics involved in the allocation of water resources	❑1	❑2	❑3	❑4	❑5	❑6
The EA understands the needs of its users well	❑1	❑2	❑3	❑4	❑5	❑6
The current water management system represents my interests adequately	❑1	❑2	❑3	❑4	❑5	❑6
The EA balances the needs of people and the environment well	❑1	❑2	❑3	❑4	❑5	❑6

Q30 Now thinking about periods of shortage, have you felt satisfied with the NRA/EA's management of drought?

YES.....❑ NO.....❑ NOT SURE.....❑

Please comment :.....

.....

.....

.....

.....

.....

Please turn over

Section 5 - Difficult Decisions in the Lark Valley

The questions in this section ask that you consider situations where there is a lot of stress on water resources in the Lark valley area, and that as a result, competition and conflict are serious problems.

Q31 Imagine that there are no new resources left to abstract in the Lark area. The following concern your opinion on which management strategies would be fair. (Circle the number you think best represents your opinion and then say what influences your belief)

Receiving water through a national grid:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

Building a new reservoir in this area:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

Withdrawal of licences which are causing environmental problems:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

Encouraging people to use less:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

Pooling of licences among groups of users:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

Transferring water from another part of East Anglia:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

On farm reservoirs for winter storage of water:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

Withdrawal of licences which are not being used:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

Charging more for licences so that businesses users are encouraged to conserve water:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

The trading of licences between users:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

Metering domestic users so that they use water more efficiently:

1 2 3 4 5

strongly support support don't know oppose strongly oppose

Why?: .....

Q32 Imagine that as a result of low rainfall, flow in the River Lark is unacceptably low. A reduction in abstraction is required. Two large abstractors, one industrial and the other a spray irrigator, are both in a strategic location, where the most benefit would be gained from cutting back their abstraction. Do you think it most fair if (chose only one):

1. restrictions were shared equally by both abstractors .....❑
2. restrictions were applied only to the industrialist.....❑
3. restrictions were applied to the irrigator only.....❑
4. restrictions were shared equally by all abstractors across the whole catchment.....❑
5. restrictions were shared equally by all *large* abstractors only.....❑
6. other.....❑

Please comment on your choice: .....

.....

.....

Q33 If a user is granted a licence on condition that abstraction does not harm a special environmental site, who should finance the monitoring of safe water levels?

The Environment Agency .....❑ Local authority.....❑

The abstractor.....❑ Local environmental groups.....❑

Other .....

Q34 Once supplies have been fully committed which of the following would you most agree with?:

a) Please tick one box

The government is responsible for ensuring that there are always enough supplies to meet any demand ❑

Private companies should pay for the development of new resources in response to demand ❑

We should adapt the way we use water to match limits on current water availability ❑

b) Please tick one box

Any new resources should be sold in a water market to the highest bidder ❑

Any new resources should be allocated by first come first served, without profit ❑

Allocation decisions should be made by an independent 'water court' ❑

Q35 Now again imagine that no new licences are being allocated in your area. A large local industrial firm needs more water. A water company can supply the business with water, but at a much higher cost than if the industrial firm were able to obtain an abstraction licence of its own. The business argues that the water company has been allocated too much water in the past which is not fair, and that the water should be reallocated to other users.

What do you think would be a fair outcome or way of solving the dispute? .....

.....

.....

.....

FINALLY

Do you have any other comments you would like to make on water allocation, fairness, or any of the questions?

.....

.....

.....

.....

When you think back to working through this survey, how confident were you in answering the questions or making judgements?

1 2 3 4 5

very confident — very unsure

Personal Information

For the purpose of analysis, could you please provide the following information.

1. Are you: Female.....❑ Male.....❑ 2. In what year were you born: .....

3. If you live in the Lark Valley area, about how long has this been for? .....

4. Did you study/are you studying up to:
   O level/GCSE ....❑ A level/Vocational equivalent ....❑
   Degree level ....❑ Professional equivalent ....❑
   Higher degree ....❑ None of the above ....❑
   Other.....

