

How institutions elude design: river basin management and sustainable livelihoods

Frances Cleaver and Tom Franks

BCID Research Paper No.12

Bradford Centre for International Development

University of Bradford
Bradford, BD7 1 DP
United Kingdom

December 2005

How institutions elude design: river basin management and sustainable livelihoods

Frances Cleaver and Tom Franks

Abstract

This paper challenges ideas that it is possible to 'get the institutions right' in the management of natural resources. It engages with the literature and policy specifying 'design principles' for robust institutions and uses data from a river basin management project in Usangu, Tanzania, to illustrate the complexity of institutional evolution. The paper draws on emerging 'post-institutionalist' perspectives to reject over-formalised managerial approaches in favour of those that accept the dynamic nature of institutional formation, and accommodate a variety of partial and contingent solutions. Data from Usangu suggests that external 'crafting' is inevitably problematic because, to a certain extent, institutions elude design.

Key words: Tanzania, river basin management, institutional design principles.

1. Getting Institutions Right

Much theorising of collective action for natural resource management has focused on the importance of institutions as constraining and enabling structures in people's livelihoods. Such theories, informed by New Institutional Economics (NIE), Game Theory and evolutionary psychology, see institutions providing the incentives to shape the economic maximising behaviour of individuals in socially preferred directions, and the sanctions to punish those who cheat or free ride on the public good of collective action. Institutions can be shaped or crafted by external intervention and, providing due attention is paid to the structures (rules and roles) and norms (relations of trust and co-operation) contained within them, then collectively beneficial outcomes may be achieved (Uphoff and Wijayaratna, 2000). These include optimising the output of the resource, sustainable use and management, and the generation of social capital. This model has largely been adopted in Sustainable Livelihoods literature where institutions are seen as critical channels through which people's livelihood strategies are shaped and mediated (Scoones, 1998; Ellis, 2000).

The idea of institutional crafting is epitomised in the work of Elinor Ostrom who describes 'Design Principles' for robust and enduring institutions for common property resource management (Ostrom, 1990). Ostrom's ideas have spawned a vast amount of subsequent work empirically supporting the design principles through case studies. The literature tends to emphasise the formalisation of institutional arrangements, the codification of rules and regulations, the specification of clear authority structures and the strict exercise of sanctions against free-riders (Table 1). Overall there is a strong emphasis on transparency, on the principle of representation of users and on devising 'internally efficient' mechanisms for conflict resolution and resource allocation. It is deemed possible both to craft new institutions and to 'make good' the deficiencies of indigenous arrangements through careful design (Ostrom, 1990, 1992; Uphoff, 1996; Uphoff and Wijayaratna, 2000; Bromley and Cernea, 1989; Wade, 1988).

Table 1. Institutional Design Principles

- There should be clearly defined boundaries of jurisdiction over the resource.
- A clearly defined user group or community should manage the resource.
- Locally appropriate rules must be devised.
- There should be clear identification of rights to resources and rules about them.
- Those involved in resource use take part in decision making about the resources.
- Decision making should take place in public, in arenas to which all resource users have access.
- Accountable monitoring and effective authority structures are required.
- Graduated sanctions should be devised for non-compliance with collective rules. Such sanctions must be applied consistently, rapidly and impersonally.
- Conflict resolution mechanisms should be clear, accessible and rapid.
- The 'nesting' of local institutions with other levels of decision-making and governance allows multi-layered management of resources in large and complex systems.

These principles are summarised from Ostrom's work (1990,1992,2000) but similar approaches and overlapping principles have been developed by others (Wade, 1988; Baland and Platteau, 1996). See Agrawal 2001 for a discussion of the literature identifying conditions facilitating institutional robustness.

The practical appeal of this approach has been enormous. Despite Ostrom's explicit denial that they can be used as a blueprint, her design principles are frequently reiterated and elaborated in the literature (Ostrom, 2000) and we see them directly translated into policy and project documents, as guidance for action.

An emerging body of work offers a partial critique of the design principles approach to institutions for collective action, whilst recognising the contribution institutionalists have made in showing the potential for community based management of natural resources (Benjaminsen and Lund, 2002; Cleaver, 2002; Mehta, Leach and Scoones, 2001). Broadly, critics focus on the limitations of design principles and the institutionalist approach in not offering a coherent theory of collective action, not explaining the causal processes underlying the design principles, for failing to account for the variability and dynamism of contexts in which the principles must be applied, and for not recognising the socially constructed values that shape people's collective action (Ruttan, 2000). Three areas of criticism can be elaborated; the functionalist assumptions underlying mainstream institutional thinking, the evolutionism on which it is based and the over-simplification of the social world and processes within it.

Narrow Functionalism

The narrow functionalism underpinning institutionalist ideas gives rise to a number of problems. People are conceived in relation to the institution and resource to be managed as 'farmers', 'irrigators', 'fishermen' and so on, leading to a very partial understanding of their motivations for collective action (Rocheleau, 2001). A functionalist approach also makes rather simplistic assumptions about the links between rules and decision-making structures within institutions and

the outcomes produced in terms of more effective resource management. Critics suggest that institutions managing natural resources are only rarely explicitly designed for such purposes and that their inherent multifunctionalism renders them more ambiguous, dynamic and less amenable to crafting than conventional institutional theory suggests. Moreover the gaze of mainstream institutional theory is often disconcertingly narrow. Steins (2001) has pointed out that the design principles are almost totally concerned with factors *internal* to the institution being crafted and therefore cannot account for external influences on collective action. It is therefore possible for them to be applied in abstract and decontextualised ways, without taking account of the messy complexity of different contexts, the interrelating of global and local factors and the impact of social and economic changes over time (Mehta, Leach and Scoones, 2001).

Simple evolutionism

Institutional theory is strongly underpinned by evolutionary concepts of the role that crafting plays in facilitating cooperation through repeated interaction and the related development of institutions from weak to strong (Ostrom, 2000). Such a process is often equated with making good the deficiencies of traditional or indigenous institutions by introducing modern principles of transparency, the codification of rules and clarification of relations of authority. The fallacy is to equate institutional viability with fixed and formal structures (Rocheleau, 2001), and to present a static view of evolution in which there is such a thing as an ideal institution. Critics suggest that such concepts are based on poor understandings of the ebb and flow of resource use and institutional functioning (Chase Smith et al 2001, Benjaminsen and Lund, 2002), of the socially embedded decision making processes of everyday life, and partial and intermittent operation of norms and preferred ways of doing things which may not conform to 'modern' managerial concepts of transparency and accountability. According to these critics it is possible for institutions to operate intermittently, in an ad hoc fashion, through informal relationships as well as formal structures *and* to be enduring and approximately effective.

Understanding social complexity

The design principles approach is a victim of its own success (and the clarity of Ostrom's writing). The unambiguous specification of conditions which facilitate institutional robustness are attractive to policy makers and practitioners and the need for reflexivity in application is often forgotten. However, several writers have pointed out that the nature of social life renders such clear principles problematic. Neither communities nor resources consistently exist with clear boundaries (Berry 1994) Natural resources are not simply commodities but invested with social and symbolic meaning to people (Mosse, 1997; Cleaver, 2000) whose decisions about them may differ from external perceptions of efficiency and optimisation. Authority structures and the social norms of resolving competition and conflict over resources are rarely clear and consistent but diverse and contingent, subject to negotiation and messy compromise (Lund, 2001). Such complexity can be seen as a corollary of the social embeddedness of institutions (essential to their effective functioning) rather than evidence of their weakness.

