CONCEPTS AND COSTS FOR THE MAINTENANCE OF PRODUCTIVE CAPACITY: A STUDY OF THE MEASUREMENT AND REPORTING OF SOIL QUALITY

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Certificate

This is the work of the candidate alone (except where due acknowledgment has been made) and has not been submitted previously, in whole or in part, in respect of any other academic award.

The content of the thesis is the result of work carried out since the official date of commencement of the program.

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List of Abbreviations

AAA	American Accounting Association
AARF	Australian Accounting Research Foundation
AASB	Australian Accounting Standards Board
ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
AICPA	American Institute of Certified Practicing Accountants
AIE	Agri Environmental Indicators
APEC	Asia Pacific Economic Cooperation
ASB	Accounting Standards Board
ASSC	Accounting Standards Steering Committee
CBI	Confederation of British Industry
CCA	Current Cost Accounting
CoCoA	Continuously Contemporary Accounting
CPP	Current Purchasing Power
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEHCD	Department of Environment, Housing and Community Development
EEP	Export Enhancing Program
ESD	Ecologically Sustainable Development
FASB	Financial Accounting Standards Board
GATT	General Agreement on Trade and Tariffs

GVP	Gross Value of Production
HLRF	High Level Riverine Floodplain
IASC	International Accounting Standards Committee
IC	Intellectual Capital
ICM	Integrated Catchment Management
LCSMP	Loddon Catchment Salinity Management Plan
LMU	Land Management Unit
MDB	Murray Darling Basin
MDBC	Murray Darling Basin Commission
NCCLPB	North Central Catchment and Land Protection Board
NRA	Natural Resources Accounting
NZRF	New Zealand Research Foundation
OECD	Organisation for Economic and Community Development
SA	Societal Accounting
SCA	Standing Committee on Agriculture
SCARM	Standing Committee on Agriculture and Resource Management
SEA	Socio-Economic Accounting
SEC	Securities and Exchange Commission
SGARA	Self-Generating and Re-generating Assets
SIA	Social Indicators Accounting
SIG	Salinity Implementation Groups

SLA	Statistical Local Areas
SRA	Social Responsibility Accounting
TIA	Total Impact Accounting
UNCED	United Nations Conference on Environment and Development
WCED	World Commission on Environment and Development

CONCEPTS AND COSTS FOR THE MAINTENANCE OF PRODUCTIVE CAPACITY: A STUDY OF THE MEASUREMENTS AND COSTS OF SOIL QUALITY

Summary

This thesis was undertaken to determine the role accounting plays in the monitoring and reporting of soil quality in one sector of the agricultural industry, broadacre farming. Little public information is available about one group of participants, the farmers themselves. A primary aim was to determine if farmers have a clear idea of, and manage appropriately, the productive capacity in their soil quality. The role which accounting plays in providing useful information to decision makers on the management of natural resources, and in particular soils, is questioned. Accounting systems, developed for the manufacturing sector may not be appropriate for managing long-term, complex resources such as soil. Soils, and soil quality in particular, are major elements in determining land value, yet potential buyers and other decision makers, particularly policy makers, could make decisions concerning soil quality on the basis of incomplete and often misleading information.

It is proposed that a major reason is due to the fact that different participants in the agricultural and accounting industries require and use different information. The topic of soil quality and land degradation is viewed from two perspectives. In one perspective, the proprietary view, the accounting emphasis is on the ownership of assets and the change, both in income and capital, in these assets over time. In this case the accounting equation is seen as Assets – Liabilities = Equities.

A more recent perspective in accounting, the entity view, emphasises the assets whether

financed from equity or debt and where the accounting equation is seen as Assets = Equities. The emphasis changes to the income flow from these assets and more interest is shown in current market prices as a reflection of the future value of these assets. The entity view has grown because of the need for information by interested participants who are outside the firm, and who have to rely on comparable information about each firm for their investment buy-or-sell decisions.

Economists, governments, policy makers and accounting standard setters make decisions based on the entity theory, therefore, the major question in this thesis was whether the farmers' perspective was also based on the entity theory. Two subsidiary questions flowed from this major question. What accounting do farmers find useful in the management of their soil quality? Do the farmers have a clear and conscious view of the productive capacity in their soils and do they manage and monitor their soil quality based on the proprietary theory and value to the owner?

A survey was conducted with broadacre farmers in the Loddon Catchment, Victoria, in which a questionnaire was administered. Farmers and their spouses were also encouraged to discuss their answers with the interviewer. The survey farmers recognised complexity and individuality and their accounting systems reflected this also. Extensive physical records are undertaken, while accounting is based on cash flow and annual reports for compliance purposes. The proprietary view is dominant among these farmers; therefore, it can be accepted that they do not conform to the entity view. They do not find formal accounting reports useful for decision-making and these reports based on uniform standards and market prices would not reflect adequately the productive capacity of their soil quality.

Abstract

This thesis studies the role accounting plays in the monitoring and reporting of soil quality in one sector of the agricultural industry, broadacre farming. A survey was conducted with broadacre farmers in the Loddon Catchment, Victoria, Australia. The primary aim was to determine the effectiveness accounting plays in providing information to decision makers relative to the productive capacity in soil quality and not just on profits.

The capital asset in this study was defined as soil quality. Soils and soil quality in particular, are major elements in determining land value. The concern is decisions are being made by potential buyers and other decision makers, particularly policy makers, with regards to soil quality on the basis of incomplete and often misleading information. It is proposed that a major reason is due to the fact that different participants in the agricultural and accounting industries require and use different information.

The accounting systems used by farmers are those that have been developed for the manufacturing sector which may not be appropriate for managing long-term, complex resources such as soil. The farmers themselves did not find formal accounting reports useful for decision making because these reports are based on uniform standards and market prices.

The topic of soil quality and land degradation is viewed from two perspectives. In one perspective, the proprietary view; the accounting emphasis is on the ownership of assets and the change, both in income and capital, in these assets over time. In this case the accounting equation is seen as assets - liabilities = equities. The proprietor takes all the risk.

A more recent perspective in accounting, the entity view, emphasises the assets whether financed from equity or debt and where the accounting equation is seen as assets = equities. The emphasis changes to the income flow from these assets and more interest is shown in current market prices as a reflection of the future value of these assets

Profit is not necessarily a good indicator of what farmers are doing for their capital asset. There needs to be greater emphasis on costs undertaken for the conservation of soil. Those costs should be considered an investment and put into the balance sheet and not the profit and loss statement.

The major finding of study demonstrates that decision making groups have different perceptions about the nature and choice of financial information. National policy makers advocate short term productivity which is self defeating and frustrating many primary producers who advocate long term maintenance of soils.

Chapter I

Background and Overview

1.1 Introduction

Financial reporting is increasingly expected to provide evidence of accountability to those outside an organisation. Consequently, the expectations are that everyone should use the same accounting to make decisions about their investments. This perspective describes the entity theory that emphasises formal accounting systems and reporting in standard financial reports using current market prices.

The purpose of using both market prices and uniform reporting is to facilitate a rational allocation of resources for individual investing, policy making for both social and economic requirements, and international trade (AARF 1992, 1997, IASC 1996, Hill 1996). Whatever mechanisms exist, they do not provide information on wealth in a firm's productive capacity whether they be measured at historical cost, current market value or net present value.

The major question which this perspective poses is whether the elements of the entity theory are used and can be useful to farmers in the management of the productive capacity of their soil.

In this thesis, the aim has been to develop an understanding of how participants approach the problems and solutions of land degradation in the agricultural industry in Australia. Little public information is available about one group of participants, farmers. In this thesis the participants were broadacre farmers in the Loddon Catchment in Victoria. A primary aim of this thesis is to determine whether farmers have a clear idea of, and manage appropriately, their productive capacity as impounded in soil quality on their farms. The focus on soil quality is justified because soil can be managed through its three characteristics:- soil depth; soil fertility; and soil structure. Soil quality reflects all aspects of degradation and is measurable. The role which accounting plays in providing useful information to decision makers on the management of natural resources, and in particular, soils, is questioned as accounting systems, developed largely for the manufacturing sector, may not be appropriate for managing long-term, complex resources, such as soil. Soils, and soil quality in particular, are major elements in determining land value, yet, potential buyers and other decision makers, including policy makers, make decisions concerning soil quality on the basis of incomplete and often misleading information.

It is proposed that a major reason for excluding explicit reference to soils is the fact that different participants in the agricultural industry require and use different information. The related topics of soil quality and land degradation are viewed from two perspectives. In one perspective, the proprietary view, the accounting emphasis is on the ownership of assets and the change, both in income and capital, in the assets over time. In this case, the accounting equation is seen as Assets - Liabilities = Equities. Market prices are not as important as value to the owner because these assets may never be sold. This is particularly true for the best land whose quality has been maintained and or improved. Those with a proprietary view, therefore, do not see the need to record or report on their major asset, their soil quality, because this can be monitored by observation and physical records.

A more recent perspective in accounting, the entity view, emphasises the assets whether financed from equity or debt. In this case the accounting equation is seen as Assets = Equities. The emphasis changes to the income flow from these assets and more interest is shown in the current market prices representing the future value of these assets. The entity view has grown because of the need for information by interested participants who are outside the firm and who have to rely on comparable information about each firm for their investment buy-or-sell decisions. Those with an entity view require formal accounting systems that are reported in standard formal financial accounting reports.

It is also argued in this thesis that those who manage these natural resources use different information which is not available to outsiders. Consequently, governments, policy makers, financial institutions and accounting standard setters are making assessments about farmers which are based on information developed specifically for financial accountability. There is no evidence that this approach provides useful information to decision-makers on the capital (productive) component of natural resources.

However, there is sufficient evidence to indicate that the extent of land degradation is due in part to increasing inputs and to the effects of using traditional accounting methods which exclude natural resource usage (Chisholm and Dumsday 1987). This creates several problems for farmers including the type of accounting used and the usefulness of this accounting. The first problem can be illustrated in terms of policy making and accounting. Since the 1950's, there has been a policy focus on the volume of production (income) without accounting for the state of the environment in soil resources (capital) which form the productive capacity of land (Roberts 1993).

Between 1952-53 and 1992-93, the volume of agricultural production in Australia increased by 150% (Chisholm 1992). A steady rate of improvement in productivity is undoubtedly the main reason why agricultural output has been able to grow despite the declining terms of trade facing farmers. The response of the rural sector to its declining terms of trade, increasing the volume of output, can be shown in broadacre land use intensity, where, from 1950 to 1992, the aggregate level of output in dry sheep equivalent (DSE) rose from 298 to 550 (ABARE

1994). This is represented in accounting by gross margins and profit statements and is still recommended practice.

The most pertinent information for this study is that productivity growth appears to have been much more rapid in agriculture than in the economy as a whole, but, according to public data, growth in the capital stock has been much slower (Gretton and Salma 1996). This conclusion is based on capital purchases only and not on land quality. What these figures exclude are any increase in the capital improvement in soil quality, farming methods used by farmers and intellectual capital, all of which have a direct effect on the growth of capital stock.

It is the same resources that are excluded from accounting reports. For reporting purposes, financial accounting depends largely on assets in exchange based on market prices. This system does not include non-market resources maintained and used on the farm. These resources are called assets in use and several sources of wealth are excluded from present accounting methods including soil, on-farm equipment, skills and knowledge.

Decision-making about such resources is undertaken on a cost/benefit, or opportunity cost basis, in which case no external transactions take place although the whole organisation is enhanced by this decision.

> The opportunity cost of using an asset in the company is derived by the value foregone of the next best alternative, which is not necessarily to sell it. Often, the alternative to current use is future use. The life of the asset will be increased when an asset is idle for a time (Godfrey et al 1994, p.191)[i]

A second problem is illustrated in the accounting recommended for assets in use, that is, the capital aspect of land present in the soil quality. Land held for use is recorded at historical cost and in Australia is excluded from *accounting standards relating to the depreciation and revaluation of non-current assets*[ii]. Therefore, few formal mechanisms currently exist in the accounting literature within Australia to account for, or report on changes in, the capital value of land[iii] although revaluation of assets is established practice.

Two other ways of accounting for land other than historical cost are market price offered at sale and the current market price called current value, an economic definition of the value of an asset. Under the current value approach assets are defined as 'future economic benefits controlled by the entity as a result of past transactions or other past events' (AARF 1992, p.3). Future economic benefits are measured by future cash flows the present value of which is assumed to exist in the current market price (Milham 1994). This methodology has been accepted by economists, governments and accounting standard setters as the theoretically correct value but not by accounting practitioners because of the level of subjectivity. Market price is an imperfect surrogate for land value when the market is not fully informed on soil quality and the land is not for sale. In recent times, there has been a recognition in the theoretical agricultural economic literature that the capital value of land rests in the soil quality itself, although, even in these models there is still a reliance on market prices to convey signals to buyers and sellers (Milham 1994).

Despite the lack of informed market prices for natural resources, policy makers, internationally and in Australia, are concentrating their efforts on developing market prices for all natural resources(Hill 1996, Geeves, G.W., Ringrose-Voase, A.J., Merry, R.H., Chartres, C.J., 1995). The accounting standard setters internationally are also following this process (IASC 1996). The question to be examined in this thesis is whether the accounting definitions of productive capacity, in which market prices and future cash flows are the measurement tools, are helpful in defining the value of soil quality itself.

The rationale of governments, policy makers and the accounting standard setters for the importance of market prices is based on the assumption that if the market knows the information, then farmers are informed and can then make their decisions based on full information. This assertion is made on the basis that farmers are profit maximisers and rely on the market price of land to inform themselves on whether to conserve the soil or not and whether to buy or sell.

Governments have an additional responsibility to ensure that usage of natural resources is socially optimal as well as privately optimal and are proposing that market prices will provide clear information on the extent to which social and private decisions relating to natural resources are optimal (Hill 1996, Barton 1984). There is very little empirical information about the decision-making processes of farmers or of the variables considered by them. One of the motivations for this thesis is the belief that farmers may think differently from other participants about the resources they manage and how they wish to report them.

One of the major functions of the price system is to provide information for the allocation of economic resources among alternative uses (Chambers 1980). Changes in the prices of resources provide a signal to the firm that a reallocation of resources is called for by the market. In the 1960's, the accounting response to price-level changes favoured current cost systems because they recognised changes in current market prices of resource inputs and inventories and could record them in the firm's accounting system. The same could not be achieved for fixed assets which comprised the operating capacity of the firm. Debates ensued as to whether the maintenance of the operating capacity of the firm should relate to the purchasing power of shareholders, or whether it should relate to the assets themselves (Gynther 1970, Mattessich 1995).

In financial accounting theory, the maintenance of assets has long been the concern of both academic and professional accountants (American Accounting Association 1936). It is driven by a capital concept that states that the capital of the entity should be maintained intact before distributing dividends to the owners. These debates have not been resolved and, with the dominance of the entity view in accounting, farmers are being judged increasingly on profits rather than on capital reflecting the preference for the income statement in corporate reporting. Therefore, in this thesis there will be a focus on what, and how, farmers maintain their productive capacity. The questions, to be answered are, ‘do farmers have a clear view of their productive capacity, and how do they relate this to their production and income’?

In this regard, it will be important to identify the actions which reduce the capital asset, the actions and expenditures which increase the capital asset, and the actions which maintain the capital asset. In agriculture this would mean identifying the actions farmers undertake to maintain their soil quality and avoid problems. In manufacturing, this would mean maintaining or replacing machinery as it becomes obsolete or creates waste.

The remainder of this chapter is arranged as follows. Section 1.2 examines income and the attributes of income which have been widely discussed in the accounting literature while capital has been neglected. The distinction between capital and income is central to this thesis; therefore, these topics will be discussed in relation to soil quality and productive capacity. In section 1.3, an overview of the responses by the Commonwealth Government to land degradation will be provided. In section 1.4, the two theories of accounting, entity and proprietary will be examined. The most important aspect of the final section is the differences in thinking between groups in society as regards capital maintenance. The existence of significant differences in thinking is demonstrated through an examination of the theoretical concepts in the entity and proprietary theories, and by the examination of capital maintenance in the accounting literature. This also provides a framework which leads to the hypothesis that farmers do not have an entity view of their soil quality or their farm operations. Sections 1.5, 1.6 and 1.7 set out the rationale, objectives and outline of the remainder of this thesis.

1.2 Capital and Income

Two objectives of accounting are: (1), that accounting should be decision-useful; and (2), that a business would want to maintain capital, optimally through the generation of profits whilst maintaining the asset base, either by retaining and using the assets, that is, ‘value in use’, or by the exchange of assets, that is, ‘value in exchange’ (Goldberg 1966). Therefore, many consider the central problem of accounting has been the distinction between capital to be retained and income to be distributed, a concern which has been debated in many contexts for at least the last one hundred years (Goldberg 1966, Clift and Kerr 1989). The problem still exists, that is, the nexus between income and capital and the ability of accounting reports to differentiate, for decision makers, between these two components.

One cause of controversy is that a trade-off can be made between the short-term and long-term impacts of decisions. If assets are sold, such as inventory for income, it is a short-term gain and the income statement will record the gain as income. If, however, the gain comes from an improvement in a fixed asset, such as that soil quality improves and has a long-term benefit, then the gain should be treated as an increase in capital in the balance sheet[iv].

As more users demanded the disclosure of financial information, so, also, did they require all changes initially to go to the income statement. The consequence of this is a merging of income and capital, whereas they need to be clearly segregated before distributions are made from the business. In agriculture, an improvement in the value of the land has not resulted from a transaction and any spending of this increase would represent a reduction of the capital[v].

1.2.1 Capital

The capital maintenance problem arises from the need to divide the total wealth of a firm into two notional parts on balance day, the basic initial capital component and the incremental, income component (Hoggett and Edwards 1992). The base line for the definition of capital for a corporate entity is registered capital plus income not distributed to owners, i.e., the total amount of capital available to a company to distribute to investors measured in historical cost. Revenue and expenses for a certain period would be matched against each other and the surplus could be distributed to shareholders or retained and transferred to a capital account.

Another concept of capital is defined as the ‘residual interest in the assets of the entity after deduction of its liabilities’. Under this definition, capital cannot be defined independently of the definitions of assets and liabilities (Godfrey 1994, Clift and Kerr 1989, NZSA 1993, AARF 1992). With this focus, the assets in use need to be valued in terms of some concept of value. In inflationary times, financial capital meant valuing assets at historical cost adjusted for inflation. Physical capital meant valuing assets to reflect the resources needed to continue with the same productive capacity valued at current cost. These values could either reflect an ability to maintain the same volume or the same value of goods into the future. Since inflation is not a major issue at present, adjusting assets for maintaining capital has encountered little interest either from governments or in the literature, while the accounting profession still prefers to use historical cost.

1.2.2 Income

The change in focus to assets also changed how income is reported. If income is seen as the difference between net assets at two points of time, all changes are potentially considered income because, in this view, all assets are purchased in order to provide, both in the short-term and the long-term, a stream of future cash receipts (Godfrey et al 1992, pp. 422-427). The income statement to portray this view, therefore, incorporates the changes in ‘assets in use’ as well as ‘assets in exchange’ because the values of assets are changed to reflect this future stream of cash receipts. It includes both changes in revenues and expenses from market exchanges and changes in the values of the assets and liabilities held in use. This is justified by its proponents on the assumption that users of accounting reports are primarily interested in obtaining a present and future income flow from their investing decisions and wish to know how management arrived at these decisions (Mathews and Perera 1996, p.188, FASB 1980, AARF 1995, p.3). These changes in the values of the assets and liabilities are taken to the income statement because they are considered income earned ahead of use (Edwards and Bell

1961). It may, however, lead to the impression that these changes represent possible withdrawals for consumption[vi].

Another problem arises in accounting if there are assets and liabilities that have not been adjusted for changes in value, as in land, because significant information would be missing. This explains the accounting dilemma in agricultural accounting that if all the changes are taken to the income statement and distributed, how is the erosion or enhancement of the natural resource base adjusted or recorded? Without up-to-date valuations of all assets held in use this approach has been difficult to implement in practice. Practising accountants have disagreed with this approach and, for them, changes in value, when recognised, are to be treated as changes in capital and not as income of the current period. For them, when an asset is revalued any increase is taken to an asset revaluation reserve in the balance sheet.

1.3 Land Degradation in Australia

Land degradation has been identified as a major problem in Australian agriculture[vii] (Maunders and Burritt 1991) and could be defined as including all those adverse effects that land uses may have on the potential of land to provide services.

> The major forms of land degradation commonly referred to include soil erosion by wind and water, salinity of land and streams, soil acidification, soil structural decline, soil nutrient depletion, rural tree decline, loss of native and unique habitats for flora and fauna, damage to land through recreational use, invasion of semi-arid areas by woody shrubs, and desertification through loss of vegetative cover in arid regions (Dumsday and Chisholm, 1990, p.3).

In physical resource terms, of the 768 million hectares of land in Australia, 470 million hectares (61%) are committed to agriculture.[viii] The extensive use of the nation's land resources for this purpose creates a significant cost/benefit dilemma for government policy and research decisions.

Land held under freehold title is approximately 10 per cent of Australia's agricultural land. The remaining land used for agriculture is predominantly rangelands that are under government ownership (Crown land) and leased to graziers under term-lease arrangements. It is the opinion of some economists (Young 1987, Dumsday and Chisholm 1990) that this system offers inadequate incentives to forgo short-term profits and invest in long-term sustainable land management practices, although:

> there is no evidence that land degradation has occurred at a greater rate overall on pastoral lands held under fixed-term lease than on agricultural land held under the more secure forms of tenure, namely, freehold or perpetual leasehold (Bradsen 1987, p.12).

An assumption made in economic studies is that the full costs incurred in the management of leased land have not been recovered. Dumsday and Chisholm (1990) advocate that leased land be converted to freehold and that there be generally less government involvement[ix], other than perhaps through research and extension programs. The premise behind this belief is that private landholders have enough incentives through the profit mechanism to maintain their capital assets. If profits are not forthcoming the premise is that the land would be sold. This is an important assumption in the development of this thesis because it is the basis of considerable advice to governments who then assume that they understand farmer behaviour. It is an assumption that is tested in this thesis in that if farmers have a proprietary view of their farm, profits or sale will not form the major motivation for these farmers.

In 1993-94, at the time the major survey component of this thesis was undertaken, Australia had over 64,469 broadacre farms (ABARE 1995, p.77). There is growing recognition of the role and responsibility of farmers in Australia in dealing with environmental management problems. Significant roles for farmers have been identified in a number of major national programs, for example, Landcare[x] and Whole Catchment Management and Land and Water Management Plans. These schemes are directed at the community and catchment levels and not specifically at the operations inside the farm which may explain why farmers have given the impression that they are not interested.

1.3.1 The Effect of Trade on Land Degradation

The measurement of land degradation creates significant problems, not only in scientific and technical terms, but also in economic terms. Economic studies often appear authoritative but estimates of the extent of the degradation range from $600 million a year in lost agricultural production (Commonwealth of Australia 1989) to $2 billion annually (Department of Environment, Housing and Community Development (DEHCD)(quoted in ABARE 1990). Other figures reported by the Productivity Commission (Gretton and Salma 1996) give estimates (in 1991 dollars) in Western Australia alone at $609 million for 1991 which would support the higher DEHCD figure. Little information is available on how these estimates were derived and what was included or excluded. Many of the studies use linear modelling to extrapolate physical changes given no change in farming practices and multiplying by a figure for loss of production. The range of these estimates (Dumsday and Chisholm 1990) does nothing to aid decision-making but they are an important influence on policy development. Australian farmers face additional pressures that threaten both their financial and ecological[xi] viability. Since the 1950's, a cost-price squeeze in agricultural commodities has lead to a decline in farming incomes generally (ABARE 1994 *Commodity Statistical Bulletin, AGPS, Canberra).*

As well, there are other pressures that could increase farmers' perceptions that competition is becoming more difficult. While the Uruguay Round[xii] of the General Agreement on Trade and Tarriffs (GATT) agreement places limits on the subsidisation of United States exports of wheat and coarse grains, the Australian Bureau of Agricultural Research Economics (ABARE 1995) points out that the Export Enhancing Program (EEP) in 1995 in the United States may be targeted towards Australian export markets.

Other studies estimate that Australian agriculture is likely to benefit as international trade liberalisation is extended with the implementation of the Uruguay Round of GATT trade negotiations and the Asia Pacific Economic Cooperation (APEC) free trade agenda (Gretton and Salma 1996).

The budget funding allocated to the agricultural industry often reflects governmental responses to these problems. In 1994-95, the Commonwealth Government outlays to industry allocations were, agriculture 31%, forestry and fishing 1%, manufacturing 40%, mining and energy 5% and services 23% (Industry Commission 1995). Of the allocation to agriculture, the National Landcare Program received 12%, and research and development organisations, including the Commonwealth Scientific and Industrial Research Organisation (CSIRO), received 54%. Again, the composition of these figures is not explained. All expenditures are given in aggregate with no specific breakdown on the incremental amounts relating to land degradation.

These differing opinions and considerable pressures on farmers to respond to Commonwealth Government policies give mixed messages to farmers who also have to manage uncertainties of climatic, ecological, economic and political natures.

What also needs to be factored into these assessments are the complications arising from external factors outside the control of farm businesses, namely, the rural recession of the late 1980's and a further downturn in terms of trade, and the widespread drought of the early 1990's. These occurrences are not new to the agricultural sector, but it does make it more difficult to estimate the extent of sustainable practices undertaken by farmers throughout the full range of the business and climatic cycles which farmers have to manage.

Issues studied in this thesis arise from the paradox that whilst these policies have consumed large amounts of Australian national resources particularly in terms of national policy development and research funds[xiii], little is known about on-farm management responses in relation to these resources. Nevertheless, assertions are made about the extent of degradation caused by farmers. In 1996, the Minister for Primary Industries and Energy, the Honourable John Anderson, stated that more than 40 per cent of farms in Australia have significant natural resource degradation problems. In response, the Government undertook to implement a $1 billion environmental package, the Natural Heritage Trust (Anderson, Australian Farm Management Society Annual Conference, Launceston, March 20, 1996).

Several conclusions can be made from these writings. Most are normative in essence, and most evince entity thinking with an emphasis on the assets and income of the firm. Little evidence of accounting for natural resources has been found, therefore, resource managers who are maintaining their capital base are not known or acknowledged. Both the entity view and the proprietary view will be briefly examined in Sections 1.4.1 and 1.4.2.

1.4 Two Perspectives of Accounting

In Section 1.1 it was argued that there are two major perspectives in accounting, the proprietary view and the entity view. In this section, the components of these two views will be introduced in more detail. The thinking about capital and income can also be described as falling into two categories, the entity view and the proprietary view (Goldberg 1965, Clift and Kerr 1989). Whichever view is taken by particular participants is seen to preclude the other. The entity view leads to a focus on the entity itself, the view of outsiders, and an overall community view. The proprietary view leads to a focus on the ownership interest, the view of the owner/operator, and an individual view.

The same classification can be made with the two components that comprise the approach to sustainable development, namely, and eco-efficiency. Each reflects a distinct manner of thinking and approach towards ownership and the rights attaching to that ownership as in the proprietary and entity classification. As well, each informs a differing approach to income and wealth. Eco-justice relates to social justice and the distribution of resources within a community or a nation. When the focus is the nation, it refers to the greatest benefit to the wider community, also called the 'whole of society' in policy development, and the distribution of wealth usually relates to the distribution of income and cash flow. Eco-efficiency relates to the maintenance of wealth within an individual organisation or firm (Gray 1992), a concept which also has applicability for the discussion in this thesis.

1.4.1 Entity View

The entity view of the firm can be defined as a view of accounting which is societal, favouring uniform reporting which is comparable over an industry, a concentration on the short-term income statement and the income flow from assets regardless of ownership. Such uniform reporting requires a formal accounting system and is seen as useful in macro-economic policy. The Australian standard setting bodies, the Australian Accounting Standards Board (AASB) and Australian Accounting Research Foundation (AARF) which portray an entity view also have some bearing on public reporting and reporting by farmers.

Three levels of the entity view of the firm are identified by the author of this thesis. Each level has evolved in turn over the past seventy years (Husband 1954) with level three being articulated in the 1970's (Accounting Standards and Statements Commission (ASSC) 1975), but to date they have not been seen as linked and not in an evolutionary light. In Level 1, the emphasis is on the assets of the firm and the income flow from those assets regardless of origin (Staubus 1961). The objective is to benefit the investors. In Level 2, the concern is with the assets of the firm and the income stream from these assets, regardless of ownership and where debt is seen as one method of financing the firm (Godfrey et al 1992). The emphasis in the accounting reports is on the firm itself, where the owners, investors and other interested parties are secondary. In Level 3, accounting is also seen as performing a social role (ASSC 1975) in that, as companies became larger and the financial risk is spread over a wider group, there have been greater demands for disclosure of financial information from governments, taxation authorities and stock exchanges. This view is being extended to the agricultural sector and thus, viewed this way, a business is regarded more as a coalition of different interest groups. In this view, accounting provides services to society through information.

The first such societal statement to emerge from the accounting profession was in 1975. The Corporate Report (ASSC 1975), which was the United Kingdom profession's version of a conceptual framework, was built on an underlying premise of a social contract between business and society. They did not advocate providing general purpose financial statements as did the profession in the United States and Australia, but did advocate the provision of a wide range of information including financial data to a full range of user groups. Their proposal introduced public disclosure on specific issues of interest to users based on the principles of visibility and accountability. Profit was no longer the sole indicator of performance (Mathews 1997, p.84). The Corporate Report extended the concept of shareholders to stakeholders, including investors, employees, governments, customers, suppliers and the general public. Although this wider interpretation of the entity view has not been fully accepted, it does indicate the trend in reporting required by users and in particular the Australian government, which is increasingly taking over the role of accounting standard setting in Australia.

In the 1980's, a new field of accounting developed from the earlier social accounting. It is generally accepted that Environmental Accounting is built on the wider and encompassing definition of ecologically sustainable development (ESD) which is discussed in the context of the agricultural industry in Section 1.3 of this chapter.

> Environmental accounting is recognising and seeking to mitigate the negative environmental effects of conventional practice by separately identifying environmentally related costs and revenues within the conventional accounting systems (Gray, Bebbington, Walters and Thomson, 1992, p.13).

The recommendations for environmental accounting, as outlined by many of its proponents, show evidence of Levels 2 and 3 entity thinking and portray a thinking in line with the 'whole of society' policies. Thus, although this form of environmental accounting has been influential in changing attitudes it would have little further relevance to individual farmers if they have a proprietary view.

Government responses world-wide indicate that the participants are expected to hold views which are consistent with the entity or societal view of the firm. In response to OECD agreements, the Australian government, in 1991, adopted a 'whole of society' policy which aimed to link meaningful physical and financial indicators at the national, regional, state, and local government levels. The 'whole of society' framework is based on providing government support to agriculture according to the social good. In order to facilitate policy, the government is encouraging farmers to provide accounting information which is uniform, comparable across an industry and which can be measured by market prices. Consequently, the financial indicators recommended to government have an emphasis on the income statement. In addition, such measures tend to concentrate attention on the short-term rather than the long-term maintenance of productive capacity and rely substantially on market prices. In 1996 financial indicators were recommended to the Commonwealth Government which focussed on the entity and could be described as Level 2 entity thinking. These indicators would require a formalised accounting system and would place the emphasis on short-term profits.

1.4.2 Proprietary View

The proprietary view of the firm can be defined as a view of accounting that emphasises individuality and diversity between firms in the same industry. The emphasis is on capital and ownership of that capital. The role of income is secondary but complementary to the maintenance of capital over the long-term. Such diversity reflects the unique characteristics in each firm and reflects a micro-economic point of view. The aim is to achieve best practice in management decision-making which in the ESD literature would align with the eco-efficiency approach.

Empirical agricultural studies have been undertaken by studying the response of markets to visible soil conservation (Sinden and King 1988), and by comparing gross margins between different forms of farming and the effects on fertility and gross margins (Wynen 1989, Oram 1987, Klonksy et al 1992). Accounting for farmers has been studied by bankers, agricultural economists, accounting academics and some practising accountants who mostly advocated what is known as the cost accounting manufacturing model of accounting (see Appendix 1 for a full list of studies), and, without naming it, an entity view of the firm. All these attempts to solve the problem, although knowledgeable, are not targeted towards participants in the business of farming.

In the accounting literature, there is another view where it is also recognised that value to the owner is a legitimate valuation concept. It does challenge objectivity, conservatism and attributes of historical cost accounting. It also challenges market price as a representation of value. Value to the owner includes all direct and indirect benefits of ownership and it is not likely that market price would be an accurate representation. Recognition that the market cannot be fully informed about the future productive capacity of the land without specific knowledge of the physical attributes is generally avoided in the accounting literature with some exceptions (Mattessich 1991, Belkaoui 1985, Tweedie and Whittington 1984, Harrison and Lutz 1993). It is most important to note that none of these writers were writing about agriculture.

1.5 Rationale

The rationale for this research arises from the seeming differences that emerge between an individual farm business and the interests of policy bodies and financial institutions in agriculture. Those outside the farm business construe all these differences as a lack of farm management skills (ABARE 1995). With a lack of empirical research, this view cannot be supported. Therefore, it cannot be categorically stated that they are not viable either in financial terms or in long-term sustainable terms.

The rationale for this thesis derives from four considerations:

1. Lack of research into the contentious issue of accounting for the capital or productive capacity of land.
2. Inconclusive and inconsistent findings from studies of market reactions to land degradation.
3. Inattention to the possibility of another view of accounting theory other than the entity theory, to the exclusion of the proprietary theory.
4. Lack of research into the long-term reporting of the management of natural resources.

These gaps and inconsistencies in the accounting literature are addressed in this thesis. That is, how to account for the capital maintenance of soil quality over the long-term is not addressed in Australia (AARF 1997, EATF 1998) and there is no published empirical research on the topic. Similarly, no known research examines the set of activities in the total management of soil quality. The attributes that are examined for accounting treatment are increases in the value of growing assets, inventories, and partial-farm product costing of different crops and pastures. Land is assessed only through market price at sale, but not when there is any intention of keeping the land.

One approach to capital maintenance not solved in the research to date is where the long term is factored into the reporting of land. The gap is in the physical maintenance of land and whether this is factored into the farmer’s decision-making. Certainly there are no explicit financial indicators of soil quality. Farmers are normally evaluated on their financial viability using the gross-margin or net-margin statement which cannot adequately report the value of an asset held for the future. Farmers are being assessed on outcomes based on traditional accounting reports (see Appendix 1 for a comprehensive list) that were developed principally for company structures that have a dispersed shareholding. In Level 3 of entity thinking developed in this thesis, business reporting is deemed to be the province of many groups in society.

A belief in valuing all natural resources with market prices has lead to a search for market prices by both governments (Hill 1996) and accounting standard setting bodies (AARF 1997). However, many assets in use do not have reliable market prices because the market is not fully informed. It is intended in this thesis to determine the extent to which the survey farmers use market prices, and the extent to which they find them decision-useful.

1.6 Objectives and Scope

Given the current state of knowledge, this is a descriptive study undertaken in order to describe the characteristics of farmers’ attitudes and practices towards accounting and their soil quality. In addition, a primary goal of this study is to describe, from an individual perspective, the accounting and physical information which farmers find useful, and to offer ideas for further research.

In this research study, an investigation is undertaken to determine what accounting is used by farmers when making their operating and investing decisions. The focus of these decisions is their soil quality and the processes, both financial and non-financial, farmers undertake in its management. The aim is to identify commonalities and differences between farmers and to propose explanations for these differences.

The determination of the survey group is based on an ecological unit in which all the farmers have similar physical and topographical characteristics. This is in contrast to most studies that are based on industrial or political boundaries. The use of market prices has produced inconclusive results in studies and the extensive normative models which use market prices have had no empirical testing (Mattessich 1995, Thornton 1991). Thus, in this thesis, the relevance of market prices to the survey farmers will be tested together with the relevance of non-financial indicators. In using an ecological unit, the aim is to identify commonalities and differences between farmers based more on their management practices.

In contrast to policy and theories of accounting which concentrate on a broad interpretation of users, the aim of this research is to discover whether the behaviour and activities of farmers have an individual perspective, that is, a proprietary perspective. For this purpose an investigation will be made into the nature of the relationship between farming businesses, ownership and soil quality, and the implications of this relationship for farm accounting and reporting.

This research has two stages. The first is the inductive stage which sets out to discover relevant variables from the literature review and research developed by other participants in the agricultural sector in general, and the Loddon Catchment in particular. In this stage an examination will be made: (1) of research undertaken in response to the Ecologically Sustainable Development policy developments; and (2) of the major issues emanating from policy and research, both in agricultural accounting and farming methodologies. This is undertaken to determine the underlying thinking which produces the particular normative solutions prescribed by accounting academics, governments and research bodies for the problems in land degradation. It is also proposed that farmers may have a different approach to monitoring and managing their resources which is based on thinking emanating from the earlier accounting literature and known as the proprietary theory.

In the second stage an empirical field study was undertaken. This comprised the development of issues from the literature, the formulation of propositions and the development of a questionnaire instrument built on the normative accounting and methodologies by all the participants, excluding the farmers. The major exception, as noted above, were the farming methodologies which were sourced from the Loddon Catchment Salinity Management Plan (LCSMP 1992) and which resulted from consultation between farmers and government representatives in the formulation of a catchment management plan.

The investigation is at two levels: (1) The determination of the attitudes and behaviour of the survey farmers to the complex management of a farm and their soil quality, that is, productive capacity in particular. This will entail a description of the extent to which proprietary thinking has an influence on these farmers, in particular if they have a clear notion of productive capacity. (2) The determination, as far as possible, of the underlying self-regulating forces and underlying causes and structures at work in the interaction between the physical environment and the current knowledge in farming methodologies resulting in a profile of soil care from the farmers' point of view. This will entail a discovery of the extent to which best practice has an influence on these farmers. The problems in determining productive capacity with market prices have not been solved in the accounting literature, and it is proposed in this thesis that assets in use may have many direct and indirect benefits which the market cannot estimate.

1.7 Outline of Thesis

In Chapter 2 the legislative, policy requirements and professional requirements pertinent to issues examined in the ensuing chapters are described. The description will show how this thesis has been developed from existing research. The influence of governments in the agricultural industry and particularly in regard to policy development for land degradation is examined. The influence previous research has had on policymaking, and specific gaps in the literature addressed within the thesis, is also specified in this chapter. In Chapter 3 the literature concerning issues addressed by this study is reviewed. The purpose of Chapter 3 is to describe the two accounting theories, entity and proprietary to demonstrate that another view other than the entity view can be held by participants. In this chapter, it is explained how the entity theory is the dominant and presumed approach to accounting to the exclusion of the older proprietary theory of accounting. This distinction is distinctive and important because the entity and proprietary views have different attitudes towards capital and income, social and individual attitudes to ownership and accountability. In Chapter 4 the literature concerning the capital maintenance issues in this thesis is reviewed. The purpose is to determine if extant capital maintenance theories are appropriate to measuring and reporting the productive capacity of land. The chapter includes an examination of the history of capital maintenance theory development in the accounting literature and an explanation as to why a consensus has not been reached and possible reasons.

Also in Chapters 2 to 4, the issues of reporting on productive capacity are examined from the accounting viewpoint and from the viewpoint of other interested participants including governments, researchers, professional accounting bodies and professional standard setters. In Chapter 2 in particular, the intention is to show that those outside the farm mainly study land degradation and rely on financial accounting reports. Consequently, in Chapter 5, the issues emanating from these earlier chapters and the questions to be answered in the survey questionnaire for this thesis are brought together. The issues to be tested are dominant in all the literature and focus on market prices, income determination and formal accounting systems. The lack of empirical evidence about farmers themselves necessitated that the thesis to this stage be based on normative thinking and public data.

Chapter 6 comprises details on question development and empirical testing to investigate the role and accounting implications of what attributes could be important to farmers and the activities they undertake in the management of their soil quality. Limitations in the development of the questionnaire resulted from a lack of empirical data about most of the attitudes and activities undertaken by these farmers. The published data available were restricted to accounting reports that farmers or their accountants prepare for compliance purposes, including annual census surveys undertaken by the ABS and ABARE. Thus, the only data were aggregated for regions or averages. The questionnaire was, therefore, built on the relevant elements of entity thinking, and, in addition, the relevant elements of the proprietary theory view namely, the best practice farming activities advocated for farmers in the survey area.

Examination of the survey results was undertaken in Chapter 7. The chapter was organised into three parts. In the first part the survey population was validated. Prior to the interviews it was not possible to identify the farmers from publicly available data, therefore, the location, size of farm, type of farming, level of operations and financial viability formed part of the results. Because there has been no similar study undertaken previously, it cannot be stated to what extent these results can be generalised. What could be said is that the population was representative of the broadacre farmers in the Loddon Catchment. In the second part the accounting used by the farmers is detailed as well as their objectives both annually and in the long-term. Also detailed are the criterion by which they assessed their success, their marketing and their competitiveness which in the entity literature is assessed using financial indicators and in the use of market prices. The results in part three explains the extent to which these farmers relate to the entity view when accounting for and managing their farms. This part also gave clear indications of whether the farmers used entity accounting in determining and measuring their productive capacity. The section also provides the results for a proprietary model of soil quality, that is, productive capacity. These results provide evidence of the extent to which farmers consciously and clearly undertake what is considered best practice for the maintenance of soil.

Chapter 8 summarises and synthesises the arguments and results of previous chapters. The emphasis will be on verifying the hypothesis that farmers do not have an entity view of soil quality and their farms.

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[i] 'Solomons says value in use is the relevant perspective in contrast to other accounting writers such as Chambers and Sterling who argue totally for market prices without giving consideration to intangible factors' (Godfrey et al 1994, p.192).

[ii] Agricultural resources, called growing assets, such as forests, crops and livestock are currently being discussed and called self-generating and regenerating assets. The major focus of this discussion is the determination of the valuation of growing assets using market prices (AARF 1997, IASC 1996).

[iii] Taxing mechanisms exist for recognising increases in wealth. Some of these include Capital Gains Tax, the Local Government Accounting Standard, Corporations Law, Local Government rating processes and Land Tax. The estimates for taxation are determined on averages and do not relate specifically to either market prices or value to the owner.

[iv] As noted earlier revaluations are provided for in accounting practice. On a cost/benefit basis this might not be done and it will be argued that those with a proprietary interest will not need to have a formal revaluation undertaken.

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[v] Farmers main short-term reporting reports are prepared for taxation purposes. There is a provision in the taxation legislation for deductions relating to expenditure on conservation works. These would appear in the income statement as short-term expenditures even if the farmers intention is to maintain long-term soil quality.

[vi] Called the intergenerational rule because sustainability is based on being accountable for the future flow of resources and the responsibility for ensuring these resources are available for the future generations (Geno 1997).

[vii]"Ozone layer protection is claimed to be Australia's 'most significant global environmental issue' and it attracts a high priority from the Commonwealth government" (Burritt 1995). Although farmers are important users of chemical fertilisers, the subject of this thesis is the natural capital of the individual organization not critical capital or built capital. This uses the taxonomy suggested by Turner, 1987, 1988, 1989; Pearce and Turner, 1990; Daly, 1990; Gray, 1992 of critical natural capital, sustainable or renewable natural capital, man-made (built) capital.

[viii]Australian Bureau of Statistics, Year Book Australia 1994, ABS Catelogue No. 1301.0, 1993, page 462, table 15.9, from Roberts et. al. 1995.

[ix] The additional issue of native title claims will not be discussed in this thesis.

[x]The Landcare Program is sponsored by the Government and the farmers federations and aims to achieve sustainable agricultural production and resource protection through local action by Landcare groups. For instance, in Victoria there were over 80 groups in 1993 involving almost 14% of rural land. Various State government departments provide technical support to these Landcare groups.

[xi] Ecological viability is based on the maintenance of an ecological system. This is any system in which there is an interdependence upon and interaction between living organisms and their

immediate physical, chemical and biological environment (Jones, Robertson, Forbes and Hollier 1990).

[xii] Reference to the Agreement on Agriculture which is one of the outcomes of the broader GATT Uruguay round of trade negotiations. This agreement calls upon signatories, among other things to eliminate non-tariff barriers to trade through tariffication; to reduce subsidies for agricultural exports; and to reduce production-linked support to agriculture in general. These changes, price signals and incentives, to national agricultural policies should help to improve the allocation of resources both domestically and internationally, reduce incentives to over-use polluting chemical inputs and to farm fragile, low-yielding land, and increase the market orientation of producers, all of which should generally benefit the environment (OECD Observer, Oct/Nov 1995; n196, pp 36-37).

xiiiAn Industry Commission survey has also estimated that state expenditure benefiting the rural sector would be at least $592 million for 1990-91. Around 16 percent of these expenditures were committed to soil conservation services, with 30 percent going to research and development and a further 13 per cent to disease and pest control. A comparison with an earlier 1981-82 survey shows that expenditures nominated as benefiting soil conservation increased from 5 per cent to 16 per cent of total expenditures (Industry Commission 1993). Over the same period, the share of general research and extension services declined from 36 per cent to 30 per cent, and 23 per cent to 14 per cent, respectively. The reported growth of soil conservation expenditures, even if it results from a reclassification of some activities, indicates a heightened policy emphasis on soil conservation (Industry Commission 1997, p.11).

Chapter Two
Policies and Studies Relating to the Agricultural Industry

2.1 Introduction

As noted in Chapter 1, the aim in this thesis has been to develop an understanding of land degradation in the agricultural industry and the extent to which accounting plays a role in providing decision-useful information to decision makers on the management of natural resources, and, in particular, soils. In accounting theory and professional standards, land is not valued for its soil quality, and no depreciation or appreciation is recorded as soil quality changes. The main indicators used are the historical cost at purchase, a general valuation for council rating purposes, or market price at sale with no guarantee that soil quality is known. Although registered valuations are used for finance, insurance and for personal reasons there is no particular measurement of soil quality itself, and many of these valuations revert to an average value for an area neither reflecting value in exchange nor buyers', or sellers', value in use. For these reasons, potential buyers and other decision makers, particularly policy makers, make decisions on soil quality on the basis of incomplete and often misleading information.

There are two types of process which firms mainly undertake in relation to the degradation of natural resources. One represents processes that actually or could deplete natural resources in the production of goods. The second represents processes that discharge entropy (waste) into the environment and thus cause it to deteriorate. Traditionally, in the first type would be firms in mining, forestry and fishing where the government is likely to be the owner of the land or waterways. These resources form their livelihood so that, in theory, they are assumed to monitor resource depletion for their own survival. The second type would include manufacturing. Agriculture has been seen as a special case, as the land resource, the soil, is not always owned by the government and has been excluded from environmental policies and discussions on land degradation. The assumption made in the case of agriculture is that farmers on private property have sufficient incentives to maintain the productivity of their land because of the higher returns[i] whereas in reality agriculture belongs to both types. The fact that land degradation takes place is interpreted as evidence of a lack of incentive for farmers.

Several limitations to the government approach can be identified. Briefly, they are; (1) the role that the 'whole of society' policy plays by ensuring the benefits go to society while the costs are borne by the farmer. The rationale for this is that farmers either make a profit or sell; (2) the exclusion of research into soil quality at the farm level because of the requirement that monitoring of resources must take place 'outside the farm gate'; (3) the partial nature of scientific research; (4) the insistence on financial indicators to measure a farm's sustainability; and (5) the choice of market prices as the major measurement tool of natural resources. Each will be discussed in detail in the following sections.

2.1.1 Whole of Society Policy

Since 1991, when the Australian government first implemented 'whole of society' ecologically sustainable development policies, the overriding principle shaping all funding bodies including the Murray Darling Basin Commission (MDBC), of which this study area forms a part, has been that financial support for any given activity must be proportionate to the degree of national or regional benefit which will result. For example, until 1996, the MDBC, which oversees one-seventh of the continent, one quarter of the nation's cattle herd, half of the sheep flock, half of the crop land and almost three quarters of its irrigated land, had spent $156 million on projects decided on the basis of the social good (Lovering 1996).

2.1.2 Outside the Farm Gate

Only from 1995-96 have governments and advisers recognised that there is a connection between soils, water health and sustainable agriculture and that 'the cost to the community is greater if farmers' soils are ignored'. It was suggested in 1996 that soil research may be a valuable addition to policy formulation (Blackmore and Connell 1996, p.11).

2.1.3 Partial-Farm Research

Malcolm (1988) attributes some limitations to the nature of scientific research itself;

> Much academic work about farm management during the past fifty years lacked relevance because of a 'partial-farm management' orientation. This derives in part from a methodological focus which is too narrowly disciplinary, and insufficiently dynamic, and also from the imperative of specialization for progress to be made in particular disciplines (Malcolm 1988, p.24).

A lack of integrated studies, therefore, could have limited appeal to farm managers.

2.1.4 Accounting Techniques

The effects of emphasising traditional accounting techniques, particularly the gross margin, has encouraged increased productivity (Dumsday and Chisholm 1990).

2.1.5 Market Prices

The search for market prices for assets in use has not been satisfactorily solved by the accountants over the past forty years and the special case of agriculture could make this task even more problematic.

Over the past five years, two streams of government policy, that is, market prices and financial indicators, have been explicitly linked to land degradation on the assumption that

> If the market price of agricultural land was more sensitive to soil degradation and its effect on productivity, it would increase the economic incentive for farmers to adopt conservative soil management practices (Geeves, G.W., Ringrose-Voase, A. J., Merry, R. H., Chartres, C. J., 1995, p.4).

What this statement implies is that farmers are bad managers but, in fact, what individual farmers are doing on their land is not known because there have not been any in-depth surveys undertaken. The only public data, apart from production figures, are the accountings prepared by farmers for taxation returns and government surveys such as ABS and ABARE. These accountings do not capture, record, measure or report the quality of the land itself, except as an asset in the balance sheet, which also is unlikely to reflect the soil quality. In addition, the evaluation of farming operations concentrates on financial viability based on short-term profits whilst soil quality is a long-term factor in farming decisions.

Most of the policy-making and research into sustainable agriculture has been from an economic point of view and, although complexity is recognised, the assumption of market price, when developing policy, can ignore market structures and national political imperatives as well as complexity in farming itself. In addition, at the farm level, market price does not include all costs as noted in section 2.1. External forces such as increasing world trade and competitive pressures could increase the downward pressure on prices and increase the pressure to ignore the long-term effect on the soil.

Issues raised in the above discussion will be developed in the following sections of this Chapter. Several research areas are identified including research undertaken into land quality and value both in accounting and economics. Government policies, internationally and in Australia, are then examined, to demonstrate the influence which those who are outside farms have on both the research and policy directions. Factors important at the regional and catchment levels are examined because the implementation of government policies is facilitated through regional and catchment bodies. These examinations provide a background for the few farm level accounting studies undertaken in the study area, the Loddon Catchment.

2.2 Research into Value

Research undertaken into land value to date has been based on economic principles and can be categorised under three headings, namely, market-based economic studies, theoretical economic studies, and experimental agricultural economic studies. Each of these will be discussed in sub sections 2.2.1 to 2.2.3.

2.2.1 Market-Based Economics Studies

In this stream, the focus is on market-based economics where mechanisms are sought to inform the market of land quality through the market price.

> In a well-functioning land market, farmland values would reflect the condition of the land and vegetation. However, this does not generally occur. Government needs to consider a catalytic role in improving market signals in this area, and developing its own land market value series for policy purposes. One obvious initiative is encouraging pre-sale assessments of the natural resource condition and predicted land management issues, by appropriately skilled consultants (Goss, Chisholm, Graetz, Noble and Barson, 1995, p.14).

Empirical studies on soil quality have been used to determine the extent to which the market capitalizes any conservation measures undertaken to improve or maintain soil quality. The results are mixed.

In Australia, Sinden and King (1990) made a study of gully erosion in a local council region in New South Wales. They showed that the market price changed as a result of investment in soil conservation. For every $1 spent on conservation the land value increased by $2.28[ii].

The existence of a stock of capital available for investment in soil conservation has also been identifited as a critical explanatory variable (Saliba 1985, Segarra and Taylor 1987, Milham 1994, p.53). However, not all studies have concluded that the farmer is rewarded by the market for their investment in soil conservation.In the USA, Gardner and Barrow's (1985) results were inconclusive and they explained this as being due to imperfect information.

> Conservation investment is not generally capitalized into farmland values. The most likely explanation for the result is that buyers have imperfect information and cannot easily determine how much erosion has occurred unless the erosion is obvious and visible. Any difference in productivity among parcels due to erosion would be easily masked by differences in technology and management, especially in the use of non-land inputs such as fertilizers. In the absence of a visible need for conservation investment, buyers are not willing to pay more for land on which sellers have invested (Gardner and Barrows 1985, p. 945).

It can be concluded that neither are 'bad' farmers being punished by the market, nor are the 'good' farmers being rewarded for their investment in conservation of the soil.

2.2.2 Theoretical Economic Studies

Theoretical economic studies were undertaken in which McConnell (1983) added soil structure to models which identified attributes of soil quality as being soil depth and soil fertility. From this, Milham (1994) developed a model of soil quality as capital maintenance which incorporated the three attributes of soil, that is, depth, fertility, and structure. The assumption was that each of these attributes could be managed separately. Milham added uncertainty into the model by identifying several of the variables that farmers have to manage in an uncertain environment, such as farming methodology, changing commodity prices and climatic conditions. The decision objective was to show the present value of future cash flows resulting from different methodological decisions and management skills resulting in a level of soil quality. This quality was then capitalized in the land value leading to a decision to keep or sell[iii] the land. However, these models have had no empirical backing to date.

2.2.3 Experimental Agricultural Economic Studies

Experimental agricultural economic studies undertaken in controlled studies have concentrated on input/output relationships measured by the change in the gross margin. This methodology is common to most studies whether they are assessing traditional or organic farming[iv] (Klonsky 1992, Oram et al 1991, Wynen 1989). An examination was made of a representative group of these studies undertaken about the same time as the survey was developed for this thesis in 1993-94. In these studies an evaluation of fertility was the decision objective and this was obtained by using the traditional breakdown of costs between direct costs and overheads to arrive at the gross margin[v] when comparing conventional and organic systems of farming. The cost of the product was arrived at by apportioning the overheads equally between all products in the manner of manufacturing costing systems. Assumptions were made that capacity costs, or fixed costs, were similar between farms in the same industry. Moreover, there was no study of the effect on the investment in soil quality although fertility was measured by productivity.

For this thesis, two attributes of these studies are relevant, namely, that productivity is the decision objective; and they were conducted under controlled conditions and some on research stations. In Australia, productivity has particular relevance because of its thin soils where it is acknowledged that increasing productivity may be achieved at the cost of the soil itself. Increasing world competition puts considerable pressure on unsubsidized Australian farmers with consequential pressure on soil quality and capital maintenance.

These studies consisted of a mix of experimental station and cooperation with farmers. Hardaker and Anderson (1981) showed that better results were obtained when the studies were carried out on working farms. Both the scientific method in which these studies were undertaken and the lack of whole farm studies are important to the later development in this thesis.

2.2.4 Studies in Accounting

Normative accounting studies on capital maintenance have concentrated on the effects of inflation and price level effects on income with preferred solutions being market prices (Edwards & Bell 1961, Chambers 1966). Approaches have been generally in three broad categories, namely, general prices affecting purchasing power of the investors, specific prices affecting the financial capital and the physical capital of the firm, and a solvency model which gives indicators of the adaptative ability of managers. All of these theoretical models relied on buying or selling market prices for valuation purposes.

The valuation of natural resources in agricultural accounting has been largely ignored. Only in 1997 has any definite statement been issued by the Australian accounting profession's research arm and that is based on a discussion paper (Roberts et al 1995) which focused on valuing changes in farming production and the valuation of inventory. This discussion paper resulted in the Australian Accounting Research Foundation (AARF) issuing Exposure Draft No. 83, Self-Generating and Re-generating Assets (SGARA)(AARF 1997). The same approach has been adopted by the international accounting body, International Accounting Standards Council (IASC) (IASC 1997). Although these publications specifically relate to agriculture, their emphasis is on income and inventories, with no mention of fixed assets, soil quality or the maintenance of the capital in the soil quality.

Market prices or fair market value are the measurement tools favoured in these accounting discussion papers, but these have little to do with the long-term and shor-term effects on capital as represented by soil quality. In any event, market prices often do not exist. The gap in the literature, therefore, is in the physical maintenance of land and soil quality and whether this is factored into the farmer's decision making.

Surveys undertaken using mailed questionnaires indicate that farmers do not use recommended accounting packages for decision making (Stephens 1992, Lees and Reeve 1991) with a minority of writers claiming that the farmers are not being asked the correct questions (Malcolm 1988, Schnitky and Sonka 1986). This raises the question of what attributes should be studied, what attributes the farmers do use, and the attributes which would be amenable to measurement in maintaining soil quality. Suggestions incorporated into this thesis, therefore, include non-financial quantitative attributes such as farming methodologies (LCSMP 1992, Milham 1994), and the principles developed by Edwards and Bell (1961) in an accounting model which incorporated the maintenance of capital by differentiating between short-term and long-term decision making and reporting.

These attributes are examined in the literature and tested against what farmers report on the management of their capital asset, the soil. This is because successful farmers can be financially but not ecologically successful.

Therefore, the question is: how do farmers manage and monitor soil quality as distinct from their production?

Few researchers have examined empirically the practices and accounting of farmers on a whole farm basis, and there is one previous study of farmers in the Loddon Catchment based on an ecological unit (Luke and Shaw 1994). Luke and Shaw undertook to identify farmers who belonged to the same Land Management Unit (LMU) within the same catchment, using a literature review and public statistics. As far as possible the aim was to establish that differences in practices and results were due to the management by the farmer and not physical differences. However, there are limitations in any extrapolation to individual farms because of the averaging methods used in their study, and as well, the results were evaluated on gross margins, the limitations of which will be discussed in Section 2.4.1.1.

More importantly, the purpose of the Luke and Shaw study was to evaluate farmers on an aggregate basis in an LMU for the purposes of estimating the extent of salinity in the sub-catchment. The aim was to provide guidance for future policy decisions at the Commonwealth Government level. Unfortunately, if these findings do not coincide with individual farmers' behaviour subsequent policy decisions may not be effective. In Section 2.3 issues arising from policy responses at the international, national and state government levels will be discussed.

2.3 Government Policy Initiatives

In this section, the importance of agriculture and soil degradation is demonstrated by the level of government responses to date. Recognition has been worldwide but at the same time, land degradation is increasing which leads to the additional clearance of forests and native grasslands as existing land loses productivity, places additional demands on other natural resources to repair the land, and leads to off-site pollution and the loss of productivity and amenity values (Gretton 1996). Significant attention has been given world wide to degradation issues but the research so far indicates that there is still a gap between aggregate and individual levels of knowledge about decision making at the farm level. Therefore, it is necessary to complete an overview of the emphasis given to date in policy formation and implementation, mainly because it directs significant industry and research endeavours.

2.3.1 International Policy

The two concurrent policy developments were implemented in response to the Brundtland Commission (WCED 1987), the Rio Summit (UNCED 1992) and the OECD recommendations for trade liberalisation. These comprised both physical and financial indicators, the latter based on market prices (see Section 2.1). Unfortunately, market prices required for trade policy have tended to capture the attention of governments when assessing land degradation. This development will be discussed more fully in Section 2.3.2.1 in order to explain that earlier thinking on physical indicators has been substituted with financial indicators and market prices in Australia.

In December 1983 the UN General Assembly established the World Commission on Environment and Development, also known as the Brundtland Commission (Organisation for Economic Co-operation and Development (OECD) 1985). The major catalyst for awareness of environmental problems outside the agricultural industry was the publication, in February 1987, of the Brundtland Commission's book *Our Common Future*. This was important for bringing to people's attention the limitations of short-term thinking, represented in accounting by the profit and loss statement. In the Brundtland Report it was argued that in ignoring the long-term effects of resource usage, a possible consequence could be the degradation of these resources beyond further use. Likewise, it is argued in this thesis that an over emphasis on annual profit and loss results can also deflect attention from the longer-term status of resources in an organisation.

The Brundtland Report used the concept 'sustainable development'[vi] which was defined as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED 1987, p.6) thus explicitly moving the focus from the short term to the long term as well as to a 'whole of society' viewpoint. Some accounting researchers who also take a whole-of-society viewpoint (Gray et al 1996) argue that sustainability is essentially a social concept and 'can be thought of as consisting of both ecological-justice[vii] (social) and ecological-efficiency (environmental) elements' (Gladwin 1993 in Gray et al 1996), the former having regard to wealth distribution whilst the latter is concerned with consumption rates of natural resources.

This was the goal which emerged from the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992. At this conference, countries were requested to develop indicators to measure progress in reaching sustainable development, not least in agriculture. One of the documents approved at the Conference in Rio was AGENDA 21 which contains recommendations for international organisations, national governments and various social groups[viii]. Australia, as one of the signatories to AGENDA 21, endorsed the concept of sustainable development. The Australian government's response has been to establish a series of working groups, and a standing committee, which have overseen commissioned research into indicators for agriculture (Standing Committee on Agriculture and Resource Management (SCARM) 1993).

Concurrently, the countries of the OECD were seeking to reform agricultural policy through lowering overall support and enhancing the role of market signals and this was agreed by the OECD Ministers in 1987 including Australia. It is argued in this thesis that this parallel policy reform, by changing price signals and incentives, can bring about unintended changes in the intensity, composition and location of agricultural production. For example, in the 1940's, incentives to increase agricultural production lead to excessive unintended land clearing (Chisholm and Dumsday 1987). In more recent times a concentration on market prices and what is called sustainable profits has placed the emphasis on the income statement and traded resources. In the following quotation it is clear that sustainability is closely linked with market prices, a mechanism which some would argue can have the opposite effect on natural resources to that intended:

> The measurement of sustainability by market prices can have environmental effects which are likely to vary widely from location to location. How these dynamic processes are linked is imperfectly understood. The least that can be said with any confidence at this point is that the reform of agricultural policies is necessary to move the sector closer to sustainability, but it may have to be complemented by other measures that are targeted to specific environmental concerns (OECD 1995,pp.36-37).