5. Are you in paid employment at the moment?

- YES....❑ What is your job title? .....
  What type of organisation/business do you work for?.....
- NO.....❑ I am unemployed...❑ I am disabled...❑ I look after the house/family ...❑
  I am a full time student ...❑ I am retired ...❑ Other.....
- If you have worked before what was your last job?.....

6. If you live or work on a farm: What type of farm is it?.....
   Do you own the farm...❑ or rent it...❑ ? How large is it .....Hectares/Acres
   What percentage of the farmed area is irrigated? .....

7. If you are a commercial (business/agricultural - non farm/industrial) user of water:
   what type of business is it? .....
   how old is the business?..... how many people does it employ? .....

8. Are you a member of any environmental groups/organisations? .....
   .....

9. Do you belong to any group which represents your views on water issues?
   .....

****

WOULD YOU NOW PLEASE FOLD THE QUESTIONNAIRE AND RETURN IT IN THE PRE-PAID ENVELOPE.

THANK YOU VERY MUCH FOR YOUR HELP.

Further work will be carried out on this project. If you would not mind being contacted later on in the year to talk about some of the issues raised in this questionnaire, please give the following contact details. Your responses will always remain strictly confidential and unassociated with your name.

Name: ..... *Organisation* .....

telephone: ..... *fax:* ..... *email:* .....

Appendix 2

Overview of licensing in the Lark Valley, 1988-1995

This appendix presents the results of attempts to use data collected from the NRA's licensing data base. Details of constraints on data manipulation were described in Chapter Four.

Number and status of licences

Table A2-1: Number and status of licences (*includes SI)

	Total Number of Licences		Status 1995[1]	
	1988	1995	perpetuity	time limited
Agriculture	*239 (81%)	*229 (83%)	78	2
Spray Irrigation			33	141
Industry	35 (12%)	29 (10%)	16	3
PWS[2]	8 (3%)	10 (3.5%)	4	5
Other	12 (4%)	8 (3%)	14	2
All	**294**	**276**	**145**	**153**

From 1988 to 1995, the total number of licences declined slightly. The percentage that were for agricultural use slightly increased[3]. In 1995, roughly half of licences were time-limited, and half were licenses of right or had been granted in perpetuity.

New licensing activity

These data on new licenses include time-limited licenses that were renewed so they do not strictly show 'new water'. What is illustrated however, is that the bulk of the licensing activity was for spray irrigation both in terms of number of licenses and volume of water.

Table A2-2: Number of 'new' licences granted each year by sector

Year	1989	1990	1991	1992	1993	1994	1995	Total
Agriculture inc. SI	7	7	6	29	34	10	14	107
Industry	1	1			1			3
PWS		1			1			2
Other				1			1	2
Total	8	9	6	30	36	10	15	114

[1] Where different data sets used, numbers do not always correspond.

[2] Key: PWS: Public water supply
Agri: General agriculture (inc. anti frost)
SI: Spray irrigation
Ind: Industrial use (inc. sand and gravel washing)
Other: recirculation and compensation; private water undertaking, domestic, amenity, fishery.

[3] Number of licenses does not equal number of *licensees* as abstractors may hold more than one license.

Table A2-3: Volume of 'new' water licensed each year (tcma)

Year	PWS	SI	AGRI	IND	Other	Total	Number of licenses
1989		432.64		668.6	0	1101.24	8
1990	100	252.77	352.77	10.23	11.36	727.13	9
1991		48.89				48.90	6
1992		2174.75	56.88	0	365	2596.62	30
1993	1000	3178.18	71.48	812	0	5061.65	36
1994		978.20				978.20	10
1995		735.90			1.6	737.50	15
Total	1100	8014.89 (71.2%)	481.13	1490.83	377.96	11251.24	114