Institutional Bricolage (Post-Institutionalism)

We can build on these critiques to theoretically reconceptualise institutions, institutional formation and collective decision-making. In doing this we draw on the concept of institutional bricolage (Cleaver, 2002; Lund, 2001). This is a process which has been defined as 'the patching together of institutional arrangements from the cultural resources available to people in response to changing conditions', based on the logic of dynamic adaptation (Chase Smith et al, 2001: 42). Lund suggests that social institutions, such as property regimes, are not things, they are what people do, and that institutions by their nature are not necessarily robust, solid and enduring but must be continually reproduced or re-enacted to exist. Whilst recognising the importance of the body of work which shows that common property resource management *is* possible, institutional bricolage encompasses a number of ideas which depart from conventional institutional theory. Institutional formation is re-conceptualised as a (frequently opaque) socially embedded process rather than a deliberate and transparent managerial activity. Institutions are often multi-functional, semi-opaque, and contingent. They are shaped by historic factors, by the power relations which prevail in social life and by world views which incorporate the roles of the human, natural resources and the supernatural. 'Bricoleurs' mould and are moulded by institutions, both

in deliberative decision-making processes *and* in the practical iterations of daily life. These individuals have complex social identities and multiple affinities, fluctuating motivations for collective action, changing priorities over lifecourses and make decisions based on both conscious and unconscious rationalities (Giddens,1984; Douglas,1987). Emergent 'post institutionalist' views (Mehta, Leach and Scoones, 2001)¹ informed by social theory and ethnographic approaches provide the conceptual basis for this paper, which now turns to consider the application of institutionalist ideas in river basin management.

The case of water resources provides a good example of the application of aspects of the design principles, illustrating how they can be taken up explicitly or implicitly in policy documents and practice. The various strands of water resources management, such as integrated water resources management (IWRM), river basin management and catchment management, all emphasise different facets of managing the water cycle but tend to build on the same key ideas. First and principle of these is that water should be managed on the basis of its natural hydrological boundaries (the river basin or catchment). This is now very widely discussed and accepted (Barrow 1998), and forms the foundation of, for example, the European Water Framework Directive (European Union 2000) and the recent Tanzanian Water Policy (Ministry of Water and Livestock Development 2002). There are, however, some dissident voices (Tortajada 2001), and very many others who, while subscribing to the fundamental concept, point out its difficulties (Swallow, Johnson and Meinzen-Dick, 2001). We discuss some of these difficulties at more length in the body of this article.

It is also widely accepted that water allocation and management should be integrated across all sectors, indeed this forms the key tenet of integrated water resources management (Jonch-Clausen and Fugl 2001), and that it should involve all stakeholders in a participatory process based on nested levels of institutions. Finally it is widely suggested that management processes should be open, transparent and accountable, in line with accepted principles of democratic governance. Water governance is fast becoming a concept in its own right, embodying these principles in explicit form, and establishing how they should be applied at the basin or catchment level. Here too the recent Tanzanian water policy provides an example of the incorporation of the principles directly into policy documents, with its reference to nested levels of water users' associations and the need for management systems to be "transparent, appropriate and accountable to the public" (Ministry of Water and Livestock Development 2002, p25).

In this paper we provide further critiques of institutional theory and its application in river basin management by drawing on a case of the Usangu basin, Tanzania. This case provides us with a good test of institutional design principles that are commonly applied in such situations. Our research draws on concepts of institutional bricolage to show how the complexity of social relations, the dynamic context of livelihoods in the basin and the fluid nature of institutional evolution renders the design principles of questionable validity. We select key principles to interrogate in the light of the Usangu data, relating to (1) the need for clear boundaries of the resource and the community, (2) the nature of monitoring, authority structures and sanctions, (3) the need for public fora for decision-making and conflict resolution to which all resource users have access and (4) the organisation of institutional arrangements into nested systems from the local to the wider scale.

2. Usangu – A Challenging Environment

Usangu provides a challenging case for the application of institutional design principles, as it is characterised by intense and diverse pressure on natural resources (particularly water and land) by social, economic and ethnic diversity and by a perceived institutional deficit.

¹ These emergent 'post-institutionalist' approaches are 'works in progress' mostly drawn from relatively recent research which identifies gaps in conventional institutional theory and attempts to formulate concepts which overcome these. 'Post-institutionalist' thinking therefore does not yet comprise a comprehensive body of theory, but suggests some promising directions for moving our thinking about institutions and resource management forward.

Usangu is an extensive basin in the upper reaches of the Rufiji river (Tanzania's main river) in SW Tanzania, covering an area of about 22,000 km². It is defined in geographical terms by its hydrological boundaries, comprising all the land that drains from the Usangu wetland into the Great Ruaha River, at the downstream end of the catchment. It is diverse in landform and land use, consisting of an upper steeply wooded part with a high rainfall, and then an extensive plain supporting settlements and agriculture in the higher reaches and seasonally flooded grassland in the lower reaches. The wetland comprises both the seasonally flooded grassland and a smaller area of permanent swamp.

Around 500 000 people live in the catchment, deriving their livelihoods in a variety of ways mainly from its natural resources. Key occupations include rainfed agriculture and some forestry in the higher regions, irrigated and rainfed agriculture in the upper part of the plain, and pastoralism and a small fishing industry centred on the wetland. The basin is characterised by an increasing demand for resources of all kind, often characterised in policy discourse as a conflict of interests between indigenous irrigators and immigrant pastoralists.² In particular, water resources are becoming increasingly stressed, with the result that the Great Ruaha river downstream of the basin began to dry up during the dry season in the mid 90s, and the period without flow is becoming increasingly prolonged (Franks et al, 2004). The realisation that it was necessary to study the complex linkages between land, water and other resources in order to develop appropriate responses to the situation led to the establishment of a project for the Government of Tanzania, with financial assistance from the UK's DFID. The purpose of this project, the Sustainable Management of the Usangu Wetland and its Catchment (SMUWC) was to develop local capacity to manage the wetland and its catchment sustainably, to be achieved through knowledge-generation and capacity-building. Capacity building covered a whole range of initiatives from conventional training programmes for strengthening local government at various levels to the establishment and support of new institutions designed to address particular issues or weaknesses in resource management in the basin. These capacity-building initiatives lead to a variety of institutional issues which provide many of the examples illustrating the points of this article (The project reports can be found at www.usangu.org).³

The basin is typical of rural Tanzania in that it is the setting for many development interventions, varying in size from local initiatives affecting a few hundred people, to regional and national programmes operating across the whole basin or in certain parts of it. Many development interventions are based around the existing local government system, focussing on the district, but extending in theory or practice to the village, or its lowest level, the hamlet. Other institutions of importance in the management of water resources are the Rufiji Basin Water Office, which is advised by the Rufiji Basin Water Board. The Water Office has the duty to protect and manage the basin's water resources (which are a national, rather than a district asset), and in particular it has the power to license abstractions and collect water fees.