This is a clear indication that the operationalization of these reforms is either not known or not clearly understood. Nevertheless, indicators were chosen, known as agri-environmental indicators (AIE's), the aim of which is to provide consistent definitions and offer methods of measurement at a broad level (OECD 1995).

In this process, market signals and market-based incentives are to be enhanced, because market price is assumed to offer farmers sufficient incentive. Australia, as a signatory to the OECD agreement has responded to these as well by instituting a body of research into both physical and market-based indicators for agriculture.

The OECD set of indicators is intended to:

- provide information to governments and the public on the current state of the environment, and changes to it, as far as agriculture is involved;
- help policy-makers understand the links between causes and effects in agriculture and the impact of agricultural policies on the environment, and guide their responses to changes in environmental conditions;
- contribute to monitoring and evaluating the effectiveness of policies in promoting sustainable agriculture; and
- to identify and develop indicators *(OECD 1995).*

The OECD considered that the relevant indicators should address major natural environment and human health problems. Each indicator should be relevant for policy, analytically sound, and presented at a degree of aggregation that can be used in policy, particularly in national policy.

The conflict inherent between the tenets of sustainable development and the OECD initiatives has been detrimental from an individual farmer's point of view. Increasing trade through the development of greater competitiveness has lead to a lowering of prices which could have an opposite effect on their natural resources than originally intended. This parallel drive for sustainable agriculture and market prices undertaken in Australia could also lead to unintended negative responses and outcomes if physical indicators are given less emphasis than market prices.

Managers or farmers cannot fully influence distribution of wealth or the macroeconomic economy but must manage within constraints present in their environment. However, farmers in particular, have a significant influence on the quality of the soils they leave to succeeding generations. The previous discussion demonstrates the dangers in assuming that what is intended at the macro-level of society can be translated to the micro-level of the organisation. It is suggested in this thesis that managers can be eco-efficient in practice and eco-just in their intent and that the two can be interdependent (Wilkinson & Cary 1993).

2.3.2 Australian Government - National Level

As noted above, the Australian government's response is designed to integrate technical and economic aspects to inform policy. In 1990, the Australian government instigated a 'whole of society' Ecologically Sustainable Development project (Standing Committee on Agriculture 1991) in which the major focus for outcomes was to support responsible land management incorporating economic and environmental principles. The indicators chosen were to be at a catchment level, with outcomes chosen by governments and through community-based self-help groups. The national guiding body, the Standing Committee on Agriculture (SCA) (SCA 1991) reported in general policy terms. Extending their responsibilities, the newly formed Standing Committee on Agriculture and Resource Management (SCARM) in 1993, instigated a key physical and financial indicators program recommending indicators at an individual farm level in 1993. By 1996 the focus was firmly focussed on a range of financial indicators which farmers were to report (Walker and Reuter 1996). Both physical and financial indicators were intended to be used by both landholders and the community to guide the allocation of funds administered by federal and state government departments. It must be noted that the financial indicators were formulated for the individual farm level but the physical indicators were intended at the catchment level. The 1993 recommendations are discussed more fully below because it seems they have been ignored; presumably because they do not accommodate the 'whole of society' focus of government policy.

In line with the OECD recommendations, the Australian government had, as a key focus, encouraged the development of pricing mechanisms that will indicate the sustainable use of natural resources. Senator Robert Hill, Minister for the Environment (1996), in reiterating the Australian Government's commitment to ecologically sustainable development stated that, for future endeavours

> better pricing for natural resource use and the application of economic instruments are critical measures in achieving environmental goals and improving economic efficiency (Hill 1996, p.4).

2.3.2.1 1993-1997 - Standing Committee on Agriculture and Resource Management (SCARM).

The Australian Standing Committee on Agriculture and Resource Management (SCARM), established in 1993, commissioned an Expert Group to 'develop a set of indicators which can be used unambiguously by decision makers to evaluate the sustainability of agricultural systems at regional and national scales' (SCARM 1993).

> As a starting point, the Group adopted the definition of sustainable agriculture endorsed by the Standing Committee on Agriculture (1991) namely:
>
> Sustainable agriculture is the use of farming practices and systems which maintain or enhance
>
> - the economic viability of agricultural production

- the natural resource base
- other ecosystems which are influenced by agricultural activities

(SCARM 1993, p.4).

Reporting in 1993, SCARM identified a set of practical indicators which were defined as a composite set of measures or attributes which embody a particular aspect of agriculture. The indicators chosen were, (1) Long-term real net farm income, (2) Land-water quality to sustain production, (3) Managerial skills, and (4) Off-site environmental impacts (SCARM 1993, p.48. See Appendix 2 for details of attributes for sustainable agriculture). Given the off-farm measuring requirement, and annual monitoring, it would be extremely difficult to obtain relevant data without understanding, over the long-term, how the off-farm and on-farm activities and practices interact with each other. Consequently, these recommendations have never formed a formal part in a program except as a basis of encouragement to farmers to achieve these indicators in a sustainable manner. This is despite the fact that the SCARM report (1993) did acknowledge that there was a considerable lack of established methodology and professional consensus as to what should be included as attributes of indicators for sustainable agriculture.

The preferred strategy by the Commonwealth Government was to link sustainable indicators at the national and catchment levels. This was approved in 1994, when the CSIRO established a program, *Dryland Farming Systems for Catchment Care,* as a direct support for the Landcare movement in Australia.

> Part of this program is concentrating on developing a set of key indicators which community groups could use to benchmark and monitor the condition of their local resources (Walker & Reuter 1996, p.5).

This has been the focus of intense research coordinated through CSIRO culminating in a National Workshop where the contributors presented their findings in a publication ‘Indicators of Catchment Health' (Walker and Reuter 1996). The findings were debated and recommendations made to the Standing Committee (SCARM). They included a recognition of the need for both non-financial quantitative and financial quantatitive indicators that connect catchment, regional and local government levels.

The results have been untested from an accounting point of view, hence the focus of this research. Comparing the SCARM (1993) indicators and the National Workshop (1996) indicators, what can be seen is a move from recommended farm level issues and concerns to a catchment or societal level of reporting these issues. For example, SCARM recognised that long-term profit was practical and necessary and used non-financial indicators for the physical aspects of farming. Conversely, the Workshop indicators are traditional financial reporting measures such as average total costs per hectare in producing a unit of a commodity; average net income per hectare per rotation sequence; average return on farm investment; and farm business profit per hectare, which are short term measures and require detailed and formal cost accounting systems. A strong perception is gained that decisions about individual farmers are based on information gathered at the national, aggregate level for policy development as noted in the initiatives listed below in 1996 by the Honourable Robert Hill, Minister for the Environment (Hill 1996).

In summary, there were five initiatives that the Commonwealth Government reported to indicate some of the aims noted above:

- the 1996 State of the Environment Report (a national overview);
- a research paper on Subsidies to the Use of Natural Resources;
- Further work on environmental indicators (coordinated by CSIRO);

- the ABS green accounts (national gross national product figures);
- the proposed National Land and Water Audit, a $32 million program funded from the $1.15 billion Natural Heritage Trust. (Hill 1996, p.10).

What must be noted, especially in the light of the comments made about landholders' responsibilities, is the lack of benefit the farmers can expect to obtain from being involved when most of the benefits do not help them with their day-to-day management.

2.3.3 Factors at the Regional Level

As required by the ESD Working Group's terms of reference, an analysis of management issues for sustainable agriculture on a region-by-region basis has been completed (SCA 1991). This involved the development of a map of agro-ecological regions of Australia. The SCA (1991) considered that these regions, based on aggregation of statistical local areas (SLAs) which are ABS smallest areas for surveys, are useful in deciding key resource management issues.

In 1994, regional farming profiles across Australia were developed by ABARE to facilitate strategies and approaches for economic assessment of land management options. One of the outcomes of the ESD process was the identification of the catchments most at risk of degradation. Five Focal Catchments in Australia were chosen for particular attention for funding and research, one of them being the Loddon-Campaspe catchment[ix]. The Commonwealth Government considers that an important component of the development of policies is to assess the economic viability of agronomic options within regions, in particular, through their Whole Catchment Management policies. The task was to investigate problems, ascertain the costs of degradation and to formulate plans for reversing this trend. The data from these expanded regional surveys are to be used as benchmark information for analysis or resource issues such as dryland and irrigation salinity and rangelands management.

For reasons of time, resources and logistics the survey conducted in this study was confined to farms in the Loddon Catchment. The Loddon catchment has been classified as part of the Central and South West Slopes and Plains and its key management issues are outlined in Table 2.1. It was noted by SCA that the listing of a problem in an area says nothing about the extent of the problem. The problem may only occur at one location or in one industry in that region. They also noted the tendency to oversimplify the issues through aggregation and that there are solutions to some of the problems. However, Table 2.1 is useful in identifying the range and complexity of the problems many farmers may need to monitor.

Table 2.1 Key Issues in Resource Management for Sustainable Agriculture by Agro-ecological Region - Australia 1990

Region Name - Central and South West Slopes and Plains, Victoria

Resource Management Issues	Detailed Responses
Soil Degradation	Decline in soil nutrients and biological activity
	Surface soil structural decline, crusting, loss of organic matter, surface waterlogging, subsoil compaction
	Soil acidification
Soil Erosion	Water erosion
Dryland Salinity Waterlogging	Waterlogging as a result of clearing perennial vegetation
	Secondary salinity from rising ground-waters.
Pesticides Residues / Resistance	Persistent use of pesticides without other management practices
Vegetation Degradation	Persistent, extensive weed problems, woody weed incursion
Remnant Vegetation Decline	Loss of species diversity
	Loss of deep-rooted native perennials, poor water use
Feral and Native Animals	Grazing competition from rabbits, goats, wild pigs, grey and red kangaroos
	Pressure on or extinction threat to native flora and fauna
	Predation of crops and domestic animals

Source: SCA 1991, p.55.

2.3.3.1 Murray Darling Basin (MDB).

The Loddon Catchment is situated in the Murray Darling Basin (MDB). A brief discussion of the importance of the MDB follows because of its political influence in Australia, both in policy development and in the allocation of funds. The importance of irrigation to the MDB is also pertinent to this study because of the effect it is having on the farmers in the Loddon Catchment. In the MDB, ninety-five per cent of the water diverted for off-stream use is used for irrigation (Blackmore and Connell 1996). Although there is an acknowledgment of the extent of damage incurred as a result of irrigation, dryland salinity is now also attracting attention, but interestingly, not in the context of possible effects from the through-flow of water to the irrigation region. In 1995, estimates of salt flowing into the Murray River from the Murrumbidgee and Lachlan catchments and the central Victorian tributaries of the Murray, using historical data covering the whole Murray-Darling Basin, indicated that the 'threat of dryland salinity was much more pervasive than previously thought'. According to these estimates, if present land management practices continued, up to five million hectares of NSW would be at risk compared to previous predictions that 1.5 million hectares of the whole of the southern part of the Basin was at risk (Lovering 1995).

In a talk to the Sustainability of Irrigation Conference 1996 in Canberra the Chairman, Professor John Lovering (Lovering 1996), discussed both the importance of industry to the region, and the threat to its survival if no changes in resource management were made. In an overview of the successes of the region he noted that food processing is the largest secondary industry sector in Australia - generating many thousands of jobs inside and outside the Basin. Nationally, the Australian food industry considers that it can increase high value-added food exports from the 1991-92 level of about $22.2 million, to more than $7 billion annually by the end of the decade. Over the period 1991-96, capital expenditure in this sector has increased at an average annual rate of 8 per cent. Much of this activity depends heavily on irrigation to provide a steady supply of high quality agricultural produce. The magnitude of this investment indicates the difficulties of implementing equitable change mechanisms when an industry is under threat of being called a 'sunset' industry[x]. Some industries which undertake the processing of foods will be threatened if irrigation is reduced significantly, let alone the degradation and livelihood of farmers, and there is a challenge for policy makers in managing the economic and political repercussions.

The availability of irrigation water has fostered enormous economic gains for the irrigation Region (Blackmore and Connell 1996). In the financial year 1993-94, the Region's agricultural production was worth \$9.4 billion. In addition in 1991-92, production from the processing industry in the Basin was worth \$10.75 billion per year. Of this, at least 70% was dependent on agriculture (Blackmore and Connell 1996).

2.3.3.2 Political Importance of the Murray-Darling Basin.

The MDB Council is made up of representatives from the governments of the Commonwealth, Queensland, New South Wales, Victoria and South Australia. These governments signed an Agreement to

> promote and co-ordinate effective planning and management for the equitable, efficient and sustainable use of the water, land and other environmental resources of the Murray-Darling Basin (Blackmore and Connell 1996, p.4).

Unfortunately, changes to water rights poses one of the major causes of social and economic dislocation (Lovering 1996). Therefore, water reform remains of great importance to the long-term economic survival of the MDB. According to Lovering, to obtain 'political sustainability' the Murray-Darling Basin's Ministerial Council and its Commission are emphasising water reform. This approach can also be interpreted as continuing to avoid the equally serious issue of land degradation in favour of concentrating on the greater political problems inherent in water reform management.

2.3.3.3 Dryland Farming in the MDB

Outside the irrigation districts is the broader problem of rising ground-water levels across the whole of the southern section of the Basin, of which the Loddon catchment is a part. This is attributed to extensive clearing over the last 150 years and is considered to be compounding the ground-water rises which are occurring in irrigation areas[xi]. It was found in the Campaspe catchment, adjacent to the Loddon, that, in a typical year, the Region exported 50 tonnes of phosphorus from sewerage treatment plants, 169 tonnes from irrigation areas and 140 tonnes from the dryland parts of the catchment (Blackmore and Connell 1996).

One of the factors causing declining water quality is salinity, frequently as a result of saline ground-water flows caused by rising water tables in both irrigation and dryland areas and assumed to be wholly caused by a range of land management practices. It is estimated that dryland salinity, resulting from the rise of ground-water in areas with salinised sub-soils, is increasing at nearly 5 per cent a year in Victoria. (Blackmore and Connell 1996).

Modelling prediction runs were conducted for a range of scenarios over the period 1988 to 2088. In summary, the Riverine Plain Groundwater Modelling project indicated that large changes in land and water management will be needed to reduce the impact of the existing shift in water balance. This may be true, but there are little data, either on water management, or on individual farm management practices, with which to inform policy directions for such large changes. As noted in Section 2.4, studies on the Loddon Catchment so far have given rise to area-wide figures but not at the locations where problems may exist, and not where problems have been avoided or solutions found, as was pointed out by the SCA Expert Committee (1991).

Another of the studies undertaken in Victoria was that by Allison and Schonfeldt (1989 cited in Blackmore and Connell 1996) which identified that widespread increases in stream salinity were related to dryland salinity. A continuation of existing trends in the Victorian uplands of the Riverine Plains would, according to Allison and Schonfeldt, eventually cause a very substantial increase in salinity near the border of Victoria and South Australia on the Murray River (Blackmore and Connell 1996). Again, the problem was aggregated over the whole dryland area.

What is particularly disturbing are the results of a water audit which the MDB Ministerial Council requested in 1994 (and delivered in July 1995) on the effects of diversion of water. The water audit found that over the five years to 1994, only 63 per cent of the water potentially available for use was, in fact, used. As a result of the audit, discussions are now taking place in order the define the appropriate level of diversions and the management regimes needed to achieve that target. This fact has particular relevance to the Loddon catchment because of the diverted water carried through the Loddon River. If water is being over-allocated, and an amount is diverted from the beginning of the Loddon catchment, then much of the stream salinity is being caused as part of water management, which then increases soil quality problems for other farmers and the community in general.

In relation to the study of the farmers in this thesis, several issues become relevant. The region has been assessed at a global level without reference to information on dryland farmers. The commencement of the Loddon Catchment, the irrigated area and the effects on the Murray River have been widely studied but not the intermediate area of dryland plains. Because secondary data, and ‘off-farm’ data have had to be used it would not be surprising that the results are not in a usable form for farmers. The biggest gap in information is arguably the condition of the soils on these farms, the rationalisation of which is explained in the following section.

2.3.3.4 Soils Research

Until 1995-96 the MDB Commission’s approach to matters involving funding was that financial support for any given activity must be proportionate with the degree of public benefit which would result (Blackmore and Connell 1996, Hamblin and Williams 1995, Goss et al. 1995). Because most of the benefits attaching to soils research were perceived to go to the private landholder or individual farmer through the profits they make, the Commission had little to do with soils. In January 1996 (Blackmore and Connell 1996), the Ministerial Council agreed to commission a consultancy to develop a soil profile. The rationale changed to the identification of the costs to the community of continuing soil degradation, subtracted from the social benefits to agriculture in the form of revenues.

2.3.4 Victorian Government

State governments have responded with similar structures and processes. The Land and Water Conservation Act 1994 in Victoria is based on the catchment as the focal unit of management. Funded by both Commonwealth and State governments, each catchment has its own Land and Water Management Plan under the umbrella of regional boards. The North Central Regional Catchment and Land Protection Board has the responsibility to develop Catchment Strategies to enhance planning, including one for the Loddon Catchment.

2.3.4.1 North Central Catchment and Land Protection Board (NCCLPB)

The objective of this Board is to "establish outputs to be implemented by providers of programs to obtain Integrated Catchment Management (ICM)" (NCCLPB 1996, p.8).

An important component of the development of Whole Catchment Management policies is the development of benchmark information to assist providers of programs in the efficient allocation of funds.

These providers of programs consist of community-based interest groups such as Landcare, and departmental officers, who report back to the State Minister of Conservation and Land Management in a partnership agreement (NCCLPB 1996, p.8). After Ministerial approval the funds are made available through programs that are delivered by various Government and semi-government authorities with the community groups on the same cost-sharing basis detailed above (NCCLPB 1996, p.8). In 1996, there were 13 state government programs in operation in the NCCLPB.

To give an example of the policy in action, the Loddon Catchment Salinity Management Plan (LCSMP 1992), developed by government officials and farmer representatives, is to be implemented on a cost sharing basis. Of a total cost of $116 million dollars, 10% or $11.6 million dollars, over a ten year period, is to be contributed by the government and administered by government officers (LCSMP 1992, p.106). The rationale for this cost allocation is that most of the benefits will accrue to the farmers. However, it could be argued that this amounts to a disincentive for individual farmers to be involved in this process.

As noted above, the 10% funding contribution by the government is the compensation to the farmers for adopting the less profitable salinity control options including tree establishment and perennial pasture establishment (LCSMP 1992, p.105). Both these activities are long-term decisions, and could be interpreted as providing the major benefit to those downstream in the catchment, another apparent conflict between macro and micro-economic requirements. The community working groups who developed the plans have all now become Salinity Implementation Groups (SIGs). The SIGs are responsible for a budget allocation for their respective catchments which they allocate according to Departmental policy guidelines.

The outcomes for SIGs require mandatory monitoring. According to State requirements, evaluations are to be made on a benefit/cost basis in relation to the asset base for the State as a whole. The aim is to assist in maintaining the focus of the priorities established by the State/Federal Partnership agreement, and with the National Landcare Program and the MDBC Programs (NCCLPB 1996, p.32).

2.4 Loddon Catchment Salinity Management Plan 1992

The Loddon Catchment Salinity Management Plan (1992) was one of four initiated by NCCLPB. Several groups in the community, including farmers and the research units of government departments, participated in the development of this plan which was presented to the Government for implementation in 1992.

When the LCSMP was developed, its main objective was; 'To reduce the impacts of salinity on the Loddon catchment environment, primarily through the optimum use of rain, where it falls' (LCSMP 1992, p.vii).

For land management, it was recommended that grazing systems be implemented based on perennial vegetation integrated with cropping rotations to maximise plant water use and improve the condition of the soil. The indicators were based on the recognition that farming methods and changes in practices would provide an indication of changes in management and, therefore, changes in soil quality. For example, for soil structure, the indications were for the inclusion of stubble retention, conservation cropping and gypsum applications in the farming management system.

The Loddon Plan was the first level of planning in which farming methodologies were specifically discussed. The group also recommended possible levels of productivity as standards for the catchment. Again, it was decided that there was no way to monitor soil because such a monitoring system could not be broadly applied. Any monitoring systems which may apply to specific locations were outside the parameters of government policy. This was also four years before the recogniton at a regional level (see MDB) that soil health should not be excluded from implementation programs. This limitation also applied to other major problems in the catchment, namely, soil acidity, soil erosion, and soil structure decline, as well as the interaction between water management and soil quality. Soils were not included in any funding programs when the survey in this thesis was undertaken.

However, these are the attributes farmers have to manage and they all affect both production and soil quality (Hamblin and Williams 1995). These attributes have not been part of a broader program or strategy and the main reason for not upgrading these problems to the status of a program is the requirement that extension officers take samples ‘outside the farm gate’. Comparability and compatibility across broad areas to provide a benefit for all Victorians (NCCLPB 1996, p.39), however, cannot be embraced by farmers themselves when their own challenges are location specific.

The Victorian State government requires management plans to be economically evaluated from the point of view of the State as a whole. The economic evaluation of the Loddon Salinity Management Plan, therefore, includes all the costs and benefits to all Victorians, plus the downstream users of the River Murray (LCSMP, 1992 p.xvii).

The necessity to use only available data, has lead to a major public focus on water management and, more extensively, on salinity management. It would also explain the emphasis on water management in the Loddon Catchment Salinity Management Plan (LCSMP), in one sense, the least manageable resource by individual farmers.

2.4.1 Financial Research Studies of Loddon/Campaspe Catchments

In the following section, it should be noted that the elements missing, partly because of the difficulties of obtaining primary data, are studies of solutions undertaken by farmers or studies which report the problems from their point of view. There is no mention of non-financial measures such as soil quality, or any assessment of the sustaining practices undertaken by farmers. It will be shown that the basis of costing is still dominated by the traditional breakdown between variable and fixed costs with the decision objective being the gross margin[xii].

The overriding limitation for these studies is the cost/benefit criteria which must be considered in any allocation of government funds; that may be of little direct benefit to individual farmers.

> Although more refined estimates of costs to the dryland and irrigated sectors could be made, this would generally entail greater costs. Any decision to pursue more accurate cost estimates needs to be made on the expected net benefit from having such data and, to a large extent, this will depend on the relative importance of the particular cost in the context of the overall development of salinity and high watertables Management Plans (Whish-Wilson and Shafron 1997, p.27).

Initially, two studies of the Loddon/Campaspe catchments are discussed in relation to the policy initiatives of government, and in relation to decision making at the farm level. A second group of studies will be examined in relation to the financial recording, monitoring and reporting recommended to farmers.

2.4.1.1 Loddon/Campaspe Catchment Studies

The total Loddon catchment runs from the south in the Great Dividing Range called the Sedimentary Rises and Metamorphic Ridges, to the north called the High Level Riverine Floodplain, the northern part of which is the irrigation region whose Victorian boundary is the Murray River.

The objective of the first group of studies was to provide a catchment assessment of the costs of salinity. The indicators used were present and future costs of salinity measured in lost production. The results are based on LMU's rather than statistical or industry-based boundaries. The Campaspe catchment lies adjacent to the Loddon catchment, and, for many statistical studies by the Australian Bureau of Statistics, the two are treated as one (Whish-Wilson and Shafron 1997). This was included in this thesis for the purpose of showing the methodology and thinking involved as indicative of all studies in the southern region of the MDC, and for highlighting the extent of the problem in the Loddon catchment.

Using the data from the 1992 LSCMP, Luke and Shaw (1994) undertook catchment-wide studies of the Loddon and the Campaspe Dryland Sub-Regions to determine the present and future costs of salinity measured in terms of lost production.

The Luke and Shaw studies are important to this research for two reasons:

1. They endeavoured to compare results based on an ecological boundary rather than a statistical boundary such as the statistical local areas (SLAs), or political boundaries such as shires. This was successful only to a limited degree because they used averages for all their calculations and had estimating problems in their calculations.

   The ecological areas of land, LMU's were based on the classifications devised by the Centre for Land Protection and Research. Each LMU represents areas with similar hydrology and geographic features, and where enterprise mixes, soil type, slope, climate, and salinity causes and downstream consequences are thought to be relatively uniform (Whish-Wilson and Shafron 1997).

2. Their methodology involved estimating yields, stocking rates and gross margins for LMUs within the catchment as detailed in the following sub section. This methodology is indicative of all studies undertaken into agricultural systems over the past fifteen years (See Appendix 1, p.342). All the studies include the gross margin which will be examined in detail in the following section to test the validity and reliability of the information.

2.4.1.1.1 Methodology of Loddon/Campaspe Catchment Study

Gross margins for the major enterprises were used to estimate the loss of Gross Value of (agricultural) Production. Gross Value of Production (GVP) is the value for a given area using yields and prices for a particular year. Although GVP provides a good indication of the relative importance of different enterprises in a given area, it is open to large fluctuations between years. For this reason, the Luke and Shaw study used averages called long-term prices on the basis, or presumption, that a comparison between farms in one year would still provide relativities.

Long-term price predictions were based on an 'average' production system for cropping and livestock enterprises. These were used to calculate gross margins for each LMU for each enterprise together with yields and stocking rates. The physical quantities were developed using Department of Agriculture standards.

Enterprise gross margins were developed for each LMU and on a per hectare basis to account for the differing crop yields and stocking rates. A gross margin for an enterprise is the income from the enterprise less the variable costs of the enterprise. Luke and Shaw used what they called the well established gross margin as an indicator on the grounds that they do not include overhead costs[xiii], therefore, they are considered a good basis for comparing the economic merits of different enterprises (Luke and Shaw 1994, p.5, Whish-Wilson and Shafron 1997, p.21).

A weighted average gross margin was calculated and multiplied by the area affected by salinity and high water-tables to produce an estimate of the total loss for the catchment. The loss of production from salinity has been assumed to have a direct effect on the general gross margin for each LMU. The costs are developed for three periods 1991, 2001, and 2041 using the above methodology.

2.4.1.1.2 Critique of Methodology

All the studies (Luke and Shaw 1994, Whish-Wilson and Shaprin 1997) use the gross margin as an indicator for the dollar value of the loss of production, as an indication of efficiency in production and as a measure of the cost of the product. Using Department of Agriculture standards, the gross margins represented an 'average' farm under present technology and salinity status. These figures are extrapolated by averaging the major enterprise gross margin for each LMU weighted according to the assumed size of each enterprise resulting in 'general gross margins' and providing an 'expected long term gross margin for each LMU per hectare'.

The development of this system of costing evolved from the manufacturing sector where the fixed factor of production, or capacity, is assumed not to change in the short term, and where firms in the same industry have comparable fixed factors of production. These assumptions form the basis for all studies using this methodological approach, providing information on what goes into the soil, but nothing about the soil itself, or only telling half of what farmers do to produce and, thereby, providing limited information to policy makers.

For the High Level Riverine Floodplain of the Loddon Catchment, which is 31% of the approximate 1 million hectares, this use of the weighted average gross margin would be applied to 310,000 hectares, a methodology which may not be useful to individual farmers in Victoria[xiv] because of the variations in physiology and climate.

The studies excluded capital costs and overheads on the basis that these costs would not be incurred if the land was taken out of production altogether. On this assumption the Whish-Wilson and Shaprin (1997) study reduced the costs of salinity.

> The gross margin analysis approach takes no account of the reduction in capital costs that will occur if the land once used for cropping was totally retired from cropping. ABARE survey data shows that capital costs amount to about 50 per cent of the gross margin per hectare for cropping farms in Victoria. When this is taken into account, the estimated (for the irrigated areas) loss of profit (read gross margins) reduces from $19.2 million to about $9.6 million (Whish-Wilson and Shafron 1997, p.23).

By assuming that the affected irrigated land was diverted to grazing sheep, using ABARE survey data for gross margins, the loss of profit would be further reduced by around $0.5 million to $9.1 million assuming no substitution costs. From a societal viewpoint, the total loss in production is $9.1 million, whereas the effect on the value of the land and the loss of natural assets is seen as a private loss. It is questionable as to how capital costs could be reduced, but more serious is the assumption that, if the quality of the soil decreases and the land value reduces, this is of no concern to the community.

2.4.1.1.3 Conclusions from the Studies

The conclusions by these writers have enormous implications for farms in the High Level Riverine Floodplain in the Loddon Catchment. For example, between $216,000 and $424,000 per annum was the estimated total cost of salinity in the whole Loddon Dryland Catchment for 1991. At this time, 19% of the costs arose in the High Level Riverine Floodplain, 19% in the Sedimentary Hills and 18% in the Volcanic Plains. According to Luke and Shaw, the total cost of salinity in the Campaspe Dryland catchment for 1991 is calculated to be between $105,000 and $205,000 per annum. At this time, greater than sixty percent were sourced in one LMU, Greenstone Range, a watershed region, 19% sourced in the Sedimentary Rises LMU and 7% in the Metamorphic Ridges LMU. In 1991, the equivalent estimated cost of salinity in the High Level Riverine Floodplain was .02%.

These figures indicate that the salinity commences through the clearing of the forests for agriculture, including forestry, the Sedimentary Hills, and is carried down the catchment with the water flows both above and under ground to the High Level Riverine Floodplain. This area already experiences rising water-tables, sometimes in the order of 2 metres, where 3 metres is the minimum depth before obvious salinity occurs. This is more widespread in the Loddon Dryland Catchment because of its natural limitations in drainage ability.

According to the figures in these studies, if no farming or policy changes take place, the estimates for 2001 and 2041 are given in Table 2.2:

Table 2.2 Future Lost Production Due to Salinity Given no Change in Policies

	1991[xv]	2001[xvi]	2041
Loddon Catchment			
High Level Riverine Floodplain	11,395ha	17,130ha	23,770ha
% of total lost production for the LMU	19%	42%	54%
Campaspe Catchment			
High Level Riverine Floodplain	62ha	4,630ha	20,810ha
% of total lost production for the LMU	.02%	53%	67%

(Luke and Shaw 1994)

For both catchments, the authors concluded that the major area at risk of salinisation, if salinity control measures are not introduced, is the High Level Riverine Floodplain, (HLRF). The HLRF is considered to have generally high water-tables natural to the area. It is also natural for these flows to be seasonal and manageable. In more recent times the lack of drainage possibilities has been aggravated by the constant flow of water from the urban areas and for irrigation purposes.

The results of the Whish-Wilson and Shafron study were similar to those of the Luke and Shaw but there were also several limitations acknowledged by them. They acknowledge that the method for estimating yields and stocking rates is only an approximation. The data for prices, sale numbers for stock, and the structure of the variable costs of cropping activities were drawn from ABS data which are averaged public data. The average gross margin for each land management unit was estimated by weighting the enterprise gross margins by the area of each crop and the area allocated to each livestock enterprise. The figures were based on the assumption that the land can be farmed for different uses, for example, cropping and grazing.

Importantly, salinity itself is difficult to detect in its early stages and it can be difficult to identify, separately, the costs of salinity and high water-tables from other normal operating costs. Even when the problem is more severe and the costs significant, it can be difficult to quantify because individuals may have changed the nature of their operation in response to the problem (Whish-Wilson and Shafron 1997). This is seen as a major limitation of the reported studies to date. They do acknowledge that this is partly due to the lack of reliable production data available at the LMU level. The smallest unit for which public data are available on a consistent basis is the statistical local areas (SLAs) by the Australian Bureau of Statistics Agstats data, yet to pro-rata SLA data to obtain accurate data for an LMU requires the assumption of homogeneity across the SLA. However, where an SLA contains two or more distinct LMUs with different agricultural productivity characteristics, the validity of this assumption is questionable.

Most importantly, it is acknowledged in the Whish-Wilson and Shafron study that the gross margin approach does not provide estimates of the costs related to the repair and maintenance of damaged infrastructure and capital items even though these could be the major costs.

> In the light of these problems, using a single method to estimate the costs of salinity and high watertables may not be the best way to approach this task (Whish-Wilson and Shafron 1997, p.24).

Several issues arise out of the previous discussion; the assumption that farmers have not made significant changes to their farming activities in response to the challenges (Luke and Shaw 1994), that all the area’s soil quality is threatened by salinity, and that the averaging methodologies which of necessity has been used in these studies will be of benefit to policy makers.

The studies discussed so far are based on calculating the costs from a societal policy-driven point of view. The second group of studies discussed in this chapter concentrate on the financial reporting of farmers.

2.4.1.2 Factors at the Farm Level

Whilst land degradation and externalities are recognised as a reduction of society's assets, it is at the farm level that decisions on soil are being made. Accounting by farmers, farm management and how farmers make their decisions at the farm level has had little attention from accountants. For too long 'public discussion on land degradation in Australia has focused largely on technical considerations with little regard to the economic aspects' (Dumsday et al in Williams 1993, p.180).

> Farmers generally make their own decisions about the use of their resources. Effective farm management is a key element in the adoption of a systems based approach to farming and the implementation of more sustainable agricultural practices (Standing Committee on Agriculture, 1991, p.33).

There are those who claim that in relation to on-site problems the farmer should have clear incentives to act (Dumsday and Chisholm 1990, p.9, Campbell, Carolan, Foster and Leeuwen 1991). To achieve a more sustainable agriculture, farmers require detailed information about the ecosystems, the resource base and farm production systems and an awareness of the inter-relationships among parts of these systems (SCA, 1991) The assumption has been made that farmers, to a great extent, do not know how to manage or do not manage on a systems basis. The response expected from the policy is that farmers develop skills in farm management.

However, the two studies to be discussed will show different thinking between farmers, their advisers and policy makers. The first, was a comprehensive literature study of agriculturalists[xvii], and the second surveyed both agriculturalists and farmers about their objectives for monitoring and what they used.

2.4.1.2.1 The Luke Study 1992

Luke (1992) undertook a literature survey of the main financial tools which have been advocated to farmers by over fifty agriculturalists since the 1960's. His conclusions are typical of the literature;

> "A range of financial tools have been developed for farmers to use in the management of their businesses and have been presented to farmers in different forms for over thirty years. Despite these efforts, the level of financial management skills among farmers remains low"(Luke 1992, p.1).
>
> and
>
> "only a small proportion of the Australian farming community have adequate financial skills by agriculturalists' standards" (Luke 1992, p.15)[xviii]

These tools have been based on accounting techniques used in 'secondary' industry[xix] and are generally accepted in the literature (Malcolm 1988, Stephens 1992). They are, (1) enterprise[xx] analysis and gross margins, (2) budgets, (3) cash flow monitoring, (4) profit and loss statements, (5) balance sheets. Several anomalies can be noted. Gross margins, a short term measure, is recommended to be used for strategic planning by substituting expected future prices (O'Sullivan 1986, Richardson 1982); the claim that tactical planning utilizes cash-flow data and a knowledge of the changes in inventories (O'Sullivan 1986) an apparent reference to working-capital management. However, crops in the ground, and the state of herds could not be managed on an industrial inventorial basis as if they were finished goods. Ironically, inventory valuation is the only specific topic discussed by the Australian and International accounting profession (AARF 1997, IASC 1996).

It can be argued that farmers themselves do not need to be proficient or knowledgeable about the various financial tools and they can leave this to their accountants and financial advisers. It would probably benefit financial advisers to have their clients use uniform systems as the advisers can become more proficient in them and provide them with economies of scale. Conversely, farmers would want tailor-made systems as their focus in on the farm itself.

For further sophistication and depth of analysis, the balance sheet and profit and loss information were recommended. Four indicators were chosen; (1) farm operating surplus per hectare, (2) farm operating costs as a percentage of gross income, (3) return on equity and (4) return on investment (McGuckian 1991 cited in Luke 1992, p.8, Cook and Ronan 1992, Walker and Reuter 1996. See Appendix 3, p.344 for an explanation of return on investment). Claims are made that using these indicators will improve financial stability, liquidity and profitability of the farm compared to industry averages and provide trends over time for one farm (Luke 1992, McGuckian 1991).

There is a general perception that there are two major barriers to sustainable agriculture: the short-term policy frameworks of governments; and the lack of appropriate skills and confidence in both public and private land managers. This was noted particularly in the 1995 Landcare Annual Report (Alexander 1995), a body with significant national membership although funded as part of the whole-of-government national policy.

From over fifty authors cited by Luke only one (Neilson 1975), refers to fixed assets, holding assets and decision making in relation to the balance sheet:

> "a balance sheet, or statement of assets and liabilities of the farm, is also important for understanding and evaluating how equity is affected by the generation of income, holding, buying, or selling assets of the business and spending by the household over the year"(Neilson 1975, p.15).

This is the first mention in the literature of long-term sale or holding of fixed assets and the effect any decisions would have on the wealth of the farmer.

Other writers in dissent (Malcolm 1988, Hardaker and Anderson 1981) claim that the wrong questions were being asked of farmers, with too much emphasis on record keeping and packages which do not enhance decision making. In Australia, the number of surveys has been small. ABARE surveys farmers regularly and many researchers and advisers rely on the industry wide figures which result. Only two surveys have employed interviews in their methodology, have consulted farmers and heard their point of view on what farm accounting they used (Lees and Reeve 1991, Stephens 1992).

2.4.1.2.2 The Stephens Study 1992

Stephens conducted research with broadacre farmers in the Northern Wimmera and Mallee regions in Victoria. He undertook surveys with two groups; one, of farm-management advisers to obtain information from a theoretical point of view; and two, of farmers to ascertain their needs from a practical perspective. The aim was to develop a package for farmers to link their physical and financial resources and thereby improve their decision-making skills in farm management.

The farm-management advisers included academics, accountants, bankers, farm management consultants, and staff of State Departments of Agriculture.

> They indicated that the most important farm management aids were cash flow budgets, gross margins, physical records, monitoring of assets and liabilities (Stephens 1992, p.2).

They reported that they were not aware of any studies which indicated what farmers wanted in a management system.

Stephens also conducted a mail questionnaire with sixty farmers in the Northern Wimmera and Mallee regions in the Avoca Catchment, Victoria, a region with some diversified farming but 98% conducting some level of wheat growing. The farmers indicated that they had goals of wanting to continue farming and handing over the farm to the next generation. However, the two groups differed significantly on how the management of long term and short term could be achieved.

For the farmers in the short term, the uncertain physical and market conditions were the most important elements of decision making, for example, current grain prices, seasonal conditions, crop diseases, weed considerations. Physical records were regularly up-dated.

In addition, the farmer's responses to the following planning tools were as follows:

Cash flow budget	72%
Development budgets	58%
Partial budgets	42%
Gross margins	40%
None	13%

(Stephens 1992, p.26).

Both farm management advisers and farmers believed in similar management concepts. These concepts were; cash flow budgeting, gross margins, financial record keeping, physical record keeping, calculation of the profitability of the whole farm (Stephens 1992, p.44).

However, the major finding of the survey related to the mode of delivery of these management systems. 76% of farm management systems known to farm management advisers required the use of a computer, whereas only 5% of farmers used computers to help with their management. 'It seems many systems have been developed with little research into what the majority of farmers wanted' (Stephens 1992, p.44).

These findings supported those of McKinlay (1984) and Malcolm (1988), the latter deciding that the economics and accounting recommended to farmers did not concentrate on what farmers do, that is, solve problems (Malcolm 1988).

What differences there were indicates a clear split in the thinking of each group, uniformity thinking on the part of the advisers, and diversity thinking[xxi] on the part of the farmers. 76% of the farm management systems known to advisers consisted of computer packages which would indicate a uniformity of response to at least some of the strategic, tactical and operational aspects of the farm. From the farmer's point of view, computer packages were not helpful and not flexible enough for timing of both production and sales.

2.4.1.2.3 Schnitkey and Sonka 1986

This difficulty with computers was clearly shown earlier by Schnitkey and Sonka (1986) in a United States study where six farmers participated in case studies involving the choice of a computerized information system.

Three conclusions were suggested by the Schnitkey and Sonka study. First, the selection and design of an information system should be based on a farm's information needs. Second, the selection of an information system depends on the decisions it will aid. This emerged with the recognition that the information needs are determined by the problems faced by an individual farmer. Third, information desired varies considerably among farmers, even among farmers who manage similar operations. They concluded that there are important implications for farm-management advisers who should tailor systems not only to accounts but also for production and marketing. Permeating all their conclusions is the acknowledgment of the operator's decision-making environment.

2.5 Summary

It has been argued (Dumsday et al in Shaw 1993,p.176) that the expansionary policies of governments and the lack of knowledge has created a neglect of long-run productivity amongst farmers, a method easily encouraged by a short-term emphasis on gross margins where overheads and capital are excluded from the calculations. Conversely, it is economists who assume that farmers have a strong incentive to treat their land in ways which maintain its future productivity so long as they are fully informed. That is, they see the problem as being one of market failure. Either way, a continuing emphasis on productivity measured by gross margin and other short-term accounting measures such as return on investment, coupled with market prices, may not achieve any of the changes the government has in mind.

Without further consideration of the quality of the land itself, this method of accounting can hide the effects of soil depletion. The differences between short term and long term in principle, are being recognised but little connection is being made with the signals that accounting reports give to those outside the firm, and to some inside the firm.

> Degradation does not necessarily imply an immediate loss in productivity. Biomass productivity could be maintained while degradation is present. This could occur during a period of overuse, so that the longer-term ability of the soil to maintain production is diminished for short-term gain. It could also occur when human technological solutions allow farming to co-exist with degradation. For example, some areas of land may be sacrificed to salinity to allow an otherwise very productive farming area to continue operating' (Gretton 1996, p.2).

These limitations of financial indicators were recognised in the earlier reports to government. 'Improvements in farming practices that are of benefit to the resource base are not always reflected in the usual financial indicators' (SCA 1991, p. x). Increasing inputs or changing technology can give the market a significant profit signal (Dumsday and Edwards 1990), but not a wealth signal. This is now being recognised at the macro level (World Bank 1995), but not at the micro level (Juchau, Clark and Radford 1989).

Formal accounting systems may not support the management of change because of the lack of timeliness and relevance. This occurs because prices in agricultural markets are volatile in response to seasonal demand and supply situations. Managing these changes is essential in farming. This does not seem to have been understood by agriculturalists who express frustration that even though information is available, only a small proportion of farmers are perceived to have adopted recommended practices or undertaken basic knowledge acquisition.

> We should be aware that sectoral and government research and marketing mechanisms have been most successful in counteracting declining terms of trade, providing technologies and market opportunities for productivity growth. The mechanisms for managing the resource base are available, but have not received the same level of government or private sector commitment or investment (Hamblin and Williams 1995, p.32)

Accounting is one of the main mechanisms for collecting and reporting information at the farm level, but it is little understood by those outside the accounting discipline and even by some within the profession that neither long-term income nor changes in wealth can be reported using current accounting practice. To maintain long-term profits requires the maintenance of wealth over several periods, and this is not represented by annual profit and loss principles or in the balance sheet because there are no agreed approaches to reporting assets in use.

In this chapter, significant detail has been devoted to the responses of Commonwealth and State Governments to the problems facing farmers and society in general. Australian governments have adopted a 'whole-of-society' policy and through this wish to monitor what farmers and agribusiness companies are doing to the physical base through indicators which are comparable, and through financial indicators based largely on profitability. The purpose here too is to compare farm performance. To do this, they are turning to the types of reports which companies produce for their annual reports.

Farmers, on the other hand, have generally not availed themselves of financial packages, and their annual reports are for the purpose of taxation reporting[xxii]. However, these accounting reports, either emanating from government policy or taxation purposes, do not represent physical or financial performance which recognizes any maintenance of capital in soil quality. Thus, it is proposed in this thesis that farmers' attitudes may conform more to thinking which is indicated by individuality, and a greater emphasis on ownership and capital.

Governments seem puzzled that even with greater concentration on ESD they do not know what farmers do. Perhaps they hope that by pushing more on to farmers by way of reporting, this information will also be available to governments.

To summarise, if the determinants of agricultural sustainability are long-term net farm income, land quality, managerial skills and off-site impacts, then financial accounting explicitly reports on profits in the short term. The other components are assumed.

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[i] In Australia there is an ongoing debate that leased land should be converted to private ownership because owners have proper incentives for maintaining their asset base (Chisholm & Dumsday 1987).

[ii] In this study there were extenuating circumstances. The government had spent a considerable amount on both advertising the project as well as providing generous grants to farmers. In addition, the land degradation consisted of gully erosion, a very visible form of degradation.

[iii] In the economic literature on this topic the farmer assesses the terminal value of the land (Milham 1994).

[iv] The assumption being that organic farming is less damaging.

[v] This is a product costing technique which categorizes all costs into direct material, direct labor, and the remainder in overhead. Gross margins are considered useful in comparing enterprises, that is, cropping in the same paddock over a period of time, or between farms.

[vi] Which was first formulated in 1981 with the publication of Lester R. Brown's book *Building a Sustainable Society*. This book summarized views suggesting that it would be possible to harmonize the material needs of society, the growth of population and the rational utilization of natural resources so that environmental pollution would also be minimized.

[vii] Eco-justice is defined as being environment-centred and life-centred, especially future generations, not business-centred; while eco-efficiency is defined as being concerned with increasing or maintaining output value without creating waste or pollution.

[viii] Sections relate specifically to agriculture, namely, an integrated approach to the planning and management of land resources; the promotion of sustainable agriculture and rural development; and, a strengthening of the role of farmers

[ix] Several reasons were given for this choice; the northern section of the Loddon catchment is irrigated and degraded; the increasing salinity in this area and the gradual creep of the salinity further south into the dryland farming region of which the survey area forms a part. The importance of this region as part of the Murray-Darling Basin was also a major factor.

[x] One that could have a finite life.

[xi] There is a tendency to downplay the effect of the increased water flowing through the dryland regions in providing for the irrigation farms further downstream. This is discussed more fully in Chapter 7 in this thesis.

[xii]What is called in the agricultural economics literature as the industrial basis of costing, presumably a reference to manufacturing costing systems (Luke 1992).

[xiii] The reference to overhead refers to depreciation of plant and machinery, rates, and electricity. What is excluded are non-market resources such as soil.

[xiv]This methodology could be useful in the larger States and the Northern Territory.

[xv] Based on aerial surveillance

[xvi] Extrapolation by hydrologists and geologists (LCSMP 1992)

[xvii] Farm management economists, agricultural consultants, accountants, bankers.

[xviii] These include agricultural economists (Hardaker and Anderson 1981), accountants (Neilson 1975), and bankers (Allen 1987, McGuckian 1991).

[xix] In 1966, a National Workshop on Farm Management Accounting resulted in the formation of the Australian Committee for Coding Rural Accounts (ACCRA). The purpose was to 'provide a code that would provide the flexibility necessary for the preparation of a simple taxation set of accounts, or management accounting reports for a multiple enterprise farm unit, applying full costing procedures. A further requirement was that a manual be produced setting out in detail the principles and accounting methods to be used in the implementation of the code'. There was a motion put that there should be an emphasis on user requirements, but it was impractible and it was instead decided to base the Code and Chart design on what was considered to be a 'reasonably widely accepted point of view'. The purpose was to establish standardization in farm management accounting, through the development of a Uniform Code and Chart of Accounts to be applied to the financial and physical reports being provided through farm management accounting (Gay 1971, p.348).

[xx] The term used for each product, for example, wheat, oats, sheep may all form part of the production or enterprise mix for any one year, and will form part of a rotation pattern. No mention of cross subsidization between enterprises is made. All enterprises are evaluated independently on gross margins.

[xxi] The accounting theory explaining uniformity of thinking is called the entity theory. The theory explaining diversity of thinking is called the proprietary theory. In Chapter 3 it is demonstrated that each of these theories represent distinct ways of thinking about firms.

[xxii] As well, ABARE records a type of cash-flow by conducting annual surveys on a statistical sampling basis.

Chapter 3

Entity and Proprietary Theories of the Firm

3.1 Introduction

In Chapter 2 a detailed account was given of the responses by governments, research bodies and the findings of farm accounting studies in Australia, to the problems of land and water degradation facing farmers and society in general. It is proposed in this Chapter that most participants hold views which are consistent with the entity view of the firm. In contrast, farmers may hold views which are not consistent with the entity view of the firm but which are more reflective of a proprietary view.

Each of these views is built upon several sets of attributes which are chosen and adopted by respective participants and which, in effect, form two typologies. Participants will have different views on the relative importance of the individual and society, concepts of capital and income, and the principles of uniformity and diversity. Each of these sets of attributes will be discussed in this chapter before a general review of the entity and proprietary views of the firm is presented. As each choice is made, it is usually justified by the proponent, who, even if they do understand the existence of another point of view, fails to see any reason to act upon it. At a formal level, theories surrounding these attributes generally do not allow for an opposing view. For this reason, it is important to base the following discussion on generally accepted objectives of accounting and to assess each, entity and proprietary, on the basis of the fulfilment of these objectives. As an overall statement, the proprietary and entity views are analogous to micro and macroeconomic in their focus, where one level may not be able to be applied at the other level.

3.2 Objectives of Accounting

3.2.1 Users

Accounting,

> in an economic/business context, is the process of identifying, measuring, and communicating economic information to permit informed judgements and decisions by users of information based on the achievement of the objectives of the business (Tweedie and Whittington 1984, Goldberg 1965).

According to Goldberg (1966, p.34), the main aim of accounting is to collect data, analyse relationships, and present useful information in a manner in which those interested find them useful[i]. As well, accounting should assist users to make informed judgments (Godfrey et al 1994). Another view regards accounting as only one aspect of economic activity, therefore, accounting cannot be wholly relied upon for making decisions about the business as a whole (Limperg in Tweedie and Whittington 1984, p.30). Extending this line of argument, the usefulness of accounting information will be commensurate with how it reflects the needs of users. This implies a certain amount of specificity if it is acknowledged that the underlying circumstances of an organisation are rarely uniform across an industry. It also implies that currently operating accounting systems cannot always be expected to meet all the information needs of users.

3.2.2 Maintenance of Capital and Generation of Income

As well as usefulness, a second objective of a business is generally conceded to be the maintenance of capital optimally through the generation of profits, either by retaining the assets, that is, value in use, or by the exchange of assets, that is, value in exchange whilst maintaining the asset base. Thus, many consider this second objective the central problem of accounting, that is, the distinction between capital and income. This issue has been debated in many contexts for at least the last one hundred years (Goldberg 1966, p.48, Staubus 1961, Clift and Kerr 1989).

Proponents of the entity and proprietary views respectively give different emphases to the reporting of capital and income. Those who see the major focus being capital and ownership can be said to act according to the proprietary theory of the firm. Those whose main concerns are the assets of the firm and the income stream from these assets, regardless of ownership, are acting according to the entity theory of the firm, that is, all claims against assets, liabilities and equities, are considered of equal weight (Goldberg 1965, p.326). In this chapter, the attributes of both the entity and the proprietary views are examined as outlined in Table 3.1, and particularly in relation to income, while the entity and proprietary responses to capital maintenance are examined fully in Chapter 4.

The proprietary view supports accounting systems based on individuality and diversity. It is argued that this is preferable because the interest is in the capital, a stock concept, where ownership and wealth over the long-term are the major motivations. The entity view is supported by accounting systems which are uniform and societal. Many groups outside the firm, called stakeholders, are interested in uniform disclosure on the flow of income from assets at regular intervals. The three major sets of characteristics will be discussed in sections 3.3. to 3.5. These are; individual and societal; diversity and uniformity; capital and income.

Table 3.1 Distinguishing Characteristics of Proprietary and Entity Views

Proprietary View	Entity View
Individual	Societal
Diversity	Uniformity
Capital	Income
Stock concept	Flow concept
Ownership	Assets
Long-term	Short-term
Microeconomic	Macroeconomic

(O'Brien 1998)

3.3 Individual and Societal

Accounting could be described as having two strands; the first being individual, economic and essential for the survival of the firm. The reason is that a solitary individual is faced with economic problems as long as resources are relatively scarce and there are problems of choice to be made (Goldberg 1965, p.12, Staubus 1961, p.10).

The second strand is the social side recognised in fiduciary duties and responsibility accounting. The role of accounting, although having to deal with both, deals with them a little differently. It is this second strand which relatively recently has begun to be recognised as an important determinant of accounting practice.

> What is often forgotten or ignored is the extent to which accounting, in its reflection of relationships, is a social activity, and is greatly influenced by the law. It could also be a part of this recognition of social relationships that accounting practices are strongly influenced by legal and taxation influences. Not only are practices determined from different points of view, namely, taxation, census bodies, companies acts, but also in the influence of legal concepts in accounting concepts (Goldberg 1965, p.9).

In 1975 when the Corporate Report (ASSC 1975) was published in the United Kingdom by the Accounting Standards Steering Committee, social aspects of accounting were formally presented to the accounting profession and the public with carefully reasoned arguments for the extension of reporting not only to shareholders and other investors, but also to employees, customers, suppliers, and the general public.

The extent to which these two strands are advocated and undertaken depends on which view of accounting is held by the preparers and users of reports (Goldberg 1965, p.12), that is, the proprietary or entity view.

3.4 Diversity and Uniformity

3.4.1 Introduction

It is generally recognised that personal aims are not necessarily the same as social aims. For example, the economist has a social point of view based on public interest whereas professional accountants have seen their major task as being to report to clients using professional judgment and the principles of best practice (Zeff 1971).

A debate in the accounting profession has revolved around the issue of whether to promote uniformity in accounting methods or to allow diversity in the selection of accounting methods to cater for different circumstances. This debate is not new, and even in the 1930's, 'the conflicting views of accountants, economists, and the courts were deemed to be irreconcilable' (Gilman 1939, p.13).

Sections 3.4.1.1 and 3.4.1.2 trace the international debate between the proponents of diversity and uniformity. This historical emphasis is important because it illustrates the existence of an older view of accounting, and the long lead time of these debates as the participants respond to new problems. Risk, in a market sense, became more widely spread as governments and public companies grew larger. Investors started to demand financial accountability in the areas of most interest to themselves. In the case of entity thinking, risk involves a shareholding, in most cases considerably smaller than the total wealth of an organisation, which is presumed to be spread over a portfolio of investments.

In contrast, a clear exposition of proprietary thinking provides an understanding of the appropriate case for diversity when risk is more closely connected to ownership, and interest in this ownership entails a continuing, long-term maintenance of wealth. This does not mean that those with a proprietary view are unanimous in their views, rather it means that their information needs are private and individual rather than public and social.

This division of opinion in the diversity/uniformity debate is clearly demonstrated by an example from the United States in 1962, when an apparently capricious treatment given to 'special items' in company statements, created a major public debate, most particularly from bodies other than the accountancy profession.

> The year 1962 was when General Motors Corporation and Standard Oil Company (New Jersey) accorded different treatments to an enormous gain from the sale of Ethyl Corporation, a jointly owned company. One showed the gain in the income statement, the other in the retained earnings statement (Zeff, 1971, p.187).

The cause of controversy was the possibility of making a trade-off between short-term and long-term impacts of decisions. If in the short term, the profit and loss statement will record a gain in income. If in the long term, the gain will be treated as an increase in capital and shown in the balance sheet.

3.4.1.1 Diversity

Two main criticisms of diversity are perceived to be lack of comparability and an increased incidence of creative accounting. This can also be seen in a positive light. In the accounting profession, 'one of the distinguishing features of Anglo-American accounting has been the availability of a choice of accounting methods' (Henderson and Peirson 1988). In the late 1960's, diversity of accounting methods was considered the predominant convention in accounting (Chambers 1965). What has been important to the accounting profession is the ability to choose the accounting procedures which best suit the circumstances of the entity.

At the beginning of the twentieth century, accountants and managers had considerable latitude and demonstrated considerable diversity in their reporting (Zeff 1971). Bookkeeping was needed primarily to record and process entries rather than to determine income or to assist with decision making. Accountants saw their duty as wholly directed to the client and the private function of accounting.

In addition, prior to the 1930's, it was regarded as a 'hallmark of good financial reporting to deliberately or materially understate assets and profits in Britain' (Zeff, 1971, p.15). Under the proprietary view, taken for granted by many in the chartered accounting profession, disclosure was regarded as an infringement of privacy and competitive advantage. Disclosure was to be decided by the professional judgment of the accountant.

In the British professional body (comprising England and Wales, formed in 1880), as well as in Scotland, Ireland, Australia, Canada and to a lesser extent, the United States, the professional accountancy bodies consisted solely, or significantly, of 'practising' members whose first obligation was to their clients. In the 1940's in Great Britain, when criticised for misleading or inadequate information, some accountants argued that the accounts were a report by the directors to the members and not a report to any other group of users or potential users (Zeff 1971, p.70).

Until the 1960's, the Scottish Institute's Council abstained from offering official guidance for the reason that 'such matters are best left to the integrity and judgment of Institute members'

(Zeff, 1971, p.51). Even in the 1970's, such official guidance was regarded in Scotland as antithetical to the tenets of professionalism and the independence of judgment tradition (Zeff 1971, p.308). The influence from external guidance was equally resisted by the Australian profession in the 1960's and 1970's where the Australian Institute's General Council believed that its role should be confined to the administration of Institute affairs. 'A majority were reluctant to advise Institute members on the conduct of their professional engagements (Zeff 1973, p.4).

The Council of the English Institute had similar views, but circumstances forced them to introduce a series of Recommendations to members in the 1940's. They had a greater number of members in commerce and industry who believed that authoritative guidance on best practice was needed. (Zeff 1973, p.4). The UK accounting bodies saw themselves as leaders in standard setting but still championed individuality such that variations were allowed but had to be disclosed. 'The deviation provision is essential to allow for the almost infinite variations in company circumstances' (Zeff 1971, p.88).

Only a small fraction of the Australian Institute's membership was not in public practice and these members were not influential in Institute affairs. On the surface it looked as if the UK accounting bodies were more easily accepting institutionalisation, 'although it must be stated that the English Institute in the 1940's was motivated by an imminent revision of the Companies Act' (Zeff 1973, p.4). The Australian Institute, until the 1960's, belonged to a more isolated society with less pressure from leaders in government, industry or commerce. As a rule 'it was not accepted that the views of one or two large firms, or of a few strong willed members of the General Council, should oblige Institute members' (Zeff 1973, p.4).

Between the 1940's and the 1960's, committees formed by the Australian Institute could not even agree on the approach to be taken for accounting reports or the contents. By 1966, this was concerning the General Council, because 'it occurred at a time when the financial press and Government inspectors were regularly criticising the accounting practices used in company reports' (Zeff 1973, p.12). The General Council warned that any pronouncements could inhibit changes in accounting principles to meet changing circumstances and, instead, advocated members use self-discipline as a means of enforcement (Zeff 1973, p.38).

Pressure from institutions and governments has grown in strength in Australia and elsewhere, particularly since the late 1970's when the diversity/uniformity debate was raging. Since then considerable efforts have been expended on developing a conceptual framework within which all reporting entities are included. It is this same framework which is now being considered for financial reporting in the agricultural sector (AARF 1997). Accounting is not alone in this trend.

In corporate reporting, problems associated with diversity are being dealt with by both management and the accounting profession by moving toward a policy of greater disclosure of accounting policies and methods. Similar foci are being considered in farming through the development of the indicators programs. These directions represent an underlying philosophy which is presented more fully in the discussion on entity and proprietary views later in this chapter because it illustrates an increasing acceptance of the entity view as the norm and the proprietary view as the exception.

In farming, different circumstances can have different effects on activities and the ways these would be reported. For example, it would need to be known how each farm is affected by geographic location, market size, trade agreements, political environments, diversification and mono-culture. As well, it needs to be noted that the decision context under consideration in this study, the maintenance of soil quality, is largely insensitive to the accounting methods recommended, namely, gross margin, net profit, return on assets and return on investment. In these circumstances, an over-reliance on uniformity in reporting as recommended by governments, agriculturalists, accounting research bodies and consultants can result in the neglect of risk and uncertainty.

The cyclical nature of farming could be misinterpreted by the presentation of uniform short-term financial accounting reports. Whatever level of uniformity is appropriate for agricultural reporting, it is not necessarily going to be financial as recommended in the financial indicators presented to the Australian government in 1996. A major reason for this is that no known or reliable financial measures are presently available for many of the natural resources used in agriculture.

3.4.1.2 Uniformity

Proponents of uniformity in accounting methods consider that uniformity would achieve objectivity and enhance the ability of users to compare reporting entities. Uniformity would be suitable if total reliance could be placed on the calculations that form the basis of accounting reports. If this is not the case, then the usefulness of these reports would be limited and even misleading.

Those advocating uniformity encourage greater disclosure of accounting methods and increasing uniformity in the application of accounting standards.[ii]

The transition to an acceptance of uniformity by accountants has been slow. Many have resisted the broadening of their duty to report to other interested parties. In the United States, five principles were developed in the early 1930’s which were codified by the introduction of a certificate used by accountants when preparing financial statements stating that the reports were drawn up to ‘fairly present in accordance with accepted principles of accounting’ (Gilman 1939, p.170). The resulting debate showed that accountants were unable to agree as to what accounting principles are, and even whether any principles actually existed (Gilman 1939, p.171).

The trend towards uniformity increased and, in the years prior to 1972, with an increasing number of shareholders and debenture holders undertaking different forms of investment, a greater influence was exerted upon professional accountancy bodies from a variety of support agencies. These included company law reform agencies, securities commissions, taxation legislation bodies, stock exchanges, Federal Reserve Board of the US, the financial press and financial analysts. The change in attitude that this evinced is summed up by Moonitz, who was influential in drafting the United States accounting principles and postulates, and who recommended in 1972 that;

> accountants (can) no longer support the view that management has the primary responsibility for financial statements, and that the Board (give full name) find an effective means for enforcing its Opinions with the assistance of support agencies (Zeff 1971, p.328).

This was in recognition that there had been considerable pressure for at least 30 to 40 years for other groups to be a party to, or to control, the development of accounting principles, especially in relation to profit determination and asset valuation (Zeff 1971, p.327). It should be noted that, in the 1980's, a similar impatience was being experienced by policy makers in relation to the perceived lack of uniformity in professional thinking.