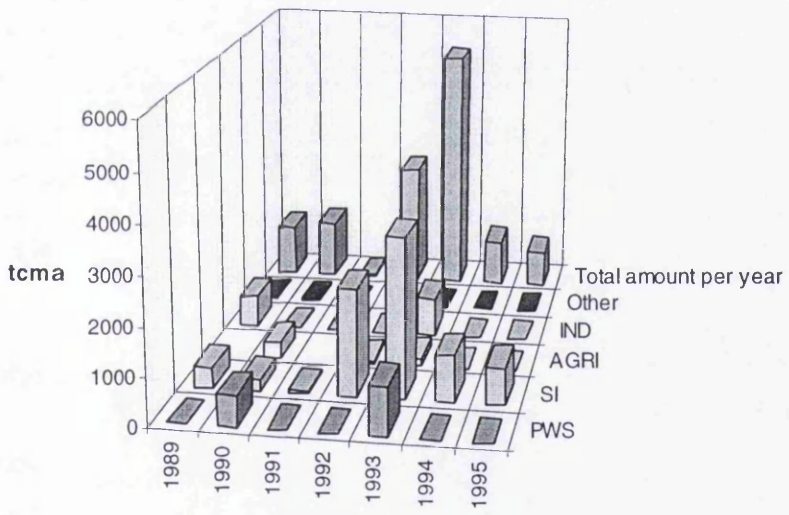


Figure A2-1: New licensing each year

Figure A2-1 shows the new licensed amounts granted each year for each sector (including renewal and upward variations of existing licences). The increased activity following the 1989-92 drought was due to a large number of license renewals, and issuing of licenses awaiting clarification of licensing policy.

Total licensed amounts

The table below shows the net amounts of water allocated to each sector from 1988 to 1995. It shows that the total amount licensed has increased from 31,986 tcma in 1988 to 33,3835 tcma in 1995; a 5.78% increase. In 1995, of the total water licensed within an area defined by the three surface water units, approximately 55% was for PWS, 24% for spray irrigation, 15% for industry and 6% for other uses (Figure A2-2). A moratorium was placed on abstraction from the aquifer in 1992, so increases in water licensed after then will be for applications submitted before the embargo, or for abstractions from the surface water courses of the fens of the lower Lark, or for winter abstraction from the river courses. The drop in licensed amounts in 1991 was due to delays in renewing time-limited licenses for spray irrigation.

Table A2-4: Licensed amounts per year per use (tcma)

Year	PWS	%	SI	%	IND	%	Other	%	AGRI	%	Total
1988	17176.12	54	8598.63	27	4699.94	15	833.34	3	677.99	2	31986.02
1989	17176.12	53	9017.85	28	4754.84	15	833.34	3	667.38	2	32449.53
1990	17808.12	54	9055.43	28	4124.90	13	844.70	3	996.97	3	32830.11
1991	17708.12	57	7654.48	24	4124.90	13	844.70	3	957.70	3	31289.89
1992	17708.12	53	9402.60	28	4124.81	12	1207.01	4	1007.33	3	33449.87
1993	18708.12	54	8943.63	26	4936.81	14	1189.63	3	1065.33	3	34843.52
1994	18708.12	54	8898.26	26	4936.81	14	1189.63	3	1063.97	3	34796.78
1995	18708.12	55	7990.38	24	4936.81	15	1136.33	3	1063.97	3	33835.61
% change	8.92		-7.07		56.93		5.04		36.36		5.78

Allocation to the environment

Figure A2-3 shows a more detailed range of water uses in the Lark, and the amount allocated to each sector in 1988. The graph also shows how much water is allocated to environmental need (sourced from Barker, 1992). This is seen to be roughly equivalent to the volume allocated to PWS.

Distribution of water

Figure A2-4 shows the distribution of water resources across all licences based on 1988 data. It can be seen that the largest 10% of licences received 81% of the water in 1988.