The population of the catchment is characterised by ethnic diversity and a history of change and uncertainty. Key features have been migration, in particular in-migration of pastoralists from the north in the period 1960 to 1980, and more recently, economic and environmental changes.

² We use the labels 'irrigators' and 'pastoralists' with some reservation in this paper to describe groups of people whose main livelihood, or way of life is characterised by irrigated agriculture or cattle keeping. We are strongly aware that this dichotomous classification is unsatisfactory as the supposed divisions between irrigators and pastoralists, although overlaid with ethnic identities, are often far from clear. Successful farmers commonly invest in cattle, whilst wealthy pastoralists often cultivate large areas of land (including irrigated land) due to their abundance of draft power and family labour. The labels do however have the merit of being those commonly used in policy discourse about competition for resources in Usangu.

³ The authors were both involved in the implementation of this project; Tom Franks was Team Leader from September 1998- April 2001 and Frances Cleaver conducted a research project on Rural Livelihoods during the same period. The data presented in this paper was collected during the course of this work through consultancy studies, research projects and daily management activities. A detailed account of the methods employed, the data collected and the conclusions drawn can be obtained from the project reports on the website at www.usangu.org

Population and population growth remains the major driving force, others being economic liberalisation with accompanying changes in agricultural policy, and the remoteness of the basin from Tanzania's main centres of economic activity.

3. The Clarity of Boundaries?

Ostrom suggests that resources should be managed within clearly defined boundaries: the boundaries of the resource and the user community with rights over it would be clearly specified. This is intended to enhance the jurisdictional integrity of collective use arrangements (Ostrom,1990). In water management, the basin provides a natural focus since all the water within it will eventually end up in the single channel (in the case of Usangu, the Great Ruaha River at its downstream end), and moreover the boundaries of the basin are, at least in theory, easy to map and define. Whilst managing water within basin boundaries may seem a logical approach to water planners and other professionals, in practice matters are not so simple.

Complexity in institutional structures operates at many scales and levels. A multiplicity of agencies, institutions and social arrangements exist within Usangu, with responsibilities covering the whole range of resource management responsibilities. Bureaucratic agencies comprise the sectoral ministries and local government, with tiers of responsibility extending from the national level to the district, and, in the case of local government, down to village and hamlet. Sectoral responsibilities extend across a wide spectrum, with the ministries responsible for land and water resources particularly important to the people of Usangu. Responsibility for the management of land is especially complex, even within the bureaucratic framework, because it is shared between the central Ministry of Lands and Surveys and local government at the village level, following the passing of the Village Land Act in 1999 which specifically devolved powers to the village. Socially embedded institutions likewise comprise a variety of local level arrangements, often with multiple functions and over-lapping responsibilities.

The number and diversity of these institutions makes it difficult to present a single coherent picture of the multiplicity and complexity of relationships between them. Table 2 gives a partial picture, focussing on the various institutional arrangements that influence the management of irrigation and pastoralism in the basin.

Table 2. Institutions related to Irrigation and Pastoralism in Usangu

<u>Institution</u>	<u>Irrigation</u>	<u>Pastoralism</u>	<u>Key interest</u>
Water user groups	●	○	Water management. Protecting crops from livestock
Pastoralist groups	○	●	Access to land and water, pastoralist rights.
Meetings of elders	○	○	Resource management and conflict resolution
Traditional institutions and ceremonies	○	○	Originating from the Merere chieftainship. Rainmakers, priests and guardians of shrines
Work groups	○	○	Maintenance, self-defence, cultivation etc
Cultural groups	○	●	Masai and other groups, many with an origin in pastoralism
Village councils	○	○	Allocating land resources within the village
District council	○	○	Raising taxes from agriculture and livestock
District livestock development officer	○	●	Supports the development of livestock in the district
District irrigation officer	●	-	Supports the development of irrigation in the district
District natural resources officer	-	●	Monitoring grazing, forest and other land resources
Local government at other levels	○	○	Village plans aggregated at ward level. District plans formulated within the framework of the region.
Rufiji basin water office	●	-	Allocating water resources within the basin. Collecting water fees
Zonal irrigation office	●	-	Development of irrigation in the basin
Usangu Game Reserve	-	●	Exclusion of pastoralism from the Usangu Game Reserve
District administration	○	○	Mediating resource management at the district level
Magistrate's court	○	○	Adjudicating resource management conflicts
NGOs	-	○	A variety of NGOs with an interest in the environment, and generally opposed to pastoralism
The media	-	○	A continuing interest on water availability and pastoralism in Usangu
Ruaha National Park	●	○	Water availability downstream Usangu
Mtera Hydroelectric system	●	-	Water availability downstream of the basin

● indicates major interest of the institution in the sector;
○ indicates general interest;
- indicates no interest.

The boundaries of both the resource and the community, and their relationship to these managerial and institutional structures, thus prove elusive to rigid specification. Resource boundaries frequently overlap or overlay administrative boundaries (for example with different villages sharing the same water supply). People may need to combine the use of water with other resources (such as grazing land) that has different boundaries, and the organisation of people's lives is partly shaped and constructed through multiple cultural and social networks rather than simply through resource or jurisdictional boundaries. So, for example, people may seek to access water resources in an area other than their own community, but where they can secure access through kinship arrangements. Indeed several recent studies show the difficulties of separating out administrative arrangements relating to land and water (Benjaminsen and Lund, 2002) and Maganga has shown for Usangu how disputed claims over property and resources can be closely linked to marital and family disputes (SMUWC, 2001a).

(a) Seasonality of boundaries

The idea of clear boundaries of a resource and a user group cannot adequately account for the seasonality of rural livelihoods and the differing needs for access to resources over the year. Seasonal uncertainty of resource availability may mean that people outside the regular user community seek access to a resource – for example if a water source dries up or breaks down in the dry season people may seek alternative supplies in an adjacent village. The seasonal permeability of boundaries often overlaps with social hierarchies of access. At a perennial pond favoured for its good supply of thatching grass the caretaker (loosely representing village and 'traditional' authorities) progressively restricted access and harvesting of grass as the dry season progressed. 'Distant users' (mainly pastoralists) were incrementally excluded from the use of the resource until the next rainy season.

Pastoralists use the grazing lands (far from the villages in which they reside) seasonally. They pay taxes and are nominally eligible to participate in public decision making in their 'home' villages and yet their use of grass and water and their temporary residence in the distant grazing lands directly impacts upon resource availability in surrounding villages. Officials in adjacent villages tried to deal with this by requiring pastoralists to register their presence locally, but they are reluctant to do this for fear of being taxed twice.

(b) Boundaries and livelihood networks

People with adequate labour or cash resources may expand their livelihood activities outside their home areas. Examples include the renting of land (including irrigated land) in other villages (often those where they have kin), establishing businesses (such as selling beer or food) in villages where kin reside, undertaking commercial exploitation of natural resources, such as burning wood for charcoal which takes place in forest areas often far from the home village. Such livelihood diversification makes it very difficult to link a resource user to a particular territorially-related, resource management institution. Moreover, Odgaard has noted that people in South West Tanzania draw on a variety of institutional channels to legitimise their access to resources, utilising both 'traditional' and 'modern' institutions (often with a different spatial location) to make claims and secure access and rights (Odgaard, 2002).