At a much earlier stage than in Australia, the United States initiated moves towards uniform standards and principles of disclosure. The needs of users, and a stakeholder view, were firmly established by the 1930's according to Zeff (1971, p.127).

In 1931, as a result of the stock exchange crash of 1929, the President of the American Institute of Accountants in the 1931 Report of the President wrote in the Year Book, pp.188-189,

> Our profession has reached a stage where there is necessity for some general pronouncement from the profession upon many technical procedures with regard to which, in the past, the individual practitioner has had to rely upon his own judgment only. These are being presented to us in increasing numbers by government authorities and stock exchange committees (Zeff 1971, p.127).

The United States was strongly proprietary in its attitude towards the objective of accounting being for shareholders (Tweedie and Whittington 1984). However, support agencies' interest and later their participation in obtaining some conformity to accounting principles created a far greater reaction in that country to company failures and differing accounting treatments than in Australia at the same time (Zeff 1971, p.127, Tweedie and Whittington 1984).

These controversies exemplify the capital/income dichotomy which is also behind the arguments over diversity/uniformity. In some cases the boundaries began to be blurred and many believed that management was synonymous with the role of ownership. Some commentators believed that,

> most authorities of the profession and the SEC address themselves to what managements may do, without the slightest reference to why such requirements serve the investors (Spacek in Zeff, 1971, p.188)[iii].

3.5 Capital and Income

3.5.1 Introduction

In this section, the relevance of capital and income concepts are further examined, and income, in particular, is discussed in terms of the increasing dominance of the income statement for reporting purposes. This is another indication of the growing tendency towards entity thinking and has important implications for cyclical and long-term businesses such as agriculture.

As was alluded to in Section 3.2.2, the major focus for those with an entity view is the reporting of a distinct breakdown between capital and income with the emphasis on income. Conversely, the proprietary view concentrates on the dominance of capital and ownership, with the distinction between capital and income being of secondary importance.

In fact, the initial writings in the 19th century were on the purpose of the firm and the nature of capital and income from the owner's viewpoint. The English classical economists, and the first accounting theorists, writing in the late 19th century, emphasised this distinction between a stock of wealth (capital) and its flow (income). To a large extent, capital was taken as a given and stable, where 'corporate accountants were given the tasks of calculating retained earnings available for dividends making sure that invested capital was maintained intact' (Hatfield 1976, p.220).

There has always been the recognition that the concepts of capital and income are inter-related with the emphasis shifting towards one or the other over time. In strictly historical cost accounting, revenue is not recognised until cash is fairly certain, and assets are recorded at their historical cost. In economic terms, income is theoretically the future benefits derived from an asset. It is this latter definition of income that interconnects income and assets, and led some to prefer to define all gains and losses as the change between two successive income statements.

Over the past ten years in Australia there has been a move to represent income as economic flows expected in the future (AARF 1992, IASC 1996) compared with the traditional accounting preference for historical cost which is a past cost. This is despite the withdrawal of Statement of Accounting Concepts (SAC 4) (AARF 1992) after an outcry from the accounting profession.

This has repercussions for the maintenance of the capital component. These changes in flows include changes in assets held over time as exemplified by the Standard Oil case described earlier where some relate to capital and some relate to income. This dichotomy was publicly debated in the Royal Mail Case, is important to this thesis, and is discussed more fully in Section 3.7.2.

3.5.2 Capital

There are dissimilar notions of what capital is: one focusses on the stock of assets used by an enterprise; the other focusses on the wealth of the owner.

Looking at the issue from the asset, revenue-producing side of the balance sheet, capital can be recognised as existing in the assets. According to SAC 4 *Definition and Recognition of the Elements of Financial Statements (1995)* para. 67, the important issue is not the measurement of capital itself but the determination of capital or equity as the 'residual interest in the assets of the entity after deduction of its liabilities'. Therefore, equity cannot be defined independently of the other aspects of financial position (Godfrey et al 1994, Clift and Kerr 1989).

The criterion for the recognition of assets and liabilities provides the criterion for the recognition of equity[iv] (NZ 1993 ED 60 Statement of Concepts for General Purpose Financial Reporting, p.103, in Mathews and Perera 1996, p.95). This is the traditional accounting recognition of capital, that is, Assets - Liabilities = Equity, which represents an older accounting view; it is still concerned with the capital stock, but the principal concern is with the owner's interest in that capital stock, a proprietary view.

In contrast, the other view is that capital is represented by all the assets with less emphasis on the ownership of the source of these assets, and is represented by the equation Assets =

Equities. This conforms with the economist's view, that is, the importance of the capital stock without any concern about the sources from which that stock came. The principal concern is with the flow of earnings from this stock and with the surplus available for distribution. There is no concern with ownership and is consistent with the entity view.

Maintenance of capital can, therefore, be one of several options, including historical cost of capital, the residual amount after valuing assets and liabilities, or the capital residing in the assets of the entity regardless of ownership. The important change for this thesis has been the increasing emphasis on the surplus or income.

3.5.3 Income

Accounting profit is arrived at in a different way from an economic profit. In the accounting profit, the commitment to assets has been made therefore the interest is in determining the earnings arising from their use. There is no immediate interest in their value. However, the economist views these assets only in comparison with choices in other assets, therefore the focus is in the value given to these assets which also represents the future flow of earnings from these assets. The economist's decision then is to keep or sell these assets in order to maximise the efficient allocation of resources. For example, it is often advocated in the economic literature that land should be withdrawn from agricultural usage because the future earnings do not compare with other investment opportunities; in this methodology no value is given to the quality of the land or the preference of the farmers. Market price is assumed, also what is assumed is that the farmer's preferences will be determined by the profit emanating from the assets, not ownership or quality.

In the following sections, the accountant's profit is discussed more fully in what is called the operating income concept, whilst the economist's ideas are more in line with the comprehensive income concept. This latter approach tries to reconcile both the economist's emphasis on value, and the accountant's emphasis on operating income. Each will be discussed in turn as to their approach in distinguishing between capital and income and their relevance to the proprietary and entity views.

3.5.3.1 Current Operating Income Concept

The traditional vehicle for reporting income has been the operating income statement. In the debates about uniformity and diversity, those with a proprietary view, including the United States Financial Accounting Standards Board (FASB), favoured the current operating income statement. This entailed, in any one period, separating trading income and expenses from the gains and losses related to capital items such as gains or losses on the sale of capital assets. What was not included were holding gains or losses arising from the changes in value of assets in use.

The United Kingdom Accounting Standards Board in 1992 stated that 'gains are all increases in equity, other than those relating to contributions from owners'.

> Various kinds of gains and losses may be distinguished, amongst the most fundamental of which are revenue gains and revenue losses, which are those gains and losses which are generally included in the profit and loss account of the entity. Another type of gains and losses is the effect on the assets and liabilities of the entity of changes in market values (to the extent such changes are recognised in accounts) para 54 (ASB 1992, in Mathews and Perera 1996, p.179)

In this view, adjustments beyond those at historical cost would be required 'for the use of supplementary financial schedules, explanations or footnotes by which management may explain the need for retention of earnings' (Zeff 1971, p.163).

The American Institute of Certified Practising Accountants (AICPA) and other practising accountants' bodies, were adamant that historical cost was the preferred manner of reporting, and remains so. For these bodies, changes in value, when recognised, were treated as changes in capital not income of the current or future periods. For example, when an asset was to be revalued, any increase would be taken to an asset revaluation reserve in the balance sheet and not treated as income[v].

The discussion above examined the thinking by those who saw that annual profits measured by revenues and expenses should be treated separately from changes that occurred in capital assets. When changes in these capital assets should be valued then they would be included in the balance sheet. Any problems are measurement problems rather than conceptual. For example, it has been accepted that land can be degraded, but the best measurement, soil quality, is outside the acknowledged measurement criteria although it is the source by which income can be achieved.

3.5.3.2 Comprehensive Income Concept

What is income and, therefore, distributable without damaging the capital, has generated considerable controversy and confusion between concepts and measurement Those writers who favoured a comprehensive statement (Edwards and Bell (1961, p.111), claimed that this information would be a better indication of well-offness. According to this view, the amount of income can be seen as the difference between assets at two points in time. This means that all changes are potentially considered income, because, in this view all assets are purchased in order to provide a stream of future cash receipts both short-term and long-term. Godfrey et al (1992, pp.422-427) in defining income, clearly explain the consequences of this method.

> The increase in value of the total assets that concurrently increases capital during a given period constitutes the revenue for the period" and "the net income for the period is equal to the increase in the value of capital, as measured at the beginning and the end of the period. Income is the increase in the economic (present value) value of capital between two points in time. The values of assets and liabilities, which determine the value of capital, are inseparably intertwined with the calculation of income (Godfrey et al, 1992, p.426).

> It can be argued that this approach represents an attempt to bring the traditional accounting concept of income and the economic concept of income as an increment of well-offness closer together (Mathews and Perera 1996, p.177).

This aligns with the economist's definition of well-offness used by Hicks (1946) because assets have to be measured at the beginning and end of each period in order to decide which is the income component. It is concerned with individual income, and, in this view, the income of the individual investor. Thus, the performance of an entity during a period can be measured and interpreted as a change in wealth over time or a profit measurement, the informational emphasis being on the income statement. This approach was established by Hicks who stated,

> Income is that amount which an individual can consume and still be as well off at the end of the period as he or she was at the start of the period. The purpose of income calculations in practical affairs is to give people an indication of the amount they can consume without impoverishing themselves. Following out this idea, it would seem that we ought to define a man's income as the maximum value which he can consume during a week, and still expect to be as well off at the end of the week as he was at the beginning[vi] (Hicks 1946).

This concept of well-offness would now need to incorporate explicit environmental factors due to their increasing significance in terms of interest rates, currency values, physical changes and carrying capacity of some natural resources. These ideas form the basis of what is known as the comprehensive income statement, which in 1985, the FASB defined as:

> The change in equity (net assets) of an entity during a period from transactions and events and circumstances from non-owner sources. It includes all changes in equity during a period (para. 70) (FASB 1985).

In the comprehensive income statement the adjustments are made as shown in Table 3.2. Note the concentration on the income statement.

Table 3.2 Illustration of a Comprehensive Income Statement

Profit and Loss Statement		Balance Sheet	
Revenue - Expenses =	xxx	Equity at current	Assets at

Net change in value of assets in use (Holding Gains and Losses) =	xxx	values	current value
Income	xxx		
Less Holding Gains	xxx		
Income attributed to operations	xxx		

Those who favoured the current operating income concept disagreed with this proposal in which all changes during a period were initially taken to the income statement. They claimed that the comprehensive, or all-inclusive, income statement would include changes in the values of assets in use (through holding gains or losses), income from prior periods and cash from the sale of fixed assets. Their argument was that it gave no indication of matching revenues and expenses or revenue realisation, that is, a reasonably certain cash flow, from operations for the period.

This was precisely the argument used by those who advocated the comprehensive income statement on the grounds that visibility in reporting would be enhanced especially when managers were reporting to interested users. There were several attempts to clarify this accounting concept of income by differentiating between gains and losses in assets and liabilities held by an entity during a particular period, and increases or decreases in revenues and expenses within an expanded profit and loss statement (FASB 1980, 1985, Edwards and Bell 1961, Sprouse and Moonitz 1962, in Mathews and Perera 1996, p.175). This format is demonstrated in Table 3.2.

Edwards and Bell (1961) developed a model to operationalise the comprehensive income statement. Their presentation separated income from operations with potential income in the future by the act of holding these assets. They identified four types of income:

- current operating profit - the excess of sales revenues over the current cost of inputs used in production and output sold;

- realisable cost savings - the increases in the prices of assets held during the period;

- realised cost savings - the difference between historical cost and the current purchase price of goods sold; and

- realised capital gains - the excess of sales proceeds over historical costs on the disposal of long-term assets (Edwards and Bell 1961, p.111).

Conceptually, these classifications provide a satisfactory solution but, to date, there have not been any successful attempts to operationalise them in reporting.

The linking of the gains and losses from the effect of changes in the values of the assets and liabilities within the income statement, that is, the comprehensive income statement, is justified on the basis of visibility and accountability. Those who supported this type of reporting claimed that it was a way of significantly changing perceptions on how accounting techniques can shape perceptions and behaviour, that is, management's behaviour (Morgan and Willmott 1993, p.6, Burchell, Clubb, , Hughes and Nahapiet 1980, Hopwood 1983, p.4, Hopwood 1986). This is based on the assumption that users of accounting reports are primarily interested in obtaining a present and future income flow from their investing decisions and wish to know how management arrived at these decisions.

As early as the 1940's in the United States, the Securities and Exchange Commission (SEC) expressed its preference for the comprehensive income statement (Zeff 1971, p.157). Their argument in favour of the comprehensive income statement was based on usefulness. It was preferable to a single profit figure and was an early attempt to present a 'set of information' (Tweedie and Whittington 1984, p.339).

Those who favoured the comprehensive income statement were both wanting to report on operations using accounting profit as well as report changes in the values of assets which reflected future earnings. They tried to enhance economic decision-making as well as provide useful information to many groups in society, an entity view. Those who favoured the operating income statement (FASB) historical cost accounting and the proprietary view were clearer in their definitions of accounting profit.

It should be noted that in the 1960's those who believed in the proprietary theory also believed in transparency and decision usefulness for many users of accounting reports, thus many versions included adjustments which would relate to the proprietors as well as entity-based asset adjustments (Sweeney 1936, Edwards and Bell 1961, Chambers 1965, Baxter 1967, Tweedie and Whittington 1984, and Clift and Kerr 1989). A consistent theme emerges in the literature in which all parties, in trying to balance the demands of various groups, usually ended by advocating a combined set of statements. This is also arguably a major reason why agreement could never be reached.

The move over the past ten years in Australia to represent income in terms of economic income, that is, as flows expected in the future (SAC 4), compared with the preference for historical cost has again not been accepted by accountants. Their objections are that future economic flows are too subjective and expensive to record and report. Three further objections relate to market price. To use a market price to record the change in the value of assets assumes that these are the values which will be realised at sale, that they provide a reliable measure of future earnings, or that they are equal to value in use to the owner, none of which may be realistic.

3.6 Entity Theory versus Proprietary Theory

3.6.1 Introduction

The accounting equation is seen differently, depending on the point of view taken. In the proprietary view, the equation is written as A - L = P (Sprague 1907, Paton 1922, FASB, SFAC 6 in Clift and Kerr 1989, p.196-197). Capital is a right in property. In the entity view, the accounting equation is written as A = E with no particular emphasis on whether assets are funded by loan or equity (Sprague 1907, Anthony 1983, Clift and Kerr 1989, p.196).

The gain in support for, and possible consequences of, the entity view was foreseen in the 1920's (Berle and Means in Clift 1992, p.2) as an attack on the tenets of the proprietary view;

> The surrender of control over wealth by investors has effectively broken the old property relationships…by tradition, theirs is the only interest to be recognized as the object of corporate activity … the owners, by surrendering control and responsibility over the active property, have surrendered the right that the corporation should be operated in their sole interest, they have released the community from the obligation to protect them to the full extent implied by the doctrine of strict property rights (Berle and Means, 1932 p.354-5, in Clift 1992, p.2).

There is general agreement that 'the original mechanism probably was designed to serve chiefly the proprietors of business, that is, the proprietary view, who were both owners and managers' (Gilman 1939, p.12), and the objective of accounting was to determine 'value to the owner' which could be either value in use or value in exchange (SAC 2 para 43, Bonbright 1937).

In farming, 'value to the owner' may entail not using the land for production in any one period as part of a rotation cycle, foregoing income in the short-term for increases in capital and income at some future period. For those with an entity view, two scenarios can occur. Either the lack of income in one year may not be accepted, even if a gain was reported in the balance sheet. Or, as in the present thinking, the gains assumed to be happening in the asset are disclosed in the income statement and treated as income of the period, form income and are part of taxable income (AARF 1997, IASC 1996).

Ownership and capital were of major interest to early users of accounting reports which led to what was known as the balance sheet viewpoint (Gilman 1939, p.26, Littleton 1933 in, Godfrey et al 1994, p.69-75). The balance sheet is the focus of attention in the proprietary theory where the balance of proprietorship is a summing up of some of the elements which constitute the wealth of some person or collection of persons. However, as indicated earlier, assets in use and long-term maintenance of natural resources, although constituting the major source of wealth in farming, are not reflected accurately in the historical cost balance sheet.

What is not reported did not matter to those with a proprietary view because it could be argued at the extreme that these issues of importance in the entity view were irrelevant. The proprietor did not require the use of detailed records in financial terms. In fact, according to Goldberg (1966, p.3), detailed disclosure requirements developed from coercive reasons for the requirements of the state, taxation, the need for detailed information by managers who were not proprietors, and for the determination of matters of policy for social and business objectives.

Chatfield considers that the complete form of the proprietary theory was presented by Sprague in 1907 and Hatfield in 1909 (Chatfield 1977, p.223). The purpose in going back to the late 19^{th} and early 20^{th} centuries is to examine the time when the proprietary theory of accounting was dominant, and when the dominant form of commercial activity was a family business owned and operated by the same few people. Farming was also instituted as a family business and largely remains so. Even if a company structure were used for financial purposes the ownership and the operations were undertaken by the same people. The central feature of the double-entry bookkeeping system was proprietorship and the final results of this bookkeeping cycle consisted of operating totals summarised in proprietary capital and income accounts, a practice still used for sole proprietorships and partnerships (Chatfield 1977, p.217).

> Under the proprietorship theory, the emphasis is on the proprietor not the entity. Thus, bookkeeping represents an accounting by the proprietor for his own property (G.E.M. de Ste. Croix, in Goldberg 1966, p.32).

In the proprietary view of the firm it is accepted that every firm is unique, and that diversity exists, which places considerable emphasis on professional judgment by accountants when preparing financial statements (Zeff 1971 p.317). Industry-wide comparisons are legitimate and necessary, but aggregate statistics are unlikely to describe accurately a particular firm. This is particularly true in agriculture where each farmer has his or her own unique natural resources to manage.

In this view, expenses are defined as outlays that reduce the owner's net worth, and revenue is a potential increase in the owner's net worth. To some accounting writers, proprietorship is central (Littleton, in Godfrey et al 1994, p.69-75) and accounting should be seen from the owner's point of view. To Littleton, companies are seen as the vehicle by which owners seek to increase their wealth. Littleton claimed that economic theory took a proprietary view, where the concept of profit is seen as a return for 'entrepreneurship'.

Differing points of view requiring different information were recognised in the early 20th century while the proprietary view was dominant.

> If outsiders were requiring the report it may be that the point of view is so alien to that assumed in the accounts themselves that no adjustment for this purpose is practicable (Sprague 1907).

Although taking an opposing view himself, Gynther gives a succinct definition and context in which the proprietary theory has meaning. He suggests that the prevalence[vii] of the proprietorship viewpoint is a carry over from the classical models of the entrepreneur and the focus on the entrepreneur that preceded the large corporation.

> It is certain that most sole proprietors, members of partnerships, and shareholders-directors of small companies look upon the firm with a proprietary viewpoint. The business and the private interests are all owned and tend to be blurred into the one net worth (Gynther 1970).

They were concerned with the shareholders funds (SHF) at the beginning of the period, and they were concerned with the monetary expression of that interest.[viii] The accounting reports which small companies prepared were based on a presumption that the accounting system reflected the interests of the shareholders.

According to Chatfield one basic aspect of the proprietary theory is that ‘owner’s equity is the collective expression of all other accounts. The grand aim of double entry is to ascertain the full state of the stock (capital) accounting’ (Chatfield 1977, p.221). This could be interpreted as a defence based on double-entry bookkeeping; however, the double-entry bookkeeping system does provide a pathway which ends in the stock concept in the balance sheet.

Capital was associated with ownership rather than being simply a residual balance (Chatfield 1977, p.220) and profits were an increase in proprietorship.

> Accounting records are kept and statements prepared from his viewpoint and aimed ultimately at the measurement and analysis of his net worth. Assets represent things owned by the proprietor or benefits accruing to him. Liabilities are his debts (Chatfield 1977, p.223).

In the proprietorship accounts, the balance of the profit and loss account shows the net change in the proprietor's wealth that has occurred during the course of the year. This amount is transferred to the proprietor’s capital account. There is no discrimination between the original capital contribution and the surplus or deficit due to business operations (Hatfield 1916, p.145)·

For those who see the accounting equation in terms of changes in wealth or net assets, the emphasis is on the balance sheet (Godfrey 1992, p.71, Staubus 1961). This is true for both sole traders and companies. Sole traders' balance sheets will show the opening capital as contribution plus past earnings; companies will show the opening capital as paid-up capital plus capital reserves plus opening balance of retained earnings.

3.6.2 The Entity Theory compared with the Accounting Entity Convention

The entity view of the firm is a separate issue from the 'accounting entity' convention whereby the accounts of the business are separated from the private accounts. These include household accounts and the accounts for other businesses that may be operated by the same people. This is so for all owners even for those who hold the proprietorship viewpoint. Some writers justified the entity view through the mechanics of the double-entry bookkeeping system, perhaps confusing the 'accounting entity convention' with the deeper meaning of the entity view of the firm, according to which the bookkeeping system treats the proprietor as though he were a creditor (Gilman 1939, p.54, Godfrey et al 1994). The 'bookkeeping system' argument has also been applied to non-company structures so long as the accounting system was managed and analysed from the point of view of the entity as an operating unit. This tends to substitute an attitude for the rights attaching to private property.

3.6.3 The Entity Theory

According to Godfrey et al (1992, p.73), the entity theory was formulated in response to shortcomings of the proprietary view, citing the practical issue of the growth of large complex companies with an increasingly larger gap between the owners and the managers. There was also a perception that directors were increasingly being seen as acting in the proprietary mode to the detriment of shareholders who had less authority than management (Royal Mail Case UK 1931, in Zeff 1971; Goldberg 1965, p.10).

An indication of the greater prominence and influence from outside the accounting profession was the increasing interest in obtaining technical advice by the then newly formed United States Securities and Exchange Commission in 1934. Initially, the Chief Accountant regularly sought counsel from senior technical partners in the large public accounting firms as to <u>best practice</u> but this view soon altered:

> The great diversity of practices used by companies and approved by their auditors in the 1930's led the Chief Accountant to wonder how the general acceptance implicit in Generally Accepted Accounting Principles might be ascertained (Zeff 1971, p.129).

As an overall statement, therefore, the major features of 20th century accounting developments are summarised by Mathews and Perera as;

> the search for accounting principles (including establishing accounting as a scientific activity through empirical investigation); the development of the institutional structure for accounting (including standard setting and regulatory bodies) and a consideration of accounting as a social phenomenon (Mathews and Perera, 1996, p.64).

The foci of these developments were several groups in society[ix], not necessarily the proprietor, (Mathews and Perera 1996, Staubus, 1961) with a decision-usefulness objective.

The debate has become increasingly formalised through public institutions and professional associations. The growth in size and complexity of the corporate form of organisation and the consequential changing climate of risk led to the move towards disclosure, uniformity and accountability to diverse groups in society. In the UK, in the Royal Mail case of 1931, the Directors were accused of transferring secret reserves, in fact past profits, to capital reserve accounts. In the year of the court case credit balances were transferred back to profits to cover losses made in that year. When the shareholders saw both the loss and the appropriation, they sued the accountant and the directors for keeping funds from them in previous years. The defence by the accountant and the directors was that it was common and professional practice particularly in an industry that has major cycles in earnings. The director's aim was to retain resources to ensure the future continuance of the company. The accountant's and the director's argument were upheld by the court.

External shareholders found these practices unexplained and unacceptable, and interpreted the accumulation of secret reserves similarly to the manipulation of the valuation of assets and the timing of recognition of events (Gilman 1939, p.155). The result has been considerable efforts put into a search for a uniform set of principles and standards by which all reporting companies must comply.

Many changes were in response to an increasingly legislative approach[x] for the protection of those outside the firm. These were based on their rights to disclosure of both the financial position and the profitability of the firm (Zeff 1971, p.62-70) in order to compare the performance of firms.

As a result, between 1939 and 1946, professional accounting bodies in the United States, United Kingdom and Canada began to issue Recommendations or Bulletins to guide their members in determining best practice - (Zeff 1971, p.308) a phrase used by both sides of the debate to justify their position[xi].

Over the past fifty years, the entity theory of the firm has become more prominent until it is now considered the normal and presumed reality. Differentiation between trading gains and losses, which is value in exchange, and holding gains and losses, which is value in use, have increasingly been recommended in the income statement for the purpose of disclosure to a widening number of interested parties outside the direct ownership or management of the firm. This trend has continued until owners are seen only as shareholders who are interested in their dividends as income, and not the wealth of the owners as operators of firms such as family farms.

Instead of looking at capital, the emphasis has been increasingly on the determination of income, therefore, the income statement is more relevant than the balance sheet because:

- the equity holders are mainly interested in income, because this amount denotes the result of their investment for the period;
- the reason for the firm's existence is to make a profit, it is necessary for its survival (Godfrey et al 1994, p.75);
- for those who see the accounting equation in terms of Assets = Equities, where all claims on assets are equal, and who are interested in receiving the benefit of their claims annually, then all aspects in that given period should be included in income (Godfrey et al 1994, p.71).

Entity theory proponents focus on the artificial person, the accounting entity itself (Gilman 1939, p.599).

> Those who advance funds or the equivalent of funds to an accounting entity are its creditors and insofar as double entry bookkeeping is concerned, it is unimportant whether they consider themselves as outsiders or, as in the case of proprietors, consider themselves as identified with the accounting entity (Gilman 1939, p.26).

> The revenue statement is the most important accounting report and the balance sheet is regarded merely as a connecting link between successive revenue statements (Paton and Littleton in Goldberg 1966, p.15).

3.6.4 Levels of Entity Thinking

Creating a legal person moved the emphasis to the point of view of the entity itself and increasingly over time, to the relationship between that entity and outside interests. Goldberg

(1965, p.10) links the development of the entity theory to the increase in the limited liability company with the greater number of users identified and acknowledged.[xii] Understandably, the notion of uniformity in reporting also gathered momentum.

Three levels have been identified in this thesis regarding the separation between owners, entity assets, and the effects that the entity has on society. The first and more traditional level gives the major importance to the recognition of the contractual claims of the shareholders. In the second level, the retained earnings account is seen as part of the firm's equity or investment in itself because the firm is in business for itself (Husband 1954).

The third level, although more in line with the eco-justice branch of sustainability, shows a complete integration between the individual and the social as well as uniformity versus diversity (see Section 1.4 for definition of sustainability). It more closely aligns with the 'whole of society' approach of national planning.

An important issue in this thesis is that the movement from Level 1 to Level 3 shows a clear tendency towards making decisions at the macro, or the societal level. It will be demonstrated that Level 3 is the most influential level in debates about environmental issues.

3.6.4.1 Level 1 Entity

The business firm operates for the benefit of the equity holders, those who provide funds for the entity. Shareholders are regarded as one class of provider. As early as 1913, Sprague (1913, p.49, 46), and later in the 1960's, such writers as Miller and Modigliani (1961), held that all equities (loans and shares) were equal in earning income and, therefore, the distinction of ownership was no longer as valid for the firm as before. The focus moved from the static state of equity at two points in time, a stock concept (the balance sheet), to 'the periodic change in the total of investor's equities, a flow concept (the income statement)' (Staubus 1961, p.24) for all organisations.[xiii]

3.6.4.2 Level 2 Entity

The entity is in business for itself and is interested in its own survival. Like all other providers of resources, shareholders are regarded as outsiders. The entity controls the assets and the owners and creditors are providers of funds (Godfrey et al 1992).

The supporters of this concept see the entity as something separate and distinct from those who contributed funds to it. It follows that any undistributed profits remain the property of the entity and constitute part of the entity's equity in itself (Gynther 1967, p.276). The essence is the firm's objective of survival. Dividends, taxations and interest payments are seen variously as payments of a similar nature (Husband 1954, Vatter in Gynther 1967, p.277).

The entity's supremacy is such that Li (1960, p.675) allows no claims on the capital supplied by the shareholders and states that the entity's equity in itself is not a debt of an indefinite nature. The shareholdings may be transferred, but the shareholders have no greater rights than that of the survival of the firm. For long-term survival of the firm, the activities of the firm, or the way the 'entity carries out its activities in society and reports back to the members of that society' is essential (Gynther 1967, p.279). This is essentially a stakeholder concept developed later in Social Responsibility Accounting and, later still, in Environmental Accounting (see Section 3.6.4.3 Level 3 Entity).

In the publicly listed company, 'the contributors of capital are legally so distant from the business that the term 'ownership' loses its force' (Goldberg 1966, p.33, Gynther 1970, Husband 1954). The emphasis is placed upon the separateness of the business and its proprietor, no matter how closely they may be identified (Goldberg 1966, p.30) and this can be extended conceptually to all enterprises (Goldberg 1966, p.32).

Profits earned by the firm are seen to become the property of the firm. They accrue to the shareholders only if, and when, a dividend is declared. The entity is the centre of interest and a main object of accounting is to account for its interests. In this way, it can better serve shareholders and other members of society, that is, Sum Assets = Sum Equities where Equities means the entity's equity in itself. (Gynther 1970, p.713, Husband 1954, p.554).

At this level, the separation of ownership and control led many to describe the relationship between the contributors of funds and management as one of principal and agent respectively, with the accounting equation emphasising the relationship between all assets and all equities, including liabilities. In other words, Assets = Equities.

Goldberg is very strong in his statement on the entity theory.

> This theory of equities is not a mere accounting fiction, created for the purpose of facilitating the keeping of records; it is an interpretation of the facts of financial enterprise. It is not so much an assumption as a first proposition in the logic of accounting, the validity of which has here been demonstrated. The proposition may be represented symbolically by the simple equation E (quities) = A (ssets) (Goldberg 1966, p.23)

For those who adhere to the entity viewpoint there are deeper implications.

> Assets could not realistically be thought of as belonging to these people because the law recognised prior claims of creditors and preferred stockholders in liquidation (Chatfield 1977, p.223).

Very early arguments that all claims were equal, led, in 1916 in the United Kingdom, to some accountants labelling the balance sheet, Assets and Liabilities (Hatfield 1916, p.42). That is, 'it is logical to charge the directors with the capital and other funds furnished to the company and to take credit for the assets in hand' (Hatfield 1916, p.42).

What this does indicate is a time of uncertainty and evidence of a search for ways to accommodate changes in attitudes towards control versus ownership from outside groups. Concurrently, the development of accounting theory and economic theory influenced the merger of private property rights with notions of economic well-offness where all of the assets are capital because both loan-capital and own-capital are used to earn profits (Sprague 1907).

The trade-off is that most investors have limited liability and, therefore, do not personally owe the firm's debts. As in a slave/master relationship (Goldberg 1966) and also in Littleton's reference to medieval agency accounting which he considered a forerunner of the entity theory (Chatfield 1977, p.224), profit and loss measured the value of the proprietor's services (Paton 1922). Paton takes the concept of the business enterprise to be, in all cases, a distinct entity or personality.

Littleton was influenced by European writers, who saw the individual entity as part of a national production machine, a view reflecting the corporatist or collective nature of the European corporations where a business is regarded more as a coalition of different interest groups with an implicit goal of securing the continuity of the business (Tweedie and Whittington 1984, p.29, p.282). In this view, accounting provides services to society through information (Staubus 1961);

> So many decisions are dependent on interpretations of corporate reports… that better information is needed for interested persons, or for broader problems relating to the national economy (Executive Committee of the AAA, 'Accounting Concepts and Standards Underlying Corporate Financial Statements', The Accounting Review, xxiii, 1948, p.339 in, Staubus 1961, p.7).

3.6.4.3 Level 3 Entity

This point of view has had several stages in which, over time, different foci have been established leading to a new avenue of theoretical investigation. Variously, the themes have been called, Corporate Social Accounting (Parker 1976), Socially Responsible Accounting

(Mathews 1993) and Social and Environmental Accounting (Gray 1995). At this level, other groups in society (called stakeholders) are given equal rights if not more with shareholders.

The Corporate Report, published in July 1975 by the United Kingdom Accounting Standards Steering Committee (ASSC 1975), proposed seven additional statements, the value-added statement, employment report, statement of money exchanges, statement of transactions on foreign currency, statement of future prospects, statement of corporate objectives, and social accounting[xiv].

The Corporate Report formalised a stakeholder model and provided a reasoned argument to support a much wider view of public accountability, for example, potential investors, banking and financial institutions, employees, trade creditors and governments as compared with a shareholder model. It was followed by a statement by the American Institute of Certified Public Accountants (AICPA 1977), and replied to by a United Kingdom Labor Government Green Paper (1977) which;

> unequivocally made out the case for the development of a coherent structure for company reports and accounts reflecting the wider public considerations and concerns of companies (Gray et al, 1987, p.50).

The Confederation of British Industry (CBI 1976b in Dietrich and Woodward 1997) limited the concerns back to two groups, the shareholders and employees.

The discussion of stakeholder theory is limited in this thesis to the demonstration of the connection with, and extension of, the entity theory. The reason is that there is not one stakeholder theory (Dietrich and Woodward 1997) but many. Whichever theory is acknowledged depends on the perspective taken, whether it be economic, technological, social, political, internal, external, stakeholders with a contractual relationship with the organisation, and those who do not. The political orientation of the stakeholder/shareholder dichotomy is most sharply illustrated in the debate between those with a purely proprietary view (Friedman 1962, p.133) and those with what could be called an extended entity view, specifically, the typologies presented by Gray et al (1996) as pristine capitalists, expedient, proponents of the social contract, social ecologists, socialists, radical feminists and deep ecologists. What can be said is that those advocating a stakeholder approach to accounting see society at an institutional level. In particular, business is viewed as one cohesive powerful institution and the state as another important participant.

The 'whole of society' policy developments in Australia have had predecessors in the accounting literature, predominantly in social and environmental accounting based largely on the stakeholder theory. Accounting as a social phenomenon was based on widening the reporting topics to human resources, community involvement, health, employment, fair trading (Gray et al 1987, p.9) industrial democracy and value-added statements (Mathews 1993, p.96; Guthrie 1982; Parker 1976, 1986; Mathews 1984; Trotman 1979).

In the earlier social accounting, importance was placed on evaluating, measuring and reporting on the interaction of the organisation's activities with the physical and social environment of stakeholders (Guthrie 1982, Ramanathan 1976, Jensen 1976). Between the 1960's and 1980's, natural resources appeared briefly in 1978 (Gray et al 1987) portending an environmental focus. Any disclosures by companies on their activities were qualitative, displaying a self-interested, company-defending attitude (Parker 1986) and provided evidence of the minimal importance of the stakeholder view to reporting companies (Dietrich and Woodward 1997). Overall, corporate social reporting remains primarily at the conceptual stage (Gray 1990, Harte and Owen 1991, Gray et al 1995). Empirical testing will be required before conclusive statements could be made about the attitudes towards stakeholders by reporting companies and vice versa.

In the 1970's, environmental reporting in the United States took the form of reporting on pollution emissions where the main response in the 1970s came from the government in the form of regulations[xv]. However, regulations and legislation increased costs to industry to the extent that a greater concentration of market power eventuated, with the average firm size increasing (Pashigian 1985, 1983). Since the late 1980's, market-based measures have been the preferred instrument, such as the re-drafting of the 1950 Clean Air Act again in 1970 and 1990 which includes trading rights in which companies buy rights to pollute. Probably greater incentives have been achieved through the establishment of an insurance fund, Superfund[xvi], to which potentially polluting firms have to subscribe.

By 1994 the focus had moved to concerns of species extinction, planetary desecration, and biodiversity (Gray 1994), all of which were consistent with a 'whole of society' entity viewpoint with the typologies defined in a political economy framework.

Mathews (1993) proposed a less political typology each element of which justifies the need for a stakeholder accounting under three broad categories. They are; (1) market justification; (2) organizational-legitimacy justification; (3) radical justification. Each of these will be discussed briefly in order to illustrate that whichever elements are chosen in the level 3 view, they all emphasise reporting based on an entity theory view nearly to the exclusion of the individual. These details are discussed also because they form the main body of literature to date on environmental accounting, and forms another platform upon which to understand the lack of empirical evidence.

3.6.4.4 Market-Related Justification

Market-related justifications for social accounting

> are used to advance the case for additional disclosures on the basis that shareholders (stakeholders, users) and creditors will benefit from a more responsive market which is influenced by the information content in the disclosures (Mathews 1993).

More importantly, in this thesis, the market-related justifications provide evidence of the perspective taken where the beneficiaries of this information who are outside the firm will make decisions to some extent on the allocation of resources and determine the accountability for those resources.

In the studies to date, the aim was to determine the amount of information content in disclosure in the annual reports of publicly listed companies. These authors conducted content analysis on social disclosures, which were qualitative (Deegan and Gordon 1993, Trotman 1979), in annual published reports

> where the disclosures tended to be very self-laudatory emphasising the positive environmental aspects of the organisations without tending to disclose any negative environmental attributes (Deegan 1995).

Results have been mixed with some finding a positive relationship, while other have found either a negative, or no significant relationship. [xvii]

Several limitations of these studies have become evident. For example, disclosures related only to externalities[xviii] and not to the management of the possible pollution created inside the firm; only large firms were examined and all research subjects were publicly listed companies.

Private companies and small businesses, as are most farms, generally are not required to produce public accounting reports. Economic studies of farms have been undertaken in an attempt to determine to what extent the market responds to, and is aware of, expenditure incurred by farmers to reduce or prevent land degradation. The results have been similarily mixed, with the most significant study being by Sinden and King (1988) because it is one of the few research studies which tried to quantify the expenditure and resulting market reaction when land degradation on private property was the focus.

More importantly, the Sinden and King (1988) study showed that the market reacted to a strategic decision to undertake expenditure of a long-term nature, because the investment was made on gully and rill erosion, i.e., on land which is not immediately needed for agriculture but which is very visible and can be seen by both buyers and sellers in a market.

In social and environmental accounting studies, there were no conclusive correlations between responsiveness to social issues and information content in quantitative terms. However, conclusions were drawn that these responses, however minimal, showed ‘an ability to respond effectively to traditional business challenges’ (Mathews, 1993, p.18).

3.6.4.5 Organizational-Legitimacy Justification

The wider ramifications of the existence and importance of a Social Contract (Mathews 1993) as a moral imperative is not relevant to this thesis. However, the connection that can be made on pragmatic grounds as developed in Organizational Legitimacy is relevant.

Two definitions of organizational legitimacy are as follows:

> Organizations seek to establish congruence between the social values associated with or implied by their activities and the norms of acceptable behavior in the larger social system of which they are a part. Insofar as these two value systems are congruent we can speak of organizational legitimacy
>
> and
>
> Neither making a profit nor observing legal requirements will establish organizational legitimacy. This quality can only come from a reference to the norms and values of society (Dowling and Pfeffer 1975, p.122 in, Mathews 1993, p.30).

In the organisational-legitimacy literature it is accepted that demand for information within and between groups is justification for social accounting. Whether the information itself is implicit or explicit needs to be tested in the market, because informal communication can be more influential than the formal channels of communication. In the accounting studies to 1998, most only test explicit information because of the ease of access; however, not all information is obtained in this way. In addition, studies have shown that the wider community has considerable interest in environmental issues and, in particular, land degradation and the problem is to capture this information at all these different levels. What was concluded from three particular studies (reported in Pitt, Sinden and Yapp 1995; Yapp, Walpole and Sinden 1992; Sinden 1987) was that over six years there was a significant and consistent preference by both rural and urban people in their selection of land degradation as their highest concern for the Australian environment. Using an hedonic pricing model, one of the studies (Pitt, Sinden and Yapp 1995) indicated that the respondents were willing to pay higher food prices for their preference. These studies do provide tentative evidence that changes in land quality could have an important market and community effect.

The social values emerging from these studies lend support to the view that consumers are willing to pay to conserve natural resources. The limitations of using only market prices, as advocated in government policies in Chapter 2.3 to provide sufficient measurement signals, are also reinforced in studies undertaken to test organisational legitimacy. There have also been studies undertaken which provide evidence that attitudes are not necessarily a good and direct predictor of action taking place. This was important in forming the methodology of this thesis (Cary and Barr 1989; Bebbington, Gray, Thomson and Walters 1992).

In studies undertaken of corporate annual reports, results have been inconclusive. Guthrie and Parker (1989) examined companies and found no discernible effect on company share price in response to negative environmental events, and no change in corporate social reporting[xix] disclosures in relation to these economic events in the environment external to the company. The results indicated that from the companies' point of view there was little pressure to communicate to shareholders information on matters other than financial results. Other surveys have found the same inconclusive results (Dietrich and Woodward 1997, Bebbington et.al. 1994, 1992, Deegan and Gordon 1993, Gray 1992).

3.6.4.6 Radical Justification

Radical theorists (Tinker, Lehman and Neimark 1988) criticise the whole capitalist system particularly its use of microeconomic theory, overlooking the fact that central planning systems have also created pollution problems using systems of quotas and physical requirements[xx]. Chua (1986) argues for accountants to increase the number of sets of ideas, or paradigms, with which they are willing to work.

What these authors criticise is the assumption in micro-economic theory that, while it is profitable to produce one more product it is assumed that the resources not measured, the capital or fixed asset, continues to have value in use. This assumption has not been tested partly because many productive assets are not intended to be sold (Staubus 1990), and the most hidden of these assets is land because it is assumed not to depreciate (ASRB 1021).

Consequently, the optimum scale of production is not specified if the decision objective is ecological sustainability. The optimizing rule is to increase the scale of the activity only up to the point where increasing marginal cost equals declining marginal benefit. However, when there are goods not included in the cost function this

> creates the use of the free goods until they become scarce and wealth diminishes. While goods are classified as value in use, they are not necessarily costed and the decline in wealth is not noticed (Daly and Cobb 1989).

A second criticism made is of the institutionalization of accountancy (Roslender 1992, Burchell et al 1980) which, they claim, has lead to greater interplay between accounting and other institutions such as the capital market and the state. The intertwining of accounting with economics required for micro-economic planning by agencies of the state (Hopwood 1986) has been of particular importance for the agricultural industry in Australia because of its post World War II importance to export earnings.

> Certainly the state came to act on accounting in the name of both accountability and the furtherance of efficiency, the flow of information useful for the investment decisions of stakeholders (governments) for research, government agencies, infrastructure, education, fiscal and monetary policies) and the maintenance of ……control over the rational allocation of resources. (Burchell et al 1980, p. 9,10).

The radical view results in diverse opinions in recommending change, but the authors discussed in Section 3.6.4.6 do have a common entity view of accounting.

As well as articulating the three justifications above, Mathews (1993, p.59) also developed a normative framework for discussing social accounting and reporting.

The Mathews framework is in line with the 'whole of society' entity view of the firm, and is therefore more likely to be suitable for policy deliberations by governments at the macroeconomic level. It comprises three classifications; being (1) the private sector, Social Responsibility Accounting (SRA) and Total Impact Accounting (TIA); (2) the public sector, Socio-Economic Accounting (SEA) and Social Indicators Accounting (SIA): and (3) both, Societal Accounting (SA) (See Appendix 4, p.346 for a brief summary of both Mathews' typology and the extension by Evans, 1995).

However, within these three stakeholder classifications, there is not one classification which would encompass or measure natural resources, and, in particular, land. In this thesis, the critical factor is soil quality, but no mention is made of land in any of the categories, not even at a national level. Further classifications to include these two areas of capital (wealth);

Natural Resources Accounting (NRA) and Intellectual Capital (IC) have been proposed elsewhere by O'Brien (1996). A fuller discussion of natural resources accounting forms the basis of the productive capacity of soil quality and is developed further in this thesis whilst intellectual capital is not discussed specifically.

3.6.5 Issues Arising from the Entity Theory

Several issues have been raised in the preceding discussion. In the main, they relate to the effects on accounting reporting if all organisations are expected to use uniform accounting methods in their reports. The institutionalisation of professions such as accounting has occurred as part of a general change in policy and as a reaction to the damage to interests other than those of shareholders, including social and environmental interests. Some of the implications of the attributes of the entity theory are discussed in the current section.

Staubus (1961) recognised early in the debate that different groups of stakeholders could maximise their own wealth at the expense of other stakeholders. He recommended a middle ground where the focus is on investors, present and potential. This, in his view, would prevent the fusing of the private and social dimensions of accounting. Macro-economics is the discipline of bringing together the determination of matters for policy by governments, regulatory bodies, and the development of social accountability (Goldberg 1966, p.3) when the individual firm is seen as part of an industry. This has led to a possible confusion and even a fusion between macroeconomics and microeconomics and the neglect of the individual firm.

The reporting issues of importance in the entity view may be seen as irrelevant by the proprietor who does not require the use of detailed records in financial terms. Detailed disclosure requirements developed from coercive reasons for the requirements of the state, for taxation, the need for detailed information by managers who were not proprietors, and for the determination of matters of policy for social and business objectives (Goldberg 1966, p.3) are not the needs of owners-managers.

The issue in this thesis is based on the value and relevance of imposing the philosophy of publicly owned companies on sole proprietors and private companies with restricted ownership. The major feature of widely held corporations is the separation of power and ownership, between managers and owners, where the power is in the hands of the managers, that is, those not responsible ultimately for accepting the financial risk of failure.

There may be value in considering the entity view for a large public company where the investor is separated from the day-to-day operational decision making. The entity view may not have value for a sole proprietor who undertakes the day-to-day operational decision making as well as the investing and financing decisions in a firm.

Perhaps the most important implication in the entity theory applications is that to make the tenets of the entity theory operational, and give value to the rights of the suppliers of materials, labour, short-term and long-term credit and research information as equal with shareholders, the rights attaching to private property have to be restricted in some way although not the duties, for capital is still the residual equity which must bear all losses. This in turn, means that the responsibilities of all parties ought to be reconsidered.

The preceding discussion, especially the Level 3 entity views, raises particular questions for investigation in this thesis about the relevance of advice to and of the requests for information from farmers. After all, Australian farmers are not subsidised or rewarded for their behaviour and are expected to take all the risks both physical and financial and to accept being assessed using financial accounting reports and industry aggregates. As noted earlier, the entity view is presumed and inclusive with no acceptance or awareness of the existence of a proprietary view.

The present 'whole of society' policy developments in Australia are aimed at linking the macro-economic and micro-economic levels of society, but the translation may not be operational because the participants at each level have a different focus on planning and reporting. The government is attempting to reduce duplication of programs and to ensure a community-based treatment of issues. It is also intends to reduce, as far as possible, programs being at cross-purposes with each other. For example, economic growth in the short term at the cost of environmental protection in the long term. One of the major constraints is that industry comparisons are legitimate and necessary, but are based on aggregate statistics that are unlikely to describe a particular firm or farm accurately.

3.7 Developments since the 1970's

To date, the response by the accounting standard setters and the accounting profession has been minimal. However, their responses indicate a formalised entity view. The Accounting Standards Review Board (ASRB) 1021 '*Depreciation of Non-Current assets',* and the Australian Accounting Standards Board (AASB) AAS 1010. '*Accounting for the Revaluation of Non-Current Assets'* apply to firm's assets such as buildings. Goodwill, leases and intellectual capital are recognised and reported in intangible assets. However, land and natural resources are not included in these pronouncements.

Other agricultural resources such as forests and livestock are now recognised as 'self-generating and regenerating assets', but are distinguished from land as 'non-human related living assets' (Roberts et al 1995, AARF 1997). The Australian Accounting Research Foundation (AARF) issued Exposure Draft 83 in August 1997 entitled 'Self-Generating and Regenerating Assets' (SGARA's) which takes a tentative step towards including natural phenomena in financial reports. The Exposure Draft, which uses as its basis Discussion Paper

No. 23 ‘Accounting for Self Generating and Regenerating Assets’ published in May 1995, includes forests, livestock, crops (including field and row crops, and perennial crops), fruit bearers (including orchards and vines) and the living assets of aquaculturalists and stud breeders. These assets are different in that they undergo biological change over their lives.

The purpose of the ED is to standardise recognition and measurement of changes in value of growing assets and also inventories because at present ‘diverse accounting practices are used across various industries in both public and private sectors’ (AARF 1997, p.4).

The entity view is apparent in the treatment of changes to these assets.

> Any change in the carrying amount of a SGARA should be recognised in the profit and loss or other operating statement as revenue or expense in the reporting period in which the change occurs (AARF 1997, p.4).

Presumably these are realisable savings, or holding gains or losses, which could be distributed as income. The connection with capital is being considered by the Public Sector Accounting Standards Board and AASB as part of a measurement project, which should then have further implications for how changes are allocated between income and capital in the value reported for these assets.

The International Accounting Standards Committee (IASC) Steering Committee on Agriculture issued a Draft Statement of Principles (DSOP) in December 1996. In their proposals they differ from ED 83 in that the DSOP proposes that carrying amounts of changes of SGARA’s be allocated between price change and biological change, with the price change being recognised directly in equity and the biological change being reported in the profit and loss or other operating statement when the change occurs. It could be argued that precisely the opposite is occurring in the assets, that the biological is a part of the innate quality of the asset and the one quality which registers the change in capital value, and, particularly, value in use.

For ED 83 there is no such allocation required and the change in the carrying amount of a SGARA is to be recognised in the profit and loss or other operating statement, that is, with no differentiation between income and capital elements. What occurs under such a system is that value is determined by market prices for these assets even when they are still in the process of growing. If they are deemed to be income and taxable, then there could be pressure on farmers to cut short the maturing of these plants or products, or to increase inputs into the soil to the detriment of the soil quality itself.

3.7.1 Applications to Agriculture

In farming, different circumstances can have different effects on activities and the ways these would be reported. For example, it would need to be known how each farm is affected by geographic location, market size, trade agreements, political environments, diversification and mono-culture. As well, it needs to be noted that the decision context under consideration in this study, that is, maintenance of soil quality, is largely insensitive to the accounting methods recommended, namely, gross margin, net profit, return on assets, and return on investment. In these circumstances, an over-reliance on uniformity in reporting as recommended by several agriculturalist organisations, consultants, accounting bodies and governments, can result in neglecting risk and uncertainty. To date, the use of market prices or marked to market value advocated in SGARA are not available and also do not relate to soil quality, a capital asset.

In corporate reporting, the alleviation of problems associated with diversity is being dealt with again by moving toward a policy of greater uniformity and disclosure of accounting policies and methods. The overriding aim is to disclose the changes in value in assets, an economic view, and if applied to agricultural produce, accentuates to need for market prices, a formal accounting system and an emphasis on short-term income.

3.8 Summary

Those who support the proprietary view of the firm consider that the focus of accounting is to maintain the wealth of owners in real or physical terms, (Sweeney 1936, Edwards and Bell 1961, Chambers 1966, Baxter 1967, Tweedie and Whittington 1984, Clift and Kerr 1989). When the issue of measurement and reporting is raised, however, many of the writers choose market price and the income statement which shows a preference for the definition of owner used by Staubus as including all contributors of capital whether inside the firm or not.

Those who advocated the entity theory of the firm (Schmidt 1920, Limperg, in Tweedie and Whittington 1984, p.30, Mathews and Grant 1962, Gynther 1966, Sterling 1970), were concerned with the income and wealth of shareholders but the prime emphasis is on preserving the means of continuing the production of the entity's goods and services before measuring income.

Two objectives are central to accounting, (1) that accounting should be useful for decision making, and (2), that profits can only be achieved after capital has been maintained. The distinctions within and between these two objectives, and in importance, will depend on whether the users have an entity or a proprietary view of the firm.

It was demonstrated that proponents of the proprietary view will take an individual, diverse, long-term attitude towards the ownership of their capital and income which comprises their wealth. Personal aims describe the proprietary view, whereas social aims describe the entity view. Three levels of entity thinking have been identified, where in all cases the major emphasis is on the assets of the firm itself and the income stream from these assets regardless of ownership. The differentiation between capital and income is important with the users concerned not just for shareholders and investors but with the efficient allocation of resources in society.

As the entity view became dominant in the 1970's in Australia, the emphasis gradually moved towards an emphasis on the income statement. The fullest expression was developed in the comprehensive income statement in which all changes occurring during the previous period were initially reported. There were two basic categories, income relating to operations, and gains and losses in assets. This latter adjustment represented the increase in resources required to maintain capital. Although this form of reporting was never accepted, the entity emphasis on the income statement and in accounting reporting itself has remained.

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[i] See Belkaoui's (1985 p.451-453) outline of the six relevant paradigms in the accounting discipline. This grouping follows the 1977 American Accounting Association's publication, Statement on Accounting Theory and Theory Acceptance, which suggested three dominant theoretical approaches: (1) the 'classical' (true-income/inductive) approach, used by normative deductionists and positive, inductive writers; (2) the 'decision-usefulness' approach (initiated by Chambers 1955) used by those who stress decision making and (3) the 'information/economics' approach.

[ii] The term standards is analagous to indicators in agriculture in which industry performance indicators in physical and financial terms are currently being developed and debated both by researchers and policy makers.

[iii] Leonard Spacek, "Are Double Standards Good Enough for Investors but Unacceptable for the Securities Industry?", Financial Analysts Journal, March April, 1965, p.17 (In Zeff, 1972, p.188).

[iv] This contrasts with the legal definition of capital in the Australian Corporations Law and the Australian Securities Corporation Act 1991 which defines capital as registered capital, that is, the total amount of capital available for the company to issue to investors (Godfrey et al 1994, p.379). This is a legal concept relating to registration fees.

[v]Revaluations are not permitted in the United States.

[vi]Hicks, J.R., Value and Capital, 2nd Edition (Oxford University Press, 1947):172.

[vii] In the early debates the profession leaned heavily towards the proprietary view.

[viii] The opening balance sheet always shows the capital value with no distinction between contributions and past earnings in sole trading firms, and consisting of paid-up capital, capital reserves and the opening balance of retained earnings for companies.

[ix] Users identified include management, investors, creditors, government, credit agencies, trade unions, potential investors, employees, suppliers, customers, legal authorities, taxation authorities, local governments, stock exchanges, company regulatory bodies and financial institutions.

[x] The Companies Act in the UK for example.

[xi] Proponents of the proprietary view claiming that best practice was better obtained through the continued professionalism of accountants, whilst proponents of the entity view claimed an agreed best practice would better facilitate comparisons between firms. The modern term is benchmarking.

[xii] Goldberg's list is worthwhile repeating. It includes management, investors, creditors, government, credit agencies, trade unions, potential investors, employees, suppliers, customers, law institutes, taxation authorities, shires, stock exchanges, company regulatory bodies and financial institutions.

[xiii] This is despite the warnings that 'a blind insistence on the independence of the business entity in (small business) is bound to lead to unreasonable conclusions' (Paton W. A., Accounting Theory, New York, The Ronald Press Co., 1922, p.476-477).

[xiv] What has been generally ignored is the fact that the Corporate Report addressed alternative models for performance measurement and capital maintenance (see Chapter 4).

[xv] 1977 Federal Water Control Act; 1976 Toxic Substances Control Act; 1950 Clean Air Act (amended 1970); 1976 Resource Conservation and Recovery Act.

[xvi]1980 Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund)

[xvii] For a fuller discussion of these studies see Mathews 1993, p.12, and Gray et al 1996.

[xviii] `An externality describes the situation where one agent generates a positive or negative level of welfare for a third party leading to an external benefit or cost. An external cost exists when the following two conditions prevail: One, an activity by one agent causes a loss of welfare to another agent. Two, the loss of welfare is uncompensated (Pearce and Turner 1990, p.61).

[xix]Corporate Social Reporting (CSR) can be defined as a corporation's reporting on: (a) the social impacts of its activities; (b) the effectiveness of its social programs; (c) the discharging of its social responsibilities; (d) the stewardship of its own social resources. It has also been variously termed'corporate social accounting', 'social responsibility accounting', and 'social disclosure' (Parker 1986)

[xx] Similar quotas used in the fishing and forestry industries in Australia, a one-instrument policy, are creating greater waste, not less (Landline Australian Broadcasting Commission 1998).

Chapter 4
Capital Maintenance Concepts

4.1 Introduction

If the aim of policy makers, accounting standard setting bodies and farmers is sustainable agriculture, then the accounting theories for reporting productive capacity should be examined for the thinking involved, and for any contributions they may offer.

The accounting theories of capital maintenance have a long history, beginning with the differentiation between income and capital as exemplified in the Royal Mail Case in 1931. A second stage occurred as a reaction to the erosion of capital due to inflationary price rises and the effect on the purchasing power of owners. The erosion of productive capacity has also had significant thought given to it in the accounting literature where the aim was to overcome the out-of-date measures of historical cost. Changes in the earning capacity of productive assets created the possibility that replacement and continuity of a firm's assets could be threatened.

Current market prices have been the preferred measure of value in policy making, economic theory and accounting theory. The rationale is that in a fully functioning market current values reflect the future earnings to be generated from these assets. Difficulties arise when there are no reliable market prices available, or when there is no agreement on which attributes of the firm's asset should be measured.

In agriculture, the productive capacity of the soil is built up over the long-term, suggesting that short-term measures of income or surplus would not provide information on soil quality. A common response from the 1960's to the present day, in agriculture and manufacturing, has been to define productive capacity as a constant supply of goods and services. One major limitation in applying this method to agriculture for which solutions are currently being sought is that it has helped create land degradation. In agriculture, maintenance of production can be facilitated by the use of increased inputs, and continuous cropping. In addition to the focus on productivity, it is suggested in this thesis that the various accounting concepts using market prices and maintenance of production criteria also take little cognisance of the changing external environment relevant to agriculture, namely, markets and climate, which create uncertainty[i]. These two uncontrollable factors indicate a need for long-term thinking and reporting.

If farmers are of a proprietary view they will not measure productive capacity in a formal financial accounting system. One of the reasons is suggested by Bonbright (1937) that in valuing property the indirect benefits of holding land can be much greater than the market price.

In addition, if farmers have a proprietary view of their farm they will not agree that uniformity of reporting would necessarily disclose the true condition of their land (Schnitkey and Sonka 1986). The financial indicators recommended to farmers in 1996 (Walker and Reuter 1996) are based on entity thinking which emphasises the income statement and efficiency measures such as return-on-assets. Apart from the fact that these measures require a detailed, up-to-date valuation of assets, they would not be useful to either farmers or to those outside the farm if soil quality is the primary objective.

The above discussion will be expanded in the remaining sections in this chapter in which two proposals will be examined; (1), value to the owner as compared with value to buyers and sellers in a market; and (2), the implication for accounting when the long term is as important as the short term. In this respect, productive capacity can be and is measured in physical terms, in the soil quality itself.

The discussion of proprietary and entity views will be relevant. That is, the emphasis between the income statement and balance sheet or wealth; maintenance of production compared with long-term production; uniformity compared with diversity; and the focus on the owner as compared with the stakeholders.

4.2 Accounting Concepts of Capital Maintenance

In Chapter 3, it was shown that a major problem in accounting is the differentiation between capital and income. Profit is earned only after the firm's capital has been maintained intact. This problem of measurement still exists, that is, the nexus between income and capital maintenance and the ability of accounting reports to differentiate for decision-makers between these two components.

> Nearly all the difficulties of measuring business income arise from the interpretation that is given to the notion of maintaining capital intact, and all the valuation controversies that have occurred during the last fifty years are essentially concerned with what is meant by maintaining capital intact (Mathews in, Clift and Kerr, 1989, p. 19)

In contemporary accounting texts, there are generally considered to be two principal concepts of capital maintenance (Godfrey et al 1994); namely, financial capital maintenance, where capital is measured in units of money; and physical capital maintenance, where capital measures the physical operating capacity of the firm in monetary terms.

The United States Financial Accounting Standards Board (cited in Tweedie and Whittington 1984) referred to the proprietary approach as 'financial' capital maintenance and the entity approach as 'physical' capital maintenance. This has some advantages as the distinction can be interpreted as referring simply to whether the capital concerned is all the long-term capital including loans (entity view) or merely that attributable to equity (proprietary view) (op. cit, p.283). The proprietary notion is relatively simple, objective and appealing from the shareholders' point of view, but needs to be tested for its relevance to soil quality.

The impact of high inflation rates, partly because of their effect on taxation in the 1960's, had much to do with the initial interest of accounting writers in capital maintenance. Whether they advocated proprietary or entity approaches, many of the writers were concerned with two things: (1) the effect on the amount of money capital being distributed as dividends; and (2) the effect of depreciation and profit taking on holding gains and losses[ii] , that is, changes in the values of assets held in use in the firm (Godfrey et al 1994, p.125). However, lack of operational implementation and falls in the inflation rate in the Anglo-American accounting countries, such as Australia, United States and the United Kingdom, has seen this significant subject decline in importance over time in the accounting literature with very little discussion as to its present applicability. The various accounting systems developed for changes in the values of assets held in use are examined in the following sections and will be assessed as to their applicability in measuring the productive capacity of the soil.

4.2.1 Criticisms of Historical Cost

Traditional historical cost accounting, still favoured by accountants, needs to be explained in terms of its assumptions and consequent limitations. Historical cost is the cost incurred by an entity when acquiring an item, measured at the time of the originating transaction and, as such, is objective and verifiable. At the next balance date, the historical cost of some non-monetary assets are adjusted for use and this adjustment is commonly referred to as depreciation. The result is a written-down historical cost in the balance sheet.

Given proper depreciation approaches, together with requirements for revaluation in the event of significant valuation differences, this is supposed to ensure that the historical cost balance sheet reflects the current value of the assets in its practical application. The profit and loss statement is prepared by a matching process, that is, the revenues for the current period are matched against the historical costs incurred in the period to obtain that revenue. Consequently,

> Matching historical costs with current revenues could mislead users by producing a profit figure which included both gains from holding assets (investments) and profits from selling or using assets (operations) (Henderson et al, 1992, p.176).