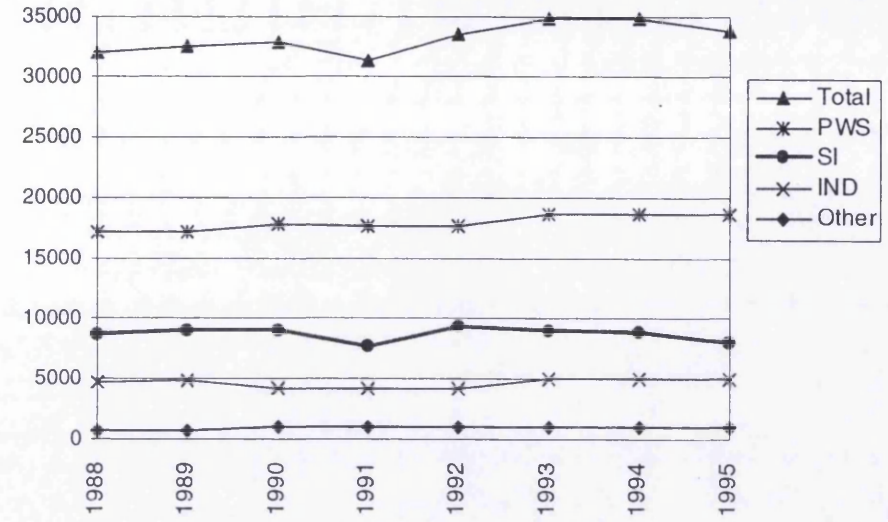


Figure A2-2: Licensed amount per year per use (tcma)

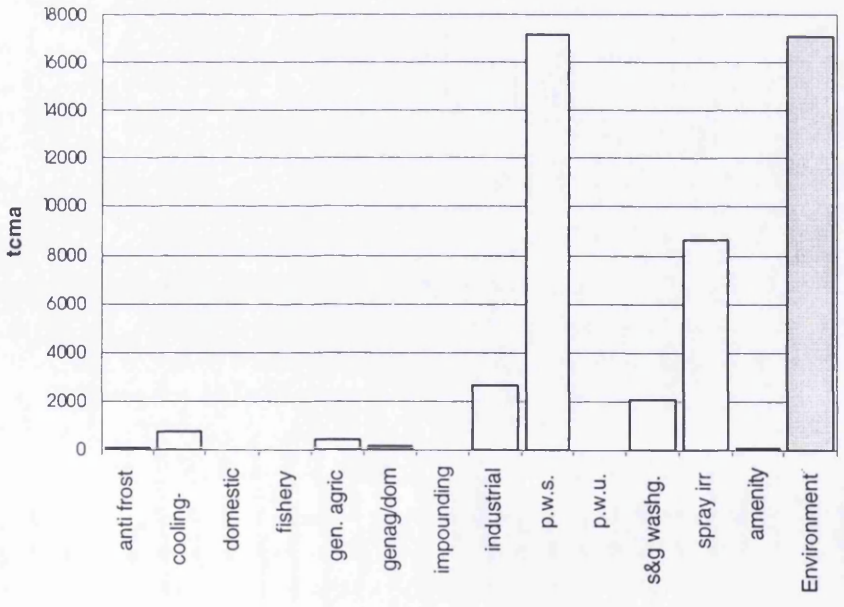


Figure A2-3: 1988 allocations

These 29 licenses include 7 large PWS licenses. If the 54% of water that is allocated to PWS is deducted from the 81%, 22 non PWS licenses (7.5% of licenses) are allocated 28% of the water. The majority of licences are negligible in size compared to the largest 10% of licences. In fact, 90% of licences use a total of only 19% of water and will have very little impact on the catchment's resources. Policy is however based on the aquifer as a whole. A small licence, even if it would have no local effect, will not be granted when the aquifer has been declared as fully committed.

