

From Productivism to Pragmatism: Sustainability in Tasmania's Vegetable Processing Industry

Anthony Paul Abraham
BA, Dip. Ed., Master of Environmental Studies

**Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy
School of Geography and Environmental Studies
University of Tasmania**

June 2010

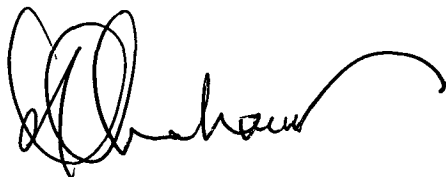


**From Productivism to
Pragmatism: Sustainability in
Tasmania's Vegetable Processing
Industry**

Declaration of authorship

This thesis contains no material which has been accepted for the award of any other degree or diploma in any tertiary institution, and to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signed:



Anthony Paul Abraham
30 November 2009


Authority of Access

1. This thesis may be made available for loan and limited copying in accordance with the Copyright Act 1968.

Statement of Ethical Conduct

"The research associated with this thesis abides by the international and Australian codes on human and animal experimentation, the guidelines by the Australian Government's Office of the Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University."

Anthony Paul Abraham


16.7.2010

Abstract

From the second half of the twentieth century, modern agricultural developments have reproduced a productivist corporate-controlled globally-integrating food system. Some of the system's negative impacts include heightened and extensive risks to the food and health security of a majority of the world population, environmental modification, and biodiversity losses. The period also witnessed a growth of importance in sustainable issues and alternative farming systems accommodating concerns for sustainability and social equity associated with the hegemonizing power of global productivist agri-food chains. Similar concerns for the condition of agriculture in peripheral regions such as Tasmania gave rise to this study which explored the characteristics and distribution of mandatory productivist industrial farming practices within the vegetable processing industry. The study aimed to determine the overall sustainability of this industry.

To achieve these aims, the study commenced by establishing a literature background as a framework on which historical, political, economic, social and environmental dimensions of food production were explored. This was followed by three phases of qualitative field studies of industry stakeholders with a focus on the potato industry and the management practices of farmers and processors. The phases marked a progressive movement from the institutional/structural level to individual actors in specific locations involving farm working visits. The study applied open-ended interviews in which all aspects of the research were open to collaboration by participants, thus encouraging frank communication, cooperative learning and purposeful action. While acknowledging the significant contribution of farming women and the power of retail capital and consumers, the scope of the study was limited to a focus on farmers and processors in the main agricultural regions in the north of the state.

Interviews confirmed the views that farmer stereotypes were both inaccurate and unhelpful beyond a certain point, failing to reflect the diversity within farming cultures, while results indicated that practices within the vegetable processing industry were indeed productivist in their reliance on inorganic and chemical inputs, mechanization, heavy dependence on technology and fossil fuels, and therefore unsustainable. Yet some change was discernible where conventional farmers have begun to borrow useful and inexpensive techniques from alternative agriculture such as increased use of rotations, green manures and no-till cultivation among others. The study also recognized and developed a 'farmer narrative' in the volunteered stories and descriptions of local beliefs and practices within the study areas. The incorporation of this accumulated knowledge is a useful aid in the development of more sustainable farming models which rely on close knowledge of local resources and conditions. While the study identified a pervasive fatalism in farmer attitudes regarding shrinking profits, contraction in farm communities, the inevitability of soil erosion, compaction and soil structure loss in Phases One and Two, farmers generally expressed a concern for the welfare of the land and its resources and their role as stewards and conservers. While acknowledging some of the damage caused by conventional practices, farmers generally argued that strained price returns made the cost of resource and environmental conservation prohibitive. The study associated such tensions with farmer demands for change to their situation as 'price takers'. This was subsequently confirmed in action to increase price returns. Longer term less optimistic views suggested continuing farmer stress and adjustment although the results found no evidence of farmers leaving the land. As a contrary indication that lent weight to previous research, the study detected a

pragmatic flexibility among Tasmanian farmers to manage new conditions in difficult times. The study concluded that present practices in the vegetable processing industry were both damaging and unsustainable but given public support, pragmatic flexibility and farmer knowledge were valuable resources with which many farmers will manage a gradual transition from productivism to ecological sustainability and social equity.

Acknowledgements

I dedicate this thesis to my parents and my family for their endless support. I particularly acknowledge the unwavering help of my patient supervisor Dr Michael Lockwood, informative guidance of Dr Aidan Davison and Dr Elaine Stratford for her encouragement. I also thank my colleague Dr Greg Phillips for his friendship and stimulating dialogues over the candidature period and Ms Atsuko Byakuno for her technical skills. The work also owes the farmers and processing company representatives who gave some of their valuable time for interviews. Their responses have confirmed the view that an agricultural crisis exists and that more concern is required for farms and farmers and the health risks, impacts and security of the food they produce.

Table of contents

	Page
Declaration of authorship	i
Abstract	ii
Acknowledgements	iv
Table of contents	v
List of tables	ix
List of figures	ix
List of appendices	x
One: Overview	1
1.1 Introduction	1
1.2 Aim of the study	4
1.3 Scope of the study	4
1.4 Research method	6
1.5 Thesis structure	10
Two: Agricultural productivism and post-productivism	12
2.1 Introduction	12
2.2 Productivism in the post-war years	12
2.2.1 Productivist agricultural processes	17
2.2.2 Structural dimensions of productivist agriculture and its impacts	19
2.3 Post-productivism	20
2.3.1 Food regimes	20
2.3.2 Globalization and a third food regime	22
2.3.3 Food production chains and external capital	27
2.4 Relocalization, diversity, social agency and identity	28
2.5 Conclusion	34
Three: Sustainability in agriculture	36
3.1 Introduction	36
3.2 Sustainable development	36

3.3 Sustainable agriculture	39
3.4 Sustainability and farmer knowledge	45
3.5 Agricultural sustainability in Australia	49
3.6 Conclusion	58
 Four: Vegetable processing in Tasmania	 60
4.1 Introduction	60
4.2 The contract system	60
4.2.1 Social impacts of contract farming	61
4.2.2 Environmental impacts of contract farming	65
4.3 Contract farming in Tasmania	66
4.3.1 Tasmania farmer organizations	69
4.3.2 Tasmania's potato industry	69
4.4 Resource conditions in Tasmania	71
4.5 Conclusion	75
 Five: Phase One Exploratory interviews	 77
5.1 Introduction	77
5.2 Selection of subjects and interview procedures	78
5.3 Results	81
5.3.1 Aging farmers	81
5.3.2 Agricultural sustainability	83
5.3.3 Profit distribution	85
5.3.4 Industry relations	89
5.3.5 Technology	93
5.3.6 Green payments	96
5.3.7 Clean and green	101
5.3.8 Organic farming	103
5.3.9 Soil degradation	107
5.3.10 Attitudes, values and sustainability	110
5.3.11 Farmer action	118
5.4 Conclusion: The marginalization of small-scale primary producers	119