What is maintained is the value of the assets at purchase time plus or minus depreciation or revaluation. This may have no relevance to the current value of these assets, or their future earnings capacity, that is, their productive capacity. Thus, to give the example of inflation, using historical cost led to the reporting of higher profits, giving rise to the potential for higher dividend payments. In the same way, if the soil is being degraded through agricultural methods, the change in the productive capacity of that asset would not form part of the costs for the period, and a higher profit could be reported, leading to a higher level of disposable income as well as the degraded capital asset remaining unaccounted for in any way.

Historical cost was appropriate when little change was occurring. This ‘normal’ or stationary state (Edwards and Bell 1961) had matching accounting concepts and principles upon which accounting has been operationalised. These include costs, revenues and the financial position all being reliably measured, with concepts acceptable to all and reporting understood by users. These are, a constant money unit, cost being equal to its market value, the values of an asset’s services being able to be derived from its original or historical cost (Edwards and Bell 1961 p.7), the business intending to continue indefinitely, and the measurement of accurate results for annual reports. A major problem in historical cost accounting, argued in this thesis, is that the operations of the firm are merged with the investment decisions of the firm if changes in assets are measured as part of profits.

This situation has happened in the Australian agricultural industry using historical cost accounting with the same effect on the investment in the productive capacity of the farm. Since the 1950's the cost/price ratio in broadacre farming has been reduced by 30% (ABS 1996). If profits are being declared at the same time, there is a danger that the extra profits are taken from the investment in soil quality. In fact, the agricultural industry is accused of an inappropriately low level of capital formation. However, these accusations relate only to investment in machinery[iii], with no reference to the state of the soil quality although sufficient evidence exists that substantial soil degradation has also taken place.

In the present historical cost accounting system, if there is a difference between historical cost and market price, let alone the value of the qualities of all factors of production, then this creates a divergence between the accounting system and the means for managing change. The realisation principle which states that no income or increase in returns can be counted until realised in a market transaction, excludes any reporting of the change in the holding or use of assets. Fixed assets such as land, are assumed not to depreciate or change. If land is not to be sold, the realisation convention precludes any recognition of gain or loss prior to sale whilst

> no pretense is made of measuring profit as it accrues either in production or as a result of simply holding assets as their prices (assuming an informed market) rise (Edwards and Bell 1961, p.10).

Before a capital gain can be recognised a transaction must have occurred (Henderson and Peirson 1998, p.442).

There are three implications of this criterion:

- any capital gains (losses) are not recognised until the assets are sold or used in the production of goods which are sold.;
- the matching principle does not hold when assets which have risen in price over an extended period of time are sold;
- balance sheet values are badly distorted. (Edwards and Bell 1961, p.11).

An alternative system, which accommodated change, was developed in what is called value accounting. It is suggested that if income is measured in current prices, then costs should be measured in current prices so that the changes in the assets used in production will be properly registered. In this way, the investment in the assets is visible. In the accounting literature on current value systems, these changes in the assets are called holding gains or losses. Edwards and Bell (1961) considers these holding gains to be income, earned ahead of when they will be realised as income. The first issue is whether they should be treated as income at all when the holding gain emanates from the investment which is meant to provide income into the future. Both historical cost profit, and the current value profit described above, can, by implicitly incorporating these holding gains as income, overstate the profits from operations.

An examination of other concepts of capital maintenance apart from historical cost is undertaken in Sections 4.3 and 4.4. It is necessary to explain, briefly, that there have been many different notions of capital maintenance and, that, so far, there has been little success in implementing these ideas. The second issue is the lack of implementation and the paucity of empirical evidence for one concept or another[iv]. An overview of these different concepts will be discussed after which the proprietary and the entity concepts of capital maintenance are examined and evaluated for their relevance to productive capacity in the agriculture industry, specifically for assets in use.

For the first issue it has been stated that:

> since valuations and classification methods vary, it is by no means obvious what it means to maintain capital. The same owners' equity at the beginning of an accounting period may lead under various capital maintenance notions to entirely different income and owners' figures at the end of the period (Mattessich 1995, p.111).

Whatever the definition of capital maintenance used by the decision maker, this will underlie the determination of short-and long-term profit considered necessary to maintain capital (Gynther 1970, Hicks 1946).

An intervening variable is whether or not an entity or proprietary view of the firm is held.

> Each of us uses (whether we realize it or not) a certain capital concept to measure long term profit (or loss). That is, our particular maintenance concept underlies the determination of the amount of long term profit that we believe can be distributed without impairing the capital that must be maintained (Gynther 1970, p.714).

This is important, because profit or income will be different using different concepts of capital, and it can even be a different thing; for example, cash; the income that has been earned even if no cash has yet changed hands; or changes in the prices of assets held in use which have increased in value due to activity within the firm or due to market prices increasing. If any of these occurrences lead some to conclude their income has increased, it may also lead them to increase their consumption.

There are, in the literature, several models proposed and at least six systems have been widely advocated with varying degrees of support (Ma, Mathews and Macmullen, 1987) although according to Tweedie and Whittington (1984), there are eight basic models.

The various models can be summarised to include: (1) historical cost financial capital maintenance models which have no regard for general inflation, specific price changes, or any changes in physical condition since the time of purchase; (2) general purchasing power models which take into account general price changes and their effects on non-monetary assets; (3) physical capital maintenance models which are based on the specific prices of individual assets or asset groups and are known as current value systems; and (4) exit price systems which measure the adaptative ability of a firm.

In addition, there are five major valuation approaches, which reflect different concepts proposed in the literature. They are variously based on: (1) past costs - historical costs; (2) buying prices - replacement cost; (3) selling prices - exit prices; (4) economic values - value to the owner, or value in use; and (5) discounted cash flows. In this research, measurement is not the major issue, but rather the thinking which prompts their advocacy, and, in particular, their usefulness and what they say about capital and income because the valuation of assets and income are entwined (Sterling 1972, p.20). What is most important in the following discussion is that a value judgment is necessary when choosing the focus of attention.

As to the second issue of paucity of empirical evaluation, Mattessich devotes considerable effort to proposing the value of instrumental hypotheses. He advocates showing means-end relations (1995) to determine situations under which different capital maintenance bases are relevant and their illustration in specific situations. If the farmers hold the proprietary view it could go some way to explaining why many of the value systems have not been acceptable, at least for this group.

4.2.2 Current Purchasing Power Concepts

In the 1960's, the response to inflation was directed principally toward the purchasing power of shareholders or the effect on the purchasing power of acquiring investment goods in the firm. The simplest response was to adjust the historical cost figures by an index. Current

Purchasing Power (CPP) systems adjust the values in the revenue statement and balance sheet for the general change in the price index. The choice of index will depend on whether the measurement is for the purchasing power of consumption goods or investment goods. The aim of these systems is to maintain the wealth of owners in real terms (Sweeney 1936, Edwards and Bell 1961, Chambers 1966, Baxter 1967, Tweedie and Whittington1984).

4.2.2.1 Consumer Purchasing Power

The initial response in the accounting literature was very much a proprietary response to the loss of purchasing power for owners and, as such, profit was recognised after movements in a general purchasing power index were adjusted through the use of a Capital Maintenance Adjustment Account. The index reflected the movements in the prices of all goods and services in the economy such as a Gross National Product Implicit Price Deflator Index, for example (AICPA 1963, UKED 8 1973, Australia 1974, New Zealand 1975, Canada 1975. Full details can be found in Mathews and Perera 1996). The United States Financial Accounting Standards Board (FASB) published an exposure draft entitled Financial Reporting in Units of General Purchasing Power. Another exposure draft published in 1979 was on Constant Dollar Accounting using 'an Historical Cost/Constant Dollar (general purchasing power) basis' - price-level adjusted historical cost (Chambers 1980). These indices were meant to be a reflection of price changes in all goods and services whether or not this was relevant for each shareholder.

Thus, the capital of the firm could be restated as follows:

> Profit is not recognised until shareholders' funds (common shareholders) have been restated to reflect movements in the consumer price index. The idea is to maintain the purchasing power of these capital funds in accordance with price movements of consumer goods (and not all goods). The emphasis is on shareholders' funds and not on the assets of the entity (Gynther 1970, p.715).

This approach was acceptable in the literature (Tweedie and Whittington 1984, Chambers 1966, Research Foundation of The Chartered Accountants in England and Wales 1968). The Australian accounting profession had initially chosen the Current Purchasing Power (CPP) concept, and as noted in Chapter 3, took a proprietary view of the firm. Critics of the CPP proposal claimed that it was not possible to get an agreed basket of goods and services and that all shareholders were not in the same geographical location. This was also an argument for specificity (Gynther 1968, Edwards and Bell 1961). For example, if the shareholders are in different parts of a country like Australia, then an average adjustment of say 10 percent to all non-monetary assets would have little relevance to the maintenance of purchasing power if one shareholder has prices increasing by 12 percent whilst the other shareholder is experiencing a 9 percent increase in prices. Presumably, shareholders could have entirely different consumption habits and different price structures. This is analogous to farmers for whom location may be the most important factor for them to manage. Apart from the physical characteristics of their land, other costs such as fuel, inputs, machinery, stock requirements vary considerably between different states and regions within Australia.

Others, writing in the agricultural literature also agree that,

> agriculture like other natural resource-dependent economic activities, is highly dependent on place, practices vary from farm to farm (Flora 1995, p. 229).

4.2.2.2 Investment Purchasing Power

The emphasis in this model is on maintaining all the long-term assets of firms in accordance with price movements of investment goods, using an index that represents 'investment purchasing power'. All long-term assets are to be restated through a Capital Maintenance Adjustment Account, again reflecting a proprietary view of maintaining the capital of the firm. The assumption made is that an average index would apply to all firms.

The same criticism as for the CPP approach was made of this method as being one of expediency, and perhaps demonstrates the difficulty in obtaining specific data even when the object of that data is clear. Other criticisms reflected the entity view of the firm. Claims were made that maintaining intact investment purchasing power confuses the entities involved. In this view, shareholders were seen as a different entity from the company and the imposing of the point of view of one entity on the accounting procedures of another would not provide relevant information. Gynther (1966), in particular, thought an investment purchasing power valuation would reflect an entity's point of view, because it is the entity which purchases investment goods and profit is not earned unless its ability to purchase these goods is maintained. This line of argument also indicates a movement away from ownership to the assets of the firm, i.e., from proprietary to entity.

Evaluated on the basis of usefulness, or the ability to differentiate the value of capital and income, the current purchasing power (CPP) systems failed even though they took changes to the balance sheet. They focussed on the short term, uniformity, and a social measure such as a Consumer[v] or Investment Price Index, and as such, fit a macroeconomic model. This is because the CPP models change the specific prices of all non-monetary asset changes at the same rate. CPP is often referred to as adjusted historical cost and is considered to afford even a lesser level of usefulness because it adds nothing in understanding for either capital or income.

The use of general and specific price indices to adjust for inflation was completely devoid of theory and was the original response to price changes. They merely presented adjusted historical cost accounting. The realisation that money could not measure everything led to a shift in the concept of capital as being not just money. The issue became one of looking at the object of measurement.

4.2.3 Exit Price Capital Maintenance

The most influential exponent of exit prices was Chambers (1965, 1966, 1980a,b) who regarded the firm as a collection of investments to be managed for the maximum benefit of the proprietor.

Chambers' proposal used exit prices which he called 'Continuously Contemporary Accounting' (CoCoA) (Godfrey et al 1994, p.183) under which he measured capital on a proprietary basis adjusted by a general price index to allow for inflation (Tweedie and Whittington 1984, p.272). The proprietorial features of CoCoA are that it provides for diversity, individuality, and a micro-economic decision-making model. It is appropriate to consider the elements of his particular model more closely because another fundamental feature of his thinking was that the objective of accounting was to report on adaptation, that is, change (Chambers 1966).

For profit measurement purposes he advocated valuation at realisable values (sales revenue less expenses incurred in the process of selling), and an adjustment to capital by a general index.

> Chambers views the firm essentially as a fund of resources to be applied in whatever use is of maximum benefit to the shareholders, rather than a store of productive capacity to be maintained in its present activity (Tweedie and Whittington 1984, p.272).

Adaptability in itself is an important element of the management of agricultural land, and is arguably the process by which farmers maintain the productive capacity of their land and a measurement of their wealth. In all firms, according to Chambers, this ability to change contributes to the magnitude of measure of a company's wealth.

In the CoCoA system, wealth is measured in market prices, which is 'the money's worth at the company's command at a point of time, (net realisable value) i.e., cash and net selling prices' (Chambers 1966, p.23). It is the 'sum of the money equivalent of assets minus the sum of the money equivalent of all liabilities as dedicated at a definite date to the conduct of a definite business unit' (Chambers 1966, p.24). That is, what you can purchase at a point in time. The magnitude of wealth being its 'exchangeable value' (Adam Smith 1776 in, Galbraith 1987, p.23). This implies perfect information in all the markets of the appropriate assets (Anderson, Leo and Whittred 1976).

Chambers seemingly advocates a perfect market framework by rejecting subjectively based assessments of future cash flows. However, the author then decides that the money equivalent of the asset can be various 'discovered prices', an approach he attributes to Bonbright's (1937) recommendation of value to the owner (or value in use). Consequently, it would be quite serviceable to take the simple average of the discovered prices for the simple average is a representative amount having the least probable error. To Chambers, problems of approximation are preferable to the discrepancies between book values under historical cost accounting and dated money equivalents. Because there are buyers and sellers in the market, selling prices and purchase prices are objective according to Chambers. whether or not there are actual sales or purchases; a matter of some considerable disagreement from Bonbright (see Section 4.3.3).

Chambers admits that every asset has, in principle, a value in exchange and a value in use. The value in use is a calculated amount of a present expectation. With non-monetary assets such as land, the decision to continue in business results from an assessment of the future based on the 'condition' of the land in the present. Although he rejects what he calls subjective assessments of future cash flows he acknowledges that if the belief about the future can be based on the present condition of the asset, then, if this can be measured, it allows both a measure of the expected future earnings and a measure of the present condition.

The attribute of 'present condition' opens a way to another type of thinking and is developed in this thesis because it implies diversity, individual decision-making and technical knowledge. Adaptation and change in the condition of the assets would certainly describe how land is managed. It would also indicate the present wealth of the soil, and indicate productive capacity for the future.

A couple of limitations relate to the implementation of exit price measurements in agriculture. Exit price measurements are not decision useful for the long term despite the premise of subjectively assessing the condition of assets such as land. Market prices are limited in their information, and averaging of prices would not measure wealth of an individual farm. Bonbright (1937) carefully articulated attributes of value to the owner which in many cases would make it different from the selling price. Chambers' leap from selling prices to average prices highlights a common difficulty in all systems which aim to measure value with imperfect market prices. It also highlights the difficulty of providing useful information when selling prices either do not exist or do not represent productive capacity. Although the 'present condition' allows for a measure of adaptation this can not be done with market prices or cash with current knowledge. It is worthwhile, therefore, to discuss attributes of value to the owner.

4.2.4 Value to the Owner

Bonbright (1937) in a treatise on valuation of property, nominated 'value to the owner' or its 'deprival value' as the appropriate characteristic of an asset. Over the years since that publication the accounting literature has defined the deprival value of an asset as the amount that an entity should receive to compensate for the loss of the asset. In a further development of these ideas, this loss reduces the operating capacity of the firm itself because it is related to the asset's decline in market value rather than the owner's wealth, and is treated in a manner which is consistent with an entity view of the firm. In the literature of the 1990's, various valuations are given, namely, current replacement cost, net selling price or the present value of future economic benefits (Henderson and Peirson 1998).

Value to the business or owner became an integral element of the professional pronouncements in addressing the problem of changing prices in various countries including the United Kingdom (Sandilands 1975, ED18 and ED24, SSAP16, 1980), United States (FASB33, 1979), Australia (SAP1, 1983) and New Zealand (CCA-1 1982. All are fully detailed in Mathews and Perera 1996 and Henderson and Peirson 1998). In these statements of principles, current values were to be determined by the 'value to the business rule' which, deliberately or not, substituted 'business' for 'owner'. The value to the business rule involved three valuation methods, economic value, that is, present value of future cash flows; replacement cost; or net realizable value. As in most of the current valuations, problems in estimating value led to the value to the business rule declining in importance.

The nexus between value to the owner and the entity theory valuations for the firm is rejected by others (Fraser 1988) on the grounds that the original meaning given to the term was considerably wider in interpretation and was based on private property rights to an individual. He argues it did not refer to a narrowly defined usage where deprival value came to be seen as deprivation in which the need for compensation came to mean replacement cost or market value (Solomons 1966, Whittington 1983, Baxter 1967, Parker and Harcourt 1969).

This distinction is an essential feature in distinguishing between the individual and social, capital and income parts of the entity or proprietary theories. Bonbright was discussing the private property rights of owners and the full value and costs of owning that property in which market price may play one part.

> The essential distinction, therefore, between value to the owner and other forms of subjective value lies, not in measurability in terms of money, but in the fact that ownership values are values that cannot be fully enjoyed without benefit of those legal powers of control and exclusion that we associate with the rights of property (Bonbright 1937, p.69).

The use of a direct market price, for example, replacement cost, ignores two other conditions which ought to be examined in determining value to the owner. Included in Bonbright's original proposals were the provisos that value included the 'value of the entire loss, direct and indirect, that the owner might expect to suffer if he were to be deprived of the property' (Bonbright 1937, p.71). Whereas Baxter interprets value to the owner not as 'advantages of its acquisition but disadvantages of its loss' (Baxter 1967, p.126), Fraser (1988) argues that in Bonbright's original meaning the direct and indirect benefits of maintaining ownership are value to the owner. The proposition in Bonbright was that value to the owner is an expression in positive terms of the present adverse value of the loss which the owner would suffer if he were deprived of the property, including 'a temporary interruption of business, or loss of locational[vi] goodwill' (Bonbright 1937, p. 73). The latter result is a matter of some importance to this research because the focus is on assets already held rather than compensation for assets already lost. It also provides some support for the proposition that the value of ownership is greater than market price of replacement.

In the accounting literature deprival value applies in the case where the owner has lost the asset, whereas value to the owner applies to an owner in possession of an asset (Fraser 1988). Thus, to Bonbright, value to the owner was in principle, not measurable by market values. Bonbright recognised that a favourable attitude towards one's property is subjective and, therefore, market value could be fairer. However, this did not mean that value to the owner should be defined as replacement cost or net realisable value. Deprival values may be practical …..

> but in no way do they impair the force of the statement that the true value of any property to its owner necessarily takes account of all the direct and indirect advantages that the property affords its owner (Bonbright 1937, p. 73).

Admittedly, the search for market prices were chosen to overcome some of the limitations of the historical cost balance sheet. In historical cost balance sheets, different assets are carried at figures that cannot reflect what they are worth to the continuity of the business, 'the sum total of the values placed upon assets does not ordinarily measure what the entire enterprise is worth to its shareholders' (Bonbright 1937, p. 79). Market price, however, is rarely a substitute for total worth unless perfect competition exists as might happen in active share markets and where the property has a market price which represents both the price at which the owner could sell and the price at which he could buy.

> But the value that an individual places on his property has little bearing on the price at which he can sell it, since a buyer is not concerned with the worth of the property to the seller (Bonbright 1937, p. 92).

Value to the owner, a proprietary concept, became value to the business, an entity concept. It also became part of the rejection of current values because of the estimating problems and the assumptions encountered.

Regardless of the problems in the accounting literature relating to 'value to the business', the concepts of Bonbright's 'value to the owner' seem to have particular relevance to farming. In valuing the productive capacity of land, the owner or farmer would have sufficient knowledge about the specific qualities of the land and, therefore, is the only one who does not need a current market price. The productive capacity of the land will be the most important factor in determining the present value of the future cash flows, but this is not necessarily a linear relationship. Maintaining the productive capacity of land is determined over the long-term and has to accommodate good and poor seasons so that a continual cash flow is not guaranteed or even desired.

The entity interpretations of value to the business has unfortunately refocussed attention on the income statement and the concept of sustainable profits[vii] which has become influential in the entity writings in agricultural accounting and economics. A proprietary interpretation of value to the owner based on productive capacity would have to be initially evaluated by the activities that the owner undertakes to maintain soil quality. This is an important element of this research.

4.2.5 Evolution of Thinking

As described above, the initial response was to confirm a proprietary view of the firm but related to maintaining general purchasing power between 1971 and 1973. However, by 1975 in the United Kingdom, the Corporate Report, significantly influenced by government and related interests other than owners, opted for a form of current value accounting (ASSC 1975). Thus, although the Accounting Standards Committee in the United Kingdom, in 1971, 1973 and 1974 also chose a CPP ('consumer' or 'current' version of CPP) model in line with a proprietary view of the firm, in a decision which coincided with the issue of the Corporate Report (1975) they changed to a value method called Current Cost Accounting (Inflation Accounting Committee 1975).[viii] Many considered this a political decision in that there was some suspicion that a full CPP would significantly affect taxation receipts.

In 1975, the pronouncement delivered by the Sandilands Committee in the UK recommended that holding gains be credited to equity as a maintenance reserve. In this view, it was necessary to preserve the physical substance of the business rather than risk its erosion by being recorded as profit available for distribution to proprietors (Tweedie and Whittington 1984, p.7). The Committee chose the 'value to the business' concept, one which recognised deprival, or opportunity, value (Tweedie and Whittington 1984, p.8).

Also, in Australia, by the time a Second Exposure Draft was published in 1975, the relevant Australian authorities had changed their minds and recommended the maintenance of the operating capability of the firm, defined in terms of the volume of goods and services produced. The entity view is still held in the literature (Henderson and Peirson, 1998), although practitioners remain proprietary in their thinking (see Chapter 3[ix]).

Capital maintenance concepts associated with the entity view were generally called current value systems with one of the objectives being to find relevant market prices for each concept of operating capacity. The initial assumption in the current value models is that managers of the firm want to know how they should allocate the firm's resources in order to maximise profits (Godfrey et al 1994, p.124). The most commonly accepted concept was of physical operating capacity in which profit is earned only after the firm's physical capital has been maintained intact (Henderson and Peirson 1998, p.142).

4.2.6 Current Value Accounting

In 1975, proposals in four of the English speaking countries (UK, US, Australia, New Zealand) recommended the maintenance of the operating capacity of fixed assets and inventories (Canada was an exception). By 1984, only Australia continued to advocate any form of operating capacity concept (Tweedie and Whittington 1984, p.249-52).

In the Anglo-American accounting countries, the accounting bodies and the relevant governments convened committees to discuss the vexatious issue of inflation accounting. Their discussions all centred around capital maintenance and the income relevant to each accounting period. The Australian Mathews Report (1975), the New Zealand Richardson Report (1976) and the UK Sandilands Report (1975) all advocated a physical operating capacity concept, based on replacement cost. This meant reporting the asset valuation effect on operating capacity with an entity specific price adjusted form of capital maintenance.

In the entity view (Gynther 1970, p.716), the firm itself and its assets are the centre of interest. Profit is not recognised for each firm until its specific operating capacity has been maintained. All long-term capital is to be restated through a Capital Maintenance Adjustment Account. This is done in accordance with market buying price changes relating to individual assets held where operating capacity is represented by the assets. Operating capacity and the price changes for individual assets = total net assets and have to be accounted for separately because they change at different rates.

Gynther claims that accounting for the effects of price changes is more directly concerned with capital maintenance than with periodic net asset valuations and short-term profit determinations. This implies that assets can be valued in several different ways (Gynther 1970, p.721-723), or that assets can be replaced by others more appropriate (Gynther 1966, Limperg 1964). Such discussions implicitly suggest a preference for diversity depending on the decision to be made. These inconsistencies demonstrate both a focus on the assets as belonging to the firm, but a recognition that the capital had proprietary characteristics although most of these writers were thinking of investors rather than owner/managers.

4.3 Definitions of Operating Capacity

As indicated in Section 4.4.1 inconsistencies in separating proprietary and entity views existed, creating difficulties for the various accounting theorists and professional accounting standard setting bodies in establishing a uniform, comparable set of concepts and measurements which would clearly describe both the maintenance of the firm's physical capital, and the reported profit for the period. Some of the difficulties were the decision on: (1) which assets should be measured; (2) which prices to use, (3) what were the attributes of these assets (such as, the volume of production or the value of production). The 'condition' of these assets was not mentioned.

The potential conflicts and confusion can be demonstrated by the number of definitions of operating capacity. Three suggestions will be discussed below as an indication of the problems attached to defining and then operationalising such concepts in diverse industries. The points to be noted are that market prices can be unreliable and unavailable, and that it was not unanimous which attributes of assets, or which assets, should be measured.

In the first definition, operating capacity is identical to that which existed at the beginning of the period concerned. The prices are the current market buying prices of assets at various points in their lifetime.

> An objective of this method is to produce the results (in current prices) from operating the entity at each short period, for the way it actually existed in its industry, with the assets it did have, in the geographic locations it occupied. This information is relevant to management and shareholders, and would be needed for any decision making relating to change (Gynther 1970, p.716).

One of the major attributes in this definition is the importance of short-term monitoring of existing assets in a specific geographical location and particularly important in decisions relating to change.

A second definition of operating capacity is one which is based on the latest equipment and other assets incorporating any technological improvements needed to produce the same <u>volume</u> of identical output of goods and services (Limperg 1964, Mathews and Grant 1958, Gynther 1966). For capital maintenance purposes this involves taking into account the current market buying prices of this latest equipment[x]. This definition does incorporate change among the attributes of operating capacity itself. Its focus is on productivity and assumes economies of scale where technological improvements can provide a greater capacity or improved inputs. The assumption is that the fixed assets can be changed as well as the inputs, an assumption which has less relevance for agriculture.

The third definition relates operating capacity to that which is based on the latest equipment needed to produce the same value of identical goods and services as measured by current market buying prices of any such latest equipment. Capital maintenance involves the firm in maintaining the same generating capability as existed at the start of the period. There were criticisms of these definitions in which claims were made that the physical operations or the sales would continue without any change (Davidson and Weil cited in Godfrey et al 1994, p.433). It was suggested that management decisions were made more on an opportunity cost basis in the short-term, that is, looking at different relevant alternatives without a direct focus on market prices.

Both the volume and the value approaches also had their detractors on the basis that businesses had to manage uncertainty and change.

> The volume approach although generally the accepted approach by the standard setters, is not immune from criticisms, especially when there is technical progress, or there are large relative price and cost changes, or when enterprises are diversifying or changing their areas of operations (Tweedie and Whittington 1984, p.284).

The value approach also had several other criticisms levelled at it. It was criticised for being too rigid, offering no fluidity, ignoring technical progress, ignoring large relative price and cost changes, not allowing for diversification, not allowing for moving operations and that is could lead to secret reserves[xi] (Tweedie and Whittington 1984). Additionally, the use of maintaining production as the criterion for operating capability, that is, the capacity to provide a constant supply of goods and services (Henderson and Peirson 1998, p.142, Godfrey et al

1992) has a decided emphasis on income flow, would encourage short-term thinking in terms of sales, and is a manufacturing model of capacity.

The arguments over measurements were as vocal as the choice of concept and because of these difficulties, the topic has been largely ignored since the middle 1970's.

4.3.1 Operating Capacity in Agriculture

Each of the three definitions is now examined for their relevance to agriculture. The first does include elements which describe a farm which would normally maintain the same fixed asset, land, in the same geographical location. But it is also unlikely that current market prices relate to the value of the land, especially if the farmer has maintained the productive capacity over a long period. In this case, the best land is often not sold. Because farms are largely influenced by uncertainty, market price reactions may not be timely. For example, commodity prices in agriculture are notoriously volatile. Constant recording in a financial system would not be decision useful and without knowing the soil quality market prices would not indicate the productive capacity of any particular farm.

The second and third definitions in Section 4.4.2 point to a maintenance of product flow. Contained in these two definitions is the recognition that technological improvements and the latest equipment are ways of monitoring a manager's adaptability. This emphasis, which is still prevalent, has influenced those in the agricultural industry because of the concentration of attention on capital equipment and inputs, which is the major focus of the 'green revolution'. It also diverts attention from the land itself. These definitions could encourage monoculture in agriculture or mass production in manufacturing by focussing on output rather than the condition of the assets themselves. Another issue relevant to agriculture is the impact of adverse market and climatic seasons. It may not be prudent to use the asset, and particularly land, in the same way or at all, in every year. Crop rotations are prescribed practices for agriculture and, if practiced, a constant production could not be guaranteed.

These manufacturing costing models were envisaged at a time of expanding markets and economies of scale. This thinking has had a significant effect on the language used in agriculture. Maintaining productive capacity in terms of production could have negative implications for soil quality, where inputs, which improve productivity, can reduce soil quality. In natural resource usage, it cannot be assumed that the fixed element, land, will not change in quality. For example, since the green revolution, technological improvements in agriculture have seen productivity increase by 150%, but at the same time soil quality has deteriorated. The signals from this definition need to be interpreted carefully when the fixed component is land.

This demonstrates that in many ways, productive capacity as it is currently applied to agriculture, has stayed at the manufacturing, scientific management stage. Manufacturing and farming are the same in the sense that decisions are substantive and not marginal in the way that stock exchange decisions are. In the second and third definitions above the assumption is implicit that assets are readily bought and sold. In agriculture, land is not readily bought and sold, and soil quality is built up or maintained over many years. Therefore, to maintain operating capacity in agriculture the focus in agriculture should be soil quality itself instead of production figures or sustainable profits, as is included in the government financial indicators.

4.4 Edwards and Bell Model (1961)

As was common in the early proposals on change, Edwards and Bell's (1961) advocated an entity capital maintenance concept for measuring operating profit, based on physical assets, but ultimately measuring income overall by maintaining proprietary capital, defined as the real purchasing power of shareholders' equity. Edwards and Bell (1961) called this a Real Terms approach, which combines current replacement cost as an asset valuation base with a general index adjustment of capital for the effects of inflation. This concept was later accepted in the United States in their first inflation accounting standard (FAS33, 1979b, Tweedie and Whittington 1984, p.217). Again, this proposal combines entity and proprietary thinking.

At the same time, Edwards and Bell took a management decision-making perspective of the firm.

> Outside users of accounting data such as stockholders, stock analysts, labor union officials, government statisticians and policy makers and economists are mostly by-product beneficiaries (Edwards and Bell 1961, p.5).

Even though their focus was management, their ideas were helpful in that they distinguished between financial accounting, which is about the past, and management accounting, which is about making decisions which will affect the future. Rather than relying on accounting about the past to measure expectations about the future, they emphasised the decision-making ability of management, which the authors saw as a product of a dynamic environment. These ideas are useful for this thesis because they could lead to the development of a concept in which the proprietary view (owners) and the entity view (managers) are combined in some way to form a hybrid view (owners who are also managers, for example, family farms).

Edwards and Bell (1961) were also unique in that they differentiated between short-term profit which they called realisable profit, to be used as a short-term decision making tool by management, and long-term profit which took into account the long-term effect of production.

Edwards and Bell's definition of realisable income is useful in that it recognises the decision making phase of management, including the decision to retain the asset in question, and the decision not to fully utilise the asset continually, because of its value to the owner. They recognised explicitly that there can be a trade-off between the short term and the long term.

They did see the trend towards the entity view whereby

> a growing sense of social responsibility and an awareness of what may be considerable self-interest at stake are leading businessmen to be more and more concerned about the external users of accounting data (Edwards and Bell 1961, p.7).

For this they advocated the long-term profit report, which they called business income.

If Edwards and Bell are correct, in the short term uncertainty and complexity demand a form of decision making which makes formal reporting difficult. Realisable profit is a short-term decision-making tool and is measured as being the opportunity cost of the firm's assets at the end of the period exceeding the opportunity cost of its assets at the beginning of the period. If the firm is better off in terms of operations and in the use of assets compared with other opportunities available to it, this informs the owners that the best has been done for the continuity of the firm.

'Thus the opportunity cost of a machine in a very particular use may be the present value of quasi-rents[xii] that could be earned by putting the machine to a different use' (Edwards and Bell 1961, p.102). The importance of this statement for farming is that it aptly describes the conditions under which farming is undertaken. To use the accounting system for such decision-making would be difficult to maintain.

> Crops take too much out of the soil. At that price I'm better to leave it in the ground and feed it to the livestock. In this way, I can maintain the soil as well (Author Survey 1994 - 95).

Another way of saying this is that Edwards and Bell drew together physical capital and transaction costs, and, it could be argued, unrecorded costs such as land and soil quality; some of the direct and indirect attributes noted by Bonbright.

4.4.1 Rationale by Edwards and Bell

Edwards and Bell argued that in an uncertain environment, productive capacity in the short-term was not necessarily capable of being successfully recorded in a financial accounting system because decisions were made too quickly and too frequently. Only in the long-term could any assessment be made in financial terms of the survival of the firm and the maintenance of its capital. They contrasted this scenario with what was previously considered the normal, stable state of business, which they called a stationary state;

> In a stationary state 'where tastes, technique, and resources remain constant through time such pressures are non existent because the future is certain'. It is uncertainty that breeds a demand for managerial ability and creates the pressures to increase that ability over time (Edwards and Bell 1961, p.2).

For reporting purposes, they proposed the calculation of current operating profit consistent with the maintenance of physical capital. Holding gains and losses are part of this physical capital definition and are meant to provide information on the investment still existing in the assets. In addition, they proposed the calculation of business profit which is consistent with the maintenance of financial capital (Henderson, Peirson and Brown 1992, p.179). This is so because in the long term all systems are reconciled with cash flow.

Accounting profit, economic profit and current operating profit are all based on the assumption that in the long-term all resources will be converted into cash. This includes debts and conversion of fixed assets. This is the connection by which business income is consistent with the maintenance of financial capital.

4.4.2 Edwards and Bell - Business Income

As discussed above, to factor in the long-run contribution of a business, the authors developed the concept of business income (Edwards and Bell 1961, p.100). They suggested that the operating and the holding (investing) decisions of managers are reflected in a concept called 'business profit'. It has two components. (1), current operating profits which are the excess of the current value of the outputs sold over the current costs of the related inputs; the operating decision. (2), realisable cost savings, which are the increase in the current cost of the assets held by the firm in the current period. In accounting terms these are called 'holding gains or losses' and reflect the investing decision. (Godfrey 1994, p.124). This is demonstrated in Table 4.1.

Business income indicates whether or not the current proceeds from the sale of products is sufficient to cover the current cost of all the resources used in production. If these current costs[xiii] are covered by the current revenue this indicates that the firm is making a positive long-run contribution to its survival[xiv].

Table 4.1 Calculation of Business Income

Business profit is determined in the following way:	
Current value of output (total revenue at current values)	xxx
Less current value of input (cost of sales and other operating expenses at current values)	xxx
Current Operating Profit	xxx
Plus Realisable cost savings (increases in values of assets, held during the year adjusted to allow for depreciation)	xxx
Business Profit	xxx

(Australian Accounting Research Foundation, 1975, p.20).

What is also explicit in business income is that for the successful long-term survival of the firm, it is not always necessary to use all the assets at the same rate at the same time. The asset usage may need to be lower in some years than others in order to provide for long-term survival (Edwards and Bell 1961, p.102, Drake and Dopuch, Prakash and Sunder, see Godfrey et al 1994, p. 127). What the business income statement could achieve was some recognition of the state of the productive capacity of the firm, in the same way that recognition of the soil quality would enhance farm reporting by explicitly articulating the trade-off between short term and long term.

For example, if new machinery is purchased to improve future quality, or to reduce future operating expenses, then the benefits attributable to the asset may not be reflected in the short term, but the expectation is that greater gains are available in the future years. In the case of land, the farmer may undertake a longer crop rotation in order to preserve the soil quality for future years. Management would not be evaluated on the correct measures if only current profits were disclosed in the income statement. To the owner these assets have value now because of what they are expected to earn in the future either through production or through sale. In the proprietary view it is ownership which allows these decisions to be made about the long-term capital of the firm.

4.5 Limitations of Current Value Accounting

As discussed in Chapter 3.5.3.2, reporting of current value accounting was formulated primarily through the comprehensive income statement, where treatment of items as either income or capital, that is, holding gains and losses, was disclosed. Over time, the capital nature of these gains and losses became hidden, and as the definition of assets changed these holding gains or losses were considered by some to be an anticipation of future profits. These changes were noted by others whose alternative suggestion was to recognise these changes in assets held as asset management or capital maintenance which would more clearly denote that these changes were not income and not distributable. In Australia, New Zealand and the United Kingdom it was recommended these changes be transferred to an ‘asset revaluation reserve’.

In Australia, Mathews (AARF 1975, p.22), for instance, viewed the holding gain as that amount required to maintain capital at the same level of productive capacity and accordingly included it as a capital reserve in shareholders equity.

In the final outcome, the FASB in the United States decided to maintain the historical cost approach and make reporting of price level changes voluntary and supplementary, a choice other professional bodies also followed. Another major obstacle which prompted the reversion to historical cost were the problems with the availability and reliability of current cost data (Henderson and Peirson 1998, p.169), a matter of some relevance at present.

4.6. Developments in the 1990's

Exposure Draft 83 (1997) by the Australian Accounting Research Foundation (AARF) and the discussion paper 'Agriculture' by the International Accounting Standards Committee (IASC, 1996) contain recommendations, from an entity point of view, regarding the treatment of changes in the value of growing assets and inventories in agriculture. Both recommend that all farming businesses use 'market value' or 'marked to market value' to value these changes and inventories for the financial statements. Their aim is to produce uniformity to enhance comparability, a sign that in the 1990's accountings for agriculture favour an entity view. The IASC does caution that the increasing importance of intangible assets such as intellectual capital calls for a consideration of whether marked-to-market is the right criterion for valuation and provides an opening for the discussion of other ways to develop.

Theoretically, the IASC and AARF, are moving toward an economic definition of an asset as an income stream flowing in the future. In addition, the marked-to-market rule, if adopted, implies that recognition be made on the first day that production commences and be regularly up-dated as market price changes. This could create radical fluctuations in the annual profits as financial reports become asset and liability driven and could even prevent the payment of steady dividends.

4.7. Summary

According to Barton (1984, p.498) one of the uses for capital maintenance accounting is to provide information for accountability purposes to assist investors, and to assist the government and the public in demonstrating that the business is operating in the public interest. Price adjustment accounting was useful in allocating scarce productive resources efficiently in the promotion of sound macro-economic management of the economy. This is despite the fact that there has been no empirical evidence to suggest that this proposition has validity. It has not been shown in cost/benefit terms, or in decision usefulness that current value systems incur additional benefits which far outweigh the costs incurred in regular asset revaluations and in revising the accounting records.

When, in 1972-73, inflationary changes moved the accounting profession to formalise the effects on the annual income statement and balance sheet, Ball and Brown (1977) had essentially the same analysis of short-term decision making when talking about current cost accounting (CCA)

> Most of the alleged benefits of replacement cost accounting are already obtainable at a less formal level, whereas the costs of formally implementing CCA are yet to be met. (Ball and Brown 1977, p.420)

Their argument was based on the efficient market hypothesis in that the market had already impounded that knowledge. This could be very relevant to the way farmers obtain information.

In the 1970's and 1980's the debate floundered because there was no general agreement as to what comprised operating capacity. The debate could not finish until all parties accepted one definition which would be uniformly adopted such that comparisons of performance could be made within industries. The importance in choice is illustrated through the signals that each definition gives to users of the information.

The preceding discussion has sought to clarify the various systems which could be described as either proprietary or entity capital maintenance theories.

The proprietary theories of capital maintenance were concerned with the wealth of owners. In the initial responses, wealth equalled money capital which was maintained by adjusting assets with a purchasing power index to compensate for inflationary effects. These responses were limited in their usefulness because of their uniformity, their short-term impact and lack of meaning to individual owners.

The adaptative exit price system was also proprietary in that the important issue was an individual's ability to adapt, each in his or her diverse ways. This ability to change was based on the 'condition' of the assets in the present which is helpful when land is the asset. But the measurement and magnitude of wealth was in its exchangeable value or cash, using average current selling prices. This is a short-term measure which did not provide any indication of the productive capacity into the future and was never seriously accepted in theory or in practice. These ideas were based on investment criteria rather than operations. Investment would describe farming if the farmers view their land as an investment in wealth, which, if the 'condition' of the land can be measured, would provide an indication of productive capacity.

Value to the owner as originally conceived is directly proprietary. Wealth is defined as the direct and indirect advantages to the owner in owning property. It would be expected that owners are fully aware of these benefits of ownership and would know the attributes to monitor in order to maintain this wealth. This monitoring would be done privately, individually and in response to the specific conditions under which each has to operate.

The owner does not, therefore, need current market prices except as one part of making decisions, thus there is no benefit in reporting externally. In farming, the external markets and climatic conditions would be monitored daily, and it would be expected that the farmer has a very clear idea of the productive capacity of the land and the attributes which constitute the soil quality.

The entity theories of capital maintenance were also concerned primarily with the maintenance of the productive capacity of businesses before profits were declared. The most acceptable was the physical operating capacity where the wealth was contained in the fixed assets and inventories. In contrast to historical cost accounting, these systems were concerned with current and future value measured by current market prices. The focus in these systems was the entity, the assets of the entity and the income which could be generated by those assets.

These systems were part of the search for market prices that would provide meaningful, uniform comparisons between firms for the protection of shareholders and other interested users of financial information. Considerable effort was given in the 1960's and 1970's to what constituted operating capacity. Choices were numerous but the most common were, the assets as at the beginning of the period, the ability to produce the same volume of goods, or the same value of goods. As noted earlier, the emphasis moved away from capital towards income. There was no agreement among theorists and others, and eventually the subject was abandoned. Major changes in natural resources have again focussed attention on the productive capacity of businesses.

In the 1990's market prices have again become the focus of attention in agriculture, along with significant research into the physical aspects of degradation. Although productive capacity would be the focus of management on farms, the concentration on market prices is driven by the desire for uniform, comparable external accounting reports for the benefit of a wide group of users, and one which represents a Level 3 entity view.

Sustainable profits is the term used in agricultural accounting literature because the rationale is that farmers will not survive if they do not make profits. If farmers are proprietary in their thinking and their activities, their productive capacity will be in the soil quality of the land that they own, and they would have a very clear idea of their capital in contrast to an accounting measure of profit. It would appear that very little agreement has been reached on how to account for productive capacity, an empirical issue that is very important to this thesis.

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[i] This uncertainty has particular relevance to broadacre farming. Farming indoors has its own characteristics and is not covered in this thesis.

[ii] Another term is 'realisable cost savings', which is the increase in the current cost of the assets held by the firm in the current period. This is in recognition that the assets in use can represent future rather than present cash flows. In this way the long term is acknowledged. Realisable cost savings or holding gains or losses can be realised or unrealised. Realised is when income has been earned but not yet in the form of cash. Unrealised represents gains or losses in the market price of assets in use and/or production for the current period.

[iii] On closer examination, the capital referred to is not the capital value in the land, but investment purchases such as machinery (Gretton and Salma 1996).

[iv] Studies (Beaver and Landsman 1983; Thornton 1991) indicate that financial statements based merely on historical costs are at least as informative, or even more so, than those using current values or any other kind of

price level adjustment (Mattessich 1995, p.98). This does not provide proof of the superiority of historical cost, rather it does show unanimity and a familiarity with the system.

[v] The Consumer Price Index (CPI) contains a bundle of goods, not necessarily ones which represent the assets the firm has to buy or sell. The composition of the CPI may not relate to individual owners.

[vi] Bonbright defined valuation as 'the procedure and technique of estimating the value of specific property at a stated time and place' and that 'value of property should always be taken to mean value to some specific individual or group of individuals, who have or may have an ownership interest in the thing' (Bonbright 1937, p. 10, 15).

[vii] Accounting packages developed by Farm 500 in Victoria and in the agricultural literature is now using the term sustainable profits and disposable income as one test of continuing productive capacity.

[viii] Although they stayed with the capital maintenance reserve.

[ix] This evolution reflects the gradual institutionalisation of the standard setting bodies, compared with the practitioners who still prefer historical cost with relevant revaluations and depreciation adjustments.

[x] This became the accepted version in Australia, June 1975, and in the United Kingdom, with the publication of the Sandilands Report, September 1975 (Henderson and Peirson 1998)

[xi] Secret reserves are not hidden cash reserves, but can be in the form of non-monetary assets such as buildings and other investments and can be in the form of understatement of these assets.

[xii] Quasi rents are the gains arising from strategies, quality, costs and information.

[xiii] Current cost was one method of endeavouring to measure the value of assets at the prices relevant at the time income was earned.

[xiv]Although Edwards and Bell claim they have a proprietary view of the firm, they also use such terms as 'contribution to the economy' a social aspect of accounting and an entity view, one which reflects an economist's societal view. As with many other writers they were tempted to combine the two views.

Chapter 5
Issues and Development of Research Questions

5.1 Introduction

Several generalisations were drawn in Chapters 2, 3 and 4 which detailed the underlying attitudes and thinking by various interest groups towards farm management, in general, and sustainable agriculture or productive capacity, in particular. It was shown that participants generally held views that were consistent with either the entity view of the firm or the proprietary view. These views were examined from the societal point of view in Chapter 2 and from the accounting point of view in Chapters 3 and 4.

In Chapter 3.2, each of these views was linked with two generally accepted objectives of accounting: (1), that accounting is to provide useful information to users; and (2), that the objective of accounting in a business is to maintain capital, preferably through the generation of profits whilst maintaining the asset base. It is important to reiterate that, in the proprietary view, the accounting equation is written as A – L = P and proprietorship is a right in property.

In the entity view, the accounting equation is written as A = E and the interest is in the operation of the assets regardless of how these are financed. The focus is on the accounting entity rather than on ownership rights. As in the theoretical alternatives stakeholders tend to promote sustainable agriculture from their own point of view. Staubus (1970), when cautioning against providing equal rights to other than investors stated that they all try to maximise their own benefits, as they see them. An examination of the literature provided evidence that the entity view dominates the thinking of those outside the farm.

The need by those stakeholders outside the farm is for information that can be assessed across regions within industry groups, therefore the emphasis is on uniformity and comparability. In addition, ninety percent of the data used in the preparation of the survey in this thesis came from the public domain and are based on entity thinking, which is another reason why it is important to obtain the view of the farmers. The acceptance of the entity theory by those outside the firm or organisation has created expectations that information generated by managers should be useful to all users. This expectation, however, can give rise to misleading or inaccurate messages to outsiders.

The major question to be answered in this thesis is whether the elements of the entity theory are useful to farmers. They might focus on non-financial facts that cannot be expressed accurately in market prices, and this leads to two further subsidiary questions. These questions relate to the two objectives of accounting discussed in Chapter 3.2. (1) The first is, what accounting is used by and is useful to farmers, and in what ways does an entity view of accounting relate to them? (2) The second question is, do farmers have a clear idea of the productive capacity of their soils, and how do they manage their soil quality?

These two subsidiary questions will be tested through the proposition that farmers do not have an entity view of their farms. These questions will be answered in a series of questions based on the attributes of both proprietary and entity theories. The criteria used are the characteristics of both the entity and proprietary views summarised in Table 3.1 and discussed in Chapter 3.3 to 3.7. The evidence suggests that when tested against the entity view, which is reporting, farmers do not appear to be successful[i]. An alternative explanation is that farmers when planning, select information, both accounting and non-accounting, on the basis of the characteristics of the proprietary theory.

The above discussion will be expanded in the remaining sections in this chapter. The issues which emerge from this discussion leads to the development of the questions which focus on the usefulness of accounting to farmers and how they manage their soil quality. Section 5.2 examines the nature of government policy, and their effect on farmers particularly in relation to the income statement, market prices, financial indicators, a formal financial accounting system and how this translates into incentives for farmers. In Section 5.3, the discussion focuses on the development of the proposition that farmers do not use entity-based value accounting, or product costing, to analyse their productive capacity but instead use activities to assess their productive capacity. Section 5.4 examines the applicability of a proprietary productive capacity model, and the influence of debt arising out of the entity view.

From these issues the questions will be formulated to form the basis of the survey questionnaire developed in Chapter 6.

5.2 The Nature of Government Policy

In Chapter 2, government policy initiatives were examined at all levels within a ‘whole of society’ framework. This policy framework is analogous to accounting standards that also arose from the need for an all-encompassing conceptual framework. These policies are administered through a series of programs from which benefits are to accrue to groups in society at the broadest possible level, either an industry, a catchment or in the case of Victoria, the assets of the State as a whole. In Section 2.3.4 it was shown that the government aims to develop identifiable and comparable physical indicators of sustainability that are uniform and consistent at the national, regional and individual catchment levels. At these levels, aggregates or average figures are seen as sufficient but there is the limitation that individual farmers may not be able to respond.

The policies are necessarily based on the whole catchment, for example, stream management, salinity management. Australian farmers are not subsidised by the government and this must be seen to be implemented. Clarification is needed on the extent to which farmers can respond to this approach, and if these policies create a gap between the aggregate and individual levels of information usefulness. Three policies, namely salinity, soil research, financial indicators, will be discussed in Sections 5.2.1 to 5.2.3 in relation to productive capacity and their relevance to individual farmers.

5.2.1 Salinity

The effect of this policy framework is to treat the problems of land degradation at the most public level rather than to concentrate on the underlying mechanisms which individual farmers have to manage. The result is that only average findings can be made about farming behaviour.

The most visible program in Victoria is salinity under which all other problems are subsumed to the exclusion of other related problems such as soil acidity and soil structure which are deemed to be the individual farmer's problem. It is assumed in the agricultural literature that salinity is mostly caused by a range of land management practices (Ch 2,p.19). This may be true, but the use of aggregate figures for policy making, for extension services and grants creates the possibility the actual causes may stay undetected. One outcome of the policy is that solutions concentrate on the most obvious and visible. Salinity has a long lead time in which it is invisible. It is during this lead time that farmers can influence any changes on their land.

Each LMU in the Loddon Catchment was surveyed by aerial surveillance for the extent of salinity, and these results were extrapolated to whole regions. Costs were also extrapolated. In the case of the High Level Riverine Floodplain (HLRF) the costs of salinity in the future are expected to be the highest of any LMU in the Loddon Catchment. Assessments of these farmers and subsequent policies developed on the basis of these findings could have an adverse effect on the farmers in the HLRF shown in Table 2.2.

In other studies farmers have stated that they do not have salinity themselves, and this has been interpreted as denial (Cary 1993). If this is true, it would not be helpful to ask such a question. Therefore, in this survey, questions will be asked which relate to the causes of salinity.

These include (1) what the farmers actually do for soils, water, acidity, structure and fertilisers? and (2) what has been done to avoid problems with soil quality?

Because of the 'outside the farm gate' policy, the government and researchers have emphasised problems, but they do not know what preventative measures have been taken on individual farms so, (3) to what extent do the survey farmers avail themselves of government advice, grants and incentives? If the farmers answer in the negative it would provide evidence that policies at the aggregate are not decision useful for the farmers.

5.2.2 Soil Research

Section 2.3.3.4 indicated that soil research was seldom mentioned until 1996, due to the 'outside the farm gate' policy[ii]. Funding is provided for the monitoring of resources to people other than farmers, except for experimental programs conducted on individual farms and pro-rata grants to individual farmers for prescribed programs, in particular, fencing, tree planting for salinity and pest control.

This omission could provide an explanation as to why there is no attempt to define productive capacity either in the agricultural literature or by agriculturalists. This can be partly explained by the reductionist approach to research problems (Malcolm 1988). In fact, soil research is not only a private matter for farmers and there are good reasons why it should not be treated differently from any other natural resource. The nation depends on agriculture at a societal level, poor soil management causes off-farm effects. The Victorian government has recognised the importance of agricultural land via its policy to restrict the encroachment by urban developments of agricultural land. The Mining Act also recognises that agricultural land can take precedence in an application for mining rights.

To a great extent, the only resources farmers can manage are the physical resources on their own land. One gap in the research literature is what farmers do, in a whole-farm framework, about the management of their soil quality, either in financial or non-financial terms. This is incorporated in the Soil Quality Model developed in section 5.4.2.

5.2.3 Financial Indicators

A firm's reported accounting numbers indirectly affect the extent to which the firm is either criticised or supported by consumers, politicians and bureaucrats. For example, large oil companies were castigated in the financial and popular press for reporting record profits during the oil 'shortage' of the 1970's, but concern is often expressed for the harmful effects of foreign competition when domestic companies report record losses. In either scenario politicians can increase their influence by imposing implicit or explicit taxes on 'unpopular' firms and granting implicitly or explicitly subsidies to 'popular' firms or groups. This is happening in the agricultural industries in the 1990's where the international trend for competitiveness in world trade is overriding the earlier support for Australian farmers. In this case the use of formal financial accounting reports would most likely put pressure on farmers to endorse short-term behaviour and profits.

Managers of those firms have incentives to choose particular accounting techniques, and to lobby for or against mandatory changes in accounting standards that alter their firms' political visibility. The causal link between political visibility and accounting numbers is more tentative than any of the other causal links in the economic consequences literature. In contrast with the other causal links, the linkage between political visibility and accounting numbers does not depend on an explicit contract, to which the firm is a party. Instead, the link results from the use of firms' accounting numbers by parties usually considered external to the firm, e.g., by politicians and bureaucrats (Holthausen and Leftwich 1983 p. 87). Because of the historically close relationship the agricultural industry has had with governments this link has been both directly and indirectly made to a significant degree.

Extensive research and several studies concluded that farmers need to improve their farm financial management and this was linked to their ability to indicate their sustainability. Two solutions have been suggested: (1) financial indicators to provide formal knowledge about farmers' sustainable profits, and in which uniformity will provide comparability between farms; and (2) the use of market prices for all resources (OECD). This is a critical component of entity theory that needs to be tested for its applicability to farmers.

An important consequence of these attempts is that they force farmers to report in the abstract terminology common to financial reporting, but which operationally results in an emphasis on productivity as a measure of success. These financial indicators are based on the requirements of entity thinking that were examined in Chapter 3. These can be summarised as an emphasis on the income statement and standardised measures such as gross margin and net margin. In addition, comparisons between firms were seen as being facilitated by return on assets and return on investment, which theoretically provide a measure of how efficient a firm is in obtaining a flow of income from the use of assets. These forms of accounting report require formalised and detailed accounting systems, another corollary of the entity theory.

On balance, there is a tendency in the agricultural accounting studies to concentrate on production and productivity and to ignore the balance sheet and its importance for reporting on wealth (Neilson 1975). Both the farmers and the agriculturalists agree that monitoring assets and liabilities is essential but not in the context of ownership as would be indicated in the balance sheet.

To test the relevance of these indicators, the following questions need to be asked of the farmers: (1) their gross income, gross margin and net income; and (2) the financial and management accounting records kept over a period of a year. These questions also provide some indication as to the importance of market prices to these farmers and their use of a formalised accounting system. If the answers to these questions are in the negative it would indicate quite strongly that these indicators would not provide useful information to governments or agriculturalists on either the true state of the returns of the farm or the productive capacity of the soil. In this case, neither of the objectives of accounting stated in Chapter 3 would be achieved.

If these indicators would not provide information on the productive capacity of the soil, this indicates that an important research question would be to ask if the farmers distinguish between soil quality and productivity; and this will be detailed in Section 5.4.1.

5.2.4 Reliance on Short-Term Market Prices

There is an acceptance of the objectivity of market prices and a belief that they are the least cost method for governments to assess value. Underlying all research on indicators is a belief that market prices for all natural resources (Hill 1996) would provide the clearest message to both markets and governments of the relative supply and use of natural resources

The question is, to what extent are market prices a reflection of the physical indicators of productive capacity and soil quality? Market prices are important to those outside the farm because it is assumed that farmers respond primarily to market signals. Therefore, it is argued, that if market prices reflected all resources, this would give the farmers a mechanism by which to assess the condition of ecosystems, the resource base, production systems and the inter-relationships among parts of these systems. Accounting standard pronouncements in the years 1996-97 have reverted to current values to measure changes in growing assets.

Conversely, the attributes articulated by Bonbright (1937) in Section 4.3.3 would indicate that value to the owner is greater than market price. Farmers would already have sufficient information available for their decision making, whereas others can only rely on market prices.

If a link to productive capacity cannot be made using short-term market price changes, then the link cannot be made to three of the four financial indicators at present recommended to the government in Australia; namely, return on assets, return on investment and gross margin for each enterprise. If these measures have no meaning for the survey farmers in the short term it would also be expected that the farmers would not maintain formalised accounting systems because these would not be of assistance in the decision making required in maintaining their operating capacity, i.e., soil quality.

The importance of market prices to farmer decision-making was important throughout the survey questionnaire. The questions raised were: (1) the level of formal accounting; (2) attributes of most importance in assessing annual success; (3) the most important attributes of future success; and (4) the most important ways in which the farmers assessed the success of their competitiveness and marketing strategies.

In summary, preceding arguments lead to the following conclusions:

(1) if the results show that farmers do not use market prices to measure their annual success, their competitiveness, and marketing; and

(2) if the results show farmers do not tend to be informed with entity accounting, then the second question can be tested. What do farmers do to maintain their soil quality? This is tested using the characteristics developed from the capital maintenance literature discussed in Chapter 4.

5.3 Productive Capacity as Proposed in the Entity View

In the entity view ‘value to users’ is more important than ‘value to the owner’ and this implies uniformity. Other users will have a need to compare the value of various investments with a farm possibly being one of a number of investments and market prices are seen as a common and objective measuring tool. These people compare but do not manage the entity being assessed. The consequences of these views are that those with an entity view do not get down to the individual level and can manage with averages. However, the individual proprietor must have specific information.

In Section 4.3 and 4.4.1 the accounting literature was examined on accounting for changes in productive capacity. The emphasis for disclosure was again on the income statement. Several accounting notions of operating capacity were discussed in Section 4.4.2. They included: (1) The identical capacity to that which existed during the period concerned, measured in current market buying prices of assets. This does assume an active market in all assets. (2) Operating capacity which incorporates the technological improvements needed to produce the same volume; and (3) The same value of the identical goods and services (Gynther 1970, p.716, 1966). All of these put an emphasis on the income statement and productivity, while the issue of the value of the assets has still not been satisfactorily resolved.

Certainly, in agriculture, constancy of volume or value has less relevance when climate and markets vary. Tweedie and Whittington (1984) summed up the limitations of productive capacity based on maintaining value or volume of output. For them, these definitions ignored technical progress, large relative price and cost changes, diversification, changing areas of operations, and whether the single asset or all assets should be the focus. In addition, it was demonstrated (Chaney 1996) that changing market prices in the short term often led to different decisions within the one accounting period.

Several limitations relate to these proposals and illustrate one of the drawbacks to the value system of accounting. They could indicate an increase in income rather than capital investment, an especially risky strategy for farmers who do have forward contracts but cannot always recognise income before the cash flow is fairly certain. These recommendations could push farmers back to a short-term focus on income in order to maintain cash flow for taxation payments. This system would also add significantly to record keeping and administrative expenses. The major issue in this instance is the evidence of an entity view on the part of the accounting standard setters.

The issue arises, therefore, as to what the farmers consider value and how they maintain it.

In summary, preceding arguments lead to the following conclusions:

(1) If the level of debt amongst these farms is minimal this implies a strong ownership motivation.

(2) Farmers who do not think that a constant volume or value of goods equals productive capacity would be operating their farms using the attributes of proprietary thinking

(3) If farmers show no tendency towards the entity views of productive capacity, and if farmers do not equate quality of soil with production, then they may base their productive capacity on farm techniques and activities.

5.4 Productive Capacity Utilising Proprietary Thinking

Attributes of proprietary thinking include long-term, wealth-focussed, decision-making on financial and non-financial data, little reliance on formal accounting systems, and an attitude of individuality and uniqueness. In agriculture, planning horizons can be based on rotation cycles that vary from five to eight years. In the survey undertaken with the farmers, one aim was to test whether the farmers used a proprietary approach to their productive capacity and to their farm accounting, in contrast to the entity accounting systems and government policies which follow entity thinking.

Individuality and the non-financial attributes of sustainable agriculture were indicated by both the 1991 Standing Committee on Agriculture and the 1993 Standing Committee on Agricultural and Resources Management. Their recommendations were; (1) long-term net profit, (2) management of land-water quality to sustain production, (3) management skills, and (4) off-site environmental impacts. However, as discussed in Chapter 2, these attributes have been over-ridden by the commitment made to market answers or market prices. Nonetheless, these recommendations would still apply if farmers have a proprietary view and they have clear and knowledgeable ways to plan and monitor these attributes.

Whilst ownership and control of day-to-day management are in the same hands, the balance between what is income and what is capital is not an issue. This is the part of accounting which has an individual, economic, and essential function. Problems of choice are to be decided by the risk taker and represent proprietary thinking. This is because the farmer assumes the whole-farm risk rather than shares as part of a portfolio.

In the proprietary view, diversity is accepted as the norm with best practice evolving as an individual achievement. The focus is the proprietor, not the investor or the potential investor, for example, banks and creditors. Whereas the entity view recognises the legitimacy of different users of accounting information, the proprietary view is an individual ownership view and the usefulness of accounting is measured in terms of ‘value to the owner’. It is argued (Sprague 1907 see Goldberg 1966, p3 for full reference), that the proprietor does not require the use of detailed financial accounting. As quoted earlier,

> If outsiders were requiring the report it may be that the point of view is so alien to that assumed in the accounts themselves that no adjustment for this purpose is practicable (Sprague 1907).

It is proposed that if farmers in the Loddon catchment do have a proprietary view and their emphasis is on soil quality, decisions are made on a ‘set of information’. Tweedie and Whittington (1984) advocated a ‘set of information’, that is, both financial and non-financial information to be presented to users, when many activities are equally important and occur in a complex environment. The agricultural literature shows that many activities are necessary for the production of cropping or grazing, many happening in unison. Therefore, it would not be appropriate for research methodologies to be designed on a partial-farm basis. The only meaningful methodology to use would be several activities or ‘set of activities’ which would contribute in various degrees to the decision objective, soil quality.