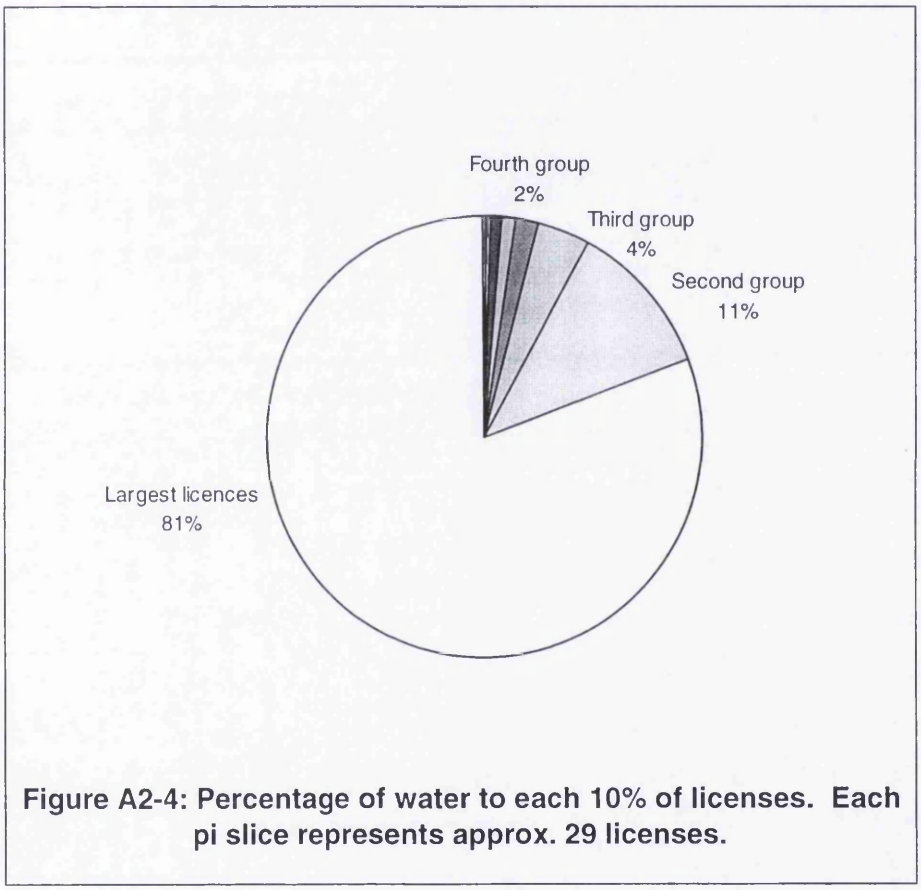


Figure A2-4: Percentage of water to each 10% of licenses. Each pi slice represents approx. 29 licenses.

Returns - actual usage

Abstractors are required to record and submit details of water abstracted to the regulator. These are known as a*nnual returns*. Figure A2-5 shows annual returns for 1989-1994. (1995 returns were not available at the time this data was collected). The large dip between 1990 and 1993 is attributable to reductions in withdrawals by Anglian Water for PWS for its boreholes in the area (see below) and to surface water

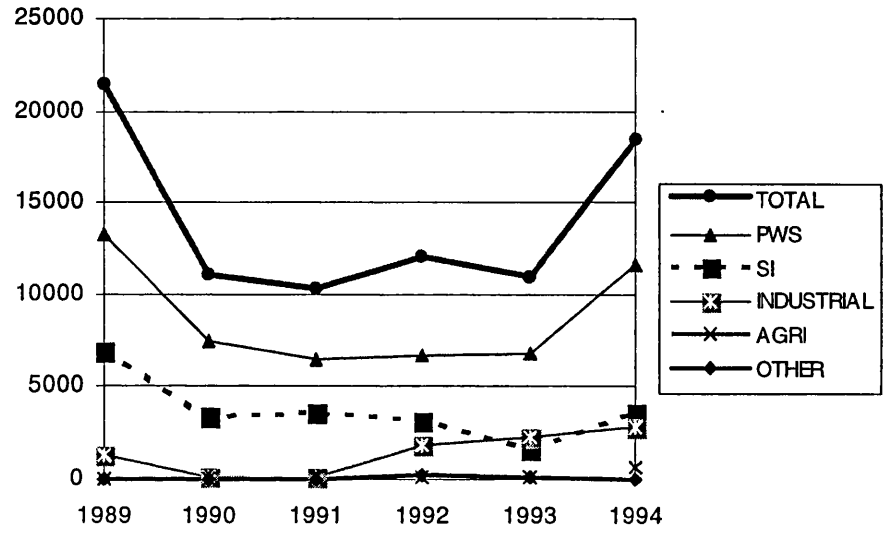


Figure A2-5: Annual returns (tcma)

abstraction bans and irrigation bans in force from 1990 to 1993 (see Table 5-1 in Chapter Five).