Six: Phase Two: Interviews with vegetable farmers	124
6.1 Introduction	124
6.2 Research instrument and procedures	124
6.3 Results	128
6.3.1 Gender in agriculture	128
6.3.2 Aging of the farm population	131
6.3.3 Farm size	133
6.3.4 Soil erosion	137
6.3.5 Deep ripping	152
6.3.6 Soil structure, fertility and compaction	155
6.3.7 Fertility and organic matter	157
6.3.8 Soil compaction	159
6.3.9 Conservation practices and price returns	164
6.3.10 Rotations	166
6.3.11 Potato profits	169
6.3.12 Attitudes to action	171
6.3.13 Farmer knowledge	174
6.3.14 Farmer priorities	178
6.3.15 Farmers' environmental image	182
6.4 Conclusion	186
 Seven: Phase three: Farmer follow-up studies and macro-micro articulations	 192
7.1 Introduction	192
7.2 Farm visit method	193
7.3 Case study #1	193
7.4 Case Study #2	196
7.5 Case study #3	199
7.6 Two case studies from Europe	202
7.6.1 Mono-cropping versus multi-cropping	202
7.6.2 Under-utilization versus over-utilization	204
7.6.3 International versus local	205
7.7 Rules negotiation	206
7.8 Conclusion	207

Eight: Analysis/Conclusion	210
8.1 Introduction	210
8.2 Loss of rural ways of life	210
8.3 Sustainability	214
8.4 Contract system	215
8.5 Practices	216
8.6 Corroboration	217
8.7 Conclusion	218
References	221

List of Tables

3.1: Key indicators of agricultural sustainability	54
4.1: Tasmanian vegetable industry crop production 2004-05	68
4.2: Cropping and cropping/grazing rotations in Australia by state	72
5.1: Key industry informants interviews	79
5.2: Age and distribution of farmer representatives	82
5.3: Reference areas in farmer representatives' definition of agricultural sustainability	84
5.4: Phase One summary of findings on industry sustainability	121
6.1: Number of respondents using an officially recommended erosion control	144
6.2: Phase Two summary of findings in sustainability terms	188

List of Figures

Fig. 1.1: Industrial agriculture – the reality	2
Fig. 1.2: Tasmania, showing the three areas in the study	5
Fig. 1.3: Overview and field research method indicating the three phases.	7
Fig. 3.1: The sustainability indicator industry in Australia	55
Fig. 5.1: Value-adding in the vegetable processing industry	87
Fig. 6.1: Krasnozems soils, north-central Tasmania	136
Fig. 6.2: Krasnozems soils with darker horizon in northern Tasmania	136
Fig. 6.3: Soil erosion in northern Tasmania	138
Fig. 6.4: Mulched rip lines hay in furrows to slow erosion on newly ploughed land, a Tasmanian innovation, Tasmania central north	139
Fig. 6.5: Disturbed krasnozems soil in northern Tasmania	141
Fig. 6.6: Potato paddock in north-east Tasmania	147
Fig. 6.7: McCain's harvester and truck, examples of heavy traffic on north-west Tasmania	162
Fig. 6.8: Pea harvesters, examples of heavy machinery, and a major cause of compaction in northern Tasmania	163
Fig. 6.9: Potato harvester behind a modern tractor on Tasmania's north-east coast	181

List of Appendices

Appendix A: Simplot Potato Contract	235
Appendix B: Phase One survey instrument	239
Appendix C: Phase Two survey instrument	253

Overview

Who can deny the significance of food? It has a central role in our sustenance and pleasure, and it touches the deepest of nerves in our economy, politics and culture (Atkins and Bowler, 2001: viii).

1.1 Introduction

Although food retains its centrality in the 21st century, the value of its sustenance and pleasure is now questionable. Food has changed from a recognizable integrated material symbol and supporter of life in Western cultures to a mix of ingredients of dubious sources combined along a complex and often global food chain (Friedmann, 1993: 216). Much of the working pleasure previously associated with the production and preparation of food has now become merely an assemblage of ‘jobs’ (Goodman and Redclift, 1991: 5). These changes have occurred largely as a result of 20th century developments in which capital penetration of previously disaggregated food systems has propelled waves of commoditization that now threaten health, food and environmental security.

From the second half of the twentieth century, agriculture, a major source of food production, has become the subject of social, political, economic and technological restructuring – a change that has had far-reaching effects on the majority of the world population, the environment, and the future of biodiversity. The 1950s is a commonly accepted point from which to chart the trajectory of productivist developments; a period during which emphasis was placed on increasing farm output, continuous modernization and industrialization of agricultures (Ilbery and Bowler, 1998: 57).

After the enormous economic disruptions of the 1970s, that saw the floating of the US dollar, ‘shocks’ in oil prices and world inflation, came the ‘rural crises’ of the 1980s (Lawrence, 1996: 46–48) with further restructuring accelerating the ongoing impacts of agricultural production. The industrial inputs on which modern productivist agriculture once depended are now widely viewed as major sources of agricultural and environmental degradation (Longo and York, 2008: 82; Cook, 2004). Frequently, there are reports of food-borne diseases and toxic residues further shaking the public confidence in the food

system as occurred in the UK (Bovine Spongiform Encephalopathy, BSE) epidemic of the 1980s.

A sharper focus on productivist agriculture (Kimbrell et al., 2002) depicts farmers struggling with debt and insecurity on industrial farms, straining for ever-higher productivity under a toxic mix of pesticides, herbicides and inorganic fertilizers. Such settings depict the effluent of industrial production being transported by wind and rain to pollute the living landscapes; in streams, rivers and once teeming oceans (Figure 1.1). ‘Only since our fascination with industry developed, has human attention drifted away from the source and meaning of food’ (Friedman, 2000: 480). As a consequence, much of the consuming world now lives in ignorance or denial of the major causes of environmental damage where its most vital resources have become literally and metaphorically, sewers for unwanted waste.