During the 1960’s, debates on inflation accounting in the accounting literature were activated by two consequences of changing prices: (1) the amount of capital in the firm being consumed; and (2) the amount of gain or loss in any assets being held for the future.

These two reactions are equally relevant to capital as measured by soil quality. Any part of the soil quality that is transferred to the product leaves the farm and is reflected in income. The resultant gains or losses in soil quality in land being held for the future are not recognised properly as capital.

A minority of writers suggest that farmers are not asked the correct questions (Malcolm 1988, Stephens 1992) and that designers of accounting systems have not involved the farmers

(Schnitkey and Sonka 1986, Hardaker and Anderson 1981, Flora 1995). Only one study has concluded that information needs vary considerably among farmers, even among farmers who manage similar operations (Schnitky and Sonka 1986). This view is supported by the findings of Miles and Snow (1978), in another context, who developed a competitive strategy model based on a firm's responses to complex environments. Their model has been tested and verified in several studies reported by Abernethy and Guthrie (1994) who concluded that the formal accounting system is less effective in an open system where the management need to be proactive in managing complexity (Edwards and Bell 1961).

Accounting information is less appropriate as a focal element of control with an increasing exposure to the environment (Otley 1978; Hopwood 1972) argued similarly, suggesting that as environmental exposure increases, those activities necessary to accomplish objectives are decreasingly captured by the formal accounting system and excessive reliance on accounting information can be dysfunctional in such cases (Brownell 1982, p. 25).

Edwards and Bell's (1961) contribution, Section 4.4.3, was to distinguish between the short term and the long term. In the short term, in a dynamic environment, they argued that accounting systems could not be expected to provide timely information to decision makers. This is because they reasoned that many decisions are based on opportunity cost. In farming, this would involve making use of on-farm resources, an emerging issue in the agricultural literature in the United States from the middle 1990's. Therefore, the question to be asked is, do farmers who have a proprietary view of the firm use non-financial decision making tools for the short term, and base their profits on long term factors, roughly in line with their view of the cyclical nature of the climate and markets? This is incorporated in the soil quality model detailed in Section 5.5.

The main issue is whether farmers have a concept and a recognisable measurement for productive capacity and do they recognise this productive capacity as being embodied in their soil quality. In the proprietary view, ‘value to the owner’ is an accepted basis for valuation, and this implicitly suggests a meaningful concept of productive capacity and a recognisable measurement for it. There was evidence that farmers do understand their soil quality, do manage various attributes and respond individually but in a consistent way with their soil. That is, there are recognisable successful ways of managing soil quality (LCSMP 1992).

5.4.1 Productive Capacity Model

One farm-level model of private decisions, based on the physical attributes of soil, farming methodologies and uncertainty, was developed by Milham (1994). It is a theoretical model and it conforms in its assumptions and measurement systems to economic models that assumes profit maximising behaviour that can be represented by the cost in producing one more unit compared with the revenues, and with the decision objective being to keep or sell the land.

Milham extends the model by stressing the importance of seeing the soil degradation problem within a general policy framework that ‘encourages private users of all natural resources, not just soil, to act in a socially optimal manner’ (Milham 1994, p.61). He recommends that this can be done by effecting market prices through monetary policy, that is, interest rates, and through fiscal policy and taxation allowances. Again, as in all other entity pronouncements noted in previous chapters the model is formulated to reconcile private and social aims through market price.

Theoretical evidence is given in Milham (1994) on the development of the soil model in which the assertion is made that soil can be managed in discrete categories, that is, soil depth, soil fertility and soil structure. In so doing, the model offered a clear manner in which to assess management practices as well.

5.4.1.1 The Content of the Milham Model

The content of the model has been developed over the past ten years. In a seminal paper, McConnell (1983) acknowledged that land is an asset, but he also identified soil depth and linked this to decisions by farmers about whether to deplete soil or to invest in soil conservation. In a further development, Saliba (1985), and Segarra and Taylor (1987) formulated a dynamic economic model that included soil fertility as a unique property of the soil.

Sinden and Yapp (1992) showed that declining soil structure may be at least as important, in terms of productivity decline, as depletion of soil depth. Milham adds other factors omitted from earlier soil-use models namely, the farming activity being undertaken, the technique selected and environmental conditions. As well, soil profile and topographical characteristics of farmland were included as playing an important role in enterprise (product) selection.

In summary, soil has three unique components, namely, depth, fertility, and structure, and these may vary independently (Milham 1994, p.53). Therefore, the stock of soil is disaggregated as

$$S = S(SD,SF,SS)$$

and is a function of farming activity, the technique selected, the environmental conditions being experienced and investment in soil conservation (Saliba 1985, Segarra and Taylor 1987).

The stock of capital available for investment in soil conservation is included (Saliba 1985, Segarra and Taylor 1987 in Milham 1994) which is coupled with the choice of commodity and the technology undertaken. Capital gains and losses are recognised as well as contributions to current profits, and is one of the rewards for maintaining soil quality (McConnell 1983).

The model is stated by reference to the terminal resale value of the land:

R = R(Soil Depth, Soil Fertility, Soil Structure, Soil Conservation)

and in present value terms

Rpv = e-pt R(SD,SF,SS,SK)

where this represents the present values of one more unit of soil depth, fertility, structure and soil conservation in some future period (Milham 1994, p.55).

5.4.1.2 Assumptions in the Milham Model

The assumptions provide some insight into how governments and policy makers could interpret individual behaviour from an entity viewpoint, and then translate this into policy. These assumptions do provide some evidence that helps to explain the policies developed in Australia over the past decade. It is however, imperative that the assumptions are clearly noted because they limit its usefulness in a practical sense for an individual proprietor.

5.4.1.2.1 Market prices reconcile social and private goals

The importance attached to efficient capital markets in the literature and in policy making is stated in the overriding goal to match 'the socially optimal soil use' with the 'privately optimal soil use'. These are assumed to be matched when the capital markets are efficient and where the rate of interest reflects perfect information and where market prices are efficient also.

5.4.1.2.2 Profit maximisation

The model is based on profit maximising at the margin where farmers seek to maximise the discounted value of the stream of annual net profits plus the market value of the land at the end of the planning horizon.

> 'The general problem is then to choose the rate of soil depletion that satisfies this criterion' (Milham 1994, p.52).

Profit maximising behaviour can be represented by the revenue less the cost in producing one more unit, and with the decision objective being to keep or sell the land. It includes the unit price received for the commodity, farm inputs and the investment per unit in soil depth, fertility, structure and soil conservation. It is implied that soil quality is not improved as the major objective, because 'it is only higher marginal profits that provide incentives for the farmer to conserve the soil resource for the future'.

5.4.1.2.3 Decision to keep or sell

The model is stated by reference to the terminal resale value of the land. Farmers will not conserve their soil unless motivated by incentives. This is expressed in many cases in the negative and forms an important assumption for policy directives. Throughout the discussion, there is a constant reference to the assumption that farmers will continually compare the value of the land with the future as a result of activities in the present. Because decisions are based on profits the farmer will continue the practice that erodes the soil while ever, in present value terms, any resulting decrease in future profits and the market value of the land is less than the flow of profits achieved by degrading the marginal unit of soil (Milham 1994, p.57).

As in other economic models, where the decision objective is to weigh up whether to keep or sell at the margin, the underlying assumption is that the resale value of the farmland is principally dependent on its future profit potential. This assumption has been tested (Ervin and Mill 1985, Gardner and Barrows 1985) but has proved to be inconclusive. What this assumes is that the only means available to test this assumption is if the sale occurred and the buyer clearly recognised the land condition (Sinden and Yapp 1991).

There is a danger that this interpretation could be read into the published figures for farm returns even though, theoretically, the Milham model incorporates the long term. Soil conservation and any capital gains are not discussed any further in this model, therefore, it is not resolved how these gains are recognised, whether in the increase in wealth or in the increase in the income statement. Again, operating and investing decisions are acknowledged but not operationalised.

This is extremely important in view of the current policy developments that are based on the assumption that farmers who are not earning a sufficient return on capital are degrading their soil.

5.4.1.2.4 Uncertainty excluded

Uncertainty is explained in the model in the sense that there are considerable practical difficulties in satisfying optimizing conditions. Milham says that farm methodologies and environmental conditions are two of the uncertainties and are, therefore, outside the model parameters.

5.4.1.2.5 Efficient capital markets

To enable farmers to make a fully informed decision about their soil quality, a further assumption is made that if the farmers have access to competitive, smoothly working capital markets, the wealth maximizing objective is equivalent to maximizing the present value of the profit stream (AARF 1992, McConnell 1983, Pearce 1988, Saliba 1985, Milham 1994, p.54).

This is saying that the short term and the long term will be reconciled and that the short-term profit figures will translate into a representation of the future value of the land.

The primacy attached to market prices and an efficient market can be explained by the following process. The market needs to know the effects of soil usage through efficient prices, then the farmers will be informed as to the short-and long-term effects of their actions through the changes in the terminal value of the land. This will provide the basis for their motivation to conserve their soil.

5.4.1.2.6 Effect of cost/price squeeze

In economic models it is assumed that uncompetitively high input prices coupled with decreasing commodity prices (Dumsday and Edwards 1990) will also increase pressure on farmers to reduce investments in soil quality and utilise the existing stock of productive capacity and induce degradation of the soil at a faster rate than is desirable, even by the farmer. For example, in the 1980's fertiliser applications were reduced at the cost of fertility (Powell and Milham 1990). Presumably yields were lower, however, this raises another question as to whether continual fertiliser application is a positive thing to do. This is one assumption in the model that does not have unanimous agreement and forms another question for the survey. On one hand, it is assumed that a cost/price squeeze will cause degradation.

Alternatively, it is argued that this would not be the case in the real world where opportunities exist for switching between farming technologies, for example, changing from conventional cultivation techniques to minimum tillage, and using many on-farm resources.

> There is the possibility that 'high' input prices could force farmers to a lower-cost production technology, such as rotational cropping or minimum tillage, which could in fact conserve soil (Milham 1994, p.62).

If this is correct, an analysis of accounting numbers such as gross and net profit would not necessarily provide any evidence about these changes, especially if there is a significant use of on-farm resources and on-farm modification of machinery. If there is evidence of significant use of on-farm changes to production methods, it would also add more weight to the possibility that, at present, market prices would not provide the information for others to value land, and would, in fact, be of little use to farmers. Unfortunately, the literature at this time makes the assumption that the use of existing on-farm resources means using up the stock of productive capacity (Milham 1994, p.62), an attitude which further reinforces the Government's need for market prices as a means of obtaining visibility.

5.4.1.3 The Treatment of Variables in the Present Study

The inability to account for the effects of imperfect input and output markets is recognised as a major constraint on profit maximising models and their information content in maintaining the stock of soil, i.e. a stock of capital. Chaney (1996) in a farm study articulated the limitations placed on a profit maximizing model because of environmental uncertainty.

> the yields and organic price premiums … and year to year variation in production costs for each system (of production) were the most important factors determining relative whole farm profit (Chaney 1996, p.13).

The consequence is that if prices for commodities are lower than expected, the anticipated rate of soil degradation arising from the farming activity will be higher than the optimum.

Instead of using a product costing model, the approach taken has been to incorporate in the survey questionnaire all the physical activities for each attribute of soil, depth, fertility, and structure. For this the recommended best practice methodologies for the particular HLRF in the Loddon Catchment (LCSMP 1992) were chosen to inform the questions about the physical activities farmers undertake[iii] to maintain their major asset, soil quality.

Experimental studies in Australia, the United States and the United Kingdom (Section 2.2.3) concentrated on levels of fertility measured with traditional one-product cost accounting techniques. The limitation in these latter studies was the assumption that capacity costs or fixed costs were unchanged and that operations were similar between farms in the same industry. They were static studies based on a single year, i.e., short-term result. The usefulness of these studies is limited also by the partial-factor methodology by which they were undertaken.

Because of the difficulty of providing evidence of long-term thinking in previous models, there was also an assumption in this thesis survey that farming methodologies take time and resources to obtain and apply. Therefore, if farmers are managing their cropping, pastures and stock in a manner which is recommended as best practice, then this could provide evidence of the ability to manage change over the long-term in order to maintain productive capacity.

Investment in soil conservation and a long-term focus would be implied by the farmer's attitudes, and also by the evidence given on knowledge, skills, rotation practices, the willingness to lose earnings in the early years of changeover to conservation practices and the amount of debt each farm carried. Long-term objectives would also be indicated by the responses the farmers give to the questions on how they measure their success as detailed in Section 5.3, p.180.

Uncertainty is accepted and is represented by a 'set of information' over a five-year period. Farming activities, techniques, environmental conditions and the management of water was also assumed to be detected by the activities undertaken by the farmer. Location, soil profile and topographical characteristics were incorporated by defining the boundaries of the survey area in an ecological unit, the HLRF. The terminal value of the farm could only be approached by asking each farmer what their future intentions were. Most importantly, market prices were not used because it did not seem appropriate to determine per unit product costing when it was proposed that farmers undertake activity costing.

The assumption is that farmers with deep fertile topsoils would have less incentive to adopt degradation control measures (Van Kooten, Weisenel and Chinthammit 1990; Walker 1982, Milham 1994, p.59). This attitude could emanate from United States studies that make different assumptions about the features of the soil. McConnell's model of the rate of soil loss and the effect on productivity assumed a safe level of soil loss, which was considered to be generally at the level of two to five tons per acre (McConnell 1983). This paper is still considered a seminal paper by Australian agricultural economists. The Milham model, because it translates all activities into market prices, could ignore the effects of specific locations, knowledge which would be of benefit for the targeting of information. This will also be tested in the thesis survey.

The entity view and the importance of efficient capital markets conforms with the view that it is the assets which are important regardless of how they are financed. Debt combined with low commodity prices places considerable financial stress on even well established farm businesses (Powell and Milham 1990). It may be that during major changes in world markets, as discussed in Chapter 2, debt is a major intervening variable.

This is based on the assumption that any debt incurred in order to ensure future profit potential, and, therefore, market resale value, is validated by the returns and that the market will recognise the land value. Dumsday and Edwards (1990) identify two objectives that characterise the behaviour of farmers. The first is the maximisation of short-run cash flow, which is assumed to be a ‘reasonable description of the behaviour of farmers with very low incomes together with substantial debts’. The second is a wealth maximisation objective (Dumsday and Edwards 1990).

It will be important to determine what farmers do regarding debt and the effect it has on their operations because in the literature the assumption is made that when debt is very high it forces them to reduce soil conservation. It will be necessary to find out the extent to which they see debt as a way of obtaining assets, or whether they see it as an imposition on the ownership of assets and as a financial risk, weighed on a cost/benefit basis.

5.5 Summary

One potential limitation in the development of the questionnaire is the reliance on normative theorising and secondary sources. The bulk of the literature shows tendencies for the stakeholders to have the dominant entity view, for example, each group of researchers, whether they are in accounting, water or land studies, economics or banking, prescribe one form of the entity view. To take the accounting literature as an example, if the conclusions are correct, farmers would have a limited response to the questionnaire in this thesis.

In this chapter it was suggested that the usefulness of accounting in the management of productive capacity could be tested by examining how farmers react to the tenets of entity thinking supported by government, policy makers, and accounting research bodies. If the survey farmers responded negatively to these tenets, then the attitudes of the farmers would be sought utilising a proprietary based productive capacity model.

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[i] According to a survey by ABARE Australia's farmers were older and poorer than the general population and were relying more on money earned away from their farms to survive. It shows that farming households earned an average of $27,000, well below the national average of $38,700 (Age newspaper 12 January, 1998, p.6).

[ii] Significant scientific research has been undertaken on soil profiles but not in connection with farm management.

[iii] According to Mattessich, claims there are three distinct dualities developed in accounting for thousands of years: the relationship of a physical transfer of goods connecting an input with an output, the debt relations connecting a debt with a creditor, and the ownership relation connecting an object or asset with an owner. Of these three empirical relations, only the first is physical, while the other tow pertain to social reality.

Chapter 6
Research Methodology

6.1 Introduction

Sarantakos (1993) divides research into three major paradigms, or set of propositions that explains how the world is perceived; the positivistic, the interpretative and the critical. The interpretative paradigm has been chosen for this thesis because of its emphasis on 'the empathetic understanding of human behaviour' (Sarantakos 1993, p.34). In the interpretative paradigm reality is seen as not being 'out there' even if the participants are manipulating physical objects, because

> reality is internally experienced, is socially constructed through interaction and interpreted through the actors, and is based on the definition people attach to it (Sarantakos 1993, p.35)"

In social research in general (Blaikie 1993, p.69), and in this thesis in particular, the dilemma of the relationship between the natural and social sciences had to be bridged. As Mattessich (1991) states, this dichotomy between social reality and physical reality is created when empirical variables can be directly and indirectly observable depending on the point of view of the observer. The problem was to find appropriate observational variables for certain theories of accounting such as the concept of capital of an asset in use, a social reality. In this case, it is suggested that indirect measurability was found in surrogates (Ijiri 1967) or indicators, the physical reality.

According to Mattessich (1991) there is a physical reality behind tangible assets and a social reality behind owners' equity and income. Whilst the natural sciences could elucidate cause and effect on the physical aspects of farming, it was the preceding step of farmer decision-making which created the actions undertaken in the management of soil quality. In the translation from physical reality to the accounting reports, much depended on the meaning attached to objects by participants and, therefore, it was necessary to understand their interpretation and the institutional structures in which they operated. Other participants are government officers, consultants, accountants, academics, bankers, all of whom are stakeholders in assessing the performance of farmers. If these other participants are reading the present financial statements as a literal translation of farmers' intentions and decisions, then there is a need not to 'confiscate the maps (financial statements) but to show them how to read the maps (financial statements) more effectively' (Thornton 1991). This is recognition of the claim by Giddens that social structures are both constituted by human agency, and yet at the same time are the very medium of this constitution (Blaikie 1993, p.73).

Using the interpretative paradigm to understand the meanings farmers attach to their physical and social reality is justified by Blaikie in the following statement where he implicitly distinguishes between motivation and action.

> Giddens regarded social actors as being both capable and knowledgeable. The former refers to the fact that social actors, in any place in a given sequence of conduct, could have acted differently, even though they may generally act out of habit. The latter refers to what social actors know about their social situation and the conditions of their activity within it. Social actors are viewed as having the capacity reflexively to monitor interaction as it happens and the setting within which it occurs. At the same time they can give reasons for (or rationalize) their actions (in Blaikie 1993, p.74)

From an interpretative perspective, the task is to search for the systems of meaning that actors use to make sense of their world. The accounting researcher’s task is to search for the systems of meaning farmers translate into decisions which then have an impact on their financial operating and investment decisions. In this case, the accounting researcher also searches for the systems of meaning farmers give to their soil quality.

Critical theory was not appropriate in this thesis because the aim was not to be prescriptive, but descriptive. Neither was positivism, and the major limitation of positivism was in the assumption that reality can be defined as objective. For the positive methodology, reality is governed by strict natural and unchangeable laws. It is assumed that all members of society define reality in the same way, because they all share the same meanings. Even if this is so for farmers, this view is not helpful when accountants and others are examining farmer behaviour from the outside from the assumption that all decisions are reflected in financial reports.

Just as importantly, the positivist perspective assumes that 'causes produce effects under certain conditions, and predictions can be limited by the occurrence of such conditions' (Sarantakos 1993, p.35). Agriculture is dominated by uncertainty and change, which necessitates farmers to be continually making value judgments, characterised by Edwards and Bell and Coase as opportunity costing, and by Staubus as activity costing.

Perhaps reflecting this uncertainty, and confusing physical with social reality as discussed above, previous studies concluded that farmers did not use, but should use, financial accounting reports in their decision making (Stephens 1992) and did not use formal decision models in managing risk (Malcolm 1988, 1996). The Australian Bureau of Statistics surveys farmers annually on their farming practices, cash flow, gross income and used and unused land acreage, but these surveys are reported as averages based on state, regional and industrial spatial boundaries and not on individual cases, which are the focus of accounting, or on ecological boundaries which are the focus of farming. However, if the financial accounting reports do not reflect the meanings given by farmers to their assets then they would be averse to using them for the assessment of their performance.

The emphasis in previous surveys on accounting reports and decision models failed to measure or provide indicators of the effect of adopting the dominant accounting reports within which farmers framed their assessments of success or failure. For example, what is the effect on farmers' decisions if their monitoring is based on the components of the profit and loss statement and the balance sheet in historical cost terms? The characteristics of successful and unsuccessful farmers are presumed to be known in relation to income and yields, which are productivity measures. What are not known are the attributes that relate to wealth and the maintenance of soil quality.

As a result, it was decided to monitor changes in the quality of soil as an asset in use when there are no market prices by describing the results of the decision making process through the actions of farmers. In this way, the aim was to understand the characteristics of farmers and detect similarities and differences amongst those who produce the same products.

These areas of interest could best be undertaken in describing the variables 'conducted in the natural setting where events occur without the researcher interfering with the variables' (Sekaran 1993, p.101). If possible, correlations between the characteristics of the farmers would be calculated in order to trace the influence of variables on one another relating to soil quality (wealth) and, possibly, the direction and degree of association between the variables.

The state of knowledge indicated that a descriptive survey was appropriate. Thus, the information sought came under the following headings:

- the nature of existing conditions;
- the attributes of the population;
- attitudes and practices undertaken in accounting;
- practices of accounting for decision usefulness; and

- the practices for soil quality undertaken by the population.

An explanatory survey which would seek to determine cause and effect relationships, for instance,

- sustainability and the effects on their farming practices
- attitudes of farmers towards accounting and the effect on
- their farming practices,

could not be undertaken because the variables could not be controlled.

6.2 Methodology

The chosen methodology

> provides guidelines about how research is done in the context of a particular paradigm, that is, it translates the principles of a paradigm in a research language and shows how the world can be explained, handled, approached or studied. (Sarantakos 1993, p.30)

Sarantakos argues that as a theory, positivism is inappropriate but 'as a basis of methodology it is still influential'.

For the interviews, the questions were framed in a way conducive to generating quantitative data. The questionnaire format was standardised and a series of closed questions was developed based on 'expert knowledge'. The question structure was fixed allowing no change in the question order as well as the use of fixed wording and the order of the wording.

The Delphi method of relying on the opinions of experts and farmers was employed in the collation and formation of the questionnaire (Sarantakos 1993, p.183) in an attempt to reconstruct some of the basic premises of 'reality' from the point of view of participants.

However, qualitative methods were included in two ways: (1) an 'other' category was included in many of the questions. These were classified and coded at the conclusion of the interviews and included in the analysis: (2) small groups, that is husband and wife, were interviewed on their properties. Qualitative data were sought after each of the structured questions was completed. In this way, the interview became a dialogue. The major advantage of the group process was the ability of either the husband or wife to expand on or complete each other's answers, especially when different conditions and different responses were required over a number of years and this was seen as important to the explanation.

The research consisted of 3 stages. In Stage 1 a study was undertaken of the literature and previous studies on agricultural sustainability. Several issues for further study emerged from this stage. Stage 2 consisted of a pilot study undertaken in two regions in Victoria. The aim was to gain a perspective from farmers. The issues emerging from stages 1 and 2 formed the basis of the questionnaire. In Stage 3 the questionnaire was tested after which the main survey was conducted with broadacre farmers in the High Level Riverine Floodplain land management unit in the Loddon Catchment.

6.2.1 Stage 1

Stage 1 consisted of a search of the literature, surveys and other research into the field of environmental accounting and agricultural sustainability in Australia, the United Kingdom and the United States. From this the main issues were identified. Some of these included the facts that on-farm field studies were more informative than studies conducted on research stations (Anderson and Lockeretz, 1992); profitability has been the key focus in assessing farmers, not wealth (Oram 1989, Wynen 1989, Klonsky, 1992); gross margins were the dominant method in assessing performance (Stephens 1992, Luke 1992, 1994, National Bank 1991, Farmfacts 1992, Davis UCLA 1991); the desirability of an ecological basis of study rather than an economic or political basis for determining the area of study (Gray 1987, Boulding 1978, Daly and Cobb 1989). Two areas not found in the literature was empirical evidence about; (1) an integrated approach to farm management and (2) the effects of diversification rather than monoculture as an approach to risk management.

6.2.2 Stage 2

On the assumption that management decisions and practices reflect the objectives, goals and strategies of decision-makers, a pilot study was considered an appropriate method by which the researcher could match an accounting framework with what farmers did without the researcher having a working knowledge in farming methodologies.

The selection of an area to be studied which had the most likely level of generalisability was broadacre farming because of the volume of such farms in Australia and in other countries. What was not certain was the suitability of either monoculture such as grains cropping, or more broadacre mixed farming, given the importance of the management of risk.

To test these propositions, the second phase consisted of a pilot study covering both the monoculture grains region of the Wimmera, and the diversified North Central region of Victoria. Lack of public records relating to location, farm type, size or identification details of farming businesses necessitated an identification process based on personal contacts.

Farm Management 500 (FM 500) has a membership of Victorian and southern New South Wales farmers and agricultural consultants, who, together, have developed a computer-based management program. They are articulate about both their farming and accounting activities. The FM 500 members are self-selecting and computer literate, which, it is claimed, is not representative of most farmers (Stephens 1992). They work cooperatively in groups of ten with an agricultural consultant to develop best-practice decision models or standards. In an interpretative research approach the decision-maker is the focus for understanding, thus, it was appropriate to start with their models as a basis of comparison.

Initially, several interviews were conducted with a leading farmer-member of FM 500 who directed the researcher to other farmers in both regions, both FM 500 and others. The interviews were designed to find out, from the farmers, which activities were undertaken, which costs were incurred for both operating and sustainable goals, how they were recorded and monitored, and to determine how they made their decisions for both the short-and long-term.

For the pilot study only, open-ended questions in unstructured interviews were considered appropriate, although open-ended questions have been seen as producing ‘material that is extremely variable, of low reliability and difficult to code’ (Foddy 1993, p.27).

Other social researchers (Lazarfeld 1944, in Foddy 1993, p.127) have suggested that open questions should be used at the initial stage of a project

> so that the appropriate response categories could be identified for use with closed questions, and also, at later stages in the research, to throw light on apparently deviant answers to the closed questions. (Foddy1993, p.127)

It was important to allow the respondents to be the "experts" and the interviewer the learner. The current normative position is implied in the following excerpt from Schuman and Presser (1979)

> Differences (in response distributions for open and closed versions of the same questions) will be minimised if investigators begin with open questions on large samples of the target population and use these responses to construct closed alternatives that reflect the substance and wording of what people say spontaneously (Schuman and Presser 1979, p.710).

In this project it was not possible to identify large samples of the target population. However, extensive study was made of farmer-groups own research (LCSMP 1992, Farm 500, Farmsmart Financial Management, Farm Biz), other studies and secondary sources.

From this stage it emerged that these farmers thought in terms of activities and management accounting costs; knew what their short-and long-term goals were, all of which were not necessarily expressed in their financial reports. This had implications for the development of the questionnaire in that it would have to be constructed around the physical attributes of the land and the actions of the decision-makers.

6.2.3 Stage 3

Stage 3 consisted of the development of the questionnaire for the survey reported in this thesis (See Appendix 6 for details of the questionnaire). The interviewer questioned persons who were experts - farmers, government extension officers, bankers, and agricultural consultants - in the area of study. Another group questioned was farmers in catchments adjoining the Loddon Catchment who were not necessarily experts. They were asked to offer information, pass judgments on the issue in question and make suggestions on as many variations in conditions and responses as possible. Alterations were made until all possible ideal and actual conditions were included in the questionnaire in relation to the management of soil quality. This procedure of interview, discussion and study of secondary sources continued until a stable judgment was reached. (Sarantakos 1993, p.183). This form of interview is considered to be similar to the discursive interviews described in the Delphi method.

Two people were to share the interviewing load: the researcher - skilled predominantly in accounting; and an assistant - skilled predominantly in geography. Several training sessions were held in which the interviewers guided each other through the questions. This process was repeated at intervals during the interview period to ensure that the original intentions were being followed.

Further precautions were built into the questionnaire itself. There were restrictions on the wording of the questions and the order of questions in the interview schedule. The questions were standardised and the answers determined by a set of response categories given for this purpose. Respondents were expected to choose one or more of the given options as the answer. As well as objective questions on biography, farm dimensions and farm activities, questions about subjective perceptions, attitudes and self-assessment employed Likert scales graded 'Strongly agree', 'Agree', 'Undecided', 'Disagree', 'Strongly disagree'.

Diversification was a variable which was to be studied in the context of risk management and soil quality. Therefore it was decided to eliminate irrigated and monoculture farming. The choice of a study area is developed fully below, however, the choice of the Loddon Catchment in the North Central region of Victoria was based finally on the fact that the Australian Government chose this catchment as one of five focal catchments having actual and potential environmental problems. Consequently, there was an extensive number of reports and research projects undertaken by both government and farmer/consulting groups articulating their problems and the proposed solutions. Finally, the main characteristic of the population chosen for study was broadacre dry-land farming located in the High Level Riverine Floodplain land management unit, which comprises 30% of the Loddon catchment, and contributes 40% of the farming income.

The ‘farming couple’ were identified in the pilot study, and in previous studies (Tragowel Plains 1993), as being complementary in their main concerns between financial and physical components of the business. Also, in the women’s farming organisations, women have been identified as stakeholders (FAAW 1996, Gooday 1995) and, in fact, all of them were owners. The questionnaire was tested with farmers, accountants and academic staff at the Department of Accountancy, Royal Melbourne Institute of Technology.

Farmers are frequently requested to fill in mailed questionnaires and government extension officers at the Bendigo Department of Agriculture have experienced difficulties in obtaining sufficient responses to these. Therefore, it was considered appropriate to undertake personal interviews with both husband and wife on their farming property.

6.2.4 The Contents of the Questionnaire

The questionnaire consisted in 4 sections. The purpose of Section 1 was to ascertain the physical characteristics of each farm. A second part contained questions about the physical effects farmers' activities have on each other. Section 2 contained questions about the practices the farmers undertook to maintain their soil quality. Section 3 related to the financial management of the farm, the accounting undertaken, and their marketing and competitive strategies. Finally, in Section 4 the farmers and their spouses were asked about their ages and education.

6.2.4.1 Section 1- Physical Dimensions

Section 1 consisted of two parts. Part 1 consisted of questions on the physical dimensions and products of each farm business; Part 2 consisted of questions on the extent to which farmers incurred costs or received benefits from their neighbours as a result of their activities. To ensure a degree of comparability in the responses each question was designed, where possible, to provide answers, which could be, collated quantitatively (See Appendix 6 for details).

A 'summated' scale based on the pattern designed by Likert (Likert 1932 in Foddy 1993, p. 154) rated the degree to which each gave or received costs and benefits from others. This was designed to identify attitudes of farmers to others outside their farm, both other farmers and government authorities, and also to test the strength of these attitudes. Cary (1993, p.44) had identified that farmers deny they have problems on their farms but acknowledge that problems relating to land and water exist and the strength of this belief increases the further the farmer is from the problem. A focus on the ecological unit was maintained by framing the questions according to the natural flow in the catchment, that is, either upstream or downstream of their farm.

Responses were asked for each relevant item according to the following classifications:

a. *Upstream of the catchment*

1 *Great*

2 *Some*

3 *Little*

4 *None*

b. *Downstream of the catchment*

1 *Great*

2 *Some*

3 *Little*

4 *None*

by circling on a scale of 1 to 4. In all these "Likert" questions, 1 was designated as having the highest ranking or the greatest impact.

6.2.4.2 Section 2 – Maintenance of Soil Quality

It was not possible to measure precisely abstract notions or concepts such as profit maximisation or capital maximisation. Therefore, these concepts were translated into observable characteristic behaviours. For example, if these farmers were profit maximisers, certain variables would be expected as observed behaviours; on the other hand, if farmers were maintaining their capital via their soil quality, certain activities would also be expected. The major concept in this study is maintenance of capital as represented by soil quality. The dimensions developed for this concept are soil depth, soil fertility and soil structure, as explained in Section 5.4.1, with moderating variables being location, and the ability to obtain and use information.

Section 2 contained questions about the practices and costs incurred in managing soil quality. Soil management practices have been identified as a major long-term factor in maintaining soil quality (Milham 1994, Sinden 1989). The questions in this section related to the three attributes of soil, depth, fertility and soil structure, what practices farmers employed, and how these practices affected costs and income. Salinity was not mentioned because other research in the Loddon catchment in both 1988 and 1992 (Cary 1993) identified that farmers deny the existence of salinity on their own farms. What is known in the literature are the causes and effects of salinity on soil depth, soil fertility and soil structure. Therefore, farmers were asked if they had any problems with soil depth, soil fertility, or soil structure, what caused these problems and what it cost them. All farmers were asked to report on their practices. The farmers who had problems were asked what they did to alleviate problems. To avoid non-response error, if farmers reported that they had no problems, they were asked what they did to avoid any problems (Refer to Questions 17, 24 and 31 in Appendix 6). Farmers were encouraged to explain what they meant by their answers, when these activities were employed or not, and why, that is, they were encouraged to explain and justify their methods. Thus, the questionnaire was a starting point.

Analysis of the research undertaken by the Loddon Catchment Salinity Management Plans Groups and Victorian Departments of Agriculture, and Conservation and Natural Resources, identified sound farming practices for the region as well as the practices which are seen as causing problems. In the questionnaire the farmers chose from a broadly based set of options. These options were included only after the researcher was sure that the answer options were comprehensive and appropriate (Foddy 1994, p.142). An 'other' category allowed farmers to add their individual choices; the more frequent of these were to be coded and analysed. Because 'other' is considered to be inadequate (Foddy 1994, p.142), extensive notes were to be taken during the interviews[i] . Respondents were encouraged to discuss their answers fully whilst notes were being taken. It is important to remember that the questions in the Appendix 6 were only the starting point for discussion. As indicated in the following section, Section 6.2.4.3 Section 3, other researchers have noted many variables which would have long-term consequences but have yet tended to ignore them.

6.2.4.3 Section 3 – Financial Management

In Section 3 the major objective was to discover the nature of the financial information farmers used over both the short-term and long-term. Further evidence of their goals was obtained by the use of Likert scales in questions relating to the most important variables in determining their competitive position and the use of market prices in their marketing strategies.

Farmers are simultaneously (Martin and Savage 1988) seen as overcapitalising their farms based on land values vis-a-vis their incomes, whilst at the same time having a low rate of capital investment compared with other industries. ABARE figures indicate that productivity growth was much more rapid in agriculture than in the economy as a whole. Growth in the capital stock has been much slower as indicated in Table 6.1. Technological advances in Australia have saved both labour and capital but more so capital. This, however, indicates a short-term analysis on the part of ABARE. To date, nobody knows the investment which has been put into farmer's soil quality because it is seen as unmeasurable.

Table 6.1 Annual Changes in Capital, Labour, Output and Productivity Growth, 1965-1985-86

Sector (%)	Capital Growth	LabourGrowth	Output Growth	Productivity Growth
Agriculture	0.29	-0.91	2.43	2.76
All Sectors	3.97	0.99	3.40	1.12

Source: W.J.Martin and C.R.Savage. Development in Australian agricultural capital. ABARE paper presented at the 32nd Conference of the Australian Agricultural Economics Society, La Trobe University, 1988.

For example, in the Industry Commission publication, *Land Degradation and the Australian Agricultural Industry* (Gretton and Salma 1996), the same results were reported, but again, the components and causes of productivity increases were linked to annual productivity increases and any long-term component was not recognised, measured or made visible. The

Commission undertook an examination of the relationship between productivity growth and possible causal factors. The examination found such things as ‘learning by doing, farmer experience, education attainment in the community generally’ (Gretton, and Salma 1996, p.9). Farms are considered to have a very low R and D activity level, so that any increase in wealth brought about in soil quality, the major capital asset of farmers, is excluded. It is included, by default, in what is called a Multi-Factor Productivity Measure, which has a short-term connotation.

An effort has been made in this thesis to isolate some of these factors and they have been grouped under the concept and measurement of capital as represented by soil quality. Information acquisition is also acknowledged in this thesis and was intended to provide some indications of short-term and long-term decision making and management ability.

This occurred in two ways; (1) an indication of long-term knowledge acquisition was indicated by the various farming methods used and their various combinations; and (2) the use of two concepts of opportunity cost and business income developed by Edwards and Bell (1961) and the attributes of uncertainty assumed away by Milham (1994) but acknowledged in this thesis. Likert scales were one of the tools used to measure the latter attributes by obtaining the perceptions of farmers and how they rated themselves as managers of uncertainties. Another was in the soil quality model.

6.2.4.4 Section 4- Demographic Data

Section 4 covered the biographical background of the farmers. Their ages and how many generations had been in farming, which was another indicator of long-term success or failure. Both spouses’ levels of education were included, where they saw themselves in five years time, and if the farm was to be passed on to the next generation. The interviews were conducted during a time of drought and it was thought in the development of the questionnaire that it might prove an important variable in the plans of these farmers.

6.3 Selection of The Area to be Studied

The sample area to be studied should ideally be based on an ecological unit rather than an economic unit. Economic units can be classified according to an industry category, for example, wheat, sheep, or beef farming, and/or within a political region which, in spatial terms, can be at one of six levels of identification:

1. regions or states
2. catchment level
3. local government jurisdictions
4. landscape or sub-catchment level
5. within sub-catchments at the neighbourhood level
6. property or household level.

Levels (1) to (4) would include a large number of farming establishments but the survey would have to rely on public data, and could not be delineated according to the boundary of an ecological unit. This latter requirement was more likely to be met through levels (5) and (6) which described the geographical area within which each farm was located.

Various farming activities such as piggeries and other intensive farming activities are classified as agricultural, therefore, broadacre farms could not be distinguished using public data. As well, public records are kept on a title basis and many titles could constitute one farming business. Tracing these titles would be difficult through the local government records because names can be different within one family farm.

Another approach was to find the most appropriate categorisation which avoided the overlapping of boundary choices made; and that was one associated with the Population

Census. The Collector's District (CD) mapping unit is formed by the aggregation of land parcels or properties embracing occupied households; this provided information on the total number of occupied households at the smallest level of aggregation. CD's are aggregated to conform with the boundaries of local government areas (LGA's). Local government jurisdictions collect records on an assessment, not a household basis, and some farms could comprise several assessments listed under various titles, therefore, they were not an appropriate source to determine the population. LGA's are aggregated to form statistical divisions (SD's); and SD's are aggregated to conform with the boundaries of states/territories, with these units finally constituting the nation's landscape. This approach was finally abandoned.

The final approach to gain information about farmers on an ecological basis and compare farms with the same physical attributes was achieved in the following manner. The smallest Collector's District maps were superimposed over the Land Management Unit maps and from these, various investigations were made to obtain an approximation of the total farming population within the land management unit. These investigations are detailed in Section 6.3.1.

6.3.1 The Determination of the Ecological Unit

6.3.1.1 The Description of Catchment and Sub-Catchment

In this section, details of the process by which the survey area was clarified is described. Political boundaries such as shires cut across natural boundaries, therefore, it was necessary to proceed through the various levels of an ecological unit. The catchment is an area which, through run-off or percolation, contributes to the water in a stream or stream system.

Sub-catchments are smaller units and comprise the land drained by a collection of streams flowing toward a common point. The Loddon catchment constitutes nine sub-catchments. The catchment and sub-catchments are the first ecological levels, and the Land Management Units (LMU) are the second.

The Loddon catchment is part of the North-Central region of Victoria which comprises one and half million hectares of land, situated between the northern foothills of the Great Dividing Range and the irrigation districts of northern Victoria. Cropping and sheep for wool and meat production are the major broadacre farming enterprises in the region (Kennelly 1996, p.1). The area supports approximately 1200 commercial farms, primarily managed for wool, beef, fat lambs and grain production, with potatoes grown in the upper catchment areas. Wool production is the major enterprise accounting for 47% of the gross value of agricultural production, which was calculated to be $103 million in 1988/89 (ABS Agricultural Census for 1993-94, LCSMP 1992 P. x, 3, Appendix 7 for map of the study area).

6.3.1.2 The Justification for the Choice of the Land Management Unit - High Level Riverine Floodplain

For planning purposes the catchment has been divided into Land Management Units (LMU's). These units group together areas with similar groundwater and salinity features. There are 12 LMU's (LCSMP 1992, p. 48, 117) in the catchment which provided the basis for the government in evaluating salinity control options in the catchment. The area chosen for this study, the High Level Riverine Flood Plain (HLRF) comprises 31% of the Loddon catchment area. This choice was made because it was considered a major source of commercial broadacre farms in the one land management unit, and it was economically important in that it provided forty percent of the agricultural production for the whole Loddon catchment.

6.3.1.3 High Level Riverine Floodplain (HLRF)

Each LMU encompasses the area of the catchment which has similar geology, physiography, soils, land use, ground water and salinity. (LCSMP 1992, p. 117). Thus as all the farms in this study belong to the same land management unit, they will have similar problems and consequently similar solutions. This conforms more to an ecological management unit rather than a political management unit such as a shire.

6.3.1.4 Sub-catchments within the HLRF.

Of the nine sub-catchments in the Loddon River catchment five are within the LMU of this study. They are ranked for possible and actual salinity problems in the LCSMP according to the following criteria:

1. Present extent of salinisation;
2. Future extent of salinisation;
3. Contribution to Loddon River salt loads;
4. Level of environmental degradation due to salinity; and
5. Level of community awareness about salinity.

Based on these criteria whole sub-catchments have been given a priority ranking for salinity control. The sub-catchments and the salinity assessment for each in the study are as follows. High Priority Sub Catchments are, Bet Bet Creek, Mid Loddon, Bendigo/Myers Creek and Loddon Plains. Medium Priority Sub Catchment in the study is Bullabul Creek (LCSMP p. xv)

It was intended to achieve a representative number of farms in each sub-catchment, therefore as each farm was identified it was classified according to the sub-catchment it was in. It was not possible to know how many interviews would be conducted, therefore, a tally would be kept to avoid one or two sub-catchments being over represented. In addition, the location of each farm was noted. As each farmer was contacted and subsequently interviewed, the farm was coded for its sub-catchment and location. It was hoped that in the analysis, similarities and differences could be detected based on the position of the farm. For example, if water problems are the greatest as proposed in the Bendigo/Myers Creek, it was hoped that the responses by the farmers would allow that to emerge in the results. It has also been proposed that farms on the river flats have such an advantage that they are least likely to seek information.

6.4 Selection of Respondents

One of the variables identified earlier to be tested was the value of diversification, thus, some farming businesses, such as irrigation farming, horticulture, dairying, vineyards and hobby farms were excluded. For the remaining area of the High Level Riverine Floodplain most farms were operated as a mixture of sheep and cropping broadacre farms. There were no public data on the number of viable broadacre farmers in the study area, therefore, a process of identification was undertaken to develop a comprehensive list.

In the Loddon Catchment, for the 1200 commercial farms the average farm size is 480 hectares (1056 acres) (LCSMP, 1992). Throughout all the identification process, all outside parties, governments, researchers and such groups as Farm 500 had delineated that 1000 acres was the smallest size for commercial viability. This was based largely on the published acreage and income figures available to government. This has become an acceptable industry standard although there is no proof that the income figures reflect the true result for the farm. However, this categorisation was followed in this thesis although the evidence about the viability of smaller farms is limited. It was considered more likely that the larger farms would provide a more reliable and uniform group.

The High Level Riverine Floodplain comprises 31% of the Loddon catchment, therefore it was assumed that one third of commercially viable farms equals 400. The identification process used the 1992 Census of Agriculture, which was collected on a Collection District basis for the four relevant Shires, namely, Korong, East Loddon, Bet Bet and Marong, which includes cropping and livestock data collected in the annual Agricultural Census from establishments undertaking agricultural activity. Hobby farms were eliminated according to the criterion used by ABARE and the ABS when determining commercial viable.

The definition of an establishment as a commercial farm rather than a hobby farm is based on what is called the Estimated Value of Agricultural Operations (EVAO). Up until 1987, EVAO had to be at least $2,500, after which it was increased to $22,500.

According to these figures there are approximately 750 farms economically viable in the shires which came within the High Level Riverine Floodplain. Table 6.2 gives the total number of farms as derived from the census.

Table 6.2 Establishments in the Interview Population by Year from 1987 to 1994 Based on the Shires Approximating the High Level Riverine Floodplain Land Management Unit

EVAO	$2,500	$20,000	$20,000	$20,000	$20,000
Shires in Years 1987 - 1990	1987	1988	1989	1990	1991
Korong. Decrease of 24% in 1987	295	217	209	217	214
East Loddon. Decrease of 7% in 1987	215	203	201	198	184
Bet Bet. Decrease of 26% in 1987	126	89	85	93	96
Marong. Decrease of 31% in 1987.	339	229	224	231	239
Total	975	738	719	730	733

Source: ABS Agricultural Census, 1992.[ii]

However, the number of 733 farms does not indicate the type of farming undertaken, and these figures do not indicate the number of farms leased or operated as one business unit by members of the same family.

In Bendigo, Victoria, a government funded research project, The Centre for Land Protection Research and Farm Advance undertook a study of farms which were known to use a farm management workbook, Farm Smart[iii]. Using Australian Bureau of Statistics figures and the criteria of $100,000 minimum turnover, they claimed that only 20% of the broadacre farms in the Farm Smart area were of an economic size. The remaining 80% were considered uneconomic and were probably managed as hobby farms with the bulk of income being derived from off-farm activities. This was especially true of the dairy farms. Thus the Centre for Land Protection and Farm Advance believed there may only be as few as 500 viable broadacre farms in the entire area covered by Farm Smart. This provided a guideline for the potential number of broadacre farms in the High Level Riverine Floodplain as between 200 and 300 farms.

6.4.1 Survey Farmers

The final number in the population in the High Level Riverine Floodplain of the Loddon catchment were determined as follows.

Census data are reported on a political boundary basis, so the Collection District maps were overlaid on the four relevant political units: the shire maps showing Korong, East Loddon, Bet Bet and Marong. The result was an estimate of the number of farming establishments based on census data. These maps were then overlaid on the High Level Riverine Floodplain map and this gave an estimate of the total farms in the High Level Riverine Floodplain.

These data did not indicate the names of the farmers or which farms were broadacre, or their size. The Country Fire Authority produces maps that show the location and name of the property holder of every building for rural Victoria. In total, the maps indicated the total number of farms to be 1505. Subtractions were made for consolidation of family holdings, farms smaller than 1000 acres, piggeries, sheds, hobby farms and irrigation farms. The final number was 251 farms. The services of Farm Advance were employed by the researcher to undertake a farmer survey to identify every nominated building in the area (Farm Advance

1994). The results of this investigation were then compared with ABS (1992) figures and the profile of the members of Farm Advance and are shown in Table 6.3.

Table 6.3 Validation of Sample Size

Size (acres)	No. of farms >1000 acres in Catchment	%	No. of Survey farms > 1000 acres	%	No. of Farm Advance farms > 1000 acres
1000 – 1999	579	68	39	50	42
2000 – 3999	222	26	22	32	27
4000 – 5999	39	5	8	12	3
6000+	17	2	4	6	3
Total Number	857		73		750

Source ABS 1992, Farm Advance Membership Records 1993.

What these figures reveal is that according to the criterion of a minimum of 1000 acres or 599 hectares, 857 farms or 30% are viable according to ABS Census 1992, 750 Farm Advance fulfill this criterion. Using the same criterion, it was estimated that because the High Level Riverine Floodplain comprised 30% of the Loddon Catchment, and 100% in the three catchments who fulfilled this criterion comprised 857 farms, the number of commercially viable farms in the HLRF would be approximately 287 farms. For the survey area 251 farms were identified therefore it is fairly certain that nearly 100% of the farms were counted. As well, it can be stated that the survey farms were representative of the catchment (complete calculations can be found in Appendix 8). Table 6.4 outlines the adjustments made to the initial population which resulted in a possible 155 farms to be interviewed.

Table 6.4 Total Possible Number of Farms to be Interviewed

Initial Population	251

Less adjusted population to take out repetition and multiple farms managed as one business to determine similar units	58
Contacted all 193 farmers. Contact response rate was 100%	193
Less Adjustment for wrong criteria not as described	38
Possible total to be interviewed	155

6.4.2 Justification for Exclusions and Adjustment to Account for Ninety-Six Farmers not Interviewed

To prevent the over-representation of any one area, a process of stratification was undertaken. This process was also undertaken in order to balance the response in each sub-catchment as to size, location, and in proportion to the larger population. For example, extreme conditions were controlled by the exclusion of farms too small to fit the criteria. This accounted for a further 38 farms as detailed in Table 7.1. Because a complete account of all farms could not be made until the survey was undertaken further details will be given in Chapter 7.

6.5 Summary

In this chapter it was explained that an interpretative paradigm has been chosen because it was necessary to understand the concepts of productive capacity from the point of view of the farmers. The research consists of three stages. Stage 1 consists of a search of the literature into agricultural accounting and sustainability. In Stage 2 a pilot study was undertaken from which it was decided to concentrate on the broadacre farming in the Loddon Catchment, Victoria.

Stage 3 consists of the development of the questionnaire. This was designed to test the three issues identified in Section 5.1, namely: the accounting used by the farmers; their responses to the entity-based productive capacity concepts recommended in the literature; and their responses to a proprietary productive capacity model. The survey consisted of interviews with both husband and wife in which they were asked to complete a questionnaire based on the information discussed in Section 6.2.4. The questionnaire included both closed and open questions and the respondents were encouraged to explain their answers.

Finally, the selection of the area to be studied was determined. It was explained that there were no publicly available records on either an ecological unit or the identity of the farmers. The validation of the final population was undertaken by comparing with ABS and ABARE sources and at the time of contact with the farmers.

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[i] The qualitative data did provide fuller development of the typologies of farming methodologies. For example, gross margins are widely recommended as an important performance indicator. This measure became meaningless in a mixed farming business where paddocks were used for different purposes depending on the quality of the soil. Movable fencing was used to control the use of pasture by livestock.

[ii] See Appendix 8 for a breakdown of the Census Data 1992 and how it reconciles with the number of farms in the equivalent geographical area covered by the farmer group Farm Advance.

[iii] The Farm Smart area covered three adjoining catchments, the Avoca, Loddon and Campaspe.

Chapter 7
Results

7.1 Introduction

In the present chapter, the issues identified in Chapter 5 are investigated. This involves collating, synthesizing and analysing the empirical evidence obtained from the farmer questionnaire survey developed in Chapters 5 and 6.

In Chapter 4 it was demonstrated that neither the government recommendations for indicators nor the accounting theories upon which they are based have been the subject of empirical research or operationalised. It was stated in Chapter 5 that the current government policies and financial indicators do not explicitly mention productive capacity or soil quality. It was also stated in Chapter 2 that the recommendations to farmers in both the physical and financial dimensions of farming are formulated predominantly according to the attributes associated with entity thinking. Therefore, this chapter consists of three main sections namely: (1) Validation of the sample surveyed;[i]. (2) Testing the accounting recommendations for agriculture both in terms of the entity view and the extent to which they are relevant and appropriate to farmers in the management of their productive capacity; and (3) The response by the farmers to a proprietary soil quality model as being representative of their productive capacity.

7.2 Validation of Survey Parameters

Of the possible total of one hundred and fifty-five farmers to be interviewed, interviews were conducted with seventy-three farmers, giving a response rate of 47%. It had been possible to calculate an initial population of 251 in the HLRF through public data. Informed community groups, using local knowledge, reduced the possible contact number to 193. Each of these 193 farmers was sent an introductory letter that explained the nature of the survey. However, further reductions to the survey population were made as each of the farmers was contacted by telephone. These reductions are discussed in more detail in the following sub-section.

7.2.1 Justification for the Exclusion of Farmers

As a result of personal contact, a further 38 of the initial 193 farmers were eliminated from the survey either because they were in a different business, for example, irrigation, or because they were too small. Stratification between sub-catchments was undertaken as far as possible in regard to location and in proportion to the larger population and this resulted in a further twenty-two farmers being eliminated. Other reasons are listed below which accounts for the 155 farmers from the initial population of 193 farmers.

Some farmers could not be interviewed due either to the retirement of the farmer or the death of the husband that led to the leasing out of the farm. At least one farm was being leased out until the children were old enough to commence farm management. In other cases, the farm had been sold to a member of a family who was including it in another farm acreage as part of the business. Some of the farms were part of a bigger farm that was managed as one farm with the other parcels of land in the same sub-catchment. A reconciliation between the total number of farmers contacted (193) and the number interviewed (73) is shown below.

Table 7.1 Number of Farmers Interviewed

Total number of farmers contacted		= 193
1:	Wrong criteria (Too small or irrigated)	(16)
2:	Not needed - extreme examples, or to maintain balance between sub-catchments	(22)
Reasons for not Interviewing		
3:	Refused to be interviewed	(13)
4:	Unable to be contacted	(35)
5:	Too busy	(7)
6:	Retired	(8)
7:	Selling or sold farm	(1)
8:	Illness	(3)
9:	Deceased	(2)
10:	Leasing farm out	(3)
11:	Evasive	(3)
12:	Returned letter	(7)
Total number of farmers not interviewed		= 120
Total number of farmers interviewed		73
Total number of useable interview questionnaires		72

Note in Table 7.1 that a population of seventy-two farmers was used for analysing and reporting the findings due to the limited data emanating from one interview.

Based on figures for the Loddon Catchment and the membership list of the Farm Advance Group it may be concluded that the survey farms were representative of the population. Below in Tables 7.2 to 7.5 is a further breakdown of the seventy-three farmers interviewed according to different characteristics. Each is classified according to the five sub-catchments of the HLRF Land Management Unit of the Loddon Catchment, and size range. Note that a population of seventy-two farmers was used when analysing and reporting the findings due to the limited data available emanating from the one interview. The results are reported in acres because the farmers were comfortable with this measure.

Table 7.2 High Level Riverine Floodplain Land Management Unit of the Loddon Catchment

(i) Sub-Catchment	Population Size	Respondents Interview	Response Rates
Bullabul Bet Bet	11	4	37%
Kingower Korong	35	11	32%
Mid Loddon Marong	47	17	36%
Loddon Plains Marong E.Loddon	61	17	24%
Bendigo Myers Creeks	40	24	33%
Total	193	73	100%
Total able to be interviewed (see above)	155	73	47%
(ii) Size (acres)			
0 - 0999	Unknown	4	
1000 – 1999	Before	35	
2000 – 2999	Contact	18	
3000 – 3999		4	
4000 – 4999		4	
5000 – 5999		4	
6000 – 6999		1	
7000 – 7999		1	
8000 - 8 999		2	
Total		73 farms	

At the time of the interviews each farm's location was recorded according to its place in the sub-catchment to which it belonged (See Appendix 10 for survey population classified by size and sub-catchment). It was suggested that diversity and individuality may be partly a function of location. It proved to be difficult to verify the effects of location within farms because of the lack of detailed data, the exception being laser levelling; however, externalities did tend to be location specific which could get lost in the aggregate, for example, forestry and infrastructure effects, and water management. The results in Table 7.3 indicate that few farmers farm on the watershed, while the river flats were more closely held in the control of a few families who would not sell that part of the farm except on sale of the whole property.

Table 7.3 Survey Population Defined by Location

Location	Frequency	Percentage
1 Watershed	9	12.5
2 Middle	32	44.5
3 End	25	34.7
4 River flats	6	8.3

Interviews were conducted between July 1994 and February 1995. The last full season was 1993-94 and all data were collected for that year. Interviews were suspended during important management periods in the farming year; for example, the farmers were not approached until after the worst of the 1993-94 drought had abated, until after the autumn break in 1994, and after the harvest periods in 1994 and 1995. Consequently, the interviewing process took considerably longer than originally anticipated.

7.3 Demographic Profile

Before the interviews were undertaken, it was not possible to determine several important variables. These were: (1) the size of each farm; (2) the type and scale of production between cropping, grazing or both; (3) the number of people working on the farm, their ages and sex; and (4) income levels. As discussed in Chapter 6 it was important to try to exclude the farmers who were not commercially viable.

The remainder of this section contains details of the physical characteristics and demographic features relating to the overall area devoted to broadacre farming in the Loddon catchment, compared with the relevant data of the survey area. This includes physical dimensions, size of properties relative to ABARE figures for the Loddon-Campaspe regions and Victoria, yields for cropping and grazing and a comparison of age and educational statistics.

7.3.1 Physical Dimensions

The total number of acres in the Loddon catchment is almost 2.5 millions acres or 1 million hectares, of which 1,423,296 acres (576,000 hectares) are devoted to broadacre farming. In the sub-catchments surveyed, the Bullabul Creek, Kingower-Korong Creeks, mid-Loddon, Loddon Plains, and the Bendigo-Myers Creeks the total area devoted to broadacre farming is 1,348,742 acres (539,497 hectares). The survey area, all broadacre farms, comprised 191,193 acres or 14.17% of the sub-catchments or 6.7% of the Loddon catchment.

In the survey area, of the total property size, land owned is 173,739 acres (90.8%), and land leased is 17,454 acres (9.2%). The major farming activity is sheep grazing (148,761 sheep), and some cattle grazing (6,804 cattle). Total area of land that was cropped in 1993/94 was 48,920 acres (25.50%). A good proportion of this cropping was either for fodder or as a supplementary form of income. Of the grains, 20% is kept and 80% is sold because it is dryland cropping. The total area of land in the survey that was used for grazing in 1993/94 was 131,949 acres or 69.00%, and the number of acres under pasture was 124,401 acres or 94.20% of the acres used for grazing. Of the acres under pasture (124,401 acres) 15,092 comprised native grasses or 12.10%.

To verify that the survey area was representative and a meaningful study area, a comparison was made for the same year 1993-94 between the survey area, ABARE figures for the Loddon-Campaspe catchments (ABARE's smallest collection area) and Victoria. The results are shown in Table 7.4:

Table 7.4 Average Property Size

	n=72	n=54	n=131
Average Property Size in Acres	Survey Area Acres	ABARE Loddon-Campaspe Acres	Victoria Acres
Mean	2655	1418	2215
Range	700-9000		

ABARE Census figures for 1993-94.

More complete information is given in Table 7.5. What can be noted in Table 7.5 is the diversity in size. The size of areas cropped, grazed, owned and leased in the survey area indicate commercially viable farm businesses, and a security of tenure evidenced in the comparison between the areas owned and leased. According to these farmers diversity gives them the choice of cropping or grazing which may be one reason for the small number of acres not farmed. These different measures could also indicate diversity in efficiency measures that are dependent on location, that is, place in the sub-catchment, rainfall, and soil characteristics. It was also postulated, but could not be proven, that the length of time each farm had been in the one family would have an effect on soil quality. However, the data in

Tables 7.2, 7.5 and 7.6 verify that the survey farms are representative of the larger farms in the region and are able to be commercially viable. A summary of area operated compared with census figures for the catchment area and Victoria is shown in Table 7.5 and the full details can be found in Appendix 11.

Table 7.5 Dimensions of Farmed Area Compared with ABARE and Victoria for the Years 1993-94

	n=72	n=54	n=131
Area Operated Acres	Survey Area %	ABARE Loddon-Campaspe %	Victoria %
=/< 1500	29.2	51.3	33.4
>1500<2000	20.8	35.4	35.2
>2000<3000	28.0	11.1	17.2
>3000	22.0	2.1	14.3
Av. Area Grazed			
Mean	1832	n/a	n/a
Av. Area Cropped			
Mean	679.4	256.0	947.0

ABARE Census figures for 1993-94

The figures for yields in Tables 7.6 and 7.7 can be confirmed by comparing them with the published figures from the census undertaken by ABARE in the same year as the survey. The farmers in this survey were willing to divulge the current yields they achieved. Considering that the survey was undertaken at the end of a drought season the figures are comparable with the normal range for the Loddon-Campaspe Catchment for the population. The ABARE figures reveal that for grazing the average was 2.3 DSE, while for cropping the average yield was 2.07 tonnes (ABARE 1993-94).

For grazing, the survey farmers averaged 1.5 DSE, while for cropping the average yield was 12.5 bags. The figures again reveal several relevant measures and as well both grazing and cropping yields less than the average obtained by ABARE for the two catchments. Further investigation is needed to determine whether these results reflect poorer productivity or a balance with the requirements for maintaining soil quality, that is, do they reflect a balance between the short term and the long term. In Tables 7.6 and 7.7 it is noted that for both grazing and cropping approximately 67% of the farmers produced slightly less than the ABARE average. Many other factors may be involved in an explanation and in part this was examined in Section 7.5. What can be concluded from these figures is that the survey reflects the results for the whole population in the statistical region of Loddon Campaspe Catchment.

Table 7.6 Yield for Cropping and Grazing Production Survey Respondents

Cropping		Grazing	
Average yield	12.5 bags	Average yield	1.5 DSE
Range	7 – 20 bags	Range	.5 – 3 DSE
67% of survey farmers	7 – 12 bags	73.6% of survey farmers	.5 - 1.9 DSE
30% of survey farmers	13 – 20 bags	26.4% of survey farmers	2 – 3 DSE

Table 7.7 Range of Yield for Cropping and Grazing Survey Respondents

Cropping Range of Yield - Bags	Percentage of Farmers	Grazing Range of Yield - DSE	Percentage of Farmers
7 - 9	4.2	.5 – .9	8.3
10 - 14	67.6	1 - 1.9	65.3
15 - 19	25.4	2 - 2.9	25.0
20	2.8	3	1.4

7.3.2 Demographic Data

One of the characteristics noted in the public data is the aging profile of the farming population. As well, it is assumed that the sons are not returning to the farm after their formal education, and that those who do return are not very well educated. Therefore, the conclusion is made that the intellectual capital on the farm is being depleted (Luke 1992). This is given as one reason why farmers seem not be adapting to modern farming and management practices, particularly financial management.