Table A2-5: Annual returns (tcma)

Year	PWS	SI	IND	AGRI	OTHER	TOTAL
1989	13289.50	6910.69	1285.48	0.00	0.00	21485.67
1990	7509.68	3412.60	131.59	17.18	0.00	11071.05
1991	6501.12	3586.16	121.79	110.92	0.00	10319.99
1992	6659.81	3216.53	1884.01	131.24	168.04	12059.63
1993	6758.81	1672.97	2297.38	137.89	114.32	10981.37
1994	11665.43	3617.53	2841.39	700.00	42.02	18388.57

Comparing the returns for 1989 (a year when no restrictions on abstraction were in force) with the amount licensed in 1989 shown in Table A2-4 shows a difference of 10,963.86 tcma (32,449.53 - 21,485.67). This shows that a third of water licensed was not being used. A recent study by Williams (1997) found that in the Lark area, 7 licenses were untraceable and 7 were no longer being used at all. They totalled 581.456 tcma.

PWS abstraction in the Lark area

During the early nineties, the boreholes of the *Upper* Lark were reaching their annual licensed quantity[1]. Anglian Water reduced the area served by these abstractions, as well as carrying out demand management measures such as pipe replacement and targeting for customer metering. As a result, abstraction from this borehole has fallen over the past decade (see Table A2-6), and so would not appear to be contributing to recent increases in resource stress in the area. Abstraction has risen from the boreholes of the *Lower Lark*, although it still well within the license limits. Anglian Water say that similar attention was given to leakage control in this area but not to household metering. In the *Lower* Lark then, increased abstraction for domestic use may be contributing to resource stress and the faster arrival of cessation levels during the summer, particularly in 1995.

Table A2-6: Abstraction by Anglian Water from boreholes in the River Lark area

	1988	89	90	91	92	93	94	95	96
Upper Lark	7102	7679	7461	7045	6799	6503	6875	6510	6309
Lower Lark	6231	6517	6821	6556	6153	6447	6749	7138	6875

Upper Lark= boreholes at Barrow Heath, Risby, Rushbrooke, Kings Road, Bury. Annual limit=8,000 tcma

Lower Lark=boreholes at Eriswell, Twelve Acre Wood, St.Helena, Beck Row, Isleham. Annual limit= 9,055 tcma.

(Source: *perscom* Anglian Water)

[1] Anglian Water, *perscom* 1997

Appendix 3

Details of an Appeal against a Licensing Decision

This appendix contains supplementary details of an appeal by an industrial abstractor, a maltings firm (PM), against a license refusal by the NRA. An analysis of the case is presented in section three of Chapter Six. The analysis draws on notes taken during the hearing[1], from documents submitted by both parties, and the final report of the Planning Inspector to the Secretary of State for the Environment explaining his recommendation that the refusal be upheld.

The appeal was heard by a DoE Planning Inspector in Peterborough in June 1996. Present at the two day hearing were :

- The maltings: Production Manager, two General Managers and a consultant representing PM
- NRA: Staff of the relevant NRA area offices and an NRA solicitor.
- Anglian Water: Water Resources Planning Manager and solicitor

In spite of the Inspector stating that the purpose of the meeting was to 'search out the agreements and disagreements through informal discussion', formal presentations were made by the NRA's solicitor who address the inspector as 'sir' and questions witnesses in a very legalistic manner. PM's consultant was not a professional lawyer and approached the hearing in a much more informal manner. During the hearing, site visits were made by the Inspector. The maltings required more water for an expansion of production at three sites in the Anglian region[2], one of which was in the Lark valley at Bury St Edmunds, and part of their argument was for the reallocation of water from the license of the regional water undertaker, Anglian Water.

PM is the largest maltster in the UK, with 8 maltings, and is eighth largest in the world. It exports 55% of its product, and, because of a marginal global deficit of malt due to increased consumption in emerging markets, the company wished to expand. At its Bury St Edmunds site, the company used two boreholes (abstracting approximately 318 tcma), but required more than double that to meet a major new

[1] A *hearing* is held where the appellant, the NRA and the Inspector appointed by the Secretary of State are in agreement that a full public *inquiry* is not necessary. A public inquiry is subject to statutory rules of procedure (allowing for example summons to attend, cross examination and large public interest), whereas a hearing is more informally conducted in accordance with a code of practice 'designed to embody the rules of natural justice' (Water Resources Act 1991, section 43). Written material is circulated and exchanged before-hand for reply.