In cases where land and water interactions are critical, the definition of hydrological boundaries is not necessarily meaningful to local resource users. We can see that where boundaries exist they are permeable and often fluctuating and that they are overlaid with the multiple social networks through which people access resources and manage their livelihoods (Berry, 1993, 1994; and Peters, 1994). Imposing rigid resource management boundaries on these existing structures runs the risk of ignoring the social realities of resource use. Both the existing institutional structures and the livelihood strategies and understandings of the local people are established along different lines, and it is therefore necessary that other approaches and institutional frameworks should evolve.

4. Low Cost Public Decision Making The design principles literature strongly emphasises the desirability of public, transparent decision-making and conflict resolution arrangements at the

lowest possible level. Thus, Ostrom suggests it is desirable that: 'Most individuals affected by the operational rules can participate in modifying the operational rules,' and that 'Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials' (Ostrom,1990:90).

The 'low cost arenas' for decision making and conflict resolution are often assumed to be representative user committees or associations, perhaps backed up with more general consultative public meetings of all resource users. However, such an emphasis is based on idealised notions of the homogeneity of the community and the possibilities of participatory processes (Li 1996, Agrawal and Gibson, 1999). It little recognises the ways in which power relations are played out in public fora and the possibility of institutions reproducing existing inequitable relations in society. Odgaard (2002) found for a neighbouring area of Tanzania that processes of negotiating access to resources through both 'traditional' and 'modern' institutions (the 'double-safeguarding' of rights) served to gradually exclude marginalized groups of people. Nor does it recognise that there may be social preferences for a convenient opacity in collective arrangements, for non-confrontational and socially supported forms of decision-making and conflict resolution (Cousins,1996). These points are elaborated in the following examples.

(a) Access and articulation

Despite the nominal specification of rights of all adults to participate in local decision making in Tanzania, social relations and imbalances of power ensure that people with particular social identities may find such participation difficult. Exclusion on the basis of social identity may become more pronounced at times of scarcity, where access to disputed resources becomes critical.

Pastoralists have very low levels of representation on decision-making bodies in Usangu, and probably even lower influence on the decisions made. Pastoralists are perceived by the politically and numerically dominant agriculturalists to be itinerant (even when they are settled) and therefore ineligible for full participation in decision making. Prejudicial attitudes against pastoralists (who are often considered intransigently backward) also militate against their full incorporation as local citizens. Examples of their inability to significantly influence local decision-making include an occasion when a village council, faced with the alleged problem of the pastoralists' cattle grazing on the growing crops of agriculturalists, demarcated a grazing area for the cattle far from the village. Despite the nominal membership of pastoralists of the village assembly, their views that the land was unsuitable for cattle were not taken into account.

In Usangu women and children often have little or no direct representation on decision-making bodies, despite being the managers in use of many natural resources. Where women are represented in public-decision making they often claim that they go just to listen, and that they don't 'have the words' to articulate their concerns in these fora. Examples of women and children being the users of water resources but being little involved in formalised public decision-making about them include their use of irrigation water both for productive and domestic purposes (children, youth and women are prime labourers on paddy fields), but their almost total absence from irrigation committees. Where women do participate in public decision-making about natural resources, their mode of involvement may render them less visible than men. Previous research in Tanzania highlighted gender differentiated preferred norms of participation in public fora, with men preferring individual articulation of interest and opinions, women deputing key representatives to present their collective views (Cleaver and Kaare, 1998).

Poor people are perhaps the most disadvantaged by public decision making arrangements. The opportunity cost of attending meetings is often too high for labour stressed households who secure their basic needs on a daily basis. They too experience severe problems of articulation in public fora – the most extreme examples being the poor families who don't even speak the common language Swahili, because they have never been to school. Their limited social networks also militate against their ability to influence the decisions made in public fora. Common water management measures (for both irrigation and domestic water) included closing sources periodically, charging for water and requiring labour contributions to maintain water

sources. Poor people, often at the tailend of systems, may be unable to secure sufficient irrigation water at times when they have adequate labour to use it. They therefore rent out their irrigated land and so forfeit the right to take part in decision making about the allocation of water. Their rights can be further eroded by the difficulty they find in contributing to collective labour to clean irrigation furrows. Inability to use land, or neglect of land, can result in it being reclaimed and reallocated by village authorities. A lack of material and social resources severely impedes the ability of poor people to participate *and be heard* in public decision-making fora.

(b) Socially costly conflict-resolution

The definition of a 'low-cost' conflict resolution arena is open to question. Institutionalists focus on the need to reduce the transaction costs of collective action, to increase the flow of information available to resource users, to ensure that agreements made are backed up by authority systems and do not have to be constantly renegotiated, that free-riding is suitably punished. Individuals are thought to be more likely to participate in resource management arrangements when the transaction costs to them are reduced.

However, research in Usangu suggests a somewhat different view of the costs and benefits of collective action. People in Usangu demonstrate a deeply held preference for conflict avoidance and for reconciliatory conflict resolution systems (Maganga, 2002). The preferred channels for resolving disputes over resource use are *existing* social and cultural structures; only if these fail do people resort to more formalised and transparent conflict resolution. Social forms of conflict resolution (often conducted through village elders) emphasise the generous interpretation of compliance with the rules (a blind eye is turned to a limited amount of free riding), the negotiation of compliance over time, rather than at a single event, and the desire for reconciliatory rather than adversarial solutions (fines and punishments imposed only in the last resort). Moreover, punishment may often safely be left in the hands of gods or the ancestors, so relieving individuals of the troublesome obligation of imposing sanctions on close neighbours, even kin. Such conflict resolution through socially embedded mechanisms is neither rapid nor low cost but people are willing to incur transaction costs if the outcomes are socially preferable, more reconciliatory and less adversarial, so preserving the possibility of maintaining livelihood interactions with the offender (Cousins, 1996).

In crafting new institutions, we need to ask critical questions about participation in local public decision-making. Whose views and interests are actually articulated in such fora, which underlying social values reproduced? An understanding of the limits imposed upon participation by livelihood dynamics, particularly the constraining effects of poverty, should make us sceptical about easily claiming that local institutions and decision making processes are representative and inclusive.

5. Monitoring , Authority And Sanctions

The design principles literature stresses the importance of effective monitoring of resource use and of compliance with collective rules. Thus Ostrom suggests it is desirable that:

- 'Monitors, who actively audit common pool resource (CPR) conditions and appropriator behaviour, are accountable to the appropriators or are the appropriators' and that
- 'Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and the context of the offence) by other appropriators, by officials accountable to these appropriators, or by both.' (Ostrom, 1990:90)

In terms of institutional crafting these principles translate into the need to establish clear monitoring systems based on indicators and transparent processes. Such monitoring systems, as well as providing information about potential depletion and degradation of resources, help to determine where people are cheating or free riding on the collective good. Authority systems built into the institutional structure are then used in the prompt and impartial exercise of

sanctions, which are seen as critical in determining the effectiveness of collective resource management.