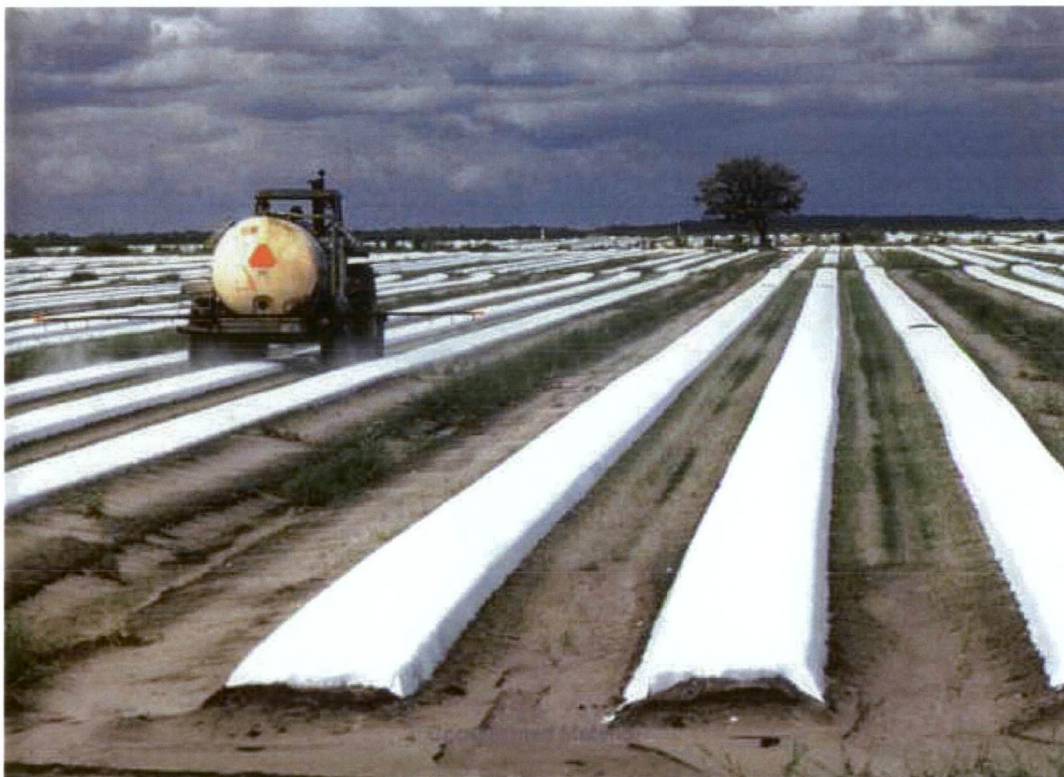


Figure 1.1: Industrial agriculture – the reality (Source: Kimbrell et al., 2002)

Industry disrupts natural cycles, not only where it creates waste, but also in distant places that supply raw materials. Separated from local cycles, industry contains no way to replace the composition and structures taken from the earth or to absorb the multiple substances

yielded. Rather, industry turns natural substances from anywhere into 'resources', and divides multiple products into commodities to be sold anywhere and 'wastes' (with no good place to go) (Friedmann, 2000: 48).

In *Silent Spring*, Carson (1962) alerted the world to the catastrophes following the reckless application of pesticides, which, over a half century ago, had begun overwhelming ecologies, increasing pest resistance¹, destroying species and debilitating future generations (Cook, 2004: 165). Today, a similar system has expanded its reach and chemicals continue to be developed and dumped on farm soils and food products. Industrial corporations maintain their impacts on biodiversity with compounds that have no 'safe levels'² except in marketing myths³ agri-chemical manufacturers such as Syngenta, Bayer and Monsanto (Rengam, 1999). And yet the manner in which agricultural products are marketed gives no clues to their side effects or the longevity of their residues. There are no health warnings on food of the kind used in tobacco products. Consumers are allowed to assume that freshness and attractive appeal of fruit and vegetables represent nutritional health and environmental care.

Such issues were the basis for this inquiry into the benefits and impacts of conventional agriculture. The study was also prompted by concerns for the veracity of Tasmania's 'clean and green' image, in relation to its pristine environment and nutritional quality of its food. The health and impact of its agricultural products is an important issue for a small state seeking a marketing niche in wider economies.

¹ Between 1950 and 1990, the number of insect species resistant to pesticides increased from 20 to over 500 (Steingraber, 1997: 152).

² Testing of Roundup, a mixture of the active ingredient Glyphosate, solvents and surfactants shows that this compound is more toxic than the active ingredient Glyphosate. In fact Glyphosate barely works as a herbicide without the addition of these 'inert' chemicals (Cox, 1998).

³ One of the myths is that once a chemical degrades, it disappears and is harmless. Most agricultural poisons leave residues of breakdown chemicals when they degrade (Short, 1994; Colborn et al., 1996).

1.2 Aim of the study

Vegetable production and processing is an important industry in Tasmania for which the great majority are produced and exported. The study aims to assess the sustainability of dominant practices in the vegetable processing industry in Tasmania as reported through interviews with the main stakeholders – the farmers and processors. In the process, the study will begin a compilation of locally specific farmer knowledge which is considered a valuable ingredient in the development of a sustainable farming model. The study will also reflect on the industry's prospects for a transition from productivist to post-productivist practices and ultimately to sustainability.

1.3 Scope of the study

Research into Tasmania's vegetable processing industry logically focuses on the farming practices of the local stakeholders (farmers, farmer representatives and processors) who interact through the vegetable contract system. The study also draws on the knowledge and perspectives of a number of 'interested outsiders' of the industry, two organic growers, an agribusiness representative and the researcher's own observations as a participant. The risks associated with the specific ecological and human health impacts of productivist agricultural practices, though fundamental, are beyond the scope of this research. As noted by Burch et al. (1992: 31), the task of empirical validation of these risks requires years of data collection to demonstrate a direct link between specific productivist practices and levels of soil degradation and cancer rates. 'Only the processes operating within the contract farming system of the vegetable processing industry, which appear to be intensifying the demands placed upon agricultural systems, can therefore be described and analysed' (Burch et al. 1992: 31).

The commodity chosen for special study is the humble potato whose banal appearance contains hidden depths of interest in terms of industry relations and production practices. In addition to its high value to the state's economy, the production and processing of potatoes forms a focus for interests at various social, political and economic scales, which reflect the critical position of agriculture and food production and the relative power of stakeholders within the modest limits of this Tasmanian industry.

It is important to recognize that food socialization is strongly gendered. Roos (1995) found that for young girls, food is a symbol for friendship and connection while for boys, it is a

means to express dominance and competition. The role and influence of women in agriculture though largely unrecognized, has been found to be both pervasive and vital to the agricultural sector (Alston, 1995; Liepins, 2000: 609). This study therefore acknowledges the significant contribution of women to the historical development and maintenance of agriculture in Tasmania. Nevertheless, time and resource constraints limit the scope of the study so that gender issues could not be given the attention they deserved. These must be left for future studies.