[2] Louth in Lincolnshire, Ipswich and Bury St Edmunds in Suffolk.

Bury site: amount of water requested per annum = 457 tcma		
	From borehole	From mains supply
cost per annum of water requested	minimal @ ~ 1p/m^3 (licence cost ~ £2,500/yr)	@ 50p m^3 = **£225,000**
% of production cost	~ 0.4%	~ 5%
cost of water ($5m^3$) per tonne of malt	5p	£2.50

Table A3-1: Comparative cost of water supply to maltings

investment of £30 million. Highly sophisticated techniques control the traditional malting process for which water is an essential part. Eighty percent is returned as effluent via the sewage system. Water is a significant, if not a major, cost in production. PM argued that efficiency was paramount for competitiveness, and that efficiency could not be improved on their sites, as the recycling of water within the maltings process is limited for reasons of product quality. PM argued that competitive production costs were required to guarantee continued production, employment and its contribution to the local economy in the Lark area (see Table A3-1). The essential argument from PM was that if AW were able to provide the supply which they required, the total demand for resources from the aquifer would be the same if they themselves were to abstract it. PM maintained that if AW were to supply their new demand, then, at current leakage rates, the value of the water lost through leakage from AW's infrastructure would be £15,000 per annum for the amounts that PM was requesting. In addition, if the water company were forecasting a decrease in demand for its water of 8% by 2001, which in comparison, made the amount that they required negligible. They had not been required to submit any economic justification for its application to the NRA, so clearly the NRA had not taken this into account at all.

The NRA stated that PM's boreholes were only 100m from the river and the additional water required by the company was equivalent to 5% of mean flow. Although it would be returned via the sewage system, it would be 3 km further downstream and there was a possibility that Sites of Special Scientific Interest downstream could be affected. It was the responsibility of the applicant to carry out an environmental impact appraisal of its proposals in order to prove no derogation, which PM had not done. As AW's borehole was further from the river, its impact would be less and AW was in any case, able to vary its abstraction across its network of sources. The principle of a hearing was that "he who asserts must prove their case", and the onus was thus on the applicant to demonstrate that their *requirement* should be considered as reasonable in line with licensing guidelines. Problems in

other areas, such as Yorkshire, had been found to be due to an insufficient margin between resources and demand.

In his final report, the Planning Inspector stated that the appeal constituted a challenge to the fundamental aspects of the NRA's water resources policy for catchment. The objection that the policy gave undue weight to established users, and ought to take account of cost savings, was not accepted, and the Inspector upheld the NRA's decision, pointing to the following[1]:

> *'The company has determined to proceed with expansion at this site in full knowledge of policy restrictions on groundwater abstraction and the consequential costs of obtaining water from the mains supply. Sustainability and precedent issues provide further support for refusal since a decision to allow this appeal would be manifestly against the whole basis on which groundwater protection policies have been advanced and water resources plans have been prepared'.*

Two months previous to the hearing and during the course of the appeal, the NRA had be transformed into the Environment Agency. The Environment Act which created the Environment Agency had introduced new issues for consideration in water resource management which might have had relevance for this case. Firstly, the aim of the Agency must be: *'to make a contribution towards attaining the objective of achieving sustainable development'* (Section 4, Environment Act 1995). This was not discussed. In the Inspector's final report he referred only to environmental sustainability and the precautionary principle and not the wider issue of 'sustainable development' (p.12). The Act states that it is Ministers who will give guidance on the meaning of the latter. A second relevant factor raised in the Act (Section 39) is that the Agency shall take into account when exercising its powers 'the likely costs and benefits of the exercise or non-exercise of the power' (emphasis mine). This requirement is however tempered with a clause which states '*unless it is unreasonable to do so*', and the cost benefit analysis should not interfere with the Agency's other duties and objectives. One further duty imposed by the Act (Section 7) is that the Agency must: '*have regard to any effect which proposals would have on the economic or social well being of local communities in rural areas.*' Had these issues been debated during the hearing, the status quo may have been further challenged, but as it stands, the first come first served water rights are dominant over any other issues to which the Agency must 'have regard' or 'take account of'.