Processes of monitoring, authority and sanctions in Usangu are nominally built within standard framework of bureaucratic systems and norms that follow these principles. Sectoral ministries retain overall responsibility at the national level for land, water and other natural resources. They exercise this responsibility at the local level either directly through their staff seconded to the district tier of local government or in close association with local government in some form of dual responsibility. For example, the Village Land Act devolved the management of land resources to the village level of local government, although the Ministry of Lands and Surveys retains national responsibility for land resources. Water, by contrast, remains a national asset, and the national agencies concerned with water retain a key role and presence in Usangu. The various agencies provide for monitoring of resource availability and use, they have legal powers to impose regulations on resource implementation, and they can sanction those who transgress the regulations through the court system.

(a) Monitoring

In practice, the apparent clarity of the design principles is not matched by simplicity in application. Firstly, it is difficult to monitor the management of water and other resources in Usangu because of the multiplicity of resources and the way they are linked to one another and utilised. Irrigators, for example, differ from pastoralists in the aspects of water availability which are of interest to them. Irrigators are interested in water reaching their fields, and the critical times at which flows above a certain minimum become available to them. They are also concerned to see that those at the head of the system are not taking more than their fair share of water. By comparison, pastoralists are interested in the regularity of smaller supplies, which they can access in diverse locations, in ponds and ditches as much as in canals. Even for irrigation, where canals and field irrigation systems in principle allow for simple monitoring (when gates are opened and closed), in practice very little monitoring is done either by the irrigators themselves, or by the agencies with overall responsibility.

Secondly, in common with other aspects of collective action, monitoring is not a cost-free activity for participants and stakeholders. For example, the water agencies in Usangu are ill equipped to discharge their responsibility for water effectively. The key institution, the Rufiji Basin Water Office, has responsibility for the whole of the Rufiji Basin, covering an area of some 177 000 km². Until recently, it operated out of a single office, and was woefully ill-equipped, in terms of skilled staff and basic resources such as vehicles, to discharge this responsibility. Even though its capacity is gradually improving, it is still difficult to foresee a situation in the near future where the Water Office will be able to actively manage and exercise its legal authority over the water resources of the basin. With dozens of sub-catchments and hundreds of control structures within its jurisdiction, the physical size of the task is just too great, and some other local adaptation must emerge.

Research suggests that where people establish their own arrangements they incorporate monitoring into existing livelihood activities, so ensuring that the effort and the opportunity costs involved are minimal. For example at a new handpump at Ukwaheri village, provided through the SMUWC project and managed by the community, a system of locking the pump was introduced. By opening the pump only at certain hours the committee could ensure that everyone in the community had to take water at roughly the same time so avoiding the necessity of constant monitoring of the pump. Observations made by committee members during pump opening hours (when they or their household members were collecting water) provided the basis for charging households differentially for water use. Such monitoring was informal, integrated into livelihood activities and uneven in application, as assumptions about a household's water use were sometimes substituted for observation and measurement. Thus, although it incurred low transaction costs, it often reproduced inequitable norms of access and use.

(b) Authority systems

The Design Principles stress the need for “accountable monitoring and effective authority structures”. However, the complex nature of livelihoods in Usangu and their relationship to linked systems of natural resources means that it is difficult to identify and define simple authority structures which can take overall responsibility for resource use and management.

Local government has a pivotal role to play, and forms an important point of contact for many local resources users. However, local government is often ill-equipped, in terms of structure and resources, to perform effectively in this role (Larson, 2002). In the case of Usangu, it was noted that village governments had legal responsibility for management of natural resources at the local level but that most members of these governments had no clear idea of these responsibilities and little capacity to discharge them. Many local government officials at the district level are primarily concerned with provision of physical infrastructure (roads, schools and clinics) and the generation of revenue for the district, rather than natural resource management for their areas, and they are in any case often very short of human and financial resources. In addition the lack of alignment of administrative and natural boundaries means that procedures for exercising their authority can become very cumbersome. For example disputes between neighbouring villages over water in Usangu can require resolution of the problem through offices at the relevant regional centres lying some 200 km apart. In one case two villages were sharing the same watercourse for their domestic needs. When the upstream village began using the water also for irrigation, the downstream village complained through the district water engineer in Mbarali, in Mbeya region. However, the upstream village lay in a different district in Iringa region. Although there was informal contact between the two district water engineers, formal resolution of the matter had to be conducted through the regional centres of Iringa and Mbeya, involving a considerable investment of human and financial resources, and lasting a significant time.

Authority is not simply invested in government structures. In common with other African countries, dual legal systems incorporating ‘customary’ and ‘modern’ institutional arrangements exercise jurisdiction over the use of natural resources. Indeed, the delineation between systems may be blurred with processes of ‘formal informalisation’ and ‘informal formalisation’ (Benjaminsen and Lund, 2002) For example in the case of ward tribunals, the lowest level of modern legal jurisdiction, ‘customary’ methods of handling conflicts through deploying reconciliatory principles and established social procedures are combined with modern ones (Maganga, 2002). Conventional wisdom suggests that modernisation, and in Usangu, a history of in-migration and ethnic diversity, has eroded traditional authorities (chiefs, headmen, spirit mediums) to the point where they are irrelevant to resource management. We found instead the persistent use *alongside* modern authority structures of traditional elders, healers, guardians of shrines and remnants of the Merere chieftainship, in matters of land allocation, access to land, water and forests, fertility of land, rainfall, personal health, family wellbeing and marital disputes. We found examples of both ‘traditional’ and ‘modern’ authorities at the local level being used to formulate and exercise ‘bye-laws’ over the use of thatching grass, grazing areas, drinking water, cattle movements and in the resolution of disputes over resource access, including irrigation water and land. The flexible and negotiated nature of such authority structures is illustrated by Sukuma pastoralists, who, as in-migrants, often deferred to indigenous Sangu customs and authorities in order to secure access to land and water (SMUWC, 2001b).

The coexistence of different systems of authority, further complicated by the diverse cultural heritage of different ethnic groups in Usangu, leads to a dynamic institutional complexity with plenty of grey areas and the scope for negotiation of rights and access. The outcomes of such dynamic processes are likely to reflect prevailing structures of social inclusion and exclusion. For example, the reproduction of gender inequities through institutional functioning has been noted in Tanzania for both water and land (Adams, Watson and Mutiso 1997, Odgaard 2002). Both customary and modern institutions, and the processes of bricolage and crafting may reproduce such inequalities. Clear authority systems in themselves may be neither possible, nor result in equitable outcomes; of more interest are the channels through which authority is exercised or bypassed.

(c) Sanctions

The emphasis in institutional design literature on the role of sanctions in securing compliance with community rules has been questioned for its adversarial emphasis on public confrontation rather than negotiated reconciliation (Cousins, 1996; Maganga, 2002). It also idealises a form of bureaucratic regulation which may be impossible to implement in the locally negotiated context of community-based resource management. Recommendations to adopt such bureaucratic approaches to water management are commonly found in the literature, which stresses the need for the prompt and depersonalised exercise of sanctions (Koudstall, Rijsberman and Savenjie, 1992).