Similar constraints also limited into the perspectives of retailers, fast-food companies and consumers whose power in the food system is acknowledged (Ilbery and Bowler, 1998: 66–67; Burch and Goss, 1999; Lawrence and Burch, 2007: 1–22). Farmers and the processing companies were selected on the basis that as the main elements comprising the production side of the vegetable food system in Tasmania, their decisions and farm practices can be most directly associated with social, agricultural and environmental impacts. Processors are said to have a double role which extends beyond farm practices to consumer choices of food on the table (Burch et al., 1992: 256–257).

Geographical limits to the study were set within the three regions in the high rainfall, fertile north of Tasmania, in which the majority of vegetable crops are produced (Figure 1.2) and where the most intensive practices in vegetable production are identified.

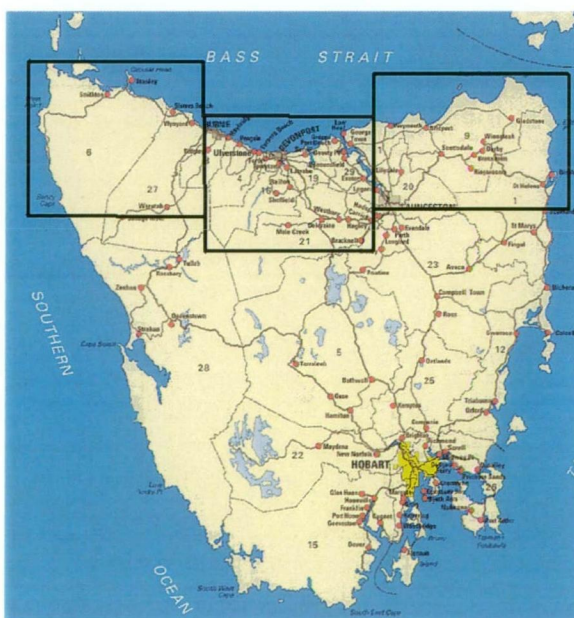


Figure 1.2: Tasmania, showing the three areas in the study: north-east, central-north and north-west (Source: Tasmanian Spatial Data Directory)

1.4 Research method

Robinson et al. (2001) argue that due to the applied and social nature of farming, the role of farmers has been understated in research. This view relies on the belief that people and their behaviour are central to agricultural development and that a participative form of research which emphasises adult learning, learning cycles, cooperation, individual needs and group interactions, is a key component of the process. For Robinson et al. (2001), participant research entails having all participants plan and enact the research program (farmers, processors and researchers) with 'action' being the key to learning (not just theory or logic; action usually being physical involvement in exploration, demonstration or experimentation), servicing the needs of individuals, and respecting existing knowledge and abilities. Stakeholders are encouraged to disclose/reflect and question their assumptions in order to improve decision making, while the imposition of knowledge or values by any of the participants is avoided. Participant learning aims at building a social environment for positive learning, and developing skills for ongoing self-directed individual and group learning. The approach was therefore considered highly appropriate for the purposes of this qualitative study which incorporates the opinions, views and perspectives of participants. Participatory research also increases the likelihood that the experience in the research will be positive where knowledge is shared and learning is cooperative (Robinson et al., 2001). Importantly, the process relies on frankness when information is exchanged to break down false perceptions and avoid stereotypes. The groundedness and personal nature of participation helps reduce (but not eliminate) the subconscious desire to make or accept unhelpful stereotypes (Robinson et al., 2001). Additionally, by allowing participants substantial control of the research and learning processes, the process can become a stimulus for purposeful action.

The study gathers information in three interconnected phases moving from institutional (farmer organizations and processors) to individual farmers. Figure 1.3 shows the direction of the process. Collaboration begins in Phase One with interviews of key informants, representatives from a farmer organization, from processing companies, farmer commodity groups, an agribusiness firm and organic producers. All participants are invited to express their views and opinions and offer suggestions for the direction of the study.

Phase Two of the study employs telephone interviews, allowing working farmers to give their views and describe the practices they use. Phase Three relies on direct observation

and participation to corroborate the material collected in Phases One and Two. In several farm visits, the researcher engages in farm work and makes ‘direct’ observations and inquiries about farm practices. Physical involvement in farm work gives the researcher a limited opportunity (one complete day) to observe and explore farming practices. Involvement in farm work is expected to encourage frank communication (Keats, 2000: 24).

In all phases, information about farm practices is sought through a combined survey interview format in which a number of questions require a ‘yes/no/unsure’ response and the remainder (open-ended enquiries), allow subjects to give free responses (Keats, 2000: 35). The modified survey interview encourages an extended dialogue, not in the traditional scientific relationship of subject–object, but a subject–subject exchange (Reason, 1998: 270). More details on the conduct of each phase and the questions employed are given in Chapters Five, Six and Seven.

The participant’s role and practices are integral to the research. The store of local accumulated knowledge/wisdom is a valued asset to be respected. At all times the researcher encourages participants to discuss their views, practices and difficulties while assessing his/her own. The interviewer’s attitude and tone should avoid giving the impression of superiority and imposing knowledge. Participants are encouraged to view the encounter as a meeting in which information is shared and explored.

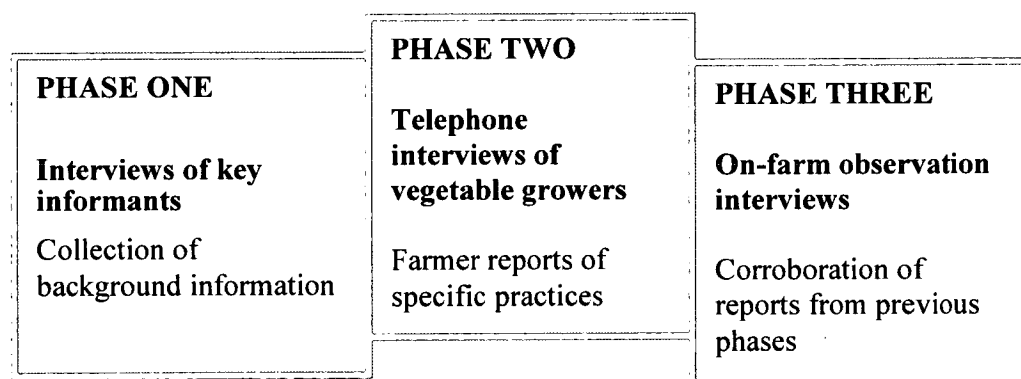


Figure 1.3: Overview and field research method indicating the three phases. More detail of the conduct of each phase and the questions employed is given in Chapters Five and Six.