The concepts used in the Recognition of Prior Learning (RPL) would indicate that technical skill in farming is not the same as knowledge gained from formal certificated education. That is, intelligence may be high but not formed by external formats during a formal education. The lack of farm management skills written about in the literature is largely based on the assumed lack of financial management skills. There is little public knowledge about the extent of management accounts and farming methodologies used by farmers, these being the attributes which would give a more accurate picture of the skills the farmers have.

Table 7.8 Education Level of Survey Respondents

n=72	Secondary Education up to Year 10 %	Above Year 10 including Post Secondary %
Husband	66.2	33.8
Wife	40.6	59.4

Table 7.8 indicates that 33.8% of the husbands and 59.4% of the wives has post Year 10 education including post-secondary education. This question did not seek information about any courses the farmers and their wives had undertaken since the end of their formal education, although in response to another question many stated that they had attended several

TAFE and other short-courses in order to improve their technical skills such as wool classing, motor mechanics and office management. The figures for the Loddon Campaspe Catchment (ABARE 1993-94) reveal that the average male farmer attended four to five years of high school, with the minimum being attendance at high school and the maximum having a University degree. The education level for their spouses indicates that the average female farmer attended five or six years of high school, with the minimum having attended or completed primary and the maximum having a University degree.

Table 7.9 indicates the age and number of generations each spouse had been in farming families. This was used as a surrogate for a thorough acquisition of the knowledge of their land. The demographic records consist of census data (unobtainable under law) and records of titles at local council chambers. It would be the exception for land titles to coincide with either existing farming acreages or the current operator due to the number of generations in the family still living. In some of the subsequent interviews, up to three generations were present, and, in many instances, both the father/mother and son/daughter-in-law managed various parts of the farm. For this reason, the main managers of the farm were asked their ages, and the number of generations each had been in a farming family. The responses are detailed in Table 7.9 below:

Table 7.9 Demographic Data of Survey Respondents

N=72	Husband – Age Years	ABARE Husband Age Years	Wife Age Years	ABARE Wife Years	Generations on Farm – Husband	Generations on Farm - Wife
Mean	51	56	47	55	3.5	2.5
Minimum	24	39	22	36	1	0
Maximum	73	78	69	73	5	7

As to the age of those in the sample, it appears that in 1993-94, 48.6% of the husbands were 51 years or younger (ABS census 53 years, ABARE broadacre 56 years), 19.5% were between 51 and 57 years, 26.3% were between 58 and 69 years, and 5.6% were between 70 and 73 years.

The data for their wives showed that 54.2% were 47 years or younger, 19.4% were between 48 and 57 years, 26.4% were between 58 and 69 years, whilst none were older than 69 years. The proportion of husbands and wives who were the only operators on the farm was 54.2%, many parents having retired from the farm business. The parents in the family retained ownership, many lived in another house on the property and, although retired, worked on a seasonal basis for their children.

The statistics for the population overall indicate an aging population, with 49 years the average in 1979 and 53 years the average in 1995 (ABS 1997). For broadacre farming, up until 1994, 60% of household members were under 40 years; while after 1994 50% of household members were under 40 years. This trend is common for populations world-wide in both agricultural and non-agricultural groups. More important than absolute age is the possibility that long-term experience coupled with several generations in the one business may also indicate an accumulation of knowledge over a longer unbroken period rather than age being connected with obsolescence. For example, one farmer’s son purchased an adjoining block of land next to where his father had been for thirty years. The son reported that even if he copied everything his father did he could not achieve the same high results and claimed that this was evidence of long-term care and attention to the soil quality.

Evidence of continuity of farming in the area was supported by the results which showed that for the husband, 43.1% had been in farming families for 1 to 3 generations, and 56.9% had been in farming families for 4 to 5 generations. The data for their wives showed that 68.1%

had been in farming families for 1 to 3 generations while 31.9% had been in farming families for 4 to 7 generations (see Table 7.9). This would seem to add significant depth to their knowledge in RPL terms. They also indicated a desire to continue farming (refer to Table 7.10 below) and to pass their farms on to their children. This was reported with some confidence with a majority of the farmers who already had two generations farming different parts of their farm with various levels of responsibility.

Table 7.10 Where the decision makers see themselves in five years

Information Set	Percentage % n=72
Stay on the farm and depend less on farm income	23.6
Stay on the farm and depend more on farm income	20.0
Same as now	65.3
Farm elsewhere	4.2
Leave the farm for another job	1.4
Leave the farm to retire	6.9
Other	5.6

Four conclusions emerge from these findings:

(1) The ages of the farmers and their wives are typical of the wider population and younger than the published statistics for the farming population for the region.

(2) Farmers and their wives have long-term knowledge of their area, and farming is still viable for them and their families, indicating care has been taken to obtain continuity and a will to maintain the farm for the future.

(3) Over half of the farms were operated by sons even though the titles were still in the name of the fathers. 46% still have older family members in another dwelling on the farm.

(4) The size of the survey farms are of viable commercial size with many in the top 20% (Farm 500, NAB 1998).

7.4 Influence of Governments and the Accounting Profession on the Survey Farmers

7.4.1 Introduction

There are three Commonwealth Government policy initiatives in response to land degradation: (1) salinity management where the individual farmer is encouraged to become involved in community education, grants and incentives; (2) financial indicators; and (3) market prices as a means to allocate and value resources. As discussed in Chapter 2 the Commonwealth Government's aim is to have information on identifiable and comparable physical and financial indicators at the regional and catchment levels.

7.4.1.1 Salinity and Soils Research

To test the relevance of this policy to the survey farmers, each of the respondents was asked the proportion of their property that was unusable due to salinity. In this survey 96% of farmers said there was no salinity on their land (see Appendix 11), and given the location maps of the Loddon catchment, this may be true.

In answering the question, to what extent are government policies which are based on entity thinking helpful to farmers, if they are proprietary, in maintaining their soil quality, it appears that the farmers are not able to respond at least in regard to salinity. They cannot respond to policies that do not relate to their everyday management. Soils research is a major omission of government policy and, consequently, the farmers rank government information and government incentives very low in their priorities for information.

The major policy relating to the Loddon Catchment is ‘managing salinity catchment-wide’, presumably in response to the funding guidelines from both the State and Commonwealth Governments. It should be noted that as at 1993-94 the amount of salinity in the central Loddon catchment, the survey area, was not an issue except for the Bendigo-Myers Creek (LCSMP 1992). Two explanations for farmers’ non-response arise from this policy: (1) that the farmers focus on early detection of largely invisible signs; and (2) that the farmers may not respond to a policy targeted at the catchment level.

The first point verifies that the topic of salinity is particularly problematic. The symptoms are invisible and long term in development, and the causes are sometimes outside the control of the farmer. It was stated in Chapter 5 that farmers have the information to manage early, invisible signs of problems with their soil. In addition, farmers may not have an incentive to respond to policies aimed at the catchment level when the more immediate problems are soil acidity, soil compaction and other causes of degradation which relate to soil quality itself. The responses by the farmers indicate that their main concerns are more focussed on managing earlier signs of salinity rather than salinity itself.

The second point highlights the fact that policies are directed at the aggregate, whereas problems and farming methodologies are seen by the farmers as demanding individual attention. At the individual level, the correct messages may not be received because the farmers do not relate the policy direction to themselves. It could also be that non-responses are mis-interpreted as indicating a lack of awareness of the existence of salinity on their land.

In a previous study of the Loddon Catchment (Cary and Barr 1992) farmers also reported that they did not have any land affected by salinity. The conclusions in the literature assume that either the farmers do not know if they have salt affected soil or that they are in denial.

In previous studies in Australia, an analysis of both economic and attitudinal characteristics has shown that adopters and non-adopters could not be distinguished by their personal or family characteristics, but rather by their economic characteristics and the economic potential of their land (Sinden and King 1988)[ii]. Therefore it was considered inadequate in this survey merely to ask farmers for their opinion. To avoid a misinterpretation of the farmer's responses, salinity was mentioned only at this time in the interview. The farmers' response may also explain why farmers do not seem to show the need to respond to government initiatives in regard to salinity. As noted earlier the soil quality model was intended to determine how the farmers manage individual attributes of their soil.

7.4.1.2 Grants and Incentives

Apart from community education on salinity, the government has initiated fiscal measures to encourage investment into reducing or preventing salinity for the catchment. The farmers were asked the question,

- Which grants and incentives from the Department of Conservation and Natural Resources have you heard of or used?

It appears that the farmers are not able to respond to a large extent for two reasons; there is no soil research policy; governments see their responsibility to the whole community rather than to individuals.

Table 7.11 Farmer's Response to Government Grants and Incentives

n=72

Grants and Incentives	Score	Percentage %	Rank
Tree planting	16	22.2	1
Pasture seed rebate	15	21.0	2
Fencing remnant vegetation	12	17.0	3
Whole farm planning	11	15.3	4
Pasture establishment	10	14.0	5
Machinery modification	6	8.3	6
Water erosion works	2	3.0	7
Weed and vermin subsidy	2	3.0	8

Two responses, water erosion works and weed and vermin subsidy was volunteered early in the interviews and was subsequently asked of all the farmers including the earlier farmers via a telephone call. A relatively low level of responses to the question concerning the influence of government incentives as indicated in Table 7.11 could mean that the farmers are more concerned with the management of resources than with focusing on salinity. That is, it is an indication that the farmers are responding, at the formal level, to government incentives when they are relevant to their everyday management. In discussions about their activities in managing soil, several activities, particularly pasture establishment and fencing, were considered to be part of their long-term planning, and machinery modification, weed and vermin costs were financed from earnings and from non-cash on-farm resources. Thus, on a cost-benefit basis it was not economically viable for these farmers to undergo the process of applying for grants. Government importance was also measured from other perspectives. In maintaining their competitiveness the respondents ranked 'better use of government information 10/14, and 'better use of government incentives' 14/14 (Table 7.27).

7.4.1.3 Taxation

The respondents were asked if they recorded certain government-targeted taxation-related financial items separately. Their responses in Table 7.12 indicate an awareness of the need for the prevention of salinity-related problems although many expenses could be categorised to fit the criteria for a taxation deduction even if the expense was not incurred specifically for that reason. The response to the research levy, 97.2%, must be ignored because it refers to the compulsory 3% levy paid by wool growers[iii].

For the rest, there is an indication that the farmers are responding, again, at the formal level, to government taxation incentives presumably when relevant to their everyday management. As shown in Table 7.12, they do respond when the issues relate to specific physical factors, such as water management, rather than to the overall term of salinity. It could not be determined whether this relates to preventative action rather than restoration actions. For example, there is a significantly different response to Salinity works 29.2%, in comparison to 84.7% for Trees program and 62.5% for Water conservation works.

Table 7.12 Taxation-Related Financial Items Recorded Separately

n=72

Financial Items	%
Trees program	84.7
Salinity works (S.75D)	29.2
Research levy	97.2
Water conservation works (S.75D)	62.5
Water conveying costs (S.75B)	55.6

Many farmers complained about the taxation deductions given for water conveying costs (S.75B Table 7.12 of which 55.6% of the farmers availed themselves) and water conservation works (S.75D of which 62.5% of the farmers availed themselves). To a great extent, water levees are the major component of these deductions. Any levees built by one farmer to counteract increased waterflow on to their land was immediately increasing problems for the farmers downstream. This placed the next farmer in a dilemma between building expensive levees for themselves and then passing the problem on further or tolerating increased flooding on their property.

In Table 7.13, water problems were rated using a Likert scale. Although the number of farmers affected is not a majority as noted in the frequency column, three explanations seem possible. The problem has become significant only recently, it is localised in one sub-catchment, and the farmers are less reluctant to talk about such problems. Examining the qualitative data gives indications that each of these explanations are applicable to the area, and importantly, that the farmers have only recently started discussing externalities with each other.

It could be that taxation policy is too complex to connect with day-to-day management[iv]. For example, rebates are an after-tax benefit, that is, there is a time lag, where costs are more certain than the benefits. The response to taxation policy highlights problems that occur with societal policies. Although taxation deductions are intended to ameliorate increased flows through the catchment, they are creating greater problems for other farmers downstream in a process that becomes increasingly costly and difficult to manage. The evidence produced on externalities confirms that water management is beginning to cause such problems that farmers who normally manage independently are faced with a problem that needs to be solved at the aggregate level.

7.4.1.4 Effect of Local Government and Infrastructure Works

It was stated in Chapter 5 that salinity is assumed to occur solely due to land management practices. As noted above, the farmers do not respond to questions about salinity. However, it was considered appropriate to ask the farmers if there were problems emanating from outside their farm resulting from infrastructure works.

The farmers were asked to do the following:

- Rate the degree to which the following activities have impinged on the quality of your soil over the past five years.

Most of the off-farm activities are implemented by local government whatever their original source as headed in Table 7.13.

Table 7.13 Level of Effect of Local Government and Infrastructure Works

n=72

Activities	Very High Degree	High Degree	Mod. Degree	Little or None	Rank
Water logging of cropping lands*	13	65	69	36	1
Runoff*	11	55	39	48	2
Water logging of grazing pastures*	10	50	63	41	3
Roads*	15	48	39	44	4
Stormwater*	8	40	48	48	5
Forest removal*	7	35	24	57	6
Sewage treatment works	3	15	27	59	7
Irrigation drains	3	15	30	57	8

Legend: High degree5, - Moderate degree 3, - Low degree 1.

** Problems relating to water from external sources*

Six out of the eight problems emanating externally relate to water problems. This is a significant individual problem for farmers but it is also increasing and the farmers do not feel able to overcome all these problems. On the other hand, the local council sees its duty as having to provide infrastructure for the sub-catchments and catchment.

What is indicated in Table 7.13 are several problems that are not necessarily caused by land management practices on farms alone as is assumed in the literature. The main problems are water logging of cropping and grazing pastures, and runoff. In the qualitative data the main worry for the farmers was an increasing amount of water created by the divergence of water through the region for the irrigation needs further north. Other farmers complained about culverts, roads, railway cuttings, the Wahranga irrigation channel, increasing urbanisation and other infrastructure constructions serving the community. These structures have added, over the past forty years, to the natural drainage problems of the floodplain.

Tables 7.12 and 7.13 highlight the difference between individual and aggregate or entity versus proprietary thinking. The farmers take an individual attitude towards their problems. An example from the survey concerns those whose land adjoins state forests. In Table 7.13 forest removal ranks 6th in the aggregate, however, it is the localisation of problems which have to be managed. For example, Farmer No. 5 stated that 30 acres had to be converted from cropping to grazing because of the eucalyptus harvesting practices in the adjoining state forest.

One of the neighbouring farmers had the leasing rights to this forest, and in recent years had changed from manual to mechanical harvesting. The result was that the forest floor was cleared which allowed flooding to occur when there was heavy rain. The farmer’s wife indicated a height of 3 feet pouring on to their paddock. Subsequently, the offending farmer was also interviewed who, when asked if mechanical harvesting was appropriate, justified it on the basis that the forestry officials had sanctioned that method.

This result adds evidence that all the problems relating to salinity are not wholly contributed by the land management practices of the farmers. This is not surprising if soil research is omitted from the policy framework. Nor can all problems be presented and solved as catchment problems.

7.4.2 Financial Indicators

As discussed in Chapter 2 the initial indicators developed by the SCA (1991) reflected farmer practice for sustainable agriculture built around the attributes of proprietary thinking although, by 1993 financial indicators was the preferred recommendation. As also noted, by 1993-94 the government saw its role instead to be that of directing the behaviour of farmers using attributes of entity thinking. The result of combining the directives of the OECD and the financial indicators developed for sustainable profits resulted in entity financial accounting indicators being advocated.

These financial indicators, formulated in 1996 and discussed in detail in Chapter 2, are briefly repeated. They are: farm operating costs as a percentage of gross income; farm operating surplus per hectare; Return on Investment; and Return on Assets (Walker and Reuter 1996). Such measures are the generally promoted ones throughout the literature (see Luke 1992, and Stephens 1992 for literature surveys) by which all farmers can be assessed by those outside the farm. They are also important in promoting uniformity, a critical component of the entity theory examined in Chapter 3.

The financial indicators recommended to farmers to report on sustainable agriculture require formalised accounting systems and extensive recording of financial accounting information. These financial indicators use the accounting definition of physical operating capacity based on the assets being able to produce the same volume or value of goods and are weighted towards productivity. All of these are linked to the availability of market prices.

The questions asked and the farmer’s responses are reported in Sections 7.4.2.1 to 7.4.2.3.

7.4.2.1 Accounting Reporting Used by Farmers

It was stated in Chapter 5 that if farmers have a proprietary view, they would be more interested in monitoring the wealth of their soil quality using physical indicators based on a 'set of information'. This would be in preference to the formal financial accounting reports as required in the government, agricultural and accounting literature.

To put the responses in perspective, each of the respondents was asked to name the type of business organisation in which they operated. The results, in Table 7.14, show that partnerships form 90.3%, sole proprietorship form 4.2%, companies form 4.2%, and other types including trusts form 1.4%. In an overwhelming majority, these farms are owned, operated and managed as family businesses where there is no legal requirement to provide complete, formal accounts.

Table 7.14 Type of Business Organisation

n=72

Business Organisation	Percentage %
Company	4.2
Partnership	90.3
Sole Proprietorship	4.2
Other (eg. Trusts)	1.4

It was expected that if the farmers had a proprietary view they would not be using farm operating costs as a percentage of gross income, farm operating surplus per hectare, Return on Investment and Return on Assets. Therefore, they were asked in the survey the following questions relating to accounting and how they measure their success:

(1) Please indicate for 1993-94 your gross farm income, average gross margin per paddock, and net margin per paddock.

(2) Please indicate which financial and management accounting records are kept over a period of a year for the year 1993-94.

(3) Which financial and physical attributes are monitored per month?

(4) Which decision support systems are used?

Table 7.15 Profit and Loss Statement Figures

Information Set	No. of Resp.	Resp. Mean	Std. Devn.	Median	Mode
Gross farm income for the financial year 1993-94	n=66	$135,689	$122,803	$102,000	$90,000*
Average gross margin per paddock	n=10	32,904	59,940	66,000	60,000*
Average net profit	n=36	35,492	33,680	33,000	000*

** Denotes that multiple modes exist.*

Gross margins in the entity view would represent uniformity, short-term and income-based reporting and is a major measurement of farmers' success in the industry and the literature. However, in Table 7.15, when the farmers were asked what their gross margins per paddock were on average, only 14% were willing to respond. They said either that they did not know, or that they did not need to calculate the gross margin because it was irrelevant because of their rotation plans, their diversification; two used and changed fencing to manage stock. Alternatively, they were unwilling to divulge information. Another two refused to answer and it is proposed that this group were profit maximisers. This same group refused to divulge their net margin for the same reason. The number of acres this group farmed and their gross earnings indicated they were in the top one quarter of performers in financial terms. It can be deduced that farm operating surplus per paddock would be unhelpful to most of the farmers.

For example, the range given for average gross margin was between $30 and $178,640. Taking into consideration that multiple modes exist for these data (see Table 7.15) this figure cannot be interpreted with any certainty. Similarly, the range for average net margin was between $2,000 and $152,004 indicating that further investigation would be needed into the accounting methods employed to determine these margins and the effect of such farming methods as diversification.

In contrast, when asked for their average gross earnings over the past five years, their responses showed that they were earning well above the average figures for the catchment and for Victoria. 53% of the survey farmers earned over $100,000, compared with .9% of the Loddon-Campaspe catchments, and 11% for Victoria. Generally, the survey group earned above average returns as reported in Table 7.16.

Table 7.16 Gross Farm Earnings in 1993-94 for Survey Area, Loddon-Campaspe and Victoria

	n=66	n=54	n=131
Gross Farm Income	Survey Area %	ABARE* Loddon-Campaspe %	Victoria* %
-$25,000 and less than 0	0	9.9	11.6
0 and under $25,000	3.0	56.1	40.9
$25,000 and under $50,000	6.0	21.1	12.0
$50,000 and under $100,000	38.0	12.0	24.5
$100,000 and over	53.0	0.9	11.1
Total	100	100	100
Average	$135,689	$22,388	$42,007

** Australian Agricultural and Grazing Industries survey - 1993-94, ABARE*

Data were not detailed or rich enough to make definite conclusions or extrapolations. Table 7.15 compares the responses for gross farm income, average gross margin per paddock, and average net profit. The results are in contrast to the studies discussed in Chapter 2 in which studies and normative theoretical pronouncements focussed extensively and exclusively on average gross margins in assessing the extent of land degradation in the Loddon catchment. If farmers are monitoring their productive capacity the preceding results indicate that they believe they would not receive sufficient information from their accounting figures.

When examining management accounting and decision making, only 1.4% calculated the gross margin once a month, 4.2% calculated it once every six months, and 59.7% calculated it once every twelve months. This would also be in response to bank forms, government and taxation requirements rather than for management requirements.

Significantly, when valuing land the farmers ranked gross margin 12th out of 12 attributes offered (Table 7.25 in Section 7.4.3.4). The earnings of the survey farmers are above the norm for the Loddon-Campaspe Catchments and many are in the top 20% (Farm 500, National Australia Bank 1998) indicating that they are financially viable.

7.4.2.2 Monitoring Used by Farmers

The results above indicate that financial accounting is used primarily for ‘whole farm’ profit and loss reporting. In contrast, cash-flow monitoring, as reported in Table 7.17, indicates a high level of monitoring, an accumulated 41.7% every two months, compared with an accumulated 13.9% for the net margin, and an accumulated 11.1% for balance sheets, and 1.4% for gross margins.

Two major findings can be determined by examining what information the farmers find important and monitor at least once a month compared with every twelve months (see Table 7.18 and Figure 1).

Table 7.17 Frequency of Record Keeping

n=72

Activity	Not Applicable	1 month %	2 months %	4 months %	6 months %	12 months %
Daily diary*	38.9	59.7	1.4			
Physical records	31.9	40.3	2.8	6.9	5.6	12.5
Cash flow	12.5	37.5	4.2	12.5	8.3	25.0
Paddock records	23.6	34.7	4.2	6.9	12.5	18.1
Monitor assets & liabilities	16.7	22.2	2.8	2.8	6.9	48.6
Net margin	9.7	12.5	1.4	5.6	9.7	61.1
Budgets	33.3	12.5	2.8	12.5	5.6	33.3
Balance sheet	9.7	11.1	nil	2.8	6.9	69.4
Capital improvements	23.6	6.9	1.4	1.4	8.3	58.3
Gross margin per paddock	33.3	1.4	nil	1.4	4.2	59.7

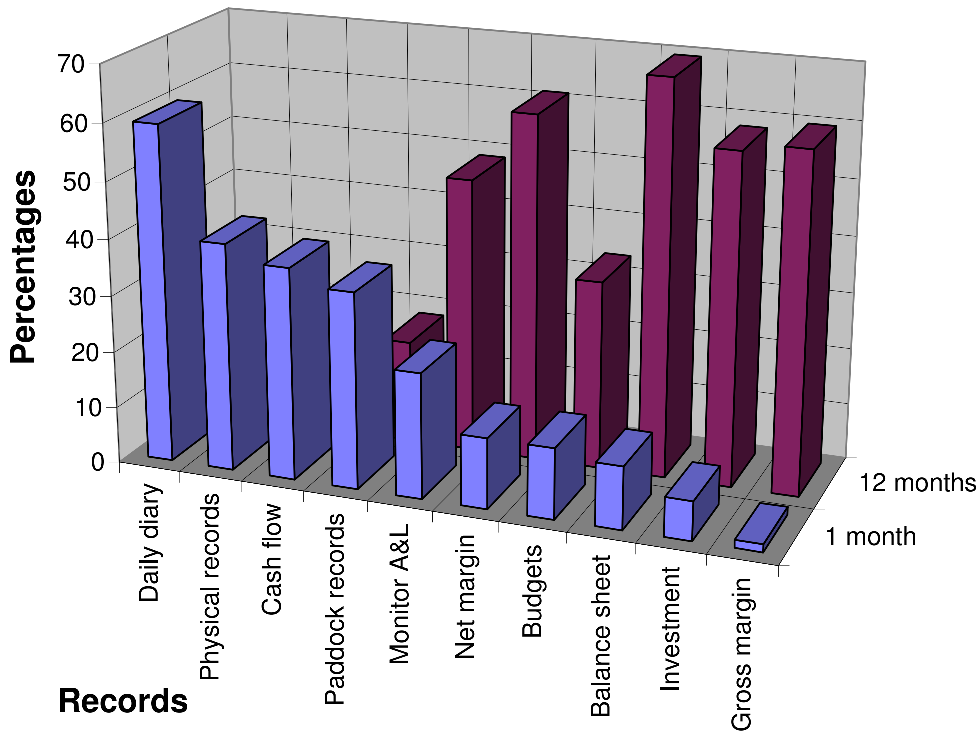
**Ranked primarily to indicate the ranking for one month*

Table 7.18 Frequency of Record Keeping Comparing One Month and Twelve Months**

n=72

Activity	1 month%	12 months%
Daily diary	59.7	
Physical records	40.3	12.5
Cash flow	37.5	25
Paddock records	34.7	18.1
Monitor assets & liabilities	22.2	48.6
Net margin	12.5	61.1
Budgets	12.5	33.3
Balance sheet	11.1	69.4
Capital improvements	6.9	58.3
Gross margin per paddock	1.4	59.7

Figure 1 Frequency of Record Keeping Comparing One Month and Twelve Months



It would seem from the results that formal accounting is not the way the farmers use accounting for decision making. This is in direct contrast with experimental studies in the literature on sustainable agriculture. These studies allocate overheads to obtain the full cost of production. As well, all their decisions were based on market traded resources. In all the studies, including those discussed in Chapter 2, the major calculation used was gross margin as the decision objective. It appears that assessments of both positive and negative results by those outside the farm are assessed by gross margin multiplied by production gain or loss in monetary terms.

In this survey, there is an inverse relationship between financial and physical monitoring and reporting which indicates a decided emphasis given to the planning and decision-making stages of management. As in other complex market environments, it would not be decision-useful to calculate full cost if price-taking dominates the industry. This is especially true of agricultural products.

The results indicate a proprietary view of accounting, where the assets of the farm are continually monitored in physical terms. Four types of monitoring are undertaken by between 59.7% and 22.2% of the farmers daily and monthly. In contrast, financial monitoring during the same period is undertaken by between 12.5% and 1.4% of the farmers. Once every twelve months between 33.3% and 69.4% of the farmers record financial data and reports, many of them in preparation for taxation reports.

The findings of previous studies (Stephens 1992, Luke 1992) which found that farmers made little use of financial management may be correct but their conclusions cannot be supported. In this survey the farmers undertake a comprehensive range of management records based on activities and quality issues. The farmers do not use a uniform or formal way of accounting for management purposes. They do not use the traditional industrial costing system, which includes gross margins and allocated overheads presumably because their business is too complex. Very little use is made of the balance sheet. Figure 1 and Table 7.18 show that financial monitoring and reporting are used to report for taxation purposes once every twelve months, while many of the farmers record cash flow and physical decisions at least every month, and, many, daily.

In evidence of this, the question on monitoring based on physical data generated an extensive range of claims (Table 7.19). At least once a month, 59.7% of the respondents kept a daily diary, 34.7% kept paddock records, 40.3% kept physical records, and 22.2% monitored assets and liabilities but not necessarily in financial terms. These claims show that they consider, and monitor very carefully, the quality of their product. When asked about the factors of importance in competitiveness, quality of product was ranked 1st; everyone ranked this as of the greatest or some importance. The most important factor in valuing land was soil quality which ranked 1st and 91.7% ranked it as of great importance or very important. In the views of the farmers, quality of product and soil quality have a very strong positive relationship (Tables 7.25 and 7.27, Section 7.4.3.4).

The majority of farmers, who stated that they are not using the financial information which agriculturalists recommend, were asked what they do use to monitor financial decisions (Table 7.19). Once a month, 50% of the respondents undertook budgets and cash-flow analysis. In most instances, the farmers made use of columnar cash books and they provided a fairly detailed breakdown of individual categories. Many of these were shown to the interviewer and in most cases they were business entries; not housekeeping books. These were also kept for many years in support of the trends in costs and prices of produce. In contrast, for financial accounting reports, 1.4% undertook gross margin analysis, and 12.5% undertook net margin analysis (Table 7.19). In summary, cash flow management was the prime financial task for the farmers.

Table 7.19 Monitoring Financial and Physical Attributes per Month

n=72

Financial Decision Making per Month			Physical Decision Making per Month	
Budgets	12.5	%	Physical records	40.3%
Cash flow	37.5	50.0	Paddock records	34.7
Net margin		12.5	Daily diary	59.7
Gross margin		1.4	Assets & liabilities	22.2

It seems that the farmers adhere to accounting theory which links assets to the cash flows from these assets, limited by the uncertainties and risk inherent in farming. It is fairly clear that the respondents would be unaware of accounting theory, but their actions appear to show a need to measure liquidity, and cash flow, coupled with an on-going knowledge of the productive capacity of their land.

7.4.2.3 Decision support systems

It was indicated in Chapter 2 that farmers in the North-Central Region of Victoria, in general, did not make use of decision-support systems recommended by several groups of agriculturalists[v]. In the Landcare Report 1995 (Alexander 1995), this was linked with a major conclusion about farmers' abilities. That, and being different from Leading Farmers, was considered of major concern for the sector in general. The farmers were asked to indicate, from a list, which decision support systems they used. Their responses are shown in Table 7.20.

Table 7.20 Use of Decision Support Systems

n=72

Activity	Yes %	No %	Rank
Manual cash, record, books	63.9	36.1	1
Other	37.5	62.5	2
Department of Agriculture	33.3	66.7	3
Department of Conservation & Natural Resources	29.2	70.8	4
Meycheck	25.0	75.0	5
Publications issued by banks	20.8	79.2	6
Spreadsheets	13.9	86.1	7

Summarising Table 7.20, it appears that the farmers in this survey rank cash and manual records 1st and 2nd, physical packages 3rd, 4th and 5th, while financial packages ranked 6th and 7th. A majority, or 63.9% of farmers used manual cash, record books, the remaining using cheque butts and deposit slips, with only one-fifth of the farmers using publications issued by the banks.

For physical monitoring, considering the conclusions in the literature, there was a surprising number of farmers who made use of support systems. For example, 33.3% made use of Department of Agriculture systems, which were usually generic in form and developed, for the specific region. Extension officers who were in the region for long periods of time had developed these for the region in which they worked. One-third or less of the farmers used more recent publications by organisations such as the Department of Conservation and Natural Resources, 29.2%. These could reflect the changing employment pattern of government officers whose jurisdiction was changed during several restructurings of departments starting in the early 1990's. Spreadsheets were attempted by 13.9% and this can be considered a reasonably high number given that they required devising and operating by the farming family. Most of these decision systems had been used for many years and do not relate to formalised financial support systems written about in the literature.

In summary, the respondents are very actively concerned, in detail, with the physical characteristics of their land. These are indications of a very clear knowledge and understanding of their capital and wealth in physical terms. As in many businesses which operate in complex and changing environments, financial viability is assessed on a 'whole of firm' basis and predominantly in cash terms. Stephens (1992) and Luke (1992) made their findings based on the farmers' responses to commercial computerised accounting packages and on public financial accounting. Results in this survey confirm these results only because the farmers do not find gross margins and net margins decision useful. The farmers can be said to have a proprietary view of their farm in the sense that monitoring physical attributes is of the greatest importance, and financial monitoring is conducted mainly for liquidity and end-of-year reporting.

Wherever spreadsheets were formalised into a standard financial and physical package, they were considered unhelpful, too time consuming and, even if it could be related specifically to the farmers needs, they found more efficient ways of using this information. Evidence for this was provided in the pilot study in the interviews with a leading farmer.

This farmer was a founding member of the most public farmer group in the North-Central Region of Victoria, called Farm 500. Four farmers, or 5.56% of the survey farmers belong to Farm 500, which in 1993 had approximately 80 member farmers in the Avoca and Loddon catchments.

However, expansion of this group is proving problematic. In discussions with this leading farmer in Farm 500, he reported that Farm 500 was losing some farmers because of the burden of data entry and reporting. Many of the farmers saw themselves as more skilled in farming than most of the advisers and were wary of their skills being commercialised by others.

Perhaps more importantly for this thesis, in discussions with this leading farmer on the stages he had been through in the development of his support systems, he stated that initially he would monitor everything and convert the data into the spreadsheets. The next stage was consolidation and development of the spreadsheets (he was also in very close contact during these stages with the consultants). When interviewed over three visits, he mentioned that he needed the formal systems-based spreadsheets less and less. This implies that information was being impounded much as experienced accountants can impute into minimum financial information a greater picture than inexperienced participants.

7.4.2.4 Conclusions from these Findings

Seven conclusions emerge from these findings:

(1) Legally these are family farms with partnerships and sole proprietorship as their main structure.

(2) Entity financial indicators are not used by the farmers to monitor the financial or physical viability of their farms.

(3) Farmers use cash flow and physical record-keeping throughout the year, and financial accounting at year end. The inverse relationship between financial and physical monitoring provides substantial evidence for the relative importance of each to the farmers when managing their viability, thus the conclusions of other studies cannot be accepted.

(4) Physical monitoring implies a proprietary view of best practice. Further evidence is provided in Section 7.5. They do not use formalised accounting systems and a tentative conclusion can be made at this stage that the accounting definition of productive capacity based on productivity and gross margins are not of major concern to these farmers.

(5) These farmers are interested in trend figures in physical terms which combines the quality of product with the quality of the land.

(6) In comparison with ABARE figures the farmers earn above the average returns on a whole farm basis.

(7) A tentative conclusion can be made that the farmers respond when the focus is technical and they consider that the information comes from the appropriate technical person. This was shown in the results of a soil program 'Soil Care' which was conducted in the North-Central Region of Victoria over four years from 1989 to 1992. The results indicate that farmers

respond when programs are couched in physical terms and in particular practices relating to the care of their soil. Thirty-three (41%) of the farmers in that program reported that the program increased their awareness of better soil management (Bendigo Advertiser 1993).

Some evidence for this was sought in a question on the sources of information used by the farmers in regard to soil depth, soil fertility and soil structure (Appendix 7). Their responses indicate that observation was ranked 1st from 13 sources of information, reading and community participation ranked 2nd to 5th, providing evidence for the basic tenets of Recognition of Prior Learning, while leading farmer ranked 6th. Many of the farmers observed leading farmers closely but all stated that these leading farmers were prepared to take high risks for higher returns and in so doing adopted new technologies very quickly. Most of the neighbouring farmers took a wait-and-see approach before they adopted what they considered appropriate.

These results confirm the Schnitky and Sonka (1986) conclusions that farmers needs are individual and this is so even for those with similar operations. The results in this section point to diversity in both monitoring and frequency of monitoring, primarily of a physical nature.

7.4.3 Market Prices

7.4.3.1 Introduction

The importance of market prices to the accounting standard setters, government and policy makers needed to be examined from the farmer's point of view. It is the individual farmer who has to operate in a global market where prices of both inputs and outputs are outside his or her control, and often outside the control of forces inside Australia. It is however, proposed by others that market prices will provide a measure of value in the accounting statements and the least cost measure to allocate resources for the government.

The farmers were asked the following questions:

(1) What factors are of the most importance in each year, given the following; maximise short-term profits, maximise cash flow, long-term profitability and do what is best for each paddock over time?

(2) What factors are most important to you in valuing your land?

(3) How do you measure your success in competition?

(4) What are the most important factors for you for the future?

(5) Where do you see yourselves in five years time?

7.4.3.2 Market Prices - Accounting Research

The relevant data for the issue of market prices arises from the interest shown by professional accounting bodies in agriculture which, to date, has been centred on the value of growing assets and inventories. What is being suggested in an accounting standard issued by AARF (AARF 1997) is that farmers assess the changes, measured by net market value, in the value of their crops and stock since the last balance date, and the valuation of inventories already harvested. This change in value is called income whether or not there is any certainty of sale or cash received. The question then is whether knowing and recording continuous price changes as a measure of resource changes is decision-useful to managers or users.

The evidence in Figure 1 and Tables 7.17, 7.18, Section 7.4.2.2 above, suggests they do not see the need to record market prices formally. Efficiency for these farmers is achieved by constantly monitoring market prices and non-market on-farm resources in a changing mix of products in their crop rotation and diversification programs. There is already a well developed daily commodity market reported in the media of which all the farmers avail themselves.

The farmer, on the other hand, might view these same changes as an investment. Costs, both market and opportunity, could reasonably be considered an improvement in soil quality and not as part of income. For example, improvements in pastures and in stock quality would be considered investments by farmers as part of long-term decision-making. In contrast to this, recognising a very uncertain income stream is high risk behaviour especially in commodities markets.

For example, farmers who have conducted sheep breeding over generations indicated that the long-term investment in their stock was more important than annual price variations for their wool. This statement does not negate other problems farmers may have to manage in the survival of the wool industry but is intended to show that to consider stock valuation changes as part of income would not reflect value for these farmers.

The government also wishes to evaluate agriculture and farmers' ability through the use of market prices, therefore, it was necessary to determine to what extent market prices are important to farmers both in the short term and in the long term. It was stated in Chapter 4 that value to the owner could be much greater than the market price.

7.4.3.3 Market Prices - Short Term

The importance and relevance of market prices was tested with qualitative data that were collated for attitudes and values as detailed in Tables 7.21, 7.22 and 7.23. These questions were aimed to determine the factors of greatest importance to farmers in the short term. Data have been processed in three different ways to emphasise different characteristics. On every measure, the farmers' first priority is to 'do what is best for each paddock over time'. In Table 7.21, the least deviation from a mean of 1.1 where 1 equalled 'of great importance', was .387. The greatest deviation related to maximising short-term profits, .909, a response that would indicate short-term accounting reports and formalised use of market prices are of secondary importance to the farmer.

Table 7.21 Achievements of Importance in Each Year (a)

Information Set	Resp. Mean	Std. Devn.	Median	Mode
Maximise short-term profits	2.2	.909	2.0	2.0
Maximise annual cash flow	1.7	.872	2.0	1.0
Long-term profitability	1.2	.587	1.0	1.0
Do what is best for each paddock over time	1.1	.387	1.0	1.0

Legend: 1 - Great,2 - Some, 3 - Little, 4 - None.

Table 7.22 Achievements of Importance in Each Year (b)

n=72

Attribute	Great Importance %	Little or No Importance %
Do what is best for each paddock over time	100	0
Long term profitability	94.4	5.6
Maximise annual cash flow	83.3	16.7
Maximise short term profits	68.0	32.0

Legend: 1 - Great, 2 - Some, 3 - Little, 4 - No Importance.

Table 7.23 Achievements of Importance in Each Year (c)

n=72

Attribute	Great Import 1	Some Import 2	Little Import 3	None 4	Score	Rank
Do what is best for each paddock over time	61	22	0	0	83	1
Long term profitability	61	14	39	4	118	2
Maximise annual cash flow	35	50	24	16	125	3
Maximise short term profits	17	64	48	28	157	4

Although the farmers wanted to achieve both short-term and long-term success, 32% (Table 7.22), were willing to forego short-term profits in preference to cash flow and long-term profitability, while everybody wanted to do what is best for each paddock over time. Overall, the farmers aimed to protect their liquidity and asset base in the short-term indicating a preference for protecting their wealth that does not depend on current market prices.

In summary, short-term decisions are based on physical attributes. For example, much of the qualitative data relate to such decisions as retaining some cropping production for stock-feed if the market does not seem favourable. These are decisions made within one production period and can entail changing decisions on stock destination as a result of the farmer monitoring both on-farm physical conditions and off-farm market conditions, including market prices. This view is strengthened considerably when marketing activities are examined. Table 7.24 indicates that between 66% and 100% of the survey farmers undertake 6 out of the 11 forms of marketing offered in the questionnaire.

Table 7.24 Methods of Marketing Used by the Farmers to Maximise Annual Cash Flow

n=72

Method of Marketing[vi]	Yes %	No %
On-farm storage	91.7*	8.3
Stock auction	91.7	8.3
Private trading	90.3	9.7
Wool auction	86.1	13.9
Delivery to the board	84.7	15.3
Stock private	66.2	33.8
Wool private	36.1	63.9
Forward contracts	26.4	73.6
Niche market	25.4	74.6
Grain warehousing	6.9	93.1
Cooperative selling	2.8	97.2

7.4.3.4 Market Prices - Long Term

The results in Tables 7.21, 7.22 and 7.23 show that the farmers have a long-term normal view of reporting, and market price is only one of their decision variables. This type of information is not easily reported to governments, because short-term decisions are based on the current observation of market prices not the recording of market prices in a financial accounting system. Their main objective is long-term survival based on current prices which create expectations for the future, that is, they think in trends over several cycles.

7.4.3.5 Land – Long Term

Return on investment and return on assets showed mixed and interesting results. In Table 7.25, where farmers were asked for the most important factors when valuing land, the respondents ranked return on capital as 7th out of 12 factors offered. It must be surmised that given the responses to the measurement of income and assets, they would be referring to a general objective and notion of a return on capital, because they would not be keeping sufficient records to calculate a return on investment or return on assets.

Two areas were examined for their level of importance to the farmers when making their decisions. The price of products was one, and the level of knowledge and relevance of the market value of land was the other. From a list of twelve attributes of importance when valuing land the respondents ranked price of products eighth, and market value of land tenth (Table 7.25). Further details can be found in Appendix 12.

Table 7.25 Most Important Factors in Valuing Land

n=69

Attribute	Rank	Attribute	Rank
Financial and Physical Factors			
Soil quality	1	Profit over a five year period	7
Access to water	2	Price of products	8
Annual cash flow	3	Capital improvements	9
Total production	4	Market value of land	10
Return on capital	5	Changes in yield	11
Disposable income	6	Gross margin for a paddock	12

Aligned with this, the most important factor in valuing land was soil quality, ranked 1st, where 91.7% ranked soil quality as of great importance or very important. In the views of the farmers, their soil quality and the quality of their product have a very close positive relationship (Tables 7.26 and 7.27).

7.4.3.6 Competitiveness – Long Term

The farmers were asked about the attributes that were of the greatest importance to them in maintaining competitiveness. Their replies indicated that the quality of their product ranked first, with production techniques, lower production costs, on-farm physical monitoring, better marketing strategies for cash flow, and better information being 2^{nd} to 6^{th} respectively.

Table 7.26 Factors of Importance to Improve Competitiveness n=72

Information Set	Resp. Mean	Std. Devn.	Median	Mode
Quality of product	1.1	.381	1.0	1.0
On-farm monitoring - financial	2.0	.872	2.0	2.0
On-farm monitoring - physical	1.7	.712	2.0	1.0
Crops that everybody else is not growing	2.8	1.113	3.0	4.0
Better capital equipment	2.6	.959	3.0	3.0
Better production techniques	1.6	.767	1.0	1.0
Economies of scale - larger farm	2.7	1.104	3.0	2.0
Lower production costs	1.6	.895	1.0	1.0
Better information	1.9	1.064	2.0	1.0
Marketing strategies that maximise cash flow	1.6	.924	1.0	1.0
Better use of government information	2.8	.998	3.0	2.0
Better use of government incentives	3.0	1.067	3.0	4.0
Better management for the climate	2.0	1.007	2.0	1.0
Better management of taxation payments	2.2	1.078	2.0	2.0

Legend: 1 - Great, Some - 2, Little - 3, None - 4.

Examining the first seven attributes, competitive advantage depends on the quality of the product and on the factors over which the farmers have some control. All of these can be monitored in both physical and financial terms and are not specifically based on productivity. The market price is again important but in the context of marketing strategies.

Table 7.27 Attributes of Importance in Competition

n=72

Attribute	Great Import.	Some Import	Little Import	None	Score	Rank
Quality of product	67	6	6	0	79	1
Better production techniques	42	44	18	8	112	2
Lower production costs	42	40	15	20	117	3
On-farm monitoring - physical	34	56	30	0	120	4
Marketing strategies which maximise my cash flow	40	42	18	20	120	5
Better information	30	48	27	36	141	6
On-farm monitoring - financial	21	60	51	12	144	7
Better management for the climate	27	48	39	32	146	8
Better management of taxation payments	21	46	51	44	162	9
Better use of government information	4	50	40	92	186	10
Better capital equipment	9	46	81	52	188	11
Economies of scale - larger farm	8	52	51	84	195	12
Crops which aren't what everybody else is growing	12	34	51	104	201	13
Better use of government incentives	7	32	60	116	215	14

Legend: 1 - Great, 2 - Some, 3 - Little, 4 - No Importance

In any form of valuation, quality of product and the maintenance of the productive capacity of the soil, ranked consistently highest for all farmers indicating that value to the owner had more relevance than knowing the value of all resources in market terms. Most resisted any moves to use economies of scale to increase profits (Table 7.26 where their Mean response was 2.7 on a scale of 1 to 4, the Median being 3; Table 7.27 where economies of scale are ranked 12th out of fourteen). That is, there is an emphasis on long-term thinking rather than short-term productivity. They also resist obtaining long-term debt for this purpose. The results of the question on long-term debt were very surprising and considerably strengthen the concept that ownership is of major importance to these farmers. Their financial results indicate that they earn well above the average for the region and for Victoria and are, therefore, viable. Over 82.1% of the farmers had less than 20% of long-term debt as a percentage of the capital value of their land, shown fully in Table 7.28.

Table 7.28 Long-Term Debt as a Percentage of Capital Value of Land

N=72

Range %	Percentage %
0	60.0
0 – 9	9.7
10 – 19	12.4
20 – 29	9.7
30 – 39	0
40 – 49	2.8
50+	5.4
Total	100

Because some of the data presented earlier is relevant here, Table 7.10 has been reproduced as Table 7.29.

Table 7.29 Where the decision makers see themselves in five years

n=72

Information Set	Percentage %
Stay on the farm and depend less on farm income	23.6
Stay on the farm and depend more on farm income	20.0
Same as now	65.3
Farm elsewhere	4.2
Leave the farm for another job	1.4
Leave the farm to retire	6.9
Other	5.6

Table 7.30 Future Skills in Order of Importance

	Extreme Import. 1	2	Moderate Import 3	4	No Import. 5	Points	Rank
Financial management	52	24	9	0	25	110	1
Marketing	48	28	15	8	15	114	2
Land conservation knowledge	48	24	18	8	20	118	3
Agronomist knowledge	33	28	39	24	30	154	4

The answers to the questions on land value, competition, marketing and the future, strengthen the ownership interest. To these farmers, proprietorship is more important than allowing other stakeholders have any say over the usage of their land. They intend to stay on the land and depend more or less on farm income. Many of the farmers and their wives use off-farm income as a counter-cyclical strategy to adverse climatic and marketing conditions.

Answers about the skills they saw as necessary for the future were unexpected. Marketing was second but this was already an on-going and complex task they were undertaking. Land conservation knowledge and agronomist knowledge, it is assumed, were matters in which they had some expertise and confidence. Financial management ranked 1st for the farmers but it cannot be known whether this is as a result of a need to understand what is expected of them and therefore a reaction to outside pressures, or whether they see a genuine need for such skills. It cannot be known, either, in what context they wish to have more financial knowledge. Further investigation is required before any conclusion can be made about this response.

Officials think 'entity', prepare 'entity' reports and, presumably, give advice from an 'entity' point of view. Tables 7.27 to 7.29 suggest strong proprietary interest and, hence, the farmers have a proprietary view. In addition, all these tables say something about individuality.

7.4.3.7 Market Prices Summary

As farming is increasingly seen as a corporate activity, the same expectations of financial accountability and disclosure have occurred. Since the 1930's, other agencies which have a stakeholder interest favour a uniform reporting system for farming as in other industries. If farmers have a proprietary view and value individuality and diversity, based on location, they will not see the necessity to keep the financial records for evaluating their soil quality and the quality of their product. The reason is that the attributes of value to the owner will not be fully reflected in entity accounting reports (Mattissich 1991, Thornton 1991).

There is an inverse relationship between financial and management monitoring reports undertaken on a regular basis by these farmers. Those outside the farm use financial data because of its seeming visibility and comparability. On balance, it appears that assessments of both positive and negative results are assessed by outsiders on the gross margin multiplied by production gain or loss in monetary terms. In constrast, when valuing land, of the twelve attributes offered to the farmers, gross margin for a paddock ranked 12^{th} or last. Soil quality (which they linked directly to quality of product) and access to water were ranked first and second. Market prices, however, are particularly important to the farmers in certain areas, although not formally recorded. The marketing strategies display a wide ranging scanning of market prices being undertaken by the farmers.

Productivity is still the dominant way in which outsiders evaluate and judge the performance of farmers. Current accounting does not measure all costs, both operating and capital, for soil or water. If using traditional costing methods, then many assumptions are made about what is included in overheads. Theoretically, these same elements of capital are then not included in the output. This used to be a minor element both financially and in terms of quality of soil but they are becoming major elements. Productivity measures are surrogates for full resource usage but they are not good surrogates because not all costs are counted in the income and expenses.

In the agricultural and policy literature productive capacity is not specifically mentioned, and the accounting professional statements have accepted productive capacity defined in productivity terms. As noted in Chapter 4, productive capacity is still defined as the ability of the firm’s assets to maintain the same volume or value of production. The previous discussion has lead to the following conclusions:

(1) The farmers do not record market prices formally. They do use daily commodity markets for price changes. Market prices are monitored continuously in order to make decisions on buying or selling. Note the number of modes of marketing choices the farmers make.

(2) Value to the owner is of greater importance than net market value. They do not specifically measure their success by their productivity in the short term but conduct their business from a long-term point of view. Their accounting and attitude towards reporting are distinctly proprietary in nature with an emphasis on ownership and a protection of their capital.

(3) Farmers do not use short-term market prices to measure annual achievements. All of the farmers rated 'do what is best for each paddock over time' as of the greatest importance. Many also linked long-term profits (94.4%), maximising annual cash flow (83.3%), and maximising short-term profits (68%) to their overriding management of paddocks. These figures indicate that farmers recognise they have multiple objectives but they tend to rank wealth maintenance above income maintenance.

(4) Market prices are not the main focus for competition or when valuing land.

(5) Farmers rank highest the things over which they have control and less the things over which they have less control. Table 7.26 clearly illustrates this split.

(6) They do not risk the ownership in their land. 82.1% of the farmers owed less than 20% in long-term debt as a percentage of the capital value of their land. Answers to questions on land value, competition, marketing and the future, strengthen the ownership interest.

(7) For the future, financial management ranks marginally higher than marketing, land conservation knowledge and agronomist knowledge. However, the first three rank very closely and indicates they are of equal importance.

(8). Market prices may not be the best 'least cost' option for the government, because there are many non-market uses of resources. There is so little control of prices by farmers and government that they do not reflect any underlying values to the owner. Therefore, the effectiveness of advocating market prices could be severely limited because of their lack of relevance. The farmers use non-market strategies in response to market price fluctuations, and they already use market price in the form of commodity markets. For example, when selling, the farmers use a variety of strategies, including staggered release on to the market in much the same way the Wheat Board and Wool Boards would store the produce and minimise the effects of fluctuations in price. The role of the Boards has been reducing over the past 20 years and the farmers are continuing this practice.

(9) Little use of grants and incentives indicates the lack of relevance of policies that are aimed at 'outside the gate'. It may also be because rebates are made available for cash outlays already incurred, whereas farmers make use of on-farm resources.

(10) Government is not relating to the individual level where it is meaningful to farmers. They do not respond to broad policy initiatives such as salinity but they do respond to technical matters in relation to their soil.

(11) Tentative conclusion is that what the farmers do for their soil quality and productive capacity cannot be assessed through the use of the financial indicators which rely solely on market prices. They do not reflect individual circumstances and have no meaning for the farmers in technical terms.

7.5 Productive Capacity

It was stated in Section 5.3 that productive capacity has been defined in various ways including, identical capacity that existed at the beginning of the period measured in current market prices, capacity that will produce the same volume or the same value. The results in this section demonstrate that the farmers do not respond to an entity view of productive capacity. They use market prices in an opportunistic manner evidenced by their marketing strategies in Section 7.4.3.2. They do not measure their success by measuring annual returns based on the same volume or value, but indicate that they try to do what is best for each paddock over time (see Section 7.4.3.2).

These results were not unexpected because, as discussed in Section 4.2, various problems are still encountered in the attempts to provide a measure of ‘productive capacity’ as the basis of an entity capital maintenance concept. In comparison, the farmers have the relevant knowledge about their own productive capacity that is not available to others. They can control their resources and cross-subsidise different parts of the farm. It is proposed that this knowledge is managed in a complex uncertain environment that cannot easily be reported by one measure of operating capacity based on the entity theory.

There has been debate in the accounting literature since the 1960’s, as referred to in Section 4.3 of the limitations of financial reporting in determining a “true” income, and in “maintaining operating (productive) capacity”. Several measures were proposed, including concepts and measurements encapsulated in a ‘set of information’ particularly for assets which are location specific (Tweedie and Whittington 1984, p.12). Such suggestions range from the reporting of two figures, trend net income, trend measure of physical properties (Mattessich 1991), to cash flow as the most direct measurement of both the short-term and long-term results of decisions (Ijiri 1978, Mathews in Clift and Kerr 1989, p.17)[vii]. All of these measure different properties but physical properties are most directly related to soil quality.

This notion of a ‘set of information’ can conform to the proprietary view. This connection can be made because economic events encompass transactions plus changes within the organisation that do not have exchange values. If reports are for users in order to make decisions about economic events then this implies reporting on transactions and other non-traded events including non-monetary measures (Staubus 1961, Goldberg 1965, p.226).

These ideas were incorporated into the section of the survey questionnaire on soil quality in physical terms designed in Chapter 5. The concept of productive capacity is tested through the physical attributes relating to soil quality. The soil quality model is based on measuring some readily recognisable and definable objects. For instance, soil loss can be measured with every crop[viii]. Soil itself is also one of the variables which is capable of precise measurement. It was, therefore, expected that the attributes of soil could be tested for both linear and multilinear connections between these attributes. Farmers must manage sets of variables within an uncertain risk profile; they work with a range of probabilities within a range over both the short and long term.

The above discussion does not imply that the farmers can be assessed in this thesis as to their absolute level of soil quality. In order to decide this issue, it would be necessary to obtain knowledge of the quantity and cost of inputs vis-a-vis output. What can be tested in this thesis is the preferred way in which these farmers manage their soil quality. It can only be shown that the farmers understand and prefer to make decisions using physical monitoring for management decisions, and whether or not they have very clear ideas of the productive capacity of their soil.

As discussed in Chapter 5, agriculturalists outside the farm rely on theoretical arguments in which the events they consider are confined to observable market transactions. These provide information for the income statement and inventories in the balance sheet but not on the quality of long-term assets such as land. It was assumed in the development of the questionnaire that farmers can use events other than observable market transactions to make decisions; for example, events relating more directly to physical attributes. In this way, farmers would be behaving more in a proprietary manner.

It was stated in Chapter 5 that a clear concept and measurement of soil quality are crucial in maintaining productive capacity of soil and that the attributes of soil, - depth, fertility and structure – can be managed separately. Therefore, the farmers were asked to what extent the model developed in Chapter 5 was relevant to themselves.

The farmers were asked the following questions for each attribute of soil quality that is, for their soil depth, soil fertility and soil structure.

(1)Do you have problems with soil depth (fertility, structure)?

(2) Please give a measure of the extent of this problem, on average, over the past five years?

(3) What has this cost you in production loss over the past five years?

(4) What are the causes of the problem?

(5) What problems does this create for you?

(6) What have you done to avoid/alleviate this problem?

(7) What benefits have you received as a result?

The responses to these questions are the core for understanding how farmers maintain their productive capacity.

7.6 Soil Quality Model

It was suggested in Section 5.4 that farmers would respond positively to the questions relating to their productive capacity, specifically soil quality, in preference to short-term income measures. Importantly, it was expected that there would be an emphasis on individuality and the management of complexity and in the use of on-farm resources. Further, if location is a major management variable for each farmer, this forces attention 'inside the farm gate'. This would also indicate a point of view that would have little meaning for agriculturalists. As an overall statement, the farmers responded very definitely and clearly to the idea of three attributes of soil being managed separately. For example, farmers who said that they had problems responded as follows: soil depth 20.8%, fertility 20.8%, and structure 52.8%, where each had some overlapping activities but also discrete activities.

The set of relationships implied in the soil quality model cannot be explained in terms of a single causal path, but is consistent with an interpretation along the following lines. Although it is assumed that the three attributes of soil can be observed and monitored separately the incorporation of best practice for soil depth will have a flow-on effect to soil fertility and structure. Such effects show up in the variety and multiplicity of activities and causes and effects of problems. It has also been stated that the use of an ecological unit has some effect on the uniformity of responses in these activities in relation to soil quality (LCSMP 1992, Otley 1978, p.138).

7.6.1 Soil Depth

The following relationship is expected, that the farmers are able to gauge the effect of internal and external activities specifically in relation to their soil depth.

The farmers' responses indicate that over the previous five years the major symptoms of soil loss were thinning of topsoil (35.0%), increase in unusable paddocks (25.5%) and water erosion (18.6%) as detailed in Table 7.31.

Table 7.31 Symptoms of Soil Loss Farmers Experienced Over the Previous Five to Ten Years

n=72

Symptom	Frequency	%
No symptoms	29	40.5
Thinning of topsoil	15	35.0
Increase in unusable paddocks	11	25.5
Water erosion	8	18.6
Wind erosion	5	11.5
Increasing water pollution	4	9.3

Of the 43 farmers who reported symptoms only 15 reported they had problems with loss of topsoil. Fourteen of those who had problems lost between 1 – 5 cm of topsoil, while the one remaining farmer reported a loss of between 11 - 15 cm of topsoil.

The cost of loss of topsoil was calculated in the following manner. Each of the 15 farmers was asked to state the loss in production per acre and how many acres were affected. This was multiplied by the price received in 1994 for the relevant products. The results show that 86% lost between $0 and $39,999 in production; and 14% or two farmers estimated they lost between $40,000 and $60,000 (See Appendix 13). Because the average earnings was $135,000 it could be concluded that for a few farmers the losses are high. The range of earnings for 92% of the farmers is between $50,000 and $800,000 which indicates that the effect of soil depth loss has varying affects. Some of this loss related also to the changeover from cropping to grazing and the lower returns from this form of land use. The farmers were easily able to relate losses in opportunity cost terms, that is, they saw their potential earnings decline as problems increased.

Table 7.32 Causes of Loss of Topsoil

n=15

Causes	%
Run off – gully erosion, sheet erosion	73.3
Increased flooding	60.0
Cultivation for weed control	53.3
Cultivation in preparation for planting	53.3
Stubble burning	20.0
Laser levelling	7.0

Results from the data show clearly two types of problem for the farmers, loss of topsoil from wind erosion, and from water erosion, of which the farmers reported that water erosion was becoming a major problem. The two major causes of loss of topsoil in Table 7.32 both relate to water erosion caused by run off and flooding.

From the data, these two problems can be classified further into two categories, namely, (1) problems which are predominantly caused by internal farming practices, and (2) problems which are caused by both internal and external practices. The first category includes cultivation for both weed control and planting, and laser levelling. In the second category the major external cause of problems with loss of topsoil was from the effects of forest harvesting techniques and the building of water levees which then caused water erosion for other farmers.

7.6.2 Internal Farming Practices

In general terms, this section will look at the correlations between the values which farmers have attached to problems such as thinning of topsoil and the values they have attached to possible causes of soil loss. A significant positive correlation indicates that farmers perceive that there is a relationship between this problem and the possible cause.

There are 15 farmers who claim they have problems. The testing statistic for the hypotheses

$$H_0 : \rho = 0 \qquad \text{(no relationship)}$$

$$H_1 : \rho > 0 \qquad \text{(positive relationship)}$$

is

$$t_{(n-2)} = \frac{r}{\sqrt{\dfrac{1-r^2}{n-2}}}$$

Using $\alpha = .05$ as our level of significance then for this t statistic with n-2 = 15 – 2 = 13 degrees of freedom the critical value is 1.77. The corresponding value of r is .44. Sample values of r that exceed 0.44 indicate that there is a positive relationship between the seriousness of the problem and the presence of the possible cause.

7.6.2.1 Laser Levelling

Because the public data are aggregated it is difficult to detect specific occurrences even though differences were expected between the aggregate and the individual.

It was stated in Chapter 2 and developed in Chapter 5 that some of the problems are location specific and that these problems could not be treated at an aggregate level. It is assumed in this thesis that interviewing each farmer in detail may provide some indications of problems relating to location.

One example is laser levelling. Only a few farmers undertook this practice and the results do not indicate a major problem at the aggregate level. However, on an individual level the damage done by laser levelling incurred the highest cost for problems with soil depth.

The proportion of costs relating to problems with soil loss caused by laser levelling was 70%[ix] of the total cost of soil loss. This was incurred by only one farmer in Catchment 4, location 1[x]. Laser levelling is a new expensive technological development, but has not worked out properly and has negative consequences for the farmers involved. Apart from the fact that it may be suitable in some locations, Location 1 in the survey indicates the farmer is situated at the watershed of the catchment or sub-catchment and the indications are that laser levelling causes expensive problems for the farmer.

7.6.2.2 Loss of Soil from Cultivation

Of the 43 farmers who reported any symptoms, only 11.5% responded with wind erosion. The rest reported they had learned from the 1983 drought, that is, they planted groundcover and reduced the use of bare fallow. The biggest symptom for the farmers was thinning of topsoil which 35.0% reported.

For the 15 farmers who had soil loss, an examination of the relationship between levels of awareness of the problem of loss of soil and the impact of factors such as weed control and cultivation indicates that there is a significant positive correlation of $r = .46$ between the loss of soil variable and the cultivation for weed control variable. For other possible causes of this problem the r values were positive but not significantly different from zero. This indicates that in the minds of these farmers weed control procedures are the key factor which leads to a problem with loss of soil.

Similar conclusions can be made about the thinning of topsoil and stubble burning (r = .49) and cultivation for planting (r = .47).