However, at the local level people are not perceived by others simply as anonymous 'resource appropriators' or users but as very real individuals with a social identity as neighbours and kinsfolk. Evidence from Usangu and elsewhere in Tanzania (Cleaver 2000, 2002; Maseruli, 2000; Mnzava, 2000; Potskanski and Adams, 1998; Adams, Watson and Mutiso, 1997) suggests that the social circumstances of individuals and households count in decisions about imposing sanctions against them for non-compliance with the collective rules. Approximate compliance with rules is usually sufficient to avoid incurring penalties as rigid adherence to punishing all misdemeanours against the common good is considered too costly in terms of time, effort and social capital. The exercise of depersonalised punishments would erode social trust and relations of reciprocity. Where fines are levied as a sanction against anti-social acts, they are often determined according to the ability to pay; household goods such as pots and pans or stools and small livestock being taken as substitutes for cash. Finally when such fines are levied they are frequently used to fund a celebration (a beer drink or feast) the purpose of which is to 'celebrate forgiveness'.

Such a socially embedded system of exercising sanctions tends to reproduce existing social structures and therefore may disadvantage those already marginalized, who are given less room for manoeuvre in terms of adherence to the rules and payment of fines. However, this disadvantage has to be balanced by the positive effect in terms of maintaining social capital and relations of co-operation. For people closely tied to their neighbours in kin through trade, labour exchange, marriage and reciprocal coping strategies, non-confrontational, reconciliatory and processual ways of maintaining compliance with effective rules make sense. We can see the outcome as an often uneven compromise between social acceptability and resource management effectiveness.

6. The Nesting of Institutions: Local to Large-Scale

Those working in institutional design, and indeed those concerned with the management of common pool resources generally, have been much exercised with issues of scale. Much of the research work on which current approaches is based has been carried out on small-scale systems where linkages and interactions on the local scale can be investigated and documented. Translating this to the large-scale has been problematic, but has generally been covered in the concept of nested systems or enterprises, in which small local systems covering perhaps a few hundred people form the building blocks which gradually create the larger institution.

Thus the design principles suggest that 'Appropriation, provision, monitoring, enforcement, conflict resolution and governance activities are organised in multiple layers of nested enterprises' (Ostrom 1990:90). By this it is envisaged that each layer deals with the same types of issues but at a progressively larger scale and lesser level of detail. Thus, in the case of water management for irrigation, the field level involves a small number of farmers negotiating with one another face-to-face on a daily basis. These field groups are taken up within more formal water user groups, which handle the management of a complete secondary canal, and meet intermittently. In turn the water user groups are nested within a larger body having responsibility for management of water resources for the whole basin. The idea of nested enterprises thus formulated within the design principles is particularly appropriate to the management of a specific CPR such as water. Other schools of thought such as actor-network theory also work with

concepts of nested systems (Steins, 2001), though in this case the idea is that the systems (“collectifs”) of resource management (which can comprise both human and non-human entities) are linked to one another through networks of interactions, rather than inside one another as suggested by the design principles.

The concept of nesting is thus used as a mechanism for linking together small-scale local interactions to develop actions on the large scale. In practice, however, nesting institutions for resource management in Usangu faces a range of constraints. Firstly, the physical scale and size of the basin mean that local-level institutions dealing with local issues find it difficult to engage with the issues facing others in the basin who are perhaps over 100 km away, and for whom indeed the key issues may be very different. Thus, water user groups in the upper part of the plain are primarily engaged in allocating water for irrigation and establishing mechanisms for sharing, particularly in times of scarcity, whilst pastoralists are concerned with access to grazing resources and drinking water for their animals. Both are concerned with the issue of water, but in somewhat different ways, and the institutions that evolve in each case do not easily link together within a larger system. Whilst the irrigators can effectively nest within progressively larger scale institutions up to the level of the whole basin, all of which are primarily concerned with water management for crop production, pastoralists’ associations do not form a natural hierarchy in the same way, nor do they have obvious mechanisms for relating to other resource user groups such as the irrigators.

Scale indeed leads to general problems of “access”, in both physical and conceptual terms. Actors in one part of a resource system such as Usangu may be physically unable to reach other parts of the system in order to interact with it, and this may lead to problems of conceptualising other components and linkages within the system. The final downstream user of Usangu’s water is the main hydro-electric system in Tanzania, but many of the local people living within the basin have no conception of what a hydro-electric dam looks like, or how it functions.

Problems of scale and access lead to problems of inclusion – how to take account of the needs of “others”. In the case of Usangu, this particularly relates to downstream users outside the basin. The importance of water for the hydro-electric system has already been mentioned, but there is also a National Park taking water from the Great Ruaha river immediately downstream of the wetland. The idea of ‘nesting’ assumes institutions arising from broadly similar circumstances that easily lock together in layers of arrangements. It is not easily applied where the interests of institutions as different as the dam and the park need to be incorporated into mechanisms for allocating Usangu’s water. Indeed, even within the basin, problems arise because of its diversity. Experience in one of the sub-catchments in trying to bring together the various resource user groups (domestic water, irrigation water, pastoralist groups) alongside the local government structure and other existing local institutions met with only limited success (Forrester, 2001). In this case, it was envisaged that these various institutions would “nest” inside an “apex body” which would provide an overarching resource management institution for the sub-catchment. Initially, local people were not convinced of the need for the apex body, seeing it as simply one more institution which would require support and contributions from them, and whose function and value was by no means clear. In due course some progress was made in the formation of the apex body, including its formal recognition within the legal system. However, this progress owed much to continuing support from the Rufiji Basin Water Office who saw in it a significant aid to water management at the basin level.

Thus the challenges remain of balancing local level concerns of water managers with those at the large-scale in Usangu (for example, an overall shortage of water in the basin, and the needs of downstream users) and these challenges are not wholly resolved by the ‘nesting’ principle. Those concerned with institutional scaling-up must also take into account dynamic processes of bricolage, preferences of people for locally adapted forms of negotiation and conflict-resolution and the need to provide mechanisms for local people to have ‘voice’ in the wider arena.

7. The Implications for Crafting Institutions

The theoretical basis for our discussion has been the institutional design principles of Ostrom and others, and their application within the context of river basin management. We have focussed our discussion on four of these principles in particular, the management of the resource within clear-defined boundaries, low-cost public decision-making, the establishment of transparent governance systems of monitoring, authority and sanctions, and the nesting of institutions from the local to the large-scale. In each case we have shown that the challenges of applying them to the resource management issues in Usangu are linked through constraints such as scale, diversity and complexity.

'Post-institutionalist' approaches (including bricolage) generally differ from mainstream institutionalism (as epitomised by Ostrom's work) because their starting point is a wider understanding of the interactions between the natural and social worlds, rather than a narrower concern with predicting (and improving) the *outcomes* of particular institutional processes. This results in a number of other differences of emphasis between the two approaches. In conventional institutional theory the nature of institutions tends to be formal and functional; effectiveness is equated with clarity of purpose, transparency, public accountability and regularity of operation. Institutions are legitimated through the participation of all stakeholders and their collective negotiation of fair arrangements. By contrast, post-institutionalists conceive institutions as both formal and socially embedded, often multi-purpose, intermittent and semi-opaque in operation. The 'taken-for-granted' nature of many institutional arrangements renders them frequently illegible to outsiders and makes crafting more difficult, although all social arrangements are conceived as subject to negotiation. For post-institutionalists, participation of stakeholders is likely to be uneven, shaped by power relations, and institutions are legitimated through a variety of processes including the use of symbolic resources, multiple authority structures and devices borrowed from the state.