The researcher may bring abstract knowledge to the dialogue for confirmation by subjects with access to a more ‘concrete’ reality. As exploratory research, the survey interviews

provide a 'human' view of the local through representations of peoples' feelings and experiences. Most social scientists recognise that interviews are interactional in some degree and that social dynamics may shape the nature of the information gained (Fontana and Frey, 2003: 647). For these reasons, including the use of structured techniques (where 'nothing is left to chance'), interviews remain inexact instruments, often prone to non-sampling errors.⁴ Respondent behaviour, the structure of questions used, and interviewer characteristics, may all be sources of response effects. To reduce the likelihood of misinterpretation, the research employs triangulation of data to 'verify the repeatability of an observation or interpretation (Stake, 2000: 443) and multiple sources to increase the validity of the analysis (Yin, 1994: 92; Babbie, 1994: 109).

The research sought information from a total of 130 industry participants including the views of a farmer organization (1), farmer representatives (24) from a population of 44, vegetable growing farmers (100) from a total of 700, and six farm visits. Two representatives were chosen from Simplot Australia, the major company with a potato processing factory at Ulverstone and another in Devonport in Tasmania. One representative was selected from McCain Foods whose only plant operates at Smithton in north-east Tasmania processing frozen French fries, vegetables and other food items. The research also canvassed the views of one agribusiness executive from Webster Limited, an onion producer, and three from the organic sector (an organic broad acre farmer, an organic essential oil producer and an organic farming lecturer from Lincoln University in New Zealand). Representatives from the organic industry are a source of alternative farming knowledge, some of which (e.g. rotations and green manure) have already seen wide adoption in mainstream agriculture (Lyons and Lawrence, 2001). Given time and resource constraints, this relatively diverse sample of subjects was expected to return useful results.

Postmodernist⁵ interest in social research has more recently focused on subject-object aspects of the interview situation (Alvesson, 2002) in which the role of the interviewer has

⁴ These can usually be attributed to the questionnaire administration process.

⁵ The core of postmodernism is the doubt that any method or theory, discourse or genre, tradition or novelty, has a universal or general claim as the right or privileged form of authoritative knowledge (Alvesson, 2002: 9).

been ‘deconstructed’⁶. The concept of ‘reflexive pragmatism’ is useful in allowing for a ‘bridging of the gap between epistemological concerns and method, trying to combine more philosophically informed aspects with what one is doing in the field’ (Alvesson, 2002: 15). This has led to more attention being paid to the interviewer/respondent relationship where the voices of subjects are now more likely to be heard and valued.

As alluded to above, interview styles may range from the traditional inflexible format of a structured interview (by the numbers) to a more qualitative style of study in which the aim is the establishment of a human-to-human relation with the respondent and the desire to understand rather than to explain. From the vantage point of the interviewer, the event is an encounter whose products are the result of a ‘socially situated activity, where the responses are passed through the role-playing and impression management of both the interviewer and the respondent’ (Dingwall, 1997, in Denzin and Lincoln, 2003: 664). Actors may collaborate to create a ‘monologic view of reality’ and:

in terms of Schulz’s ‘I–thou’ relation, in which the two share a reciprocity of perspective and, by both being ‘thou’ oriented, create a ‘we’ relationship. Thus the respondent is no longer ‘an object or a type’ but becomes an equal participant in the interaction (Denzin and Lincoln, 2003: 664).

The purpose of the survey interview is to reveal the respondents’ attitudes, opinions and behaviour—‘the strength of survey research is asking people about their firsthand experiences: what they have done, their current situation, their feelings and perceptions’ (Fowler, 1995: 78–122). However, social encounters may contain a degree of unpredictability:

The mere experience of taking part in an opinion-seeking interaction between two people, can be sufficient to change a person’s views and subsequent behaviour. As the interview develops, it can reveal aspects of the topic which the respondent had not previously considered; so a change can occur even though it was not intended (Keats, 2000: 7).

⁶ Deconstruction is a critical process which generally attempts to demonstrate that any text is not a discrete whole but contains several irreconcilable and contradictory meanings.

1.5 Thesis structure

In order to identify the theoretical underpinnings of practices in the industry, Chapter Two examines structural and institutional theories for agricultural transformations during the last six decades. Reference is made to the insights of food regime and productivist theory, relocalization and diversity perspectives. Actor-oriented and behaviourally grounded approaches offer a 'balanced approach' between the polarization of the 'macro' structuralist accounts and the voluntarist 'micro' of actor-oriented agency perspectives. The farmer processor interaction is informed by globalization and agri-food restructuring perspectives exploring transformations and claims for a post-productivist agricultural regime after the mid-1980s. Symbolic interactionist theory offers explanations for the persistence of productivist ideologies and practices among traditional producers.

Chapter Three explores sustainability as a concept and the relevance of the World Conservation Strategy of 1980 and the Brundtland Report of 1987. Problems associated with theorizing sustainable agriculture stem from the diversity of physical, cultural and philosophical dimensions represented as one defining term. Yet there are two competing visions at the heart of the concept of agricultural sustainability, one supporting the status quo (modified productivism) and the other espousing radical change (integrated ecological paradigm). Given the dire state of agricultural resources in Australia, agricultural sustainability should have been foremost among legislators and farming organization concerns. Instead, reporting on sustainability seems to be fragmented among a multiplicity of agencies and committees.

Chapter Four develops an Australian/Tasmanian agricultural context for the study of the local vegetable processing industry and its almost total reliance on a forward contract system. This system demands the application of industrial productivist practices to ensure constant supply for its factories, and, in turn, offers variable economic security for participating farmers at the expense of long-term sustainability. The chapter also outlines the structure of the industry in Tasmania with particular emphasis on the production of potatoes as the crop of choice. Most farmers, and the economy of the state, are highly dependent on this product. Although little effort has been expended on detailed surveys of Tasmania's soil conditions, there is evidence to show Tasmania's most productive krasnozem soils are in decline due to a lack of attention to the degrading effects of erosion, heavy cultivation, chemical inputs and soil structure decline.

Chapter Five describes Phase One of the study in which the views of key informants are canvassed in open-ended interviews. This phase forms an introduction to the social, economic and political dimensions of the vegetable processing industry as constructed and delivered through the opposing perspectives of farmers and processors, and reconstructed through the research process. The relations between processors and farmers mirror the tensions arising from global and local capital interactions and their corresponding world views.

Chapter Six, Phase Two, advances the process of identifying and quantifying the practices used in the industry while assessing their social, agricultural and environmental impacts. Due to the relatively large number of interviews, a telephone method was selected to expedite the process.

Chapter Seven is an analysis of corroborating follow-up studies (Phase Three) in the light of two comparable case studies from the European Union which analyse changes within two farming cultures in terms of 'rules negotiation'. These have a number of features in common with Tasmanian vegetable producers and their practices in the present study.