7.6.3 Internal and External Practices

7.6.3.1 Loss of Soil From Water Erosion

An examination of the relationship between levels of awareness of the problem of loss of soil and the impact of factors such as run-off gully erosion and increased flooding indicates that there is a significant positive correlation of r = .73 between the loss of soil variable and the water erosion caused by the run-off gully erosion variable. Similarly, there is a significant positive correlation of r = .53 between the loss of soil variable and water erosion caused by increased flooding variable. For other possible causes of this problem the r values were positive but not significantly different from zero. This indicates that in the minds of these farmers water control procedures are a key factor which leads to a problem with loss of soil.

The results indicating problems with water erosion, run-off, and flooding were unexpected in that many of these problems seem to be outside the farmer's control and it was not expected that the farmers would be so open about problems with water, perhaps because the biggest problems are experienced by individuals. For example, further investigation indicated localised occurrences involving forest removal and levees built in response to increased water flows throughout the catchment.

When the correlations were examined the strongest were those related to water erosion, both internally caused and from activities from up-stream in the catchment. Water erosion seems at least as big if not more of a problem than cultivation is for more farmers. When the correlations between soil erosion and run-off and water erosion are examined values obtained were r = .73 and r = .53. These are higher than the correlations for cultivation suggesting that water erosion is perceived as being the cause of greater loss of topsoil than cultivation. These results are presented in Table 7.33.

Table 7.33 Correlations for Soil Depth Loss with Causes and Problems Created[xi]

N=15. At .05 significance level, the critical value of r = .44

Symptoms Causes	Wind Erosion	Thinning of Topsoil	Water Erosion
a. Cult.for Weed Control	0.36	0.46	0.04
Laser Levelling	0.23	0.28	-0.06
Cult.for Planting	0.47	0.34	0.36
Stubble Burning	0.24	0.49	0.06
b. Run off – gully erosion	0.26	0.25	0.73
Inc. Flooding	0.01	0.07	0.53

The test for differences in correlations can be undertaken in the following way. If it is noted that the correlation for water erosion (r = .73) is higher than the correlation for cultivation (r = .47) then the following testing procedure can be used.

$$H_0 : \rho_w - \rho_c = 0 \qquad \text{(the same correlations)}$$

$$H_1 : \rho_w - \rho_c > 0 \qquad \text{(correlation for water is greater)}$$

$$z = \frac{(r_w - r_c) - 0}{\sqrt{\frac{1}{n_w} + \frac{1}{n_c}}} = \frac{(0.73 - 0.47) - 0}{\sqrt{\frac{1}{15} + \frac{1}{15}}} = 0.712$$

If $\alpha = 0.05$ then the critical value of z is 1.645. A z value of 0.712 leads us to accept the null hypothesis and conclude that the two correlations are the same.

They are not significantly different, therefore, it can be concluded that one is not more important than the other. However, there was anecdotal evidence and evidence from water management practices in the Loddon Catchment to indicate increasing problems relating to water flow. It was implied above and strengthened by anecdotal evidence that the farmers talk differently about things they can control and things they cannot control. In particular, the Bendigo-Myers Creek sub-catchment is experiencing increased water flows from many sources. One of the causes is the water diverted into the Loddon Catchment to provide irrigation water further downstream. Consequently, private water levees are being built to solve the increasing water problems on individual properties. This then pushes the problem further downstream.

Traditionally, farmers are reluctant to discuss problems in a context in which they cannot manage. An example is water damage. Water damage on their land has been seen by these farmers as one of the problems that they had to manage. They also do not criticise other farmers. However, the problems with levees and increasing water flow is now increasing exponentially and is becoming a visible problem for many of these farmers.

Farmer No. 71 described the situation. Water from the Campaspe River is diverted to supply water to Bendigo from which the grey water and treated sewage is released into the Bendigo Creek. The population of Bendigo has increased from 50,000 in 1970 to 70,000 in 1990 increasing the demand for water and increasing land clearing. The Bendigo Creek itself is naturally a seasonal flowing waterway but with the increased flow it now flows all year and floods more frequently on to farming land. In addition, the flooded creek trees die, fall into the creek, and cause snagging, silting buildup, water blocking and more flooding. In response, water levees are built by farmers which pushes extra water downstream. The water also floods on to road verges often cutting off traffic. The main areas affected are Kamarooka where the Bendigo and Piccaniny Creeks meet. Since the early 1990's farmers have come together and formed a community group in the hope of solving what they see as an externallity. They are not used to solving their problems with others, and are only recently admitting that there are problems which they do not believe they created[xii].

7.6.3.2 Activities Undertaken to Avoid and/or Alleviate Problems

It was stated in Chapter 5 that the farmers have a clear idea of their own productive capacity. In addition it was stated in Section 5.4.1.2 that farmers could respond in two ways to the cost/price squeeze: they could degrade the soil by increasing inputs; or they could respond by changing methods and making use of on-farm resources. This would add strength to the proposition that on-farm resources, assets in use, form an important element for these farmers.

To test this, all the farmers, including those with problems with soil loss and those who did not, were asked what activities they undertook to alleviate or avoid problems with soil loss. It was intended to demonstrate from the agricultural literature whether or not farmers were aware of recommended best practice, and the extent to which it applied to them. It was also expected that there would be commonality because the chosen land management unit created a common factor for the farmers in that they are subject to the same forces. The most important results to these questions are shown in Table 7.34 and the correlations are shown in Table 7.35.

Table 7.34 Activities Undertaken to Avoid and/or Alleviate Problems with Loss of Topsoil over the past five years on average (Please tick one or more boxes)

n=72

Activities	%
Changed cultivation to minimum tillage	80.6
Changed method of weed control	80.6
Substitute other inputs	77.8
Tree planting for wind breaks/regeneration	70.8
Use of fallow (growing wheat, chemical fallow)	34.7

The results indicate that there is an acceptance by these farmers of best practice and that they manage the changes accordingly. Fifty-eight or 80.6% of the farmers had changed to minimum tillage which also requires a change in the method of weed control (80.6%) and the increase of inputs for chemical weeding (77.8%). Tree planting for wind breaks was also undertaken by a large number of the farmers, fifty-one farmers or (70.8%).

If $\alpha = .05$ is used as the level of significance then for this t statistic with n-2 = 72 – 2 = 70 degrees of freedom the critical value is 1.645. the corresponding value of r is .194. Sample values of r which exceed 0.194 indicate that farmers perceive that there is a relationship between the activity and the avoidance or alleviation of problems with soil depth. Overall, there is no clearly dominant correlation that is stronger than another. This suggests ‘a set of information’ is relevant where a whole range of factors are important. For example, changing to minimum tillage also involves substituting cultivation for chemical inputs to control weeds and changed machinery. However this method also increases expenses.

Table 7.35 Correlations for Soil Depth and the Activities Undertaken to Avoid or Alleviate Problems

n=72. At a significance level of .05 the critical value of r = .194, at a significance level of .01 the critical value of r = .274.

	Subs. Inputs	Min. Till.	Mach. Purch. Modified	Finance from Earnings	Tree Planting	Use of Fallow	Change Weed Control
Min. Tillage	0.24	1					
Mach. Purc. Modified	0.28	0.02	1				
Finance from Earnings	0.24	0.23	0.20	1			
Tree Plantings	0.02	0.30	0.06	0.43	1		
Weed Control	0.33	0.11	0.16	0.08	0.15	0.06	1
Stubble Burning	-0.03	-0.06	0.04	-0.22	-0.12	0.30	0.22
Imp. in Cash Flow	-0.11	-0.17	0.18	0.12	0.25	0.17	0.05
Imp. in Production	0.28	0.05	0.07	0.10	0.26	0.20	0.13

When an examination is made of the relationship between levels of awareness of the problem of loss of soil and the activities undertaken to avoid or alleviate the problems by examining such factors as minimum tillage and tree planting we find that there is a significant positive correlation of r = .30.

Two areas of importance are the awareness by farmers of new methods and the importance attached to the amount of debt each farmer carried. When an examination is made of Table 7.35 and the relationships between levels of awareness of the move to minimum tillage there is a significant positive correlation of r = .32 with changed method of weed control; r = .28 with machinery modified or purchased; r = .24 substitution of other inputs. This indicates that in the minds of these farmers weed control procedures are also a key factor that leads to a reduction of a problem with loss of soil.

Farmers both changed inputs and changed methods by modifying machinery and this involved a trade-off. To prevent wind erosion they converted to minimum tillage but they also then had to increase chemical methods of weed control including chemical fallow. The relationship between substituting inputs and weed control shows a significant positive value of r = .32.

When an examination is made of the extent to which farmers prefer to finance these changes from earnings it is shown in Table 7.35 that there is a significant positive correlation of r = .43 with tree planting, r = .24 with substitution of inputs, r =.20 with machinery modified or purchased. This indicates that in the minds of these farmers financing from earnings is one factor in managing financial risk and strengthens the ownership claim. Other possible effects of these activities such as improvement in cash flow, improvement in profits, improvement in land value and improvement in production were both positive and negative, the most significant being a relationship between tree planting and improvement in production with a positive correlation of r = .22 although these results were not significant.

Tree planting is a positive indication of longer-term benefits being recognised by the farmer. The relationship between minimum tillage and tree planting (r = .30) is significant at both the 95% and 99% levels of significance providing further evidence that these farmers undertake several strategies simultaneously. Importantly, these are plantings for windbreaks. This provides an indication that the farmers respond when they see an economic return to themselves even if it involves taking a longer view of returns. They would rather finance gradually from earnings than increase debt levels.

Table 7.36 Benefits Received as a Result of Activities on Soil Depth Loss

n=72

Benefits	%
Improvement in production	62.5
Improvement in land value	56.9
Improvement in profits	41.7
Improvement in cash flow	40.3

Examining the correlations between increase in production and cash flow negative values were obtained (r = -0.0658). Production and profits were also negatively related (r = -0.10184) and land value (r = -0.03621), even though the descriptive statistics in Table 7.36 would suggest that 62.5% of the farmers stated they increased production when soil loss problems were avoided or alleviated. This did not translate into direct increases of profits, land value or cash flow.

These negative values however are quite small. When tested whether they are significantly different from 0 the findings show:

$$H_0 : \rho = 0 \qquad \text{(no relationship)}$$

$$H_1 : \rho \neq 0 \qquad \text{(a relationship exists)}$$

If $\alpha = 0.05$ then the critical values of the t statistic when the df = 70 will be the same as the critical values of + 1.96 and - 1.96 as with the z statistic. The corresponding critical r values are - 0.228 and + 0.228. These values are much less than the critical values which indicates that they are not significantly different from 0.

Once again the null hypotheses is accepted. There is not a significant negative relationship. The results indicate that the financial consequences of decisions to change methods are not the primary consideration.

7.6.4 Soil Fertility

The following relationship is expected; that the farmers are able to gauge the effect of internal and external activities specifically in relation to their soil fertility. Twenty percent or 15 of the farmers reported that they had problems with loss of soil fertility. In Table 7.37 it should be noted that two more categories were added in response to farmer's answers; these are poor soil structure and reduction of fertiliser. Table 7.38 reports on the correlations between the causes of loss of fertility and the problems they create for farmers.

Table 7.37 Causes of Loss of Soil Fertility n=15

Causes	Frequency	Percentage %
Cultivation in preparation for planting	7	47.0
Stubble burning	7	47.0
Cultivation for weed control	6	40.0
Reduction of the water table and increasing water retention	6	40.0
Maintaining yield by increasing use of sprays and fertilizers	4	27.0
Poor soil structure (compaction)	4	27.0
Reduction of fertilizer	3	20.0
Laser levelling	2	13.5

This section will look at the correlations between the values which farmers have attached to problems of loss of soil fertility and the values they have attached to possible causes. A significant positive correlation indicates that farmers perceive that there is a relationship between this problem and the possible causes. (See Appendix 14 and 15 for details of the extent and the cost of loss of soil fertility).

There are 15 farmers with major problems. Our testing statistic when we have the hypotheses

$$H_0 : \rho = 0 \qquad \text{(no relationship)}$$

$$H_1 : \rho > 0 \qquad \text{(positive relationship)}$$

$$t_{(n-2)} = \frac{r}{\sqrt{\frac{1-r^2}{n-2}}}$$

If $\alpha = .05$ is used as the level of significance then for this t statistic with $n - 2 = 15 - 2 = 13$ degrees of freedom the critical value is 1.77. The corresponding value of r is .44. Sample values of r which exceed 0.44 indicate that there is a positive relationship between the seriousness of the problem and the presence of the possible cause.

The same fifteen farmers were also asked to choose, from a list, the causes of loss of soil fertility and the problems they created. The correlations resulting from their responses are presented in Table 7.38.

Table 7.38 Correlations for Soil Fertility Causes and Problems Response

N = 15. At a significance level of 95% the critical value for r = .44.

Causes	Problem with Soil Fertility	Cult.for Weed Control	Laser Level	Redn.of Water Table	Cult.for Planting	Stubble Burning	Main. Yield by Inc. Sprays	Compac tion	Poorer Quality Product	Lower Yields	Inc. use of Fertilizer
Cult. Weed control	0.59	1									
Laser Levell	0.33	0.56	1								
RedWat er Table	0.59	0.45	0.25	1							
Cult.for Planting	0.64	0.41	0.23	0.41	1						
Stubble Burning	0.64	0.58	0.52	0.24	0.53	1					
Inc. Sprays	0.47	0.59	0.70	0.37	0.13	0.74	1				
Compac tion	0.47	-0.07	-0.04	0.15	0.53	0.13	-0.06	1			
Problem Created											
PoorQu alProd	0.69	0.53	0.21	0.53	0.63	0.48	0.30	0.30	1		
Lower Yields	0.87	0.54	0.15	0.40	0.73	0.48	0.22	0.54	0.67	1	
Inc. Fertilizer	0.74	0.49	0.45	0.49	0.44	0.58	0.64	0.28	0.67	0.62	1
Inc.Herb	0.64	0.58	0.52	0.58	0.37	0.68	0.74	0.13	0.63	0.48	0.87
Inc Pest	0.59	0.45	0.25	0.45	0.24	0.58	0.59	-0.07	0.53	0.54	0.80

In an examination of the relationship between levels of awareness of the problem of loss of soil fertility and possible causes it was found that there is a significant positive relationship between a problem and cultivation for planting r = .64; stubble burning r = .64; cultivation for weed control r = .59; reduction of the water table and increasing water retention r = .59; maintaining yield by increasing use of sprays and fertilisers r = .47. Laser levelling was not seen by the farmers as directly connected to soil fertility but indirectly when cultivation was undertaken for weed control where it was found there is a significant positive correlation of r = .56.

The results indicate that in the minds of these farmers both soil depth loss and soil fertility problems are related to their cultivation practices, and to a lesser extent to the increasing use of inputs.

7.6.4.1 Maintaining Yield by Increasing Inputs

It was stated in Chapter 5 that farmers with a proprietary view would not be primarily interested in increased production by the maintenance of yield by increasing the use of sprays and fertilisers. When we examine the relationship between levels of awareness of the problem of loss of soil fertility and the impact of maintaining yield by increasing inputs we find there is a significant positive correlation of r = .74 between increasing inputs and stubble burning; r = .70 between increasing inputs and laser levelling; r = .59 between increasing inputs and cultivation for weed control. This indicates that in the minds of these farmers maintaining yield by increasing inputs is a key factor which can eventually reduce soil fertility.

7.6.4.2 Problems Created by Loss of Soil Fertility

Table 7.39 Problems Created by Loss of Soil Fertility

n=15

Problems	%
Lower yields per acre	80.0
Increasing use of fertilisers	60.0
Poorer quality product	53.4
Increasing use of herbicides	46.7
Increasing use of pesticides	40.0

Farmers stated in Sections 7.4.2.2 and 7.4.3.5 that quality of product was their highest priority. When examining poorer quality product the strongest positive values were found with cultivation practices that then created the need to increase inputs. The causes were; cultivation for planting r = .63; cultivation for weed control r = .53; reduction of the water table and increasing water retention r = .53; stubble burning r = .48. In the minds of the farmers these practices are key factors which lead to the following problems; lower yields per hectare r = .67; increased use of fertilisers r = .67; increased use of herbicides r = .63; increased use of pesticides r = .53. The latter two are directly related to minimum tillage recommended to reduce soil depth loss. The farmers were well aware that when activities are introduced for one purpose there may also be a negative reaction creating another problem. Frequencies for these findings are shown in Table 7.39.

The most important correlations undertaken to examine the relationship between the activities undertaken to avoid and/or alleviate problems with soil fertility are presented in Table 7.40 and discussed in the following Section 7.6.4.3.

Table 7.40 Correlations for the Activities Undertaken to Avoid and/or Alleviate Problems with Soil Fertility

N=72. At the significance level of 95% the critical value for r = .194 while at the significance level of 99% the critical value for r = .274.

Activities	Better Use of Water	Min. Tillage	Soil/Water Testing	Crop Rotation	Longer View of Returns	Stubble Retention	Mulch
Min. Tillage	0.31	1					
Soil/Water Test	0.24	0.12	1				
Crop Rotation	0.03	0.27	-0.05	1			
Stubble Retent	0.27	0.18	0.24	0.05	0.27	1	
Inc.Fertil Herb	0.16	0.14	0.16	0.21	0.03	-0.13	
Lost Yield	0.23	0.10	0.10	0.09	0.28	0.19	
Mulch	0.05	0.29	0.16	-0.04	0.22	0.52	1
Mach. Mod	0.03	0.06	0.05	-0.08	-0.07	0.30	0.26
Weed Control	0.16	0.15	0.08	0.08	0.38	0.09	0.24
Legume Pasture	0.21	0.22	0.14	-0.06	0.23	0.14	0.06
Disease Break	0.11	-0.08	0.08	-0.14	0.20	0.24	0.13
Im Cash Flow	0.21	0.19	-0.12	0.14	0.11	0.09	0.01

7.6.4.3 Long-Term View of the Returns for Each Paddock

Longer view of returns for each paddock and better use of water showed the highest positive values linked with several other variables, adding evidence for a 'set of information' being both useful to the farmers and also that wealth maintenance is a continuing longer-term objective of these farmers. The farmers are well aware that increasing productivity with increased inputs can reduce the fertility of the soil.

When examining the relationship between levels of awareness of the activities necessary to maintain fertility and the impact of factors such as taking a longer view of returns it was found that there is a significant positive correlation between the longer view and certain activities including r = .27 for stubble retention; r = .28 for lost yield in early years of changeover; r = .22 for mulch; r = .38 for change method of weed control; r = .23 for growing legume pastures; r = .20 for disease break. For other possible activities the r values were positive but not significantly different from zero. This indicates that in the minds of these farmers longer views of returns is a key factor which leads to an improvement in fertility.

When examining the relationship between levels of awareness of the activities necessary to maintain fertility and the impact of factors such as better use of water it was found that there is a significant positive correlation between better use of water and certain activities including r = .31 for minimum tillage; r = .24 for soil/water testing; r = .27 for stubble retention; r = .23 lost yield in changeover; r = .21 for sowing legume pasture; r = .21 improvement in cash flow.

Interestingly, negative relationships existed between increased use of inputs and the following; mulch r = -0.147; fencing r = -0.053; profits r = -0.066; and land value r = -5.1E -17.

These findings indicate that between 22.2% and 97.2% (see Table 7.41) of these farmers are undertaking some form of conservation farming, attributes of which are emphasised in Table 7.41 with **, all of which provide evidence of a longer view of returns for the sake of conserving soil quality. This may explain why these practices are introduced in an incremental manner.

In response to the issues stated in Chapter 5, there is in the farmer's responses to loss of fertility, a significant statistical relationship with activities that take a longer view such as crop rotation, sowing legume pastures, and which are not linked directly into market prices. They do change methodologies, and finance changes from earnings. Ownership, long-term thinking and activity accounting are useful to farmers. They are very mindful of the effect of their activities on soil quality.

The highest priorities for the farmers are the quality of their product and the quality of their soil. The farmers are also well aware of the problems their cultivation practices create. By separating soil depth and fertility it is possible to observe that these farmers are continually making decisions which involve trade-offs. For example, the recommendation of minimum tillage alone for soil depth problems without also realising the effect on fertility would confirm the reductionist approach evident in the literature.

The practices recommended for conservation farming that aim for little disturbance of the soil involve direct drilling, crop rotation, soil/water testing, stubble retention, mulch and sowing legume pastures. The benefits of incremental change can be noted by the existence of mice plagues in the monocultural practices in the adjoining catchment where continual cropping of grains using direct drilling lead to severe mice plagues because their nests were not disturbed. This increased the financial and operating risks for these cropping farmers who without other changes were required to further increase chemical inputs.

Table 7.41 Activities Undertaken to Avoid and/or Alleviate problems with Loss of Fertility over the past five years on

n=72

Activities	%
Crop rotation**	97.2
Sowing legume pastures**	90.3
Changed cultivation to minimum tillage	72.2
Changed method of weed control	70.8
Stubble retention**	63.9
Increased use of fertiliser and herbicides	61.1
Better use of water**	59.7
Other (Disease break, stubble burning, bank overdraft, agronomist, cool burning, use of fallow)*/**	58.3
Taken a long view of the returns**	48.6
Mulch**	37.5
Soil/water testing**	34.7
Machinery purchase/modified	29.2
Lost yield in early years of change over**	22.2
Fencing**	22.2

** Indicates diversity.*
***Attributes of conservation farming.*

Responses less than 5% were eliminated from Table 7.41.

7.6.3.6 Laser Levelling

Laser levelling, particularly in Location 1, the watershed, created problems with soil fertility as well as soil depth. Laser levelling showed strong positive values with poorer quality product (r = .66). Maintaining yields by increasing fertilisers (r = .66), increased herbicides (r

= .66), increased fertiliser (r = .50), increased pesticide (r = .50) however, had the effect, in the minds of the farmers, of showing a positive relationship with lower yields (r = .395) although not statistically signficant (Table 7.38).

This technology is obviously inappropriate and ill-advised. It is not clear whether it was a bad decision by the farmer or that the purveyors of the technology have no knowledge of the effects particularly in relation to location.

These reactions to problems are highlighted further in the following section on soil structure where the problems have become more widespread. These problems are related to the effect of practices on water problems but the farmers did not relate to them via salinity as such but through the problem with the soil structure itself.

7.6 5 Soil Structure

The following relationship is expected, that the farmers are able to gauge the effect of internal and external activities specifically in relation to their soil structure[xiii].

Fifty-three percent or 38 of the farmers reported that they had problems with loss of soil structure. The cost of loss of structure was measured by asking the farmers how much they had lost in production multiplied by the prices in 1994 of the relevant cropping or grazing products. Only four of the farmers indicated that they did not lose any production as a result of this problem. The estimates ranged from \$0 - \$40,000, the details of which are given in Table 7.42 (See Appendix 16). The farmers stated that these costs were not connected with the costs for either soil depth or soil fertility.

Table 7.42 Farmers Affected by Loss of Soil Structure and Cost of Loss of Soil Structure in Production Loss in the Years 1989-94

n = 38

$		%
Farmers with problems with soil structure	(n=72) 38	(n=72) 52.8
Cost in production loss	n=34*	n=34
0 – 19999	19	56.0
20000 - 39999	3	9.0
40000 – 59999	5	15.0
60000+	7	21.0

** 4 farmers indicated that they did not lose any production as a result of problems.*

The amounts were considerably greater than the costs incurred for soil depth or fertility. In total the size of the costs farmers calculated cannot be verified by other studies but a tentative conclusion may be made that the area is beginning to experience both internal and external stresses above the natural conditions farmers expect to manage.

The thirty-eight farmers were asked to choose, from a list, the causes of loss of soil structure and the problems they created, the results of which are given in Table 7.43 and the correlations are given in Table 7.44.

Table 7.43 Causes of Loss of Soil Structure and Problems they Create for the Farmers

Causes n=38	%	Problems Created	%
Multiple cultivations for weed control	66.0	Water logging as capillary action reduced	90.0
Cultivation in preparation for planting	66.0	Lower production per acre	87.0
Stubble burning	45.0	Breakdown of soil	69.0
Fallow	37.0	Wind erosion	47.5
Water damage	24.0	Compaction and extra costs	37.0
Laser levelling/drains	8.0		

In this section an examination is made of the correlations between the values which farmers have attached to problems associated with soil structure and the values they have attached to possible causes and problems that these create. A significant positive correlation indicates that farmers perceive that there is a relationship between this problem and the possible causes and problems.

There are 38 farmers with soil structure problems. The testing statistic with the hypotheses

$$H_0 : \rho = 0 \qquad \text{(no relationship)}$$

$$H_1 : \rho > 0 \qquad \text{(positive relationship)}$$

is

$$t_{(n-2)} = \frac{r}{\sqrt{\dfrac{1 - r^2}{n - 2}}}$$

If $\alpha = .05$ is used as the level of significance then for this t statistic with $n - 2 = 38 - 2 = 36$ degrees of freedom the critical value is 1.645. The corresponding value of r is .2644. Sample values of r that exceed 0.2644 indicate that there is a positive relationship between the seriousness of the problem and the presence of the possible causes.

When an examination is made of the relationship between levels of awareness of the problem of loss of soil structure and possible causes it was found that there is a significant positive relationship between the problem and weed control r = .69; cultivation for planting r = .69; stubble burning r = .53; fallow r = .46; water damage r = .36 and (Table 7.44). All other possible causes of this problem were significant and this indicates that in the minds of these farmers a number of practices relating to cultivation practices which disturb the soil, lay it bare and lead to water problems are the key factors which leads to a problem with soil structure.

When an examination is made of the relationships between levels of awareness of the farming activities which cause the loss of soil structure and the problems these create for the farmer it was found that there are significant positive correlations between these causes and all the problems identified by the farmers and this is indicated by the shaded sections in Table 7.44.

The values indicate in the minds of the farmers the importance of the relationship between these farming activities and lower production and indicate a significant positive correlation of r = .87 between the existence of a problem and the effect on production. Lower production was seen by the farmers as having a strong connection with water logging where it was found that there is a significant positive correlation of r = 92. Again cultivation for weed control had a significant effect on soil structure with a significant positive correlation of r = .85 between the cultivation for weed control variable and the breakdown of soil variable.

Table 7.44 Correlations for Soil Structure Causes and the Problems Created

N=38 At significance level of 95%, the critical value for r = .2644, while at the significance level of 99% the critical value for r = .274.

Causes & Problems	Problem Exists	Cost of Loss	Weed Control	Laser Level	Fallow	Cult for Planting	Stubble Burning	Water Damage	Lower Production	Break Soil	Water Logging	Wind Erosion
Cost of Loss	0.44	1										
Causes												
Weed Control	0.69	0.39	1									
Laser Level	0.20	0.30	0.29	1								
Fallow	0.46	0.14	0.60	0.25	1							
Cult.for Planting	0.69	0.39	0.63	0.29	0.45	1						
Stubble Burning	0.53	0.32	0.62	0.05	0.47	0.56	1					
Water Damage	0.36	0.29	0.25	0.13	0.03	0.25	0.09	1				
Problems												
Lower Production	0.87	0.47	0.73	0.23	0.46	0.68	0.60	0.33	1			
Breakdown of Soil	0.71	0.38	0.85	0.28	0.51	0.61	0.60	0.33	0.82	1		
Water Logging	0.84	0.48	0.71	0.22	0.45	0.60	0.59	0.32	0.92	0.79	1	
Wind Erosion	0.55	0.35	0.66	0.36	0.36	0.39	0.43	0.36	0.63	0.77	0.61	1
Compaction	0.46	0.19	0.38	-0.10	0.29	0.31	0.14	0.34	0.39	0.51	0.38	0.36

This indicates that in the minds of these farmers cultivation practices are a key factor that causes problems with loss of soil structure which then has a flow-on effect to production losses.

These results confirm the frequencies obtained in the descriptive statistics (Table 7.43 and repeated in Table 7.45). It should be noted that two categories, namely lower production per acre and compaction and extra costs were added during the interviews in response to farmers' replies.

Table 7.45 Problems that Losses of Soil Structure Create for the Farmers

Problems n=38	%
Water logging as capillary action reduced	90.0
Lower production per acre	87.0
Breakdown of soil	69.0
Wind erosion	47.5
Compaction and extra costs	37.0

The evidence in this section leads to the conclusion that soil structure problems are the greatest challenge for these farmers. They are situated on a floodplain which when accompanied by cultivation and increasing water flows through the region are creating structural problems for over half of these farmers.

Table 7.46 Activities Undertaken to Avoid and/or Alleviate problems with Loss of Soil Structure over the past five years on average

n=72

Activities	%
Sowing pastures**	90.3
Crop rotation**	80.6
Changed cultivation to minimum tillage	77.8
Changed method of weed control	73.6
Better use of water**	62.5
Stubble retention**	59.7
Increased use of inputs	56.9
Other (Lost yield in early years of changeover, mulch, bank overdraft, agronomist, machinery purchase/modified, changed to minimal fertiliser, drains, vermin treatment) *, **	54.2
Direct drilling**	44.4
Gypsum	43.1
Taken a longer view of the returns **	38.9
Soil/water testing**	30.6

** Indicates diversity*

*** Attributes of conservation farming*

Table 7.47 Correlations for Activities to Avoid/Alleviate Problems with Soil Structure

N=72. At the significance level of 95% the critical value for r = .195 while at the significance level of 99% the critical value for r = .274.

	Better use of Water	Min.Till	Soil/Water Testing	Direct Drilling	Sowing Pastures	Stubble Retention	Increased Inputs	Weed Control	Mulch	Inc. In Cash Flow	Inc.In Profits
Better use of Water	1										
Soil/Water Testing	0.33	0.14	1.00								
Direct Drilling	0.17	0.34	0.32	1.00							
Crop Rotation	-0.09	0.08	0.10	0.23							
Sowing Pastures	0.23	0.28	0.22	0.29	1.00						
Longer View of Paddock	0.21	-0.12	0.27	0.15	0.07						
Stubble Retention	0.30	0.17	0.18	0.39	0.21	1.00					
Increased Inputs	0.14	0.21	0.27	0.33	0.28	0.20	1.00				
Weed Control	0.06	0.29	0.19	0.35	0.44	0.22	0.31	1.00			
Gypsum	0.04	0.13	0.21	0.18	0.00	0.14	0.19	0.08			
Mulch	0.04	0.18	0.19	0.43	0.07	0.38	-0.07	0.21	1.00		
Inc. In Profits	0.14	0.11	-0.10	0.11	0.04	0.18	0.10	-0.09	-0.09	0.54	1.00
Inc. In Land Value	0.12	-0.01	-0.13	0.13	0.08	0.23	-0.04	-0.09	0.13	0.22	0.36

As was stated in Chapter 5 it was expected that there would be many variables which are equally important in the management of soil, and that the gross margins and net margins would not provide relevant information for farmers or provide significant information on their productive capacity. The results for soil structure, in particular, demonstrate the importance of this statement. These multiple relationships are continued throughout a number of variables and apply particularly to soil/water testing, direct drilling and better use of water, three recommendations for conservation farming. All of the other relationships are in the same direction but not of the same strength.

It was also stated in Chapter 2 and Chapter 5 that farmers are not asked the correct questions. The emphasis on financial and farm management may be necessary but because the farmers have responded negatively to surveys it cannot be decided that this constitutes the major cause for worry about farmer's knowledge.

When an examination is made of the relationship between levels of awareness of the activities necessary to maintain soil structure and the impact of factors such as direct drilling it was found that there is a significant positive correlation between direct drilling and certain activities, for example r values for mulch is $r = .43$; stubble retention $r = .39$; changed method of weed control $r = .35$; increased inputs $r = .33$; sowing pastures $r = .29$ and crop rotation $r = .23$. For other possible activities, including financial returns relating to direct drilling, the r values were positive but not significantly different from zero. This indicates that in the minds of these farmers direct drilling activities are a key factor that leads to an improvement in soil structure. It should also be noted in the above that, initially, new methods involve increased inputs which can then lead to decreased production for these farmers. One complication created by the questionnaire is that increased inputs may mean gypsum, an input which helps restore soil structure but does not affect production and is expensive. It cannot be determined which inputs were being referred to when this was being answered.

When an examination is made of the relationship between levels of awareness of the activities necessary to maintain soil structure and the impact of factors such as soil/water testing we find that there is a significant positive correlation between soil/water testing and certain activities, for example, r values for direct drilling is r =.34; longer view of the returns for each paddock r = 27; increased inputs r = .27; sowing pastures r = .22; gypsum r = .21; changed method of weed control r = .19; and mulch r = .19. For other possible activities, relating to soil/water testing, the r values were positive but not significantly different from zero. This indicates that in the minds of these farmers that soil/water testing, which is part of conservation farming, is a key factor which leads to an improvement in soil structure. It also indicates a willingness to respond to technical information when it is appropriate to need.

Examining the correlations between soil/water testing and financial returns negative values were obtained. Improvement in cash flow obtained a correlation of r = -0.15; improvement in profits obtained a correlation of r = -0.10; and improvement in land value obtained a correlation of r = -0.13. The responses to these questions as shown in Table 47 would suggest many farmers achieved an increase in production, but not cash flow and profits when soil structure problems were avoided or alleviated.

These negative values however are quite small. When tested whether they are significantly different from 0 it was found that:

$$H_0 : \rho = 0 \qquad \text{(no relationship)}$$

$$H_1 : \rho \neq 0 \qquad \text{(a relationship exists)}$$

If $\alpha = 0.05$ then the critical values of the t statistic when the df = 70 will be the same as the critical values of + 1.96 and - 1.96 found with the z statistic. The corresponding critical r values are - 0.228 and + 0.228. These values are much less than the critical values which indicates that they are not significantly different from 0.

One again the null hypothesis is accepted. There is not a significant negative relationship. The results indicate that the financial consequences of decisions to change methods are not the primary consideration in the minds of these farmers.

Similar relationships were found between levels of awareness of the activities to avoid or alleviate soil structure loss and the impact of factors such as better use of water and minimum tillage. For activities relating to minimum tillage, soil/water testing and direct drilling there was a significant positive correlation with both increased inputs and changed method of weed control indicating again the trade-off involved in many of these decisions.

However, on examination of the relationship between levels of awareness of activities relating to the better use of water with increased inputs and weed control, it was found that there is not a significant positive correlation ($r = .14$) between better use of water variable and increased inputs variable; and a positive correlation of $r = .06$ between the better use of water variable and changed method of weed control. This indicates that in the minds of these farmers better use of water procedures are better for the soil and are more aligned with conservation farming. This would be an important finding because it would mean that two groups of farmers could be identified. Those who practise conservation farming and who minimise inputs; and those who use chemical solutions to their soil problems.

Table 7.48 Information Sources for Soil Depth, Soil Fertility and Soil Structure

	Better use of Water	Minimum Tillage	Soil Water Tests	Direct Drilling	Crop Rotate	Sowing Pasture	Longer View	Stubble Retention	Inc. Inputs	Weed Control	Gypsum	Mulch
Agronomist	0.21	-0.01	0.39	0.31	-0.13	0.03	0.14	0.24	0.26	0.04	0.18	0.29
Leading Farmer	0.08	0.06	0.15	0.07	0.10	0.12	0.03	-0.01	0.33	0.06	-0.03	-0.18
Extension Officer	0.20	0.14	0.28	0.38	0.10	0.22	0.03	0.11	0.15	0.19	-0.03	0.13
Rural Rep	-0.10	0.11	0.03	0.16	0.08	0.05	0.01	-0.07	-0.04	0.07	-0.17	-0.01
AG Consult	0.18	0.00	0.24	0.39	0.12	0.08	0.13	0.02	0.18	0.20	0.08	0.27
Media	0.16	0.24	0.10	0.05	0.04	0.22	0.04	-0.13	0.15	0.06	-0.20	-0.08
Community Group	0.08	0.21	0.20	0.19	0.11	0.18	0.06	0.23	0.49	0.13	0.11	0.09
Farm 500	0.19	-0.02	0.23	0.03	-0.19	0.08	-0.07	0.08	-0.03	0.01	0.28	0.10
Field Days	0.17	0.19	0.23	0.24	-0.02	0.18	0.08	0.18	0.18	0.16	-0.07	0.13
Kondinin Group	-0.13	0.15	0.29	0.09	0.00	0.09	0.23	0.11	0.13	0.16	-0.02	0.03

Because the greatest number of farmers in this survey responded to soil structure problems, the question asking them where they obtained their information on soil quality is discussed in this section. It was stated in Chapter 5 that farmers respond when the information is about their technical needs and when it is offered by the appropriate technical person.

Correlations relating to soil/water testing, direct drilling and better use of water (Table 7.46) provides evidence that the more recent responses to problems require the greatest concentration of technical advice (Table 7.47). Neither leading farmers nor observation had any direct impact on the provision of specific information (See Appendix 17 for responses to the question ranked qualitatively). As stated in Chapter 5 the leading farmer, although promoted in the literature (Alexander 1995), provides a point of departure for other farmers to initially observe and wait and see how these innovations develop. Observation too, may be an overall scanning device but the farmers search for specific technical information once they decide to go ahead.

Table 7.49 Correlations between Sources of Information

	Agronomist	Leading Farmer	Extension Off.	Rural Rep.	AG consultant	Media	Reading	Course
Extension Off	0.32	0.28	1.00					
Rural Rep	0.20	0.25	0.18	1.00				
AG consultant	0.40	0.17	0.38	0.18	1.00			
Media	0.06	0.34	0.16	0.34	0.16	1.00		
Community Group	0.24	0.20	0.33	0.13	0.19	0.23		
Reading	-0.06	0.30	0.18	0.28	0.21	0.61	1.00	
Farm 500	0.20	-0.16	-0.03	0.02	-0.14	-0.11	-0.17	
Course	0.02	-0.09	0.26	0.19	0.05	0.26	0.33	1.00
Field Days	0.27	0.23	0.35	-0.02	0.19	0.17	0.29	0.20

Table 7.50 Benefits Received as a Result of Activities on Soil Structure

n=72

Benefits	%
Improvement in production	63.9
Improvement in land value	55.6
Improvement in profits	34.7
Improvement in cash flow	33.3

Conclusions arising from these results:

As an overall statement, a majority of the farmers was aware of the preferred methodology for each attribute of soil quality, whether or not they acted on this knowledge. Soil structure[xiv] is the major problem for the farmers, where the main causes are cultivation, stubble burning, fallow and water damage. Problems these create are water logging as capillary action is reduced, causing a breakdown of the soil leading to a lower production per acre.

Activities undertaken for soil fertility and soil structure problems are similar although fertility changes seem to be responded to in the first place. A summary of activities for all three attributes can be found in Appendix 18.

In the Milham model it was assumed that the profit maximising farmers who have to respond to lower prices than expected will increase the anticipated rate of soil degradation higher than the optimum (Milham 1994, p.58). However, the indicators are that the farmers try to be wealth maximisers. The farmers did use the prescribed farming methods to improve soil quality and this process did reward them with increased production. However, the farmers recognised that a trade-off is often necessary because of the flow-on effects between soil depth, fertility and structure. Many of the farmers were responding to these flow-on effects by changing methods, again, mainly in response to reductions in fertility. They are, however, having greater problems with soil structure problems and this has become more complex because of the increasing importance of externalities relating to water management.

Milham assumes, as does the agricultural and accounting literature, that there is a relationship between farming activity, soil quality and yields. The results in this survey indicate that this does occur but the farmers are also aware that this is not the same as increases in land value or profits. They were quite adamant that production, cash flow, profits and land value were not necessarily connected with each other.

A further assumption that the use of on-farm resources leads to degradation cannot be supported, on average.

7.6.6 Implications for Accounting

George J. Staubus differentiates between his earlier work on decision usefulness to investors [xv] and the development of decision-useful management accounting information[xvi]. Staubus states the decision usefulness rule as "If you want to maximise this, you need that information, which should be gathered according to such and such principles" (Staubus 1990, p.250)[xvii]

Accordingly, if a decision-maker wanted to maximise profits, revenues would be the major information. However, if a decision-maker has multiple objectives, decisions would be made outside the financial accounting system. According to Staubus (1990, p.250) 'decisions are taken to <u>do</u> or <u>not do</u> something - an activity' and it is in the future. When deciding on an activity in the future, cost/benefit, or relevant costing analysis is required, and is outside the requirements of financial accounting (Staubus 1990, p.262).

As with activities, or properties, the term used by Sterling (Sterling 1972), focus on the decision making stage, not the reporting stage. Properties are those attributes and activities most important to making decisions. Relevance is then determined by the decision model.

> "One of the characteristics of a well-defined decision model is that it will specify the measurement or extinction of certain properties to allow decision makers to achieve their goals" (Sterling 1972, p.199).

One form is to measure the property of cash flow which satisfies and relates to both the short term and the long term. For decision making this is advocated as well as the assumptions which have to be made in preparing financial reports (Ijiri 1967). 'Every decision requires a prediction of the future consequences of various alternatives. For this reason, I would urge that accountants report future cash flows' (Sterling 1972, p.208).

Sterling does, however, modify this position because of the inherent risk in predicting cash flows. In an industry such as agriculture where cash flows may not only be seasonal but multi-seasonal, the investment and financing decision might use other criteria. Both physical properties as well as cash flow were shown to be important in this thesis.

A 'set of information' was formulated by many from both an entity and a proprietary viewpoint. Some suggestions were based on a set of rules or 'opportunity value', 'value to the owner (Bonbright 1937), 'value to the firm' (Sandilands 1975, Stamp NZ 1971 in Zeff 1971).

With imperfect or incomplete markets, no single number can be said to be the 'true income' of an enterprise (Thornton 1991, Beaver & Demski 1979). Consequently, an accounting standard for income measurement or asset valuation may not contain intrinsic reasons for obeying it (Mattessich 1991, p.186, 1996).

A study by Thornton (1991) showed that Canadian resource firms reported price change accounting data on the basis of cost/benefit considerations. Other reasons for not disclosing price changes (or any changes) were that they were misleading, not useful, subjective, and theoretical (Mattessich 1991, p.210).

In these cases it is argued that the appropriate role for the accountant (Manager) is not to provide economic valuations of the firm as a whole; but to provide an 'information set' which assists the user in arriving at their own decisions (Edwards & Bell 1961, Bromwich 1990, Peasnell 1977, Beaver and Demski 1979, Mattessich 1991, 1996, Tweedie & Whittington 1984, p.272). It can be concluded from the results obtained in this chapter that the reporting of soil quality could not be achieved at present using financial accounting statements. Farmers' activities concerning their productive capacity can be described as conforming to complex and eclectic circumstances, and to be decision useful, the reporting system would need to recognise the properties or activities farmers undertake over a long period of time. It is also important to note that the results indicate a proprietary view by the farmers in that they were most concerned with their wealth, and specifically their wealth in the soil quality. Thus their major focus for planning and reporting was on the activities and properties relating to their soils. In this way they measured their return on investment over the long term, while financial viability was indicated by cash flow.

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[i] Due to the lack of available private data prior to the interviews.

[ii]Although as noted in Chapter 2 the 1988 study evaluated visible land degradation.

[iii] Note the dismissal of the Wool Board in October 1998 by the farmers for failing to represent their needs in a rapidly changing market.

[iv] Many of the farmers commented that you had to have a taxable income in order to pay tax, which indicates they have more immediate concerns throughout the year.

[v] Consultants, bankers, agricultural economists, policy makers who undertake research.

[vi] ABARE survey of 1991 reports that in Victoria broadacre farmers used a similar variety of sources to obtain information on marketing as they did for soil quality. The results were media 84%, journals 46%, statutory authorities 34%, stock/station agents 75%, computer based 9%, government departments/agencies 18%, other 8%. Since farmers may seek more than one source of advice, figures may add to more than 100 per cent (ABARE 1992). In the Farm Surveys undertaken each year, farmers are asked where they obtain information on financial advice, property planning and marketing but they are not asked where they obtain information on their soil quality.

[vii] According to Mathews, the main purposes of balance sheet and incomes statements have been to report on the periodic profit of the enterprise as in accordance with Generally Accepted Accounting Principles, the entity view. However, for owners and managers, “because of the large number of valuation options which are available to firms (Chambers 1965) and the arbitrary allocations which needed to be made to derive a profit and loss the measures of income and capital are not precise, they are estimates which reflect the arbitrary application of rules

which may or may not be relevant to the circumstances in which they are applied" (Mathews in Clift and Kerr 1989, p.17).

[viii] During interviews with a leading farmer, he reported that CSIRO had devised a formula for soil loss from cropping. The loss used to be 10 cm of topsoil = 2 tons per hectare, and more recently 5 cm of topsoil per 1.5 tons per hectare. The variation in soils and location are also noted in that some tests result in 1 cm loss of topsoil per 1 ton per hectare.

[ix] Derived from data sorted by location.

[x] The laser levelling in Location 1 sub-catchment 4 by one farmer shows that laser levelling is strongly statistically related to wind erosion ($r = -.66$), and thinning

[xi] Variables were deleted which were not significant.

[xii] Similar situations are occurring elsewhere in which farmers are undertaking civil action. For example, in northern New South Wales, cattle farmers are experiencing pastures affected by sprays needed for cotton farming. Vignoners are warning adjoining farmers about the possible consequences of spraying for weeds when undertaking cropping or grazing activities, for example spraying rye grass which requires high levels of concentration.

[xiii] Causes of soil structure damage include tractor usage, ploughing, hooved animals, cultivation methods, removal of trees and deep rooted plants such as lucerne. In the HLRF the soils are predominantly sedimentary which because it forms sedimentary rock is easily compacted. To reduce this happening, farmers used to aerate the soil by letting it rest and ploughing it up increasing the risk of it blowing away. In more recent times gypsum is either applied on already covered soil, or putting it in when planting crops. 50% of the farmers had problems with soil structure and 42.4% of the total number of farmers applied gypsum which is a significantly expensive input.

[xiv] As for xiii.

[xv]See Staubus G.J. (1961) A Theory of Accounting to Investors. Berkeley CA: University of California Press.

[xvi] Staubus G.J. (1971) Activity Costing and Input-Output Accounting. Homewood III. Richard D. Irwin.

[xvii] Staubus G.J. (1990) Activity Costing: twenty years on. Management Accounting Research Journal, 1, 249-264.

Chapter 8
Conclusions and Recommendations

8.1 Introduction

In this chapter the discussion will commence by reviewing the purpose of the thesis (8.2). In Section 8.3 a summary of the findings is presented, while in Section 8.4 a discussion of the contributions of this research and the design limitations is given. In Section 8.5 the implications of the study for future research and productive capacity are discussed. The final section (8.6) concludes by summarising recommendations arising out of the thesis.

8.1.1 Purpose of the Research

The importance of capital formation and maintenance is acknowledged as the basis of sustainability (Teitenberg 1992). Unfortunately because this capital is measured in market transactions, the Australian agricultural capital formation is considered to be low, a conclusion resulting from including only purchased capital items (Gretton and Salma 1996).

The purpose in this research project was to investigate, empirically, whether farmer choices, when managing their soil quality, can be explained by the farming activities chosen over the long term for their soil depth, soil fertility and soil structure. It was stated that they would find financial accounting statements secondary in maintaining their capital asset. They would achieve this by monitoring in physical terms and maintaining an extensive range of physical records. If the farmers showed a clear understanding of the concepts and practices required for their productive capacity they would not require a formalised accounting system based on market prices but would be managing the appropriate set of variables.

When examining entity theory capital maintenance concepts in Chapter 4, the major attributes were market prices, uniform reports - primarily the income statement - and a social focus meaning those outside the firm having a right to this information. The assumption has been made by accounting theorists and policy makers that if a monetary measure is valid for exchangeable assets then it must be valid for elements of land, managerial skills and technology. The idea that money measurements and market prices are valid for elements of land, managerial skills and technological knowledge would be tested. Assets in use have characteristics that are not yet captured by market prices.

The physical capital maintenance theories are aimed at finding some way to honour the commitment made to assets and also recognise changes in value. In the entity view, this translated into the comprehensive income statement. Inadequencies have been demonstrated in these theories when applied to natural resources because the theories do not address long-term commitment to quality, nor can all attributes be measured using market prices. In these two respects, current value accounting would have no meaning for these farmers. If farmers measure revenues and expenses for taxation, cash flow for liquidity and spending, and their land in physical terms they would not conform in any way to the requirements of the comprehensive income statement (Section 3.5.3.1).

Another view recommends that accountants should expand the data in financial statements to show separate measures of more than one characteristic (Henderson and Peirson 1998).

> Multiple measures of assets are intuitively appealing from a balance sheet viewpoint. If accountants cannot decide which particular characteristic of assets to measure, disclosing several characteristics is likely to satisfy more statement users than making a wrong choice of a single characteristic (Henderson and Peirson 1998, p.88).

In the accounting sense, multiple financial measures have the limitation of leading to multiple rates of return, financial ratios, profits and the extra value in such is doubtful, particularly without empirical evidence (Henderson and Peirson 1998). The empirical survey was undertaken in this project to verify if multiple financial measures would provide extra value either to farmers or to those outside the farm. However, if the evidence from the survey leads to an acceptance of the proprietary model of soil quality and it provides useful information on the formation and maintenance of capital, then, this would deny the perspective of the entity theory for these farmers.

Although considerable normative theorising has occurred since the 1960's in both the accounting and agricultural economics literature in the search for a model based on market prices for assets in use, these efforts have not been adopted by practitioners.

> Academicians work towards more and better information to erect a structure able to fulfil an important social cybernetic function, while many practitioners and managers effectively oppose such endeavours, and with it, the practical application of new theoretical insights (Mattessich 1983, p.56).

This is a view held of farmers as well as of accountants and as such capital maintenance accounting reports have been abandoned on the grounds of lack of usefulness. There has been no particular desire among financial statement users to abandon the traditional approach but merely to supplement it (Beaver and Demski 1979, Mattessich 1991, Ball and Brown 1977). Empirical studies in accounting have verified this view (Thornton 1991), but there have been no in-depth studies undertaken in agriculture which tests what farmers do to manage and monitor these assets.

The proposition then was that if accountants do not find current value financial statements useful for investment decisions on which assets are to be held or sold, then it would not be surprising that farmers also do not use these statements in the short term when their operations and investment horizons are decided over a longer cycle.

Institutional forces outside the farm, including governments, financial institutions, agriculturalists, accounting standards bodies and research bodies are concerned with regular reporting of income and sustainable profits in a uniform and comparable format. Such is the dominance of the entity view that the accounting recommended focuses on reporting all financial changes predominantly in the profit statement, with the balance sheet being treated as the residual statement. The recommended treatment is to allow for capital maintenance adjustments to be made to expenses in the determination of profit (IASC 1996, AARB 1997, Gray 1992). This approach gives prominence to productivity, an approach which has not been supported by the findings in this project. In this project, the emphasis was on the capital base, not necessarily on productivity as a starting point.

A final proposition was made that aggregate figures at industry and national levels provide information to a wide range of interested parties formulated in this thesis as a Level 3 entity view. Aggregate figures however, are unlikely to reflect what is occurring on these farms, they will not be useful to farmers managing a complex business, and will not reflect how they manage their capital asset, their soil quality.

8.2 Findings of the Study

The empirical survey reported in this thesis verifies that multiple financial measures would not provide extra information either to farmers or to those outside the farm. The evidence from the survey leads to an acceptance of the proprietary model of soil quality because it provides useful information on the formation and maintenance of capital. It also reflects the way the farmers manage both the physical and financial attributes on their farms. See Figure 2 for a diagrammatic model of the important components of the capital maintenance model developed in this thesis.

As such, the farmers' main concerns are their capital and long-term wealth maximisation, with relevant sub-objectives being long-term profitability, and financial accounting undertaken in the short-term for statutory requirements. Farmers measure revenues and expenses for taxation, cash flow for liquidity and spending, and their land in physical terms. They do not conform in any way to the requirements of the comprehensive income statement. (Section 3.5.3.1). Decisions are based on the physical quality of their soil and products as a first priority, which implies diversity, individuality and ownership. It was confirmed in this thesis that more appropriate concepts were contained in value to the owner including a multitude of non-market measures in a set of information.

Income statements developed by stakeholders to obtain a present and future income flow from their investing decisions are neither useful to farmers nor do they provide information on wealth formation or maintenance.

As postulated, the farmers were able to respond positively when complexity was acknowledged by the researcher. Acceptance is made of multiple measures from a balance sheet point of view compared with the income statement with its emphasis on productivity. A set of information (Tweedie and Whittington 1984, Mattessich 1986) can be accepted but not in financial measures, and conforms conceptually to the realisable income of Edwards and Bell (1961) in that in the short-term decisions are made on an opportunity cost basis.

The evidence presented supports the following conclusions:

8.2.1 Demographics of the Sample

Demographic data for the survey indicate a population slightly younger than the larger population in the Loddon Catchment and in the literature. The sample does not conform to the archetype of the aging farming population. In contrast to the actual data obtained in this sample, some part of the ABS data comes from the public data where property records show no change. In fact, the demographics of farms do change but for legal, financial and family reasons public records cannot be altered.

Earnings are above average for the general population. Over 90% of the farmers arranged their business affairs as either sole proprietors or as partnerships, with ownership and control of day-to-day management in the same hands. Ownership was also evidenced by the low debt/equity ratio. The farmers did not want to risk losing the farm in times of crises. Evidence of ownership interest was also provided by the number of generations the farmers and spouses had been in continuous farming.

In general, their goals are individual, economic and long-term survival and they obtain this by attempting to maintain the quality of their soil and therefore their product. They legally and philosophically have no need of a formal financial accounting system. The findings confirm the two concepts of Edwards and Bell (1961); in the short-term opportunity cost plays an important role in decision making, and in the long-term profits will be reconciled with cash flow.

8.2.2 Accounting Used by the Farmers

Reporting for these farmers consists of financial accounting trends over a number of years and taxation accounting. They use several forms of management accounting and reporting including cash flow, budgets, physical records and a daily diary.

A majority of the farmers displayed a high level of knowledge about the technical attributes of the farming business. They tended to use a form of capital budgeting based on cash flow to manage their financial affairs, another indication of their aversion to long-term borrowing.

To these farmers, information consists of much more than market prices or shadow prices and is more indicative of the principles of Recognition of Prior-based Learning (RPL). This is true of the valuation of knowledge assets whether it be intellectual capital, technology or methodologies, and all would be greater than the sum of the resources represented on any balance sheet. Several intangible variables represent value additional to that shown in the balance sheet such as soil quality, knowledge, farming methods and technological innovation.

8.2.3 The Influence of Government Societal Policies and Studies

The evidence indicates that farmers do not respond to whole-of-society policies such as the salinity program. They cannot respond to entity-based financial indicators which favour uniform and comparable formal accounting systems. Quality of the soil and produce are interrelated and are the highest priority by an overwhelming majority. Therefore, they compete against themselves rather than other farmers because they do not wish to destroy their asset base and these are clear notions of a proprietary interest.

The findings of aggregates and averages by governments and survey studies are not verified in this study. The user-specific nature of data relied on by farmers and the aggregate data used by governments may explain why policy makers and farmers do not talk about the same phenomena. Simultaneously, it is the farming methods in which uniformity among the farmers is observed, but in various combinations over rotation periods that can be up to ten years. This is one explanation for the diversity, noted by the number of modes, in the results. Therefore, results based on averages and market prices may not be applicable to more than a few farmers.

Product costing using gross margins and allocation of overheads are not used by the farmers who are more concerned with the state of their assets and undertake activity costing instead. Throughout the literature, costs are classified according to whether they are variable or part of overhead (Klonsky 1992, Wynem 1989, Oram 1991). In this methodology, the overhead costs are averaged across all production, and the larger the production the lower the overall cost per unit, economies of scale which may or may not be best for the land. Evidence in this research indicates that the farmers do not find economies of scale relevant, therefore, they would not need this type of accounting because decisions would be made on incorrect information.

Crop rotations and diversity within one season and between seasons would make gross margins extremely difficult to calculate with any accuracy and, therefore, with any meaning. The evidence indicates that though the farmers are acutely aware of each paddock they do not see gross margin as being of value in measuring their performance, or in deciding if they are financially viable.

The accounting profession in Australia, and internationally, are presently advocating a marked-to-market rule for inventories, including forests and livestock, whereby the increases in the value of these on-farm assets, measured at net market value, are treated as income, or cost savings (SAC 4). This rationale is based on defining assets as future income (an economic value). However, to date, there is no mention of matching this income, based on biological growth, with the on-farm non-market resources expended or built up over many years, because[1] this growth is considered natural and obtained at no cost to the farmer. This process would entail recognising income before it is realised in sale and could possibly shorten the life of these assets in order to maintain cash flow for taxation purposes.

The farmers would not find financial accounting useful. In this study they consider cash flow extremely important and use it to determine their expenditure. They are concerned with long-term net profit, or profit over a five-year period. In the year the interviews were undertaken the farmers were near the end of managing a drought

[1] According to the Secretary to the Financial Committee of the ACCA.

period where production had to be curtailed in some cases, but even so their results in gross earnings indicated a positive liquidity balance. Inventories were secondary to decisions on monitoring the climate, buy, sell or keep with an eye on maintaining a base for future years.

8.2.4 Community Based Participation – Illustration of Landcare

For the survey farmers several issues may result in Landcare being less responsive to their needs. Contrary to the assumptions in the literature, salinity is caused by both publicly funded resource organisations such as water authorities and private land management practices. Farmers cannot respond to what they cannot control or what is ‘outside the farm gate’. Salinity has a long lead-time during which it is invisible. Therefore, salinity is not a major issue for these farmers, whereas soil structure problems are. The Landcare program has evolved along bureaucratic lines. Short-term funding and short-term employment of project officers would indicate, on the evidence, that the farmers would find a disincentive to become involved. The programs would be largely irrelevant to the concerns of the farmers who would have little spare funds to support programs that could not support their needs.

From the evidence in this research, to farmers, who rely on the long-term assimilation of information as well as daily observation, short-term knowledge acquisition by project officers would not appear to be helpful. Even leading farmers are not followed quickly and obviously. Many of the survey farmers preferred to ‘watch their competitor’ because of the inherent risk when the full cyclical results of decisions are unknown.

It is interesting to note in this regard that the Landcare allocation of funds for capability assessments and mapping land capability has had the least criticism, presumably because they were status reports.

8.2.5 Grants, Incentives and Taxation

On a cost/benefit basis the farmers do not find grants and incentives timely, not even for grants which provide economic advantages such as tree planting or pasture seed rebate. Many taxation deductions can have both beneficial and harmful effects. Water conveying costs that are incurred to build water levees increases the major externality experienced by the farmers and is leading to a change in culture by which farmers openly comment on other farmer's practices. At the extreme, farmers in the Bendigo/Myers Creek are discussing joint action against their local government authority. These government instruments are not the least cost method for farmers because they are not timely, whereas most of the improvements are financed from earnings.

8.2.6 Market Prices

Market price was not important to the farmers when valuing their land, the quality of their product, or in assessing their success in competition. Market prices for commodities are constantly monitored for marketing purposes. Many of the farmers endeavoured to market their products to coincide with the best prices and also as a method of managing cash flow.

8.2.7 Productive Capacity – Entity and Proprietary Theories

In Chapter 1 it was stated that the majority of writings are normative and portray an entity view but that little empirical work has been undertaken. In Chapter 3, three levels of entity thinking were identified. Each level is concerned with providing identifiable and comparable indicators to those outside the firm. Level 3, generally called social and environment accounting, is specifically concerned with natural resource usage but it is equivalent to the 'whole of society' in its effect, therefore, it was not relevant for farmers in this thesis.

In the entity view, productive capacity is measured by the income flow from assets regardless of how they are financed. This can then be saved or consumed. The accepted view is that maintaining productive capacity entails maintaining the same volume of goods or the same value of goods. In the reporting stage this has a strong connection with productivity and the income statement. The same volume or value implies certainty, for example, as would be expected in a manufacturing context. The corollary of this definition of productive capacity is a formalised accounting system.

In agriculture, there are two risks that have to be managed; the alpha risk meaning the climate which cannot be controlled, and a beta risk, skills, which can be controlled. None of these theoretical accounting definitions or attributes has any meaning to the survey farmers who do not rely on short-term accounting profits to measure their productive capacity, therefore they cannot be accepted in this thesis. They do not use productivity measures, short-term assessments of their management or market prices. Instead they consistently rated quality of product and quality of soil as interdependent which had to be managed in a dynamic and ever changing manner. The proprietary view is strengthened by the importance of location for these farmers.

The volume approach is not immune from criticisms, especially when there is technical progress, or there are large relative price and cost changes, or when enterprises are diversifying or changing their areas of operations (Tweedie and Whittington 1984, p.284). Such arguments saw the demise of inflation accounting because there was no agreement about what should be measured, and all agreed that current market prices did not necessarily have a direct relationship to the assets of the firm. Forcing farmers to take short-term decisions could be counter-productive for the operating capacity of their land in the long term.

The findings confirm that value or productive capacity cannot be linked to gross margins, return on assets or return on investment. Calculations of net profit are also problematic because they can be measured in many ways depending on the assumptions and allocations available to accountants. More importantly, the net margin most commonly calculated would be heavily influenced by taxation deductions.

Further refutation of the entity view is indicated by the debt/equity ratios of these farmers. Their focus is not the income flow from the assets regardless of how they are financed. The overwhelming majority tried to have no debt whatsoever and were very protective of the ownership of their land.

8.2.8 Soil Quality

There is significant detail in the literature about the costs of degradation and costs of restoration assuming prior degradation. While this is essential, in this thesis the emphasis was on the maintenance and improvement of the capital asset, soil quality. Elsewhere, improvements to the soil are treated as short-term expenses for income purposes, rather than asset maintenance for long-term capital improvement.

From the results in Chapter 7, it can be accepted that the farm-level model of private decisions based on the physical attributes of the soil, farming methods, and uncertainty, fairly describes what farmers do. In the survey questionnaire the questions relating to profit maximisation, market prices and the terminal value of the land leading to a decision to sell are rejected. The conversion of the soil quality model to farming activities and methods used did reflect the farmers' approach to their soil quality and their skills. The farmers demonstrated a clear and knowledgeable understanding of the long-term effect of their activities on their soil.