Ideas about the nature of decision making and the evolution of institutions also differ between the two approaches. Mainstream institutionalists see decision-making facilitated by the public building of trust through repeated rule-shaped interaction (underpinned by the threat of sanctions), such trust minimising the transaction costs of collective action. Post-institutionalists differ in the emphasis they place on unconscious, as well as conscious cooperation and action, on the proportion of 'decision-making' and norm forming which takes place outside public institutional fora. Rather, they see multiple sites of socially embedded decision-making in which acceptable rules and arrangements may be negotiated despite high transaction costs, or may be drawn from existing mechanisms and legitimating authorities, so minimising such costs. Socially embedded institutional arrangements are characterised by a preference for minimal management activities, generous interpretations of compliance and avoidance of sanctions. Such institutions rarely develop on a simple trajectory from weak to strong, nor is robustness necessarily undermined by intermittence of functioning. Such differing conceptions of decision-making in institutions are underpinned by contrasting models of human behaviour, collective action and the nature of groups.

Mainstream institutionalists see individuals operating according to a modified version of rational choice; behaviour is either rationally strategic or learnt, individuals are a combination of 'rational egoists' and 'norm users'. Collective action then becomes a strategic choice related to resource use, reinforced by the learning of norms in repeated interactions (Ostrom 2000). Individuals are primarily identified according to their interest in the resource (as 'resource appropriators') and institutions are built on the basis of identifying a common community of users. Post-institutionalists have a more diverse conceptualisation of the influences shaping human behaviour. They see strategic livelihood choices (about the use of resources) critically influenced by social concerns (the need to live in peace with neighbours), by psychological preferences for cooperation over confrontation (even at the expense of transparency and fairness) and by culturally and historically shaped ideas about the 'right way of doing things'. Individuals, invested with complex identities and affinities, may operate within a number of overlapping but diffuse

networks or communities, in multiple locations. Post-institutionalists are concerned with identifying and understanding the ways in which such diversity of institutional arrangements reproduce social faultlines, and the extent to which 'crafting' institutions reinforces or overcomes social exclusion.

An approach to understanding institutions based on the concept of bricolage emphasises the ebb and flow of institutions over time and the importance of understanding *how* processes of collective decision-making work. In combining a highly contextualised focus with a perspective on the wider structural forces shaping institutional inclusion and exclusion, it becomes clear that no one factor (or group of factors) are sufficient to explain institutional success. Rather institutional processes are dynamic, play out through very different forms in varying contexts and, to this extent, elude design.

If institutions partly elude design, what then can be the policy implications for those concerned with building institutions for better natural resource management? We do not suggest that attempts at strengthening existing institutions, or building new ones, are doomed to failure. Rather we argue that attempts at institutional intervention should be based on much better understanding of social relationships and existing processes of decision-making and resource allocation. This would involve detailed knowledge of how people understand the relationship between themselves and the natural world, the socially embedded principles of decision-making on which they draw to manage their natural resources, and the effect of such processes on inclusion and access. Such a rich view of institutional functioning is unlikely to be achieved in a one-off snapshot, nor even in the relatively short time periods of many development interventions, but to require process-based learning over much longer periods.

We can see the issues presented here played out in the SMUWC project and other interventions to improve natural resource management in the Usangu basin. These provide a stark illustration of the problems of applying institutional design principles in fluid and complex situations of competition over resources. One element of such situations is the role of institutions such as the district and village governments and the need to support and develop these institutions to meet their responsibilities. In the case of Usangu it was recognised that lack of capacity in village governments was a constraint and in due course a programme of capacity-building was put in hand to address this. This programme needed to address, amongst other matters, the issue of land tenure, which, though formalised through the Village Land Act of 1999, remains to this day a complicated web of formal and socially-embedded relationships. On the other hand it was recognised that it was essential to gain an understanding of the complex linkages between different institutions in Usangu concerned with the management of resources, and to try to build on existing strengths through a process of bricolage and patching together of established networks and processes. Thus, the role of the Rufiji Basin Water Office in the formal stewardship of the water resources in the basin was complemented by an informal Water Managers' Group supported by the project which built on existing relationships to bring together all those concerned with the day-to-day management of water. Throughout the duration of the project there was a constant tension between the need to support the formal and bureaucratic processes of resource management, with the potential for supporting and building on processes and networks already in existence, particularly where these had developed to address issues of conflict and competition over resources (for example, between irrigators and pastoralists). These tensions were exacerbated by the need for the project to achieve outcomes over a relatively short period, highlighting the need for time and patience in institutional development.

At the present time there is still uncertainty about what institution or institutions will evolve as the most appropriate for managing the natural resources of the Usangu catchment. It does, however, seem clear that simple notions of "river basin organisations" will not be appropriate and that the future response will be some form of *bricolage* of existing and evolving institutions linked together in complex and fluid networks, in which institutional design principles are only partly applicable. Support and development of the institutions that do emerge is likely to be a complex, lengthy and sensitive undertaking.

Mainstream institutionalist ideas, epitomised in design principles literature, have provided a valuable focus on the positive possibilities of local collective action for resource management, and in identifying factors internal to institutions which may facilitate or impede such collective action. However, emerging views usefully broaden and deepen this rather narrow gaze, conceiving institutions as critically shaped through social practice and attempting to accommodate the constant dynamism, uncertainties, complexities and ambiguities that this implies. This paper has attempted to illustrate that those concerned with the challenging task of developing and supporting institutions for natural resource management, could find promising directions in emerging 'post-institutionalist' thinking.

References

- Adams, W.M., E.E.Watson, S.K.Mutiso, (1997) Water rules and gender: Water rights in an indigenous system, Marakwet, Kenya. **Development and Change**, 28, 707-730.
- Agrawal, A.(2001) Common Property Institutions and sustainable governance of resources. **World Development**, 29, (10), 1649-1672.
- Agrawal, A., & Gibson, C. (1999) Enchantment and disenchantment: The role of community in natural resource management. **World Development**, 27(4), 629 –49.
- Asian Development Bank. (1996) **Towards Effective Water Policy in the Asian and Pacific Region**, Manila:Asian Development Bank.
- Baland, J.M.,& Platteau, J.P.(1996) **Halting degradation of natural resources: Is there a role for rural communities?** Oxford: Clarendon Press.
- Barrow, C. (1998) River basin development planning and management: a critical review. **World Development** 26(1), 171-186.
- Benjaminsen, T., and Lund, C. (Eds.) (2002), Securing Land Rights in Africa. **European Journal of Development Research** 14(2), December.
- Berry, S. (1993) **No Condition is Permanent: the social dynamics of Agrarian Change in Sub-Saharan Africa**, London, University of Wisconsin Press.
- Berry, S. (1994). 'Resource access and management as historical processes: conceptual and methodological issues', in C.Lund and H Marcussen (eds), **Access, Control and Management of Natural Resources in Sub-Saharan Africa – Methodological Considerations**, Occasional Paper 13, International Development Studies, Roskilde University, Roskilde, 24-45.
- Bloch, H. (1999). The European Union Water Framework Directive: Taking European water policy into the next millennium, **Water Science and Technology** 40 (10), 67-71.
- Bromley, D. W. and Cernea, M.M. (1989) **The Management of Common Property Natural Resources, Some Conceptual and Operational Fallacies**, World Bank Discussion Papers No. 57, Washington DC: World Bank.
- Chase-Smith, R., Pinedo,D., Summers, P.M. & Almeyda, A. (2001) Tropical rhythms and collective action: community based fisheries management in the face of Amazonian unpredictability **IDS Bulletin**, 32(4), 36-46.
- Cleaver, F. (2000) Moral ecological rationality: Institutions and the management of common property resources, **Development and Change**, 31(2), 361-383.