Chapter Eight analyses and grounds the study results in the theoretical perspectives of Chapters Two and Three, and provides a conclusion and recommendations.

Agricultural productivism and post-productivism

2.1 Introduction

In the previous chapter, the research problem, specifications of the study and the method for discovering solutions to the study questions were set down. This chapter commences with a brief outline of agricultural change from the middle of the twentieth century through various ‘macro’ and ‘micro’ political–economic perspectives to assist in an outline of agricultural developments. Although Australian agricultural practices are said to have been less intensive (Reeve, 1990: 70) and government support significantly scaled down by the late 1980s (Higgins, 1999: 141), the thesis argues that many of the broad features of post-war ‘western’ agriculture remain a useful framework for analysing the local setting. What are termed ‘productivist practices’ on farms in the UK, may be reproduced in Tasmania’s vegetable processing industry.

To that end, the chapter explores the origin and characteristics of political, technological and industrial developments which have enabled an industrial productivist agricultural phase (a second food regime or a green revolution) as a foil to neo-Malthusian predictions of looming food scarcity. And, as this ‘progress’ rendered traditional agricultures sites for capital accumulation by increasingly powerful business interests, ‘little heed was paid to the sustainability of rural societies and fragile ecosystems’ (Wood, 2003). The legacy of these developments is ongoing in agribusiness colonization, integration and globalization of the world’s farming sectors.

2.2 Productivism in the post-war years

From the second half of the twentieth century, agriculture has undergone unprecedented change as a consequence of social, political, economic and technological restructuring. This has had comprehensive effects on the lives of communities, the environment and the future of biodiversity in places far removed from major cores and as remotely situated as Tasmania. This study traces agricultural processes from this period, itself a time of climactic change.

The end of World War Two was a momentous historical marker. It signalled the commencement of a new geopolitical order and the establishment of hegemony by the United States. During this period of renewal, growth and modernization, which extended for two decades, the West enjoyed widespread economic growth and prosperity. Indeed, the period came to be known, somewhat nostalgically, as a 'long boom' (Le Heron, 1993: 44). After the deprivations and shortages of war time restrictions, productivity and growth became national goals and found government support in all sectors including agriculture.

US farmers in particular, experienced an enormous advance in their security and efficiency (Redclift, 1990: 82). Expanding scientific and technological knowledge produced high-yield cereals that were quickly taken up in farm production. For many individual farmers, this halcyon period provided easy access to subsidised credit, machinery and chemical inputs. With mechanical and chemical aids to farming, farmers' shedding labour made further advances affordable. The resulting accelerated flows of unemployed from the countryside to the cities were taken up in the rapid expansion of manufacturing industries (Redclift, 1990: 82).

This was a first phase in post-war agricultural development, a phase that lasted for almost twenty years now known as 'productivism' or a 'second food regime' (Ilbery et al., 1998; Le Heron, 1993) or a 'third agricultural revolution' (Bowler, 1992: 11). It became the conventional farming model, characterized by 'continuous modernization and industrialization' (Ilbery et al., 1998: 57). The roots of these developments lay in pre-war America, where, according to Chambers (2009), President Franklin D. Roosevelt's wartime administration selected commodity support programs rather than land use planning infrastructure to guide production:

This ensured the demise of reformist planning efforts that had characterized the Department of Agriculture during the New Deal of the 1930s. By guaranteeing high prices, the wartime program generated high output of crops that were not needed, overproduction of important crops, and a sharp rise in food prices. In pushing land use planning to the margins of the mobilization, these wartime decisions determined the outlines of the agricultural policies that would dominate the post-war period. The post-war U.S. Department of Agriculture distributed commodity support payments according to the total output and landholdings of farmers; marginal producers received less and were thereby encouraged (in many cases forced) to leave farming (Chambers, 2009).

However, the development of productivist agriculture is also associated with scientific and technological advances called the 'Green Revolution', a term coined in 1968 by former USAID director William Gaud, who, buoyed by trial results of the technology, was moved to proclaim:

These and other developments in the field of agriculture contain the makings of a new revolution. It is not a violent Red Revolution like that of the Soviets, nor is it a White Revolution like that of the Shah of Iran. I call it the Green Revolution (Gaud, 1968).

Success of technology was based on results obtained in Mexico, India and the Philippines, where high yielding, genetically altered wheat and rice varieties (HYVs), grown totally on irrigated soil, fed with artificial fertilizer and protected with pesticides, succeeded in making Mexico and India self-sufficient in staple foods. As the technology diffused between 1961 and 1985, cereal production more than doubled in developing countries (Conway, 1998). In Africa, where water supplies and good soils were less abundant, and topography uneven, successes were less dramatic and failures costly. Borlaug's mission had been to industrialise Third World grain cultivation following the pattern in the US, where hybrid seeds were combined with industrial chemicals and machinery. However, this revolution proved to be unsustainable as it damaged the environment, caused dramatic losses in biodiversity and traditional knowledge. It also favoured wealthier farmers, and left many poor farmers in debt (Altieri, 2009: 102). According to Castles (2008), Borlaug had not been specifically directed to solve persistent hunger in the world which according to neo-Malthusians, was caused by the excessive fertility of the poor. For Thomas Malthus (1766–1834), ideas of endless progress to a Utopian society were flawed on account of the dangers of population growth: 'The power of population is indefinitely greater than the power in the earth to produce subsistence for man' (Castles, 2008). Thus, poverty was the product of 'natural processes' rather than of social and economic relations. This view was later echoed by neo-Malthusians in *The Population Bomb* (Ehrlich, 1972) in which failing impoverished states were to be cut adrift by the prosperous developed world and left to their own devices (Hay, 2002: 174). Importantly, these perspectives obscured the manner in which the poor were deprived of their means of subsistence, thus justifying existing social relations favouring the rich.

In this manner, Malthusian logic became deeply embedded in the ideological supports of the Green Revolution. It de-emphasized structural explanations for poverty and food

scarcity while privileging technological solutions and the central premise of corporate productivist agricultural control of the means of food production (Ross, 1998). If arable land was limited, peasant agriculture could not yield sufficient increases in food. Therefore, their land must be managed in a businesslike fashion by those more able to do so. Only the business classes possessed the capacity to create a new global food system, committed to the industrialization and modernization of agricultural production. Consequently, 'throughout much of the world, Malthusian logic, hand in hand with the new technologies of the Green Revolution, helped to put land reform on hold' (Ross, 1998: 1). Adjustment policies encouraged small and subsistence farmers to leave their land.