The focus by the farmers on the activities undertaken for soil quality provides considerable insight into why they cannot respond to government policies. The farmers do worry about an increase in salinity but more specifically about soil acidity and soil structure problems arising from their cultivation practices. These are individual activities and, therefore, outside the policy framework, indicating that those assessing farmers are not using the correct information. Water problems are generated internally and externally. The farmers recognise interconnectedness, but this recognition has not yet been accepted by public bodies whose focus is either the irrigation industry further downstream or the whole catchment and not on the specific areas which are starting to cause large problems.

8.2.9 Monitoring of Soil Quality

Farmers undertake activity accounting for quality not product accounting as used in the research studies. 'Decisions are taken to do or not do something, an activity' (Staubus 1990, p.250). In addition, it was found in the survey that activities and their cost/benefit consequences can occur several times before the financial accounting double entry occurs (Staubus 1990, p.251). By identifying the resources used in an activity the focus can be directly on the usage of the capital asset rather than considering it a 'fixed cost' over which there is no control in the short term. The manufacturing analogy for land is not appropriate. Value to the owner can be accepted and in this way it acknowledges that farmers make a combination of choices. These choices include inputs, farming methodologies, intellectual capital, all of which accumulate over a long period. Thus, productive capacity cannot be restricted to productivity, or the capacity to maintain the value or the volume of goods, because value to the owner requires a system of crop rotations which rests the soil and renews it for future years.

An asset that is held rather than sold must be worth more to its owner than its exit price. Also, an asset that is not for sale does not directly cause its owner to suffer if its exit price drops, unless the drop is associated with expectations. As value adding has moved outside the farm gate the market expectation is that the value of the land will decrease. This is true in part, but not if the quality of the product depends on the quality of the soil and this is a major finding in this survey.

It is confirmed in this study that quasi-rents, that is strategies, quality, cost of production, and information, form the major competitive elements in these agricultural markets (Heilbroner and Galbraith 1987) confirming Adam Smith's dictum that 'the rent (profit and wealth) increased in proportion to the goodness of the pasture' (cited in Galbraith 1987). It is also confirmed that increasing inputs will not lead to increasing profits, but rather the cultivation and conservation practices undertaken over the long-term to preserve the soil quality.

These cultivation practices are also linked with problems with water. Water is the major problem but it is not caused by land management practices alone. Water management authorities, rural and urban, irrigation and its infrastructure requirements, have significantly changed water flows. The High Level Riverine Floodplain is already vulnerable because natural flooding is a feature. In the past, with seasonal flows, this flooding actually aided the farms situated on the river, but the constant flow at present has increased the demands on the farmers.

Significant non-financial and financial data were maintained by the farmers. Physical records of three types were regularly kept, namely, daily diary, paddock records, stock records, costings and trend figures for many years. These were personal to each farmer because of the importance of location, its unique features, and the complexity that would be very difficult to translate into gross margin, return on investment and return on assets. These were borne out in the evidence presented in this research which identified numerous sources of information and recording undertaken by the farmers.

It has been argued in Chapter 4 that assets in use are difficult to value, and the more specific that asset is to the entity the less likely is the chance that it coincides with the market price of a similar asset (Staubus 1961). For soil quality, the market does not have readily available information on the ability of a specific piece of land to produce future cash flows. Other participants in the agricultural industry are trying to develop an informed market, but there are counter arguments that it is not essential to have a uniform capital maintenance concept and certainly not a single figure to represent such an asset.

Rather, in an uncertain world with imperfect and incomplete markets, the role of accounting is not to provide a single valuation of the capital asset the land, but to provide an information set which assists the users in arriving at their own subjective valuation (Edwards and Bell 1961, Bromwich 1990, Peasnell 1978, Beaver and Demski 1979, Tweedie and Whittington 1984, Mattessich 1991)

This set of information need not be monetary, particularly in a farm that is made up of resources where events involve movement or transformation in those resources. Each of these movements involves a change from one kind of 'resource' to another. All these resources can be measured but not necessarily by a price factor (Goldberg 1965). No single number can be said to be the true valuation of some assets including soil quality, consequently, standards developed for asset valuation or income measurement may contain intrinsic reasons for not obeying them (Mattessich 1991). One study in the United States forestry industry showed that although the accounting return on assets was not high compared with other investment opportunities, this was not the main measure to indicate long-term survival in that particular industry (Shank and Govindarajan 1989).

It was argued in Chapter 4 and 5 that value to the owner that has its theoretical roots in the valuation of the individual asset, property, described the way the farmers valued their assets and wealth, and the results obtained in the thesis survey are such that the value to the owner (Bonbright 1937) can be accepted. The farmers had very clear concepts and management regimes with which to manage over the long-term the productive capacity of their soil quality. As noted in Chapter 7, it was not possible to differentiate between sustainable farmers and unsustainable farmers because inputs were not sufficiently detailed. What can be said is that all farmers were aware of best practice whether they accepted this in the short term or not. They were able to differentiate between the three attributes of soil quality, depth, fertility, and structure, and managed each accordingly and with precise and knowledgeable measurements.

Problems were identified emanating both from internal and external causes and conclusions can be made that soil degradation is not primarily caused by land management practices, but also by water management policies at the regional and inter-regional levels.

8.2.9.1 Level 3 Entity

At the Level 3 entity thinking other groups in society, called stakeholders, are given equal rights with shareholders, if not more. The ‘whole of society’ policy developments in Australia have had predecessors in the accounting literature predominantly in social and environmental accounting based largely on the stakeholder theory. Accounting as a social phenomenon was based on widening the reporting topics to human resources, community involvement, health, employment, fair trading (Gray et. al. 1987, p.9) industrial democracy and value-added statements (Mathews 1993, p.96; Guthrie 1982; Parker 1976, 1986; Mathews 1984; Trotman 1979).

Value-added reporting is the most appropriate form of Level 3 entity thinking in agriculture and for those outside the firm it has considerable explanatory power of market risk that goes beyond what is provided by earnings or cash flow measures (Belkaoui 1992). Presumably this is the information which is always available to managers whereas those outside the firm wish to have this information directly. The argument for an entity thinker is that in a global economy and in international markets with benchmarks and thresholds on quality itself, such knowledge provided to the market increases a firm's competitiveness.

This is the type of information that the farmers in the survey rated as their first preference. That is, the quality of their soil has a direct relationship to the quality of their product, which in turn determines their level of competitiveness. What is important in these findings is the implicit acknowledgment of the limitation of the explanatory power of market prices. When markets are inefficient then the same information is not available to all participants. An insistence on financial indicators and market prices to evaluate soil quality in particular and agriculture in general is counterproductive when the farmers and other participants are using different information. Two reasons can suffice at the moment. (1) An insistence that proprietary thinking family farms report as do public companies has been criticised over a long period of time. 'A blind insistence on the independence of the business entity in small business, is bound to lead to unreasonable conclusions' (Paton 1922). (2) Given the long lead time for new ideas to be fully impounded into understandable and accepted measurements, it would not be appropriate in the short-term to insist on evaluating farms purely on financial accounting methods. Other areas of research which have taken many years to emerge as the preferred practice include: present values, thirty years; entity theory of consolidations, twenty years; and funds statements, over twenty-five years (Mattessich 1983).

In this thesis, it has been demonstrated that proprietary thinking farmers value the ownership of their land, and methodically and regularly monitor the activities and methods they undertake during their production cycles. These are the technically relevant indicators with which these farmers measure their internal success. Externally, they match the quality of their products with the available market prices over the whole year, they compare over several years and use various external indicators including market prices and various marketing practices in placing their products on to the market.

8.3 Contributions of this Research

This is the first attempt to investigate empirically the wealth accumulation in soil quality from a whole farm viewpoint. The adjusted model used assumed that capital, based on physical attributes, and not income would be the major motivation of farmers.

It was stated in Section 3.2.1 that the usefulness of accounting is commensurate with how it reflects the needs of users and that this implies specificity. It was also stated that accounting cannot be expected to meet all the information needs of users. The concepts of proprietary theory were tested and found to be appropriate in describing farmers’ attitudes and behaviour.

In this way this research will facilitate some understanding of another point of view when risk management and ownership are managed by the same people, where long-term wealth is important and where the management of complexity requires an individual and local response. This research demonstrates that the desire to re-introduce entity-based current value accounting by the current accounting professional bodies and research organisations world-wide cannot be supported (IASC, AARF, ICAA).

Interestingly, the notion of best practice, so protected by the accounting profession as being determined solely by the client and the professional accountant, has been changed to another meaning in the language. It no longer stands for diversity in operational practices but for comparability in all markets including global markets. Traditionally professionals have agreed that they are required to conform to best practice, a proprietary view. This concept has been captured as a global and entity concept where uniformity is important for reporting purposes. This would be true in quality assurance frameworks which differentiated between different classes of soil and product quality, but not in annual short-term financial indicators (Section. 3.4.1.2). This research has demonstrated that farmers do not calculate their best practice in predominantly financial terms, or do they have a short-term focus. On-farm resources including intellectual capital are extremely important in the performance of a farm and this takes many years and even generations to acquire. Best practice can certainly be assessed through product quality, but the basis for this quality comes from the quality of the soil and this does not depend on financial analysis and not even on an examination of inputs and gross margins. In this way, this research shows that the strategic focus should be on the long-term management of the soil rather than productivity of the soil.

8.5 Future Research

The farmers indicated that they were confident in the management of the physical attributes of their farm but not as confident with their knowledge of financial attributes. However, this does not mean that education in financial management on an entity basis would be helpful to farmers It would need to be assessed whether they consider this a real need, or if they are responding to pressure from outside sources. There is certainly a perspective gap between the farmers and outsiders. All interested parties want information on soil quality but under the present information regimes and policies it seems unlikely these aims can be obtained. As farming becomes increasingly corporatized, and encouraged to do so, the currently available measures which are based on productivity accounting measures would not be protecting the soil quality, and the shareholders could be protected only in the short term.

A priority area for further research is the further development of appropriate quantitative and qualitative measures for accountability and performance in the Australian farming sector. Such measures will improve the overall quality of information generated by farms and assist in the understanding of what farmers are actually doing. Much of the information required by outsiders is normally the realm of management accounting and highly competitive, but physical indicators of the quality of the soil could enhance competitiveness without providing further financial details. Market recognition of quality is an established criterion for quality and commercial success. In the wool industry, the Zegna Awards for the finest wool are highly prized and recognised in the market for attributes of breeding that take generations to develop.

The need for further research on ways of accounting for aspects of farming other than its financial aspects is also indicated in this study. There are many additional aspects of farming which will also need to be taken into account by accounting and government bodies. Many of these aspects are likely to prove more difficult subjects for reporting, in large part due to the continued emphasis on uniformity and market prices present in both the Australian and the international context. Accounting bodies world-wide are presently completing what they call a program for a world-wide accounting language for reporting. These ideas are also being applied to agriculture, whereas this thesis showed that diversification over the long-term is a valuable way of managing operating and financial risk for these farmers.

The findings in this thesis suggest that a longitudinal study on the relationship between a farm and its local physical environment would prove extremely useful to the further and more detailed development of relevant information for physical environments and particularly in regard to capital maintenance of physical assets. Tentative evidence in this thesis points to the gradual adaptation by farmers. For example, many tried minimum tillage and chemical weeding but it reduces fertility too much so nearly half the farmers are moving to conservation farming. Such a study would prove invaluable in balancing existing knowledge of short-term physical and financial measurements with long-term effects and linking physical effects to financial effects. One limitation of the present survey is the lack of comparable data in which to provide any basis of generalisability. One valuable area of further research would be to repeat this survey in other catchments and also based on an ecological unit where all the farms are subject to similar physical conditions.

8.6 Recommendations

The emphasis on the income statement and assessing decisions on the basis of income/expense is not very helpful to farmers especially for in-situ assets such as land which represents wealth to the farmers. It is suggested that the asset/capital categories are more appropriate, although even when selling the land, it is hardly likely that the farmer is fully compensated through the market price by the buyer when most of the benefits are either intrinsic or flow to society, and not to the private individual. In such cases, farmers need compensatory payments for prevention of degradation rather than grants for repairing degraded natural resources (Rubenstein 1992, Geno 1997).

What needs to be recognised is that to some extent, social and private needs can be in competition with each other. Today, the Australian government is keen to be seen to be not subsidising farmers. However, resources spent on social costs and benefits should not necessarily be seen as relating to farmers. Farmers are seen as earning private and sufficient benefits through profits and the final sale of their land (Milham 1994), but land takes so long to improve that the best soil is never for sale. Some of this imbalance would be addressed if there were rewards, not rebates, for consistent, measured soil quality, as a ‘rent’ paid by society back to the farmers for not being profit maximisers, that is, a social dividend.

In decision-making it would be more explicit to record such activities in the balance sheet as improving assets for the long term thus increasing capital, rather than expenses all having to match some short-term income. It is also reasonable that soil quality be visible and accountable but this cannot be known with financial accounting. Accountability for the soil itself would also provide information to differentiate between profit maximisers, the traditional and the conservationist farmers because the soil quality is a product of their input-output ratios as well as farming methods.

Strong arguments can be raised against the decision usefulness of financial information for valuing land and assessing performance using calculations which cover only some of the attributes. As the SCARM noted in 1993, the attributes of sustainable agriculture were (1) long-term profit, (2) soil quality (3) managerial ability and (4) off-farm effects (SCARM 1993). The 'capturing' of the agenda by proponents of the entity view, which recommends uniform financial indicators, would place an arguably unnecessary recording and reporting burden on farmers. What can be confirmed in these results is that the four components advocated by SCARM in 1993 do reflect the objectives of the farmers and provide a fair representation of value to the owner.

It is recommended that farmers develop indicators of quality and not financial indicators alone. Farmers can no longer identify themselves as part of a bulk product market but must differentiate themselves on the basis of the quality of their product and this quality need not end at primary production. For example, vertical integration in the rice industry, based on a cooperative structure, is allowing these farmers to diversify their products and markets. The farmers in this thesis linked the quality of their product very closely with the quality of their soil and this needs to be evaluated further for all products.

The dependence by farmers on movements in international trade provides an explanation for several of the practices observed in this survey. They are: very little debt; lack of interest by most in maintaining a constant flow in volume or value of production; resistance to economies of scale; and a lack of decision making based solely on market prices. The World Trade Organisation forecasts that world trade will grow by just 4.5% in 1999. Based on last year's total global trade of $US6.5 trillion ($10.5 trillion) this means a drop of about $US430 billion in incremental trade. This cyclical trend should not be ignored by governments in their policies. Farmers are now part of the 'global market' which is increasing. In 1950 7% of global output was traded compared with 25% in the 1990's (Australian 1998).

There are other roles the Australian governments need to develop. Not all problems stem from land management practices. Several other problems have been identified in this thesis predominantly based on water management. Governments can respond at the macro-level by halting regional urbanisation, altering sewerage treatment methods and the management of water diversion through regions which are now, in the long-term, experiencing increasing externalities for which they are not compensated.

Appendices

Appendix 1 Accounting Studies

Appendix 1 Accounting Studies

Source of Information	Gross Income per ha.	Net Income per ha.	Return on Assets	Physical Measures	Sustain. Costs	Family Income	Long term Income	Whole Farm
Government Research								
SCARM (1993)		√	√	√			√	
SCARM (1996								
ABARE (1995,96)	√	√	√		√	√		
ABARE (1997)	√							
Research Studies								
Vine & Bateman (1974)	√	√		√				
McCall & Popoff (1986)		√	√					
Hall (1988)	√			√				
Wynen (1989)	√		√	√				
Schnitky & Sonka (1989)			√	√				
Oram (1991)	√			√				
Oram, Wilson, Papst (1991)	√							
Klonsky (1991,92)	√			√				

UCLA (1992)	√	√		√		
Luke (1992)	√	√		√		
Stephens (1992)	√	√		√		
Anderson (1992)				√		
Oram, Papst, Heath (1992)	√	√		√		
Milham (1993)	√	√	√	√	√	
Luke & Shaw (1994)	√	√				
Australasian Agribusiness Services (1994)	√	√	√			
Tattersall (1995)	√			√		√
Wilson (1995)						
Financial Packages						
Mey Check (1992)	√			√		
Farm Bix (1992)	√	√		√		
Riskfarm, CARE (1993)	√	√	√			
Paddock Box (1993)	√			√		
National Bank (1994)	√	√		√	√	
GOI Australia (1994)	√	√	√			
ABRI (UNE, NSW) (1994)	√	√				

Victorian College of Ag & Horticulture	√	√						
Agricultural Business Research Institute (1994)	√	√						√
FSEA (1994)	√	√	√	√		√		
FSEA (1996)		√	√	√	√	√		
Farmsmart (1996)	√	√		√				√
Kondinin Group (1996)	√	√	√	√		√	√	
Farm Cheque (1996)	√	√		√				
Farm 500 (1996)	√	√			√	√		

Appendix 2 Sustainability of Agriculture

Key indicators	Major attributes			
Long-term Real Net Farm Income	Net farm income	Productivity	Terms of trade	Numbers of farms over time
Land-Water quality to sustain production	Water use efficiency of crops/stock	Nutrient balance of farm	Area of native vegetation	Degree of fragmentation of vegetation
Managerial Skills	Farmer education level	Skills index	Landcare attitude index	Farm planning capacity
Off-site Environmental Impacts	Food chemical contamination level	River outfall turbidity	Duststorm frequency	Length of contact zone with non-agric. areas

SCARM 1993. Commonwealth of Australia. The relationship between proposed indicators and attributes for sustainable agriculture, p.48.

Appendix 3 Return on Investment (ROI)

Return on Investment (ROI) appeals conceptually because it blends all the major ingredients of profitability (revenues, costs, and investment) into a single number. ROI can be compared with opportunities elsewhere, inside or outside the company. Like any single performance measure, however, ROI should be used cautiously and with other performance measures (Horngren and Foster 1991).

It is calculated as follows: ROI = $\dfrac{\text{Income}}{\text{Investment (Assets)}}$

There are two basic ingredients in profit making: investment turnover, (asset turnover, an activity measure) and income margin. An improvement in either ingredient without changing the other increases ROI.

ROI = (Investment turnover) x (Income to revenue ratio).

It also needs remembering that such measures were developed to compare like divisions in multinational companies and started in the United States, particularly with General Motors, Du Pont and the Ford Motor Company. It has also been used to compare between business units in a multi unit company such as Holiday Inn motel chain and Safeway Supermarkets.

These companies all have highly computerised accounting systems and a performance measure such as ROI are reported for internal management purposes. What these performance measures ignore are other non-financial sources of performance. Other variables which should be considered are, non financial quantitative measurements, time horizons. One point relevant for farms is the extent to which such measures as ROI give meaningful comparisons between farms based only on an industry classification, e.g., wheat where in fact the farmer's classification base is location specific. This was noted in Chapter 2 by Senge and Schnitcky farmers consider their needs to be individual even at the local level and even among farmers who manage similar operations. The need for diversity may explain why the majority of farmers, as noted in all the studies, are not relying on formal financial accounting and reporting.

This measurement system also originated in companies where size dictated a hierarchical system of management, top management, middle management, and operations, as a management tool for top management. It may not be appropriate at such a formal level for an owner/operator such as in a family farm to make appropriate decisions.

Appendix 4 The characteristics of the various component parts of social accounting (Mathews 1993)

Division	Purpose	Area of main use	Time-scale	Measurements used	Associated areas
1. Social responsibility accounting (SRA)	Disclosure of individual items having a social impact	Private sector	Short term	Mainly non-financial and qualitative	Employee reports; human resource accounting; industrial democracy.
2. Total impact accounting (TIA)	Measures the total cost (both public and private) of running an organization	Private sector	Medium and long term	Financial AAA Level 111 (see px. below)	Strategic planning; cost-benefit analysis.
3. Socio-economic accounting (SEA)	Evaluation of publicly funded projects involving both financial and non-financial data	Public sector	Short and medium term	Financial, non-financial Levels 11 and 111 (see px. below)	Cost-benefit analysis; planned programmed budgeting systems; zero-based budgeting; institutional performance indicators; value for money audit
4. Social indicators accounting (SIA)	Long term non-financial quantification of societal statistics	Public sector	Long term	Non-financial quantitative AAA Level 11 (see px. below)	National income accounts; consensus statistics
5. Societal accounting (SA)	Attempts to portray accounting in global terms – overarching theories	Both - All-embracing	All	Financial aggregates	Systems theory; mega accountancy trends

Source: Mathews (1993, p. 11)

Classifications 6 and 7 are the additions so as to include Natural Resources and Intellectual Capital

Division	Purpose	Area of main use	Time-scale	Measurements used	Associated areas
6. Natural Resources accounting (NRA)	Measurement of total cost of managing the natural resources of an organisation. Measurement of wealth as well as income [1]	Private sector & public sector	Short, medium & long term	Activities Input-Output Sustainable Costs NFI	Strategic planning; cost-benefit analysis.
7. Intellectual Capital (IC)	Indicators of diffusion and adoption of knowledge and innovation in an organization or industry	Private sector & public sector	Medium to long term	Indicators are Non-financial, qualitative, activities, costs, Sustainable Costs	Employee reports; human resource accounting; industrial democracy

Source: Mathews (1993, p.11)

Sections 6 and 7 Adapted from Mathews: O'Brien, 1996.

[1] Air, noise, water are included in Natural Resources Accounting but would require a total society perspective, where externalities are created not only by private owners/companies, but by public bodies over different political boundaries, for example, local, regional, state, commonwealth. Not all externalities can be internalised because decisions affecting air, noise, water are not controlled by any one group of users and decision makers. For example, the problems the farmers face in the Loddon Catchment are not solely caused by other farmers but by policies decided upon by Urban Water Authorities (x%), reservoir policies (cite), water transport authorities (cite).

Appendix 5 Proprietary and Entity Approaches to Capital Maintenance by Author Preference

Proprietary Authors	Entity Authors	Eclectic, Value to the Owner, Set of Information	CPP	CCA	Exit Values, Market Values (NRV)
Sweeney 1936			x		
Edwards & Bell 1961		x		x	
Chambers 1966					x
Bronwich		x			
Baxter 1967		x			
	Schmidt 1920's	x			
	Limperg			x	
	Mathews & Grant 1958			x	
	Gynther 1966			x	
	Sterling 1970				x
Mattessich		x			
Tweedie and Whittington 1984		x			

Appendix 6 Survey questionnaire.

Not all the survey data gathered have been presented in the results. In Section 1 the details have been used in other sections of the analysis and results, in particular in the section on soil quality. Other sections, for instance the farmers' assessment of the value of their assets, has been incorporated in the overall discussion on the farmers' attitudes to wealth.

Appendix 7 Loddon River Catchment showing Study Area

Location of Farmers in the Land Management Unit.

Appendix 8 Estimates of commercially viable farms varies according to the criteria used.

1. Farm Advance, which is a community-based broadacre farming group and whose members are principally in the Loddon Catchment but also the Avoca and Campaspe. Tony Kent, the Department of Agriculture co-ordinator of Farm Advance, estimated that there were 700 dryland commerically-viable farmers in the three catchments.His assessment was that 80% were sub-commercial. This assessment depended on the financial reports and did not discriminate between high-input farmers and conservationist farmers.

2. Using the ABS census (ABS 1992), the latest available data at the time of the survey, the number of farms in the statistical districts of Avoca, Loddon and Campaspe catchments were as follows:

1998	1989	1990	1991	1992
4056	4000	4165	4123	3000

This data reflects the EVAO definitions.

3. Comparing the Farm Advance area which has 750 farm members who are viable.

4. Comparision of Census 1992 with Farm Advance membership.Viability is defined by size + size of income and the estimate for the Census is 30% for the total area.

Size (hectares)	Number of Farms	%of Total Farms in Census	% of Farm Advance
50-99	342	22	10
99-200	564	18	6
201-299	405	13	5
300-399	293	10	3
400-499	224	7	3
500-599	181	7	11
600-699	143	4	11
700-799	103	3	11
800-899	86	2	4.5
900-999	66	2	4.5
1000-1999	222	7	27
2000-2999	39	2	3
3000+	17	1	3
Total	3000/30%= 857 considered commercially viable.		75% considered commercially viable = 750

What these figures reveal is that according to the criteria of a minimum of 1000 acres or 599 hectares, 857 farms or 30% are viable according to ABS Census 1992, 750 Farm Advance fulfill this criteria. Using the same criteria, it was estimated that because the High Level Riverine Floodplain comprised 30% of the Loddon Catchment, and 100% in the three catchments who fulfilled this criteria comprised 857 farms, therefore the number of commercially viable farms in the HLRF would be approximately 287 farms. For the survey area 251 farms were identified therefore it is fairly certain that nearly 100% of the farms were counted.

Appendix 9 Letter of Introduction to the Farmers.

Appendix 10 High Level Riverine Floodplain Land Management Unit of the Loddon Catchment Sample Interviewed by Size and Sub-Catchment

Acres	Bullabul Creek	Kingower Korong	Mid Loddon Marong	Loddon Plains Marong/ E.Loddon	Bendigo Myers Creek	Total
0 - 0999	1	2	0	1	0	4
1000 – 1999	2	6	11	8	8	35
2000 – 2999	1	2	4	4	7	18
3000 – 3999	0	0	1	1	2	4
4000 – 4999	0	0	1	1	2	4
5000 – 5999	0	1	0	1	2	4
6000 – 6999	0	0	0	0	1	1
7000 – 7999	0	0	0	0	1	1
8000 – 8999	0	0	0	1	1	2
Total Interviewed	4 (6%)	11 (15%)	17 (24%	17 (24%)	24 (33%)	73 (100%)

Appendix 11 Dimensions of Farmed Area Compared with ABARE and Victoria

	n=72	n=54	n=131
Area Operated Acres	Survey Area %	ABARE Loddon-Campaspe %	Victoria %
=/< 1500	29.2	51.3	33.4
>1500<2000	20.8	35.4	35.2
>2000<3000	28.0	11.1	17.2
>3000	22.0	2.1	14.3
Av. Area Grazed			
Mean	1832	n/a	n/a
Av. Area Cropped			
Mean	679.4	256.0	947.0
Av. Area Owned			
Mean	2413		
Av. Area Leased			
Mean	211		
Av. Area in Pasture			
Mean	1727		
Av. Area not Farmed			
Treed/forest	18		
Swamp	11		
Rocky outcrop	7		
Salinity/unusable	2		
Water course fenced	3		

Appendix 12 Most Important Factors in Valuing Land

n=69

Attribute	Very Import.		Mod. Import.		Little Import	Score	Rank
Financial and Physical Factors							
Soil quality	50	18	18	0	30	116	1
Access to water	45	30	12	0	35	122	2
Annual cash flow	32	28	39	12	40	151	3
Total production	30	34	33	0	55	152	4
Return on capital	31	20	42	28	35	156	5
Disposable Income	30	28	45	16	40	159	6
Profit over a five year period	26	42	30	12	55	165	7
Price of products	29	22	42	24	50	167	8
Capital improvements	23	34	57	16	40	170	9
Market value of land	27	26	39	40	40	172	10
Changes in yield	14	26	66	42	40	188	11
Gross margin for a paddock	24	22	24	32	90	192	12

Legend: 1 - Very Important, 3 - Moderate Importance, 5 - Little Importance

Appendix 13 Cost of Loss of Topsoil in Production Loss in the Years 1989-94

n = 15

$	%
0 – 19999	47.0
20000 – 39999	39.0
40000 – 59999	7.0
60000 +	7.0

Appendix 14 Problems with and Extent of Loss of Soil Fertility

	Frequency n=72	% n=72
Farmers who have any problems with loss of fertility	15	20.8
Extent of loss of topsoil n=15	n=15	n=15
0 cm	57	79.2
1 - 5 cm	14	19.4
11 - 15 cm	1	1.4

Appendix 15 Cost of Loss of Fertility in Production Loss in the Years 1989-94

n = 15

$	%
0 – 19999	48.0
20000 – 39999	18.0
40000 – 59999	17.0
60000 +	17.0

Appendix 16 Farmers Affected by Loss of Soil Structure and Cost of Loss of Soil Structure in Production Loss in the Years 1989-94

n = 38

$		%
Farmers with problems with soil structure	(n=72) 38	(n=72) 52.8
Cost in production loss	n=34*	n=34
0 – 19999	19	56.0
60000 +	7	21.0
40000 – 59999	5	15.0
20000 – 39999	3	9.0

** 4 farmers indicated that they did not lose any production as a result of problems.*

Appendix 17 Sources of Information in regard to Soil Depth, Soil Structure and Soil Fertility

n=72

Source of Information	Score	Rank
Observation - communication	51	1
Community group	49	2
Reading	43	3
Field days or workshops	40	4
Media	34	5
Leading farmer	22	6
Dept. of Agriculture extension officer/DCNR	22	7
Agricultural Consultant	18	8
Rural representative	15	9
Agronomist	13	10
Course	10	11
Kondinin group (farmer information)	5	12
Farm 500 membership	4	13

Appendix 18 Summary of the Frequency of Activities Used in Response to Problems with Soil Quality

Activities	Depth %	Fertility %	Structure %
Crop rotation*		94.4	77.8
Sowing legumes		87.5	87.5
Minimum tillage	79.2	72.2	76.4
Changed method of weed control	79.2	69.4	67.0
Stubble retention		62.5	55.6
Increased fertilizer		60.0	54.2
Take a longer view of the returns for each paddock		47.2	37.5
Mulch		35.0	
Soil water testing		32.0	29.2
Machine purchases - modified	39.0	28.0	
Lost yield in early years of change over		19.5	
Fencing		19.5	
Better use of water	61.0		62.5
Substitute other inputs	78.0		
Tree planting for wind breaks	71.0		
Financed from earnings	65.3		
Cool burning**	53.0		
Direct drilling			44.4
Gypsum***			42.0
Use of fallow	26.4		
Stubble burning****	0		

**Sorted according to responses to fertility because crop rotation ranked the highest.*
***One example of a volunteered response. One farmer suggested this early in the survey. It was a costless response.*
****42.4% of the farmers use gypsum for soil structure problems, approximately the same percentage who reported problems with soil structure.*
*****The reason being they learnt from the 1983 drought.*

Appendix 19 Map Endnotes and Bibliography

These notes and the bibliography relate to the maps of the Loddon Catchment Study Area and the Location of the Survey Farmers in Appendix 7. They are separate from the main bibliography because they provide specific information on the sourcing of these maps. These maps form part of the thesis and are the work of the author Patricia Ann O'Brien with research support from Dawn Mc Bride.

Appendix 9 Survey Population Defined by Sub-Catchment

Sub catchment	Frequency	Percentage
1 Bullabul Creek	4	5.6
2 Kingower/Korong Ck.	11	15.3
3 Mid Loddon	17	23.6
4 Loddon Plains	17	23.6
5 Bendigo/Myers Creeks	23	31.9

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Appendix 19 Map Endnotes and Bibliography

These notes and the bibliography relate to the maps of the Loddon Catchment Study Area and the Location of the Survey Farmers. They are separate from the main bibliography because they provide specific information on the sourcing of these maps. These maps form part of the thesis and are the work of the author Patricia Ann O'Brien.

MAP END NOTES

Figure 1 Adapted from Loddon Waterway and Catchment Management Group, 1996, Loddon Catchment Water Quality Strategy, Draft, Murray Darling Basin Commission and National Landcare Program, page 7 and Loddon Community Working Group, 30th Nov 1992, Loddon River Catchment Dryland Salinity Management Plan, Draft, DCE, RWC, DFA and Natural Resources Management Strategy, Murray Darling Basin Commission, page 71.

Figure 2 Adapted from Figure 1 Ibid and Loddon Community Working Group, 30th Nov 1992, Op.Cit., insert map Land Management Units of the Loddon Catchment, compiled by Department of Conservation and Environment, Centre for Land Protection Research.

Figure 3a Adapted from Loddon Community Working Group, 30th Nov 1992, Op.Cit., Figs.21&31, pp.71&98 respectively.

Figure 3b Adapted from Campaspe Community Working Group, 29th Dec 1992, Campaspe Catchment Dryland Salinity Management Plan: A Land and Water Management Strategy, Draft, DCE, RWC & DFI, Victoria Fig. 2, p.25.

Figure 4a Adapted from Loddon Community Working Group, 30th Nov 1992, Op.Cit., Figs.8,10&21, pp.14,16&71 respectively. Source RWC 1991.

Figure 4b Adapted from Campaspe Community Working Group, 29th Dec 1992, Op.Cit., Map 3, p.38.

Figure 5 Adapted from Loddon Community Working Group, 30th Nov 1992, Op.Cit., Figs.5&21, pp.10&71, respectively.

Figure 6 Adapted from Loddon Community Working Group, 30th Nov 1992, Ibid, Figs.17&21, pp.38&71, respectively.

Figure 7 Adapted from Loddon Community Working Group, 30th Nov 1992, Ibid, Fig.21, p.71 and Loddon Waterway and Catchment Management Group, 1996, Op.Cit., p.11.

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23rd August, 1994

Dear ,

Broadacre Farming - High Level Riverine Floodplain Survey

With the support of this University, I am undertaking a survey of individual farmers' views of aspects of financial management and environmental problems in the Loddon catchment. This survey is part of a major research project leading to a Ph.D. in accounting under the supervision of Professor R.C. Clift.

It has been claimed that accountants have been slow to respond to ecological issues and have typically undervalued the environment and this is not helped when they concentrate on accounting for taxation purposes.

I am trying to find out how accounting and financial management can assist farmers in their management, both ecologically and financially. To do this I believe I need to know how farmers make decisions. It is for this reason that I am undertaking interviews with the decision makers, which in most cases I would expect will be you and your spouse. I think this personal approach will be more productive than a mailed questionnaire.

Your farm is in the high level riverine floodplain which has potentially the same problems and also potentially the same solutions. It is expected that the results of the survey will assist you and all Australian farmers to adapt to changes in markets, government policy and environmental legislation.

It is not my intention to compare farm practices; rather, I am interested in the way in which different management practices and procedures will affect decision making and hence finances. Please be reassured that all information given by you will remain confidential as required by the University regulations. I will contact you in the next few days in order to hopefully arrange an interview with you.

Thank you for your support.

Patricia Evans
Lecturer
Department of Accountancy
Royal Melbourne Institute of Technology

SECTION 1

Office Use

1 **Is your farm operated as a (tick one please)**

Company	1	(1.)
Partnership	2	
Sole Proprietorship	3	
Other (please specify eg., trust, tenant farmer, share farmer)	4	

____

2	Total property size	[ ] ha.	(2.)
	Area of land farmed	[ ] ha.	(3.)
	Land owned	[ ] ha.	(4.)
	Land leased	[ ] ha.	(5.)
	Total area of land which was cropped in 1993/94	[ ] ha.	(6.)
	Total area of land which was grazed in 1993-94	[ ] ha.	(7.)
	Total area of land under pasture in 1993/94	[ ] ha.	(8.)

The following questions in this section relate to the extent of the effect farmers have on each other's land in their sub-catchment.

3 **Using the list below, please rate the degree to which you have received the following benefits *from other farmers.***

	Up stream of the catchment				
Level of Degree	Great	Some	Little	None	
Trees planted	1	2	3	4	(9.)
Perennial vegetation/pastures	1	2	3	4	(10.)
Using water where it lands and increasing yields	1	2	3	4	(11.)
Proper drainage to prevent run off	1	2	3	4	(12.)
Organic farming	1	2	3	4	(13.)
Fencing	1	2	3	4	(14.)
Pest and vermin control	1	2	3	4	(15.)
Other	1	2	3	4	(16.)

____

4 **Using the list below, please rate the degree to which you have received the following benefits *to other farmers.***

	Down stream of the catchment				
Level of Degree	Great	Some	Little	None	
Trees planted	1	2	3	4	(17.)
Perennial vegetation/pastures	1	2	3	4	(18.)
Using water where it lands and increasing yields	1	2	3	4	(19.)
Proper drainage to prevent run off	1	2	3	4	(20.)
Organic farming	1	2	3	4	(21.)
Fencing	1	2	3	4	(22.)
Pest and vermin control	1	2	3	4	(23.)
Other	1	2	3	4	(24.)

____

5 **To what extent has your production increased over the past five years as a result of the benefits above?**

	Up stream of the catchment	
None	1	(25.)
1 - 5%	2	
6 - 10%	3	
11 - 15%	4	
Over 15%	5	

6 **To what extent have other farmer's production increased over the past five years as a result of the benefits above?**

	Down stream of the catchment	
None	1	(26.)
1 - 5%	2	
6 - 10%	3	
11 - 15%	4	
Over 15%	5	

7 **Using the list below, please rate the degree to which you have suffered damage *from other farmers.***

Level of Degree	Great	Some	Little	None	
	Up stream of the catchment				
Drainage channels altered	1	2	3	4	(27.)
Laser levelling	1	2	3	4	(28.)
Clearing	1	2	3	4	(29.)
Chemicals in the water	1	2	3	4	(30.)
Blocked drains	1	2	3	4	(31.)
Other ______________________	1	2	3	4	(32.)

8 **Using the list below, please rate the degree to which other farmers have suffered damage *from your farm.***

Level of Degree	Great	Some	Little	None	
	Down stream of the catchment				
Drainage channels altered	1	2	3	4	(33.)
Laser levelling	1	2	3	4	(34.)
Clearing	1	2	3	4	(35.)
Chemicals in the water	1	2	3	4	(36.)
Blocked drains	1	2	3	4	(37.)
Other ______________________	1	2	3	4	(38.)

9 **To what extent has your production decreased over the past five years as a result of the damage above?**

	Up stream of the catchment	
None	1	(39.)
1 - 5%	2	
6 - 10%	3	
11 - 15%	4	
16 - 20%	5	
Over 21%	6	

10 **To what extent have other farmer's production decreased over the past five years as a result of the damage above?**

	Down stream of the catchment	
None	1	(40.)
1 - 5%	2	
6 - 10%	3	
11 - 15%	4	
16 - 20%	5	
Over 21%	6	

11 Please rate the degree to which the following activities have impinged on the quality of your soil over the past five years.

1	2	3	4	5
Low degree		**Moderate degree**		**High degree**

						N/A	
Point Nutrients							
Sewage treatment works	1	2	3	4	5	6	(41.)
Stormwater	1	2	3	4	5	6	(42.)
Irrigation drains	1	2	3	4	5	6	(43.)
Roads	1	2	3	4	5	6	(44.)
Diffuse Nutrients							
Runoff	1	2	3	4	5	6	(45.)
Forest removal	1	2	3	4	5	6	(46.)
Water logging of grazing pastures	1	2	3	4	5	6	(47.)
Water logging of cropping lands	1	2	3	4	5	6	(48.)
Aerial spraying	1	2	3	4	5	6	(49.)

SECTION 2

Soil management practices have been identified as a major long term factor in maintaining soil quality. The following questions are about soil depth, soil structure and soil fertility; how they affect your costs, and how you report on them.

Soil Depth

12 Listed below are some symptoms of soil loss. Please tick one or more as appropriate, if they apply to you (say over the past five to ten years).

Wind Erosion	[ ]	(50.)
Thinning of topsoil	[ ]	(51.)
Increase in unusable paddocks	[ ]	(52.)
Increasing water pollution	[ ]	(53.)
Other (Please specify)	[ ]	(54.)

____

13 Do you have any problems with loss of topsoil?

Yes	**1**	(55.)
No (go to Q. 17)	**2**	

14 Please give a measure of the extent of this problem, *on average, over the five years 1989-1994.*

1 - 5 cm	**1**	(56.)
6 - 10 cm	**2**	
11 - 15 cm	**3**	
16 cm or more	**4**	

15 What has this problem cost you, on average, in production loss, in the years 1989-94?

__________ (57.)

16 What, in your opinion, are the causes of loss of topsoil problems for you? (tick one or more boxes).

Harvesting techniques	[ ]	(58.)
Cultivation for weed control	[ ]	(59.)
Laser levelling	[ ]	(60.)
Cultivation in preparation for planting	[ ]	(61.)
Stubble burning	[ ]	(62.)
Run off	[ ]	(63.)
Rabbit damage	[ ]	(64.)
Other (Please specify)	[ ]	(65.)

____

17 What have you done to avoid and/or alleviate this problem? *Please provide estimates of costs over the past five years on average?* (Please tick one or more boxes)

Activity	Farm Practice Benefits	Activity	
Substitute other inputs	______________	[ ]	(66.)
Changed cultivation to minimum tillage	______________	[ ]	(67.)
Machinery purchase (type..............)	______________	[ ]	(68.)
Scrapped old machinery (net cost)	______________	[ ]	(69.)
Financed from earnings	______________	[ ]	(70.)
Financed from borrowings	______________	[ ]	(71.)
Tree planting for wind breaks	______________	[ ]	(72.)
Break of slope plantations	______________	[ ]	(73.)
Direct seeding of trees	______________	[ ]	(74.)
Increased use of fallow	______________	[ ]	(75.)
Changed method of weed control	______________	[ ]	(76.)
Other (______________)	______________	[ ]	(77.)

18 **What benefits have you received as a result? (tick one or more boxes)**

Improvement in cash flow	[ ]	(78.)
Improvement in profits	[ ]	(79.)
Improvement in land value	[ ]	(80.)
Other (please specify)	[ ]	(81.)

____

<u>Soil Fertility</u>

19 **Do you have any problems with loss of fertility?**

Yes	1	(82.)
No (go to Q. 24)	2	

20 **Please give a measure of the extent of this problem, on average, over the years 1989-1994.**

21 **What has this cost you, *on average*, in production loss, in the years 1989-94?**

________ (83.)

22 **What are the causes of loss of soil fertility for you? (tick one or more boxes)**

Cultivation for weed control	[ ]	(84.)
Laser levelling	[ ]	(85.)
Reduction of the water table and increasing water retention	[ ]	(86.)
Cultivation in preparation for planting	[ ]	(87.)
Stubble burning	[ ]	(88.)
Maintaining yield by increasing use of sprays and fertilisers	[ ]	(89.)
Other (Please specify)	[ ]	(90.)

____

23 **What are the problems that these create for you?. Please give a ranking for each of 1 to 5 if they apply to you.**

Poorer quality product (this directly affects the price obtained in the market place)	[ ]	(91.)
Lower yields per hectare	[ ]	(92.)
Increasing use of fertilisers	[ ]	(93.)
Increasing use of herbicides	[ ]	(94.)
Increasing use of pesticides	[ ]	(95.)
Other (Please specify)	[ ]	(96.)

____

24 What have you done to avoid/alleviate this problem? *Please provide estimates of costs.*

Activity	Farm Practice Benefits	Activity	
Better use of water	______________	[ ]	(97.)
Changed cultivation to minimum tillage	______________	[ ]	(98.)
Soil/water testing	______________	[ ]	(99.)
Continuous cropping	______________	[ ]	(100.)
Crop rotation	______________	[ ]	(101.)
Increased use of fallow	______________	[ ]	(102.)
Taken a longer view of the returns for each paddock	______________	[ ]	(103.)
Stubble retention	______________	[ ]	(104.)
Increased use of fertiliser and herbicides	______________	[ ]	(105.)
Lost yield in early years of change over	______________	[ ]	(106.)
Mulch	______________	[ ]	(107.)
Bank loan/overdraft	______________	[ ]	(108.)
Mouse plague treatment	______________	[ ]	(109.)
Fencing	______________	[ ]	(110.)
Agronomist costs	______________	[ ]	(111.)
Machinery purchase (type...............)	______________	[ ]	(112.)
Scraping old machinery	______________	[ ]	(113.)
Chamged method of weed control	______________	[ ]	(114.)
Sewing legume pastures	______________	[ ]	(115.)
Other (______________)	______________	[ ]	(116.)

25 **What benefits have you received as a result? (tick one or more boxes)**

Improvement in cash flow	[ ]	(117.)
Improvement in profits	[ ]	(118.)
Improvement in land value	[ ]	(119.)
Other	[ ]	(120.)

____

Soil Structure

26 What problems have you had with soil structure?

Yes	1	(121.)
No (go to Q. 28)	2	

27 Please give a measure of the extent of this problem, on average, over the years 1989-1994.

28 What has this cost you, on average, in production loss, in the years 1989-94?

______ (122.)

29 What are the causes of the breakdown of soil structure, for you? (tick one or more boxes)

Multiple cultivations for weed control	[ ]	(123.)
Laser levelling	[ ]	(124.)
Fallow	[ ]	(125.)
Cultivation in preparation for planting	[ ]	(126.)
Stubble burning	[ ]	(127.)
Other (Please specify)	[ ]	(128.)

____

30 What are the problems that these create for you. Please give a ranking for each of 1 to 5 as far as they apply to you.

Lower yield per hectare	[ ]	(129.)
Breakdown of soil	[ ]	(130.)
Water logging as capillary action reduced	[ ]	(131.)
Wind erosion	[ ]	(132.)
Other (Please specify)	[ ]	(133.)

____

31 **What have you done to avoid/alleviate this problem?** ***Please give estimatess of costs***

Activity	**Farm Practice Benefits**	**Activity**	
Better use of water	____________	[ ]	(134.)
Changed cultivation to minimum tillage	____________	[ ]	(135.)
Soil/water testing	____________	[ ]	(136.)
Direct drilling	____________	[ ]	(137.)
Crop rotation	____________	[ ]	(138.)
Sewing legume pastures	____________	[ ]	(139.)
Taken a longer view of the returns for each paddock	____________	[ ]	(140.)
Stubble retention	____________	[ ]	(141.)
Increased use of fertiliser and herbicides	____________	[ ]	(142.)
Lost yield in early years of change over	____________	[ ]	(143.)
Mulch	____________	[ ]	(144.)
Bank loan/overdraft	____________	[ ]	(145.)
Mouse plague treatment	____________	[ ]	(146.)
Agronomist costs	____________	[ ]	(147.)
Machinery purchase (type...............)	____________	[ ]	(148.)
Scrapping old machinery	____________	[ ]	(149.)
Changed method of weed control	____________	[ ]	(150.)
Other (____________)	____________	[ ]	(151.)

32 **What benefits have you received as a result? (tick one box or more)**

Improvement in cash flow	[ ]	(152.)
Improvement in profits	[ ]	(153.)
Improvement in land value	[ ]	(154.)
Other	[ ]	(155.)

____

33 Where did you obtain the information regarding soil depth, soil structure and soil fertility? (tick one box or more)

Agronomist	[ ]	(156.)
Leading farmer	[ ]	(157.)
DFAG extension officer	[ ]	(158.)
Rural representative	[ ]	(159.)
AG consultant	[ ]	(160.)
Media	[ ]	(161.)
Farm Advance - community group	[ ]	(162.)
Landcare - community group	[ ]	(163.)
Reading	[ ]	(164.)
Farm 500 membership	[ ]	(165.)
Course (eg., TAFE)	[ ]	(166.)
Field days or workshops	[ ]	(167.)
Other (Please specify)	[ ]	(168.)

____

SECTION 3 For Year 1993-94

34 What was your Gross Farm Income, that is, your total farm income before allowing for any farm costs for the last financial year, 1993/94? $ ________ (169.)

Declined to answer [ ] (170.)

What percentage of your total capital value of your land is in the form of long term debt [ ] ha. (171.)

What is your average gross margin per paddock $ ________ (172.)

These questions ask you about the value of your farm over the past five years and whether it has increased or decreased in value.

35 **Please indicate the value you place on your land in the year indicated** (Please round to the nearest $1000) 1994

Unimproved	[ ]	(173.)
Improved	[ ]	(174.)

36 **Please indicate the value you place on your land in the year indicated** (Please round to the nearest $1000) 1989

Unimproved	[ ]	(175.)
Improved	[ ]	(176.)

37 **Please indicate the value you place on the following farm assets** (Please round to the nearest $1000)

	Replacement Value	
Buildings	[ ]	(177.)
House	[ ]	(178.)
Car	[ ]	(179.)
Plant and machinery	[ ]	(180.)

38 **Please indicate the value you place on the following farm assets** (Please round to the nearest $1000)

	Fair Market Value	
Buildings	[ ]	(181.)
House	[ ]	(182.)
Cars	[ ]	(183.)
Plant and machinery	[ ]	(184.)

39 What do you consider important when valuing land? Please rank *each item* below in order of importance to you.

1	2	3	4	5
Little importance		**Moderate importance**		**Very important**

Financial Factors						
Gross margin for a paddock	1	2	3	4	5	(185.)
Disposable income	1	2	3	4	5	(186.)
Annual cash flow	1	2	3	4	5	(187.)
Return on capital	1	2	3	4	5	(188.)
Price of products	1	2	3	4	5	(189.)
Profit over a five year period	1	2	3	4	5	(190.)
Market value of land	1	2	3	4	5	(191.)
Capital improvements	1	2	3	4	5	(192.)
Physical Factors						
Changes in yield	1	2	3	4	5	(193.)
Total production	1	2	3	4	5	(194.)
Soil quality	1	2	3	4	5	(195.)
Access to water supply	1	2	3	4	5	(196.)

40 **Given a genuine buyer, state *two* attributes which add value to your land.**

1) ____________________

2) ____________________

41 **Given a genuine buyer, state *two* attributes which detract from the value of your land.**

1) ____________________

2) ____________________

42 **Which statement below best describes what you try to achieve each year?**

Level of importance	Great	Some	Little	None	
Maximise short term profits	1	2	3	4	(197.)
Maximise annual cash flow	1	2	3	4	(198.)
Long term profitability	1	2	3	4	(199.)
Do what is best for each paddock over time	1	2	3	4	(200.)

43 **You are in a highly competitive market where you have little influence on the price you receive for your product. How then, do you compete with other farmers? How would you rank the importance to you of each of the following means to improve competitiveness? (*Please circle level of importance)***

Level of importance	Great	Some	Little	None	
Quality of product	1	2	3	4	(201.)
On farm monitoring - financial	1	2	3	4	(202.)
On farm monitoring - physical	1	2	3	4	(203.)
Crops which aren't what everybody else is growing	1	2	3	4	(204.)
Better capital epuipment	1	2	3	4	(205.)
Better production techniques	1	2	3	4	(206.)
Economies of scale - larger farm	1	2	3	4	(207.)
Lower production costs	1	2	3	4	(208.)
Better information	1	2	3	4	(209.)
Marketing strategies which maximise my cash flow	1	2	3	4	(210.)
Better use of government information	1	2	3	4	(211.)
Better use of government incentives	1	2	3	4	(212.)
Better management for the climate	1	2	3	4	(213.)
Better management of taxation payments	1	2	3	4	(214.)

44 **Who maintains the following records?**

Formal Records, Profit and Loss,Balance Sheet ____________

Management Records, Budgeting Records, Cash Flow ____________

Tax preparation ____________

Basic data recording -paddock, and physical records ____________

45 **Does the record keeper participate in farm activities?**

Yes	1	(215.)
No	2	

46 **Do you prepare a written Plan for your farm?**

Yes	1	(216.)
No	2	

47 **Do you keep records to assist you in monitoring your Plan against the actual operation of your farm?**

Yes	1	(217.)
No	2	

48 **There are many ways to measure the progress of any business. I would like to know how you measure the progress or otherwise of your farm. Listed below are a number of different reports which tell you about the financial/physical viability of your business. Could you indicate which reports you use, and the frequency with which they are prepared:**

	Frequency in Months					
Report	1	2	4	6	12	
Net margin	1	2	3	4	5	(218.)
Gross margin/per paddock/per farm	1	2	3	4	5	(219.)
Balance sheet	1	2	3	4	5	(220.)
Cash flow	1	2	3	4	5	(221.)
Budgets	1	2	3	4	5	(222.)
Capital improvements	1	2	3	4	5	(223.)
Monitoring assets and liabilities	1	2	3	4	5	(224.)
Physical records including soil/water conditions	1	2	3	4	5	(225.)
Paddock records	1	2	3	4	5	(226.)

49 **Do you use any decision support systems?** *(please tick one or more boxes)*

Manual cash, record books	[ ]	(227.)
Spreadsheets	[ ]	(228.)
Farm 500	[ ]	(229.)
Farm Bizz	[ ]	(230.)
Tapps Financial Manager Two	[ ]	(231.)
Tapps Paddock Manager	[ ]	(232.)
Paddock Boss	[ ]	(233.)
Consultant using Agrimaster III	[ ]	(234.)
Meycheck	[ ]	(235.)
Publications issued by banks (please specify)................................	[ ]	(236.)
Farm Smart	[ ]	(237.)
Paddock to Plate	[ ]	(238.)
Financial Management ABA	[ ]	(239.)
Department of Agriculture (please specify)....................................	[ ]	(240.)
Department of Conservation and Natural Resources (please specify)	[ ]	(241.)
Other (please specify)	[ ]	(242.)

50 **There have been studies undertaken in England and the United States on the costs of sustainable practices. Below are the costs which are mentioned in several of these studies. Could you indicate, where applicable, if you have recorded them <u>financially and separately</u> over the past five years?** *(Please tick as appropriate)*

Income	[ ]	(243.)
Less Direct costs	[ ]	(244.)
Fertiliser	[ ]	(245.)
Pesticide	[ ]	(246.)
Herbicide	[ ]	(247.)
Seed	[ ]	(248.)
Fuel	[ ]	(249.)
Contract labour	[ ]	(250.)
Gross margin	[ ]	(251.)
Less Overheads	[ ]	(252.)
Administration	[ ]	(253.)
Registration and rates	[ ]	(254.)
Insurance	[ ]	(255.)
Utilities	[ ]	(256.)
Computer system	[ ]	(257.)
Salaries - owners	[ ]	(258.)
Professional services	[ ]	(259.)
Legal	[ ]	(260.)
Accounting	[ ]	(261.)
Agronomy	[ ]	(262.)
Animal Husbandry	[ ]	(263.)
Shearing and crutching	[ ]	(264.)
Vet fees	[ ]	(265.)
Freight and cartage	[ ]	(266.)
Depreciation - machinery, vehicles	[ ]	(267.)
Cropping expenses	[ ]	(268.)
Water costs	[ ]	(269.)
Stubble burning	[ ]	(270.)
Production techniques	[ ]	(271.)
Maintenance and repairs	[ ]	(272.)
Machinery	[ ]	(273.)
Equipment, vehicles	[ ]	(274.)
Financial	[ ]	(275.)
Lease payments	[ ]	(276.)
Interest on debt	[ ]	(277.)
Provisional taxes	[ ]	(278.)
Marketing	[ ]	(279.)
Net margin	[ ]	(280.)
Less Sustainable expenses	[ ]	(281.)
Fencing improvements	[ ]	(282.)
Pest and vermin control	[ ]	(283.)
Trees program	[ ]	(284.)
Soil improvement	[ ]	(285.)
Drainage	[ ]	(286.)
Salinity control (Sec 75D)	[ ]	(287.)
Research	[ ]	(288.)
Education	[ ]	(289.)
Water conservation costs (Sec 75D)	[ ]	(290.)

Water conveying costs (Sec 75B)	[ ]	(291.)
Sustainable margin	______ %	(292.)

51 List the three most important factors which you use to assess your farm's performance

52 What accounting records would you keep if you had more time and resources?

53 List the community groups you belong to or have belonged to over the past five years.

This section contains questions about the organisations farmers deal with such as governments, banks, credit unions. These questions are intended to test whether these organisations are enhancing efficient business operations or creating inefficencies.

54 Marketing boards have been dismantled. You can sell your produce in different ways. Which of the following do you use to sell your produce?
Tick as many as is appropriate.

Grain selling:	[ ]	(293.)
Private trading	[ ]	(294.)
On-farm storage	[ ]	(295.)
Grain warehousing	[ ]	(296.)
Forward contracts	[ ]	(297.)
Delivery to the Boards	[ ]	(298.)
Cooperative selling	[ ]	(299.)
Niche market	[ ]	(300.)
Other (please specify)	[ ]	(301.)

____

55 In your dealings with the banks do you present your financial plans and accounts or do you use the bank's forms?

Your plans & accounts	1	(302.)
Bank's forms	2	

56 **Which grants and incentives from the Department of Conservation and Natural Resources have you heard of or used?** *(tick one or more boxes)*

None (go directly to question 63)	[ ]	(303.)
Fencing remnant vegetation	[ ]	(304.)
Tree planting	[ ]	(305.)
Pasture estblishment	[ ]	(306.)
Machinery modification	[ ]	(307.)
Whole farm planning	[ ]	(308.)
Pasture seed rebate	[ ]	(309.)
Others (please specify)	[ ]	(310.)

____

57 **Governments have changed focus in recent years. They now see their role as disseminating appropriate information. Name *two* ways in which government could benefit you more.**

1) ______________________________

2) ______________________________

SECTION 4

58 **What is the age of the following persons?**

Husband ________ (311.)

Wife ________ (312.)

59 **What is the country of birth and how many years in the family have the following persons farmed in Australia?**

	Nationality at birth	Generations farming	
Husband	________	________	(313.)
Wife	________	________	(314.)

60 **If Australia is not your country of birth, where did you learn to farm?**

____

61 **What is the highest level of schooling for the following persons?**
To be filled in by interviewer.

Husband ________

Wife ________

62 If post secondary attended, please elaborate.

____

____

63 **What farm related courses are being currently undertaken?** *Please tick one or more if applicable.*

Agricultural course	[ ]	(315.)
Business course	[ ]	(316.)
Accounting course	[ ]	(317.)
Computer course	[ ]	(318.)
Trade course	[ ]	(319.)
Other (please specify)	[ ]	(320.)

____

64 **What would motivate you the most to share information?**

____

____

65 **What skills will be the most important for you to have in the future? Choose a number from the scale of numbers below to show the level of importance to you.** *Please add to the list if you wish.*

1	2	3	4	5
Not important at all		Moderately important		Extremely important

Financial management	1	2	3	4	5	(321.)
Agronomist knowledge	1	2	3	4	5	(322.)
Marketing	1	2	3	4	5	(323.)
Land conservation knowledge	1	2	3	4	5	(324.)

66 **Do you undertake any estate planning?**

Yes	1	(325.)
No	2	

67 **Where do you see yourself and the other decision makers in five years time?** *Tick those which are applicable to you.*

Stay on the farm and depend less on farm income	[ ]	(326.)
Stay on the farm and depend mor on farm income	[ ]	(327.)
Same as now	[ ]	(328.)
Farm elsewhere	[ ]	(329.)
Leave the farm for another job	[ ]	(330.)
Leave the farm to retire	[ ]	(331.)
Other (please specify)	[ ]	(332.)

____

ATTITUDES TO CAPITAL MAINTENANCE (improvement and rehabilitation) AND CATCHMENT MANAGEMENT (externalities)

68 People have different views on land management. Here are some statements that are sometimes made about these problems. Choose a number from the scale of numbers below to show to what extent you agree or disagree with the following statements.

1	2	3	4	5
Strongly Agree		Moderately Agree		Strongly Disagree

We have a regional problem with the watertable that goes beyond fence boundaries	1	2	3	4	5	(333.)
Decreasing farmer's problems totally depends on finances	1	2	3	4	5	(334.)
Conservation measures are useful for increasing production	1	2	3	4	5	(335.)
I can't afford to pay myself a wage for what I'm worth	1	2	3	4	5	(336.)
Leased land increases the risk of degradation of the soil for the lessor	1	2	3	4	5	(337.)
Yield is the most useful measure of soil quality	1	2	3	4	5	(338.)
It is best to regularly monitor over time	1	2	3	4	5	(339.)
You can be too concerned with budgets rather than managing the land	1	2	3	4	5	(340.)
It is best to grow in each paddock what suits the soil rather than what suits the current market	1	2	3	4	5	(341.)
With sheep or wheat we can push the soil harder if necessary in any one year in comparision with dairying	1	2	3	4	5	(342.)
It is important to grow what is likely to get the highest prices each year	1	2	3	4	5	(343.)
Increasing and maintaining gross margin can be best achieved by buying or leasing additional hectares	1	2	3	4	5	(344.)
The balance of nature is very delicate and is easily upset	1	2	3	4	5	(345.)
You can't budget because the rainfall determines everything	1	2	3	4	5	(346.)
Technology does as much harm as good	1	2	3	4	5	(347.)
Increasing yields do not necessarily mean the long term quality of the soil is improving	1	2	3	4	5	(348.)
It is better to learn by experience slowly than by quick technical fixes	1	2	3	4	5	(349.)
Cultivating to eliminate weeds creates soil structure problems	1	2	3	4	5	(350.)
Technology is essential to me as a way of increasing yield	1	2	3	4	5	(351.)
It is best to talk about optimum yields rather than maximum yields	1	2	3	4	5	(352.)
There is a trade off between quality of soil and income	1	2	3	4	5	(353.)

Financial planning, especially budgets, are an essentia. monitoring device	1	2	3	4	5	(354.)
Other farmers do not have any affect on my land or farm practices	1	2	3	4	5	(355.)
Education costs are too expensive for the returns	1	2	3	4	5	(356.)
Most people don't realise the extent to which their lives are controlled by accidental happenings	1	2	3	4	5	(357.)
It is not always wise to plan ahead because many things turn out to be a matter of good or bad fortune anyhow	1	2	3	4	5	(358.)
It is impossible for me to believe that chance or luck plays an important role in my life	1	2	3	4	5	(359.)
Getting people to do the right things depends upon ability; luck has little or nothing to do with it	1	2	3	4	5	(360.)
Who gets on top often depends on who was lucky enough to be in the right place first	1	2	3	4	5	(361.)
there is a direct connection between how hard I work and how successful I am in my job	1	2	3	4	5	(362.)
Sometimes I feel that I don't have enough control over the direction that my life is taking	1	2	3	4	5	(363.)
Many times I feel that I have little influence over the things that happen to me	1	2	3	4	5	(364.)
In my case, getting what I want has little or nothing to do with luck	1	2	3	4	5	(365.)
People's misfortunes result from the mistakes they make	1	2	3	4	5	(366.)