Cleaver, F. (2001). Institutional bricolage, conflict and co-operation in Usangu, Tanzania **IDS Bulletin**, 32(4), 26-35

Cleaver F. (2002) Reinventing institutions and the social embeddedness of natural resource management, **European Journal of Development Research**, 14, (2), 11-30.

Cleaver, F. & Kaare, B. (1998) **Social embeddedness and project practice: A gendered analysis of promotion and participation in the Hesawa Programme, Tanzania**, Bradford: University of Bradford for Sida

Cousins, B. (1996) Conflict management for multiple resource users in pastoralist and agro-pastoralist contexts, **IDS Bulletin**, 27 (3), 41-54.

Dwivedi, R. (2001) Environmental movements in the global South: Issues of livelihood and beyond, **International Sociology** 16(1), 11-31.

Ellis, F. (2000) **Rural livelihoods and diversity in developing countries**, Oxford: Oxford University Press.

European Union (2000) **Establishing a framework for community action in the field of water policy** Directive of the European Parliament and of the Council 2000/60/EC Is this a complete reference?

Franks T, Lankford B and Mdemu M (2004) Managing water amongst competing uses: the Usangu wetland in Tanzania, **Irrigation and Drainage** 53 pp 277-286

Forrester, K. (2001) **Evaluation of the Sub-Catchment Resource Management Plan** SMUWC Project, mimeo. Is this available from anywhere- website?

Giddens, A. (1994) **The Constitution of Society: Outline of the theory of structuration**, Cambridge: Polity Press.

Jonch-Clausen T and Fugl J. (2001) Firming up the conceptual basis of integrated water resources management. **Water Resources Development** 17(4) 501-510

Kaufman, G.J. (2002) What if the United States were based on watersheds **Water Policy** 4(1), 57-68.

Koudstall, R., Rijsberman F.R., & Savenjie, H. (1992) Water and Sustainable Development **Natural Resources Forum** 16 (4), 277-290.

Larson, A. M. (2002) Natural resources and decentralization in Nicaragua: are local governments up to the job? **World Development** 30(1), 17 – 31.

Li, T.M. (1996) Images of Community: Discourse and Strategy in Property Relations, **Development and Change** 27(3), 501-527.

Lund, C. (2001). Seeking certainty and aggravating ambiguity: On property, paper and authority in Niger, **IDS Bulletin**, 32(4), 47-53.

Maganga, F. (2002). The interplay between formal and informal systems of managing resource conflicts: Some evidence from South-Western Tanzania. *The European Journal of Development Research*, 14(2), 51 –70.

Maganga, F. (1999) **Resource Conflicts and Conflict Management: fieldwork findings from Iringa and Mbarali District**, Copenhagen, SASA. What is this organisation?

Mance, G., Raven, P.J., & Bramley, M.E., (2002) Integrated river basin management in England and Wales: a policy perspective, **Aquatic Conservation: Marine and Freshwater Systems**, 12(4), 339-346.

Maseruli, B. (2000) **Local Institutions and the Management of Natural Resources**, Unpublished Field Notes, Mweka, Tanzania: College of African Wildlife Management.

Mehta, L., Leach, M. & Scoones, I. (Eds.) (2001) Environmental Governance in an Uncertain World, **IDS Bulletin** 32(4), 1-9.

Minzava, D. (2000) **How modern water resources management conflicts with traditional/indigenous management; the case of Arusha Water Project**, Unpublished paper, Bradford: University of Bradford

Ministry of Water and Livestock Development (2002) **National water policy**, United Republic of Tanzania

Mosse, D. (1997). The symbolic making of a common property resource: history ecology and locality in a tank irrigated landscape in South India, **Development and Change**, 28(3), 505-30

Odgaard, R. (2002) Scrambling for Land in Tanzania: Processes of Formalisation and Legitimation of Land Rights, **European Journal of Development Research**, 14(2), 71-88.

Ostrom, E. (1990) **Governing the Commons: The Evolution of Institutions for Collective Action**, New York: Cambridge University Press.

Ostrom, E. (1992) **Crafting Institutions for Self-Governing Irrigation Systems**, San Francisco: ICS Press

Ostrom, E. (2000) Collective action and the evolution of social norms, **Journal of Economic Perspectives**, 14(3), 137-158

Peters, P. (1994) **Dividing the Commons: Politics, Policy and Culture in Botswana**, London: The University Press of Virginia.

Potkanski, T. & Adams, W.B. (1998) Water scarcity, property regimes and irrigation management in Sonjo, Tanzania, **Journal of Development Studies**, 34(4), 86-116.

Rocheleau, D. (2001) Complex uncertainties and relational webs: Uncertainty, surprise and transformation in Machakos, **IDS Bulletin**, 32(4), 78-87

Ruttan, L. (2000) Games and the CPR toolkit, **The Common Property Resource Digest**, 55, December 1-3

Scoones, I. (1998) **Sustainable Rural Livelihoods: A Framework for analysis**, IDS Working Paper No. 72, Brighton: Institute of Development Studies

SMUWC, (2001a) **SMUWC Final Report: Conflicts**. <http://www.usangu.org/reports/conflicts.pdf>

SMUWC, (2001b) **SMUWC Final Report: Rural Livelihoods**
http://www.usangu.org/reports/rural_livelihoods.pdf

Steins, N. A. (2001) New directions in natural resource management: the offer of actor-network theory, **IDS Bulletin** 32(4), 18 – 25.

Swallow B.M, Johnson N.L and Meinzen-Dick R.S (2001) Working with people for watershed management, **Water Policy** 3, 449-455

Thompson, J. (1995) Participatory approaches in government bureaucracies: facilitating the process of institutional change, **World Development** 23(9), 1521 – 1554.

Tortajada C. (2001) Institutions for integrated river basin management in Latin America, **Water Resources Development** 17(3), 289-301

Uphoff, N. (1996) **Learning from Gal Oya: possibilities for participatory development and post Newtonian social science**, London: Intermediate Technology.

Uphoff, N. and Wijayarathna, C. (2000) Demonstrated benefits from social capital: the productivity of farmer organisations in Gal Oya, Sri Lanka, **World Development** 28(11), 1875 – 1890

Wade, R. (1988). *Village Republics: Economic Conditions for Collective Action in South India*, Cambridge, Cambridge University Press.

White, G.F. (1998) Reflections on the 50-year international search for integrated water management, **Water Policy** 1(1), 21-27