For some, (Dowie, 2001), the green revolution was also a US Cold War political strategy with a geopolitical objective to provide food and social stability to underdeveloped countries and weaken the foment of communist-inspired movements. However, in the 1970s, the corporate roots of the Green Revolution emerged as pressure increased for a rationalization of the global food system. The group of 'foundations' (Rockefeller, Ford, the World Bank interests) that initially subsidised Borlaug's research, formed the *Consultative Group on International Agricultural Research* (CGIAR, 1971). Situated in the World Bank, the Group's stated aim was to 'ensure a steady flow of improved technologies for food production', a view that reflected a continuing emphasis on output alone. According to Ross (1996: 2):

For forty years, the Malthusian spectre and the Cold War together have justified a process of agricultural development that has enhanced Western corporate interests at the expense of the rural poor. Looking back, one can see how the Green Revolution, despite humane pretensions, bore the unmistakable imprint of these interests, and how the argument for a technical, now biotechnological, rather than a structural solution to the problems of rural subsistence has perpetuated them.

Thus, the problems of hunger and malnutrition were and remain political problems of redistribution and equity, not technological problems (Allen, 2004: 103) closely associated with developments in a global productivist food order. Science and technology temporarily increased productivity without affecting the causes of poverty because the poor were simply unable to afford the cost of industrial food. Driven off their land to allow large-scale industrialization, small farmers no longer had the means to grow cheap adequate food and for them, the innovations of Borlaug's system was cause for misery. Adjustment

of small farmers in western developed countries mirrored this process in a more socially moderate form by forcing many farmers to move to cities and alternative employment.

Yet the innovations of the Green Revolution brought other surprises. According to Shiva (1992), productivity was often at the cost of other crops in farmers' enterprises and the destruction of self-renewing agro-ecologies. As well, soil depletion, water pollution and loss of biodiversity were impacting both farms and surrounding lands. In India, farmers and their communities suffered because little thought was given to the social and economic impacts of the model (Shiva, 1991: 176–183). It introduced new agricultural technology into a social system stacked in favour of the rich against the poor, without addressing questions of access to the technology's benefits. Over time, it led to a greater concentration of agriculture, a reflection of similar processes in the US (Rosset et al., 2000). Lappé and Collins (1979: 6–7), in *World Hunger: Ten Myths*, with the wonders of the Green Revolution in mind, concluded that 'every country in the world had the resources necessary for its people to free themselves from hunger' and, as 'Hunger exists in the face of plenty; therein lies the outrage'. Thus, as the productivism of the Green Revolution model failed to acknowledge the connections between malnutrition, global population expansion, and food production, its narrow production focus ultimately became a cause of degradation of the resources on which agriculture depends.

During the post-war period of rapid capitalist growth and prosperity in developed countries, many were left behind and by 1968, the year of world revolution, the productivist boom seemed to be heading for a bust. Following the first and subsequent oil shocks of the 1970s, concerns were voiced regarding the increasing dependency of conventional agriculture supplies on fossil oil. There was growing unease about the long-term effects of farming practices that damaged soils and waters and drove farmers off their land. In response, after the 1980s, the 'productivist' model became more industrialized with a rapid integration of farming into agribusiness sectors (Le Heron, 1993: 53–54) and the corporate consolidation and control of the various food supply chains. According to (Troughton, 2005: 23), 'these linked processes have been the product of a continuing 'productivist', growth-oriented, industrial and commercial outlook, fully supported by governments'. As a consequence, the agricultural restructuring of the past decades has been marked by a transformation of traditional farming practices and values, family farm

losses, the depletion of rural communities, and the alteration of whole landscapes and regions (Gray and Lawrence, 2001; Marsden et al., 1993).

It is therefore unsurprising that industrial productivist agriculture is sometimes seen as a process that imperils the future security of local and global food production and the world environment (Harris, 2001: 155; Henderson, 2000: 176; Kimbrell, 2002: 1). Yet, as a relic from the post-war productivist order, its hegemony may be in decline. Though entrenched, the global, national and regional distribution of productivist agriculture today is seen to be 'uneven' (Ilbery, 1985: 75; Le Heron, 1993: 33) as it coexists and competes with alternatives. These developments are explored further in the following under 'post-productivism' (Section 2.3).

2.2.1 Productivist agricultural processes

Bowler (1992: 19–27) identified three main themes to explain the processes associated with productivist agriculture. Commercialization derived from modernization theory emphasized economic factors in agricultural change in which family farms are transformed by market supply and demand relations. As farming dependence on chemical inputs and machinery substitution for labour increases, farmers are re-educated in the use of the new technologies. This leads to a dual farm economy comprised of older style labour intensive 'traditional' and 'modern' technically efficient capitalist farms increasingly integrated into the food supply system.

Commoditization stresses social rather than economic structures, and is often characterized by a political economic (structuralist) approach in explanations of agricultural change (Redclift, 1984). As farmers 'are drawn into dependency on non-farm goods and inputs purchased in the market, they are compelled to produce agricultural commodities with an exchange value in order to obtain a cash income' (Atkins and Bowler, 2001: 56). Smaller unsuccessful farm businesses are marginalized and eventually forced to sell out to more competitive larger farmers. Commoditization places emphasis on farm inputs rather than output. It is also important to note that in this view, the uneven transformation of agriculture is a function of the penetration of particular farming systems (and farming regions) by external capitals and the resulting power imbalance between agribusiness (with a capacity to source globally) and locally situated farmers.

The commoditization approach to agricultural change is considered somewhat flawed because of the continued existence of family labour farms, whose complete elimination it predicts. Additionally, many large-scale farm businesses are operated by family labour entirely (Marsden and Symes, 1984; cited in Ilbery and Bowler 1998: 59). But more importantly, the processing of farm products is largely owned by international food industries, whose preference is the procurement of raw products through forward contracts in which crops are grown by agreement on farmers' land. External capital control over the family farm is progressively increased through a process of formal 'subsumption' in which legal ownership remains with the farm family but effective controls are lost through agribusiness demands. This has consequences for the irregular development of agriculture according to Ilbery and Bowler (1998: 66) in terms of spatial selection of contracts by companies (proximity to processing firms), size of farms (small number of large farmers) and type of farming (fruit, vegetables, pig and poultry). However, Ilbery and Bowler (1998: 60) consider that the persistence of the family labour farm under advanced capitalism suggests that 'farm households have a greater degree of autonomy than theorized [in a commoditized view], and, that there is a need to incorporate behavioural attributes (human agency) into political economy perspectives on agriculture'. The debate surrounding the relative power of structure and agency is dealt with further in this chapter and in Chapter Seven of this thesis.