[1] Report of DoE Planning Inspector, Reference no: APP/WAT/95/33,34&35/P5. November 1996.

Appendix 4

Discriminant Analysis

1. On groups defined by EVALUATION variable

Number of cases by group

124 (Unweighted) cases were processed. 33 of these were excluded from the analysis as they had missing or out-of-range group codes. 91 (Unweighted) cases used in the analysis of which

PRO 32

ANTI 22

No Opinion 37

Canonical Discriminant Functions

Fcn	Eigen	Pct of Variance	Cum Pct	Canonical Corr	Wilks' Lambda	Chi-square	df	Sig
1*	.1505	68.31	68.31	.3617	.812410	17.866	10	.0573
2*	.0698	31.69	100.00	.2555	.934713	5.806	4	.2141

* Marks the 2 canonical discriminant functions remaining in the analysis.

Structure matrix:

Pooled within-groups correlations between discriminating variables and canonical discriminant functions

	Func 1	**Func 2**
INTERFERENCE	.75775*	-.14603
PUBLIC GOOD	.69079*	.62592
STATUSQUO	-.37671	.59320*
COMMODITY	-.20042	.44839*
EQUALITY	-.03804	-.15960*

* denotes largest absolute correlation between each variable and any discriminant function.

Canonical discriminant functions evaluated at group means (group centroids)

54.95% of grouped cases correctly identified

Group	**Func 1**	**Func 2**
PRO	.49902	-.09486
ANTI	-.43583	-.35173
NO Opinion	-.17244	.29117

2. On groups defined by stakeholder TYPE

Number of cases by group

124 (unweighted) cases were processed. 0 of these were excluded from the analysis.

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	Wilks' Lambda	Chi-square	df	Sig
1*	.9007	68.80	68.80	.6884	.359101	118.801	40	.0000
2*	.2081	15.90	84.70	.4150	.682540	44.304	28	.0259
3*	.1012	7.73	92.43	.3032	.824572	22.375	18	.2157
4*	.0674	5.15	97.58	.2512	.908059	11.188	10	.3431
5*	.0317	2.42	100.00	.1754	.969232	3.625	4	.4591

* Marks the 5 canonical discriminant functions remaining in the analysis.

Structure matrix

Pooled within-groups correlations between discriminating variables and canonical discriminant functions

	Func 1	Func 2	Func 3	Func 4	Func 5
INTERFER	*-.73887	.10111	-.02039	.49208	.44865
COMMODITY	*.58475	-.16871	.32252	.53500	.48925
EQUALITY	.19808	*.79669	.29709	.12959	-.47010
STATUSQU	.33467	.04061	-.63330	* .65883	.22633
PUBLIC GOOD	-.07827	.50650	-.08976	-.31331	* .79443

* denotes largest absolute correlation between each variable and any discriminant function.

Canonical discriminant functions evaluated at group means (group centroids)

49.19% of grouped cases correctly identified

Group	No	Func 1	Func 2	Func 3	Func 4	Func 5
Business and industry	12	-.37223	.02995	-.00989	-.19142	-.41790
W.Co	3	.12780	1.13095	-.20257	-1.17653	.34716
Domesitc well	10	.46885	-.43155	-.20409	-.06204	-.07548
Environmental ists	19	1.26935	.18325	.43676	.02625	.09462
Local gov	6	1.58553	.27744	.04499	.43174	-.20132
Recreationists	11	.93343	-.56950	-.65106	.04560	.16590
NRA staff	5	.54600	1.10600	-.58861	-.02448	-.17131
Irrigators	42	-.98498	.15083	.00393	.16027	.08033
Other agri	16	-.36652	-.63646	.25865	-.23455	-.01277