The industrialization theme employs concepts from both the commercialization and commoditization schools and adopts the food-supply system as its organizing framework. According to (Ilbery and Bowler, 1998: 60), this approach relies on two theoretical concepts. Appropriationism from the commoditization literature is defined as the 'persistent transformation into industrial activities of certain parts of the agricultural production process, and their subsequent reintroduction in the form of purchased farm inputs. Substitutionism focuses on outputs rather than inputs, is concerned with the increased utilization of non-agricultural raw materials and the creation of industrial substitutes' (Ilbery and Bowler, 1998: 60).

Industrialization in agriculture also emphasizes the increasing role of the state in directing agricultural change. This is sometimes expressed in varying levels of economic and informational support and policies such as price protection and subsidies. In Australia and New Zealand, reductions in state support have been more marked than in comparable

developed states to encourage a competitive environment within ‘a level playing field’ (Fagan and Webber, 1994: 129). However, for Australian and New Zealand farmers, the playing field is decidedly ‘uneven’ in view of high assistance levels in the US, the UK, the EU and Japan.

2.2.2 Structural dimensions of productivist agriculture and its impacts

Three structural dimensions of productivist agriculture describe the complexity of agricultural change which impact the quality of social, agricultural and environmental resources. According to Ilbery and Bowler (1998: 62), *intensification* describes the increased farm inputs (e.g. capital, fertilizer, agro-chemicals) or farm outputs (e.g. production of vegetables, meat, etc.) per hectare of agricultural land. Inorganic inputs are expensive and damage soil biota leaving residues that are taken up by farm products. In turn, these affect the health of the wider environment and consumers.

Concentration in agriculture describes the increasing proportion of total productive resources (labour and capital) or farm production (outputs) located in a smaller number of regions. It is also evident in the distribution of land at the farm level. Larger farms allow reduced costs of production through economies of scale leading to a sustained fall in the number of small farms the viability of rural communities and a diminished cultural diversity within nations.

Specialization in agriculture refers to the economies of scale achieved by limiting the number of products in a farm business. This can be related to management specialist skills and knowledge, and observed in the functions of the labour force, the types of farm equipment and the choices in land use. Productivist specialization can affect the biodiversity of plants and organisms. ‘Biodiversity is about people and our need for food security, medicines, fresh air and water, shelter, and a clean and healthy environment in which to live. Degradation of biodiversity is thus a risk to continued human existence’ (Centre for Plant Biodiversity Research, 2009).

Productivist developments have also increased the demands on farmers by agribusiness. Farmers are often placed under pressure to produce crops with improved processing characteristics, including greater volumes with uniform quality (Le Heron, 1993).

2.3 Post-productivism

Following the agricultural crises of the mid-1980s significant changes were occurring within mainstream agricultural systems. According to Wilson (2001: 81) ‘by this time, the logic, rationale, and morality of the productivist agricultural regime (PAR) were increasingly questioned by various state and non-state actors on the basis of ideological, environmental, economic and structural problems’. Some argued that the productivist ideology was ‘now so obviously in disarray’ (Marsden et al., 1993: 68). Consequently, the term post-productivist agricultural regime (PPAR) was adopted to describe a set of new characteristics in agriculture (Ilbery and Bowler, 1998) emerging during this period also dubbed a ‘post-productivist transition’ (PPT) by Ilbery and Bowler (1998: 70). Accordingly, the PPT can be interpreted as a reversal of productivist trends, prevalent during the productivist phase of US and European agricultures. These were characterized by a move from *intensification* to *extensification* which saw farmers being encouraged to reduce their level of purchased farm inputs and become more extensive in their practices. *Specialization* to *diversification* involved farm businesses seeking to reduce their dependence on a single product for the total farm output. This allowed more varied land-use systems to be created with positive implications for the environment. According to Ilbery et al. (1998: 71), the impetus for change drew mainly from the state to reduce public expenditure on agriculture as well as an increasing convergence between agricultural and environmental policy. Further examples of post-productivist change are introduced in the following subsections under the themes of food regime theory, globalization and a third food regime, and food production chains.

2.3.1 Food regimes

While productivist theory offers explanations for post-war agricultural processes, in phases which connect institutional and individual interests with social, economic and environmental impacts, food regime’ theory links ‘food production and consumption to forms of accumulation broadly distinguishing periods of capitalist transformation since 1870’ (Friedmann and McMichael, 1989: 95). According to Buttel (1996: 21) regime theory is a composite blend of the regulation theory of Aglietta (1979) and Lipietz (1987), world system theory (Wallerstein, 1980), Polanyi’s (1956) economic sociology and international regimes theory (Krasner, 1983), and mostly associated with the work of

McMichael (1994, 1996), Friedmann (1982, 1993, 1994) and Friedmann and McMichael (1989).

For regulationists, each regime of accumulation has its stability based on a 'mode of social regulation', the key concept for an understanding of social cohesion on which the establishment of a successful socio-economic project relies:

A mode of regulation is a set of mediations, which ensure that the distortions created by the accumulation of capital are kept within limits which are compatible with social cohesion within each nation. This compatibility is always observable in specific contexts at specific historical moments (Aglietta, 2000: 391).

In Lipietz's view, the goals of liberal productivism during the post-war era became an ongoing crusade (a restructuring) for endless profit and an assault on worker rights. Capitalist development may then be theorized as a sequence of time periods, each having a specific institutional framework with corresponding norms regarding the organization of production, income distribution, exchange of products and consumption (Atkins and Bowler, 2001: 23). These periods are traceable to the mid-nineteenth century and are each separated by a crisis of capitalism. 'In other words, capitalism was periodised in geopolitical terms and its periodisation coincided with two different moments in the life of the nation state' (McMichael, 1999: 4). In agriculture, each regime is characterised by particular farm products, food, and trade structures linking production with consumption, and regulations governing capitalist accumulation. Summarising the work of Friedmann (1982, 1987) and McMichael (1992, 1994), the main features of food regimes included a globalizing capitalist Western system for maximising accumulation through integration of farm sectors into external economic processes mediated by the state.

The first food regime was based on an 'extensive' system of capitalist production. The white 'settler' countries in Africa, South America and Australasia produced and exported unprocessed and semi-processed foods to the industrial cores in North America and Western Europe. Bulk products were exchanged for manufactured goods, labour and capital. However, as trade became multilateral, it diluted the trading monopolies of the European colonial empires, thus allowing the relocation of commercial farm production into the settler countries. This change had three important effects (Friedmann and McMichael, 1989: 102). Complementary product exchange gave way to competition where settler family farms emerged as a new form of commercial agriculture whose labour

processes were becoming appropriated by industrial capital and home markets organized into agri-industrial complexes.

A second 'intensive' food regime began at the end of World War Two and entered into crisis after the 'oil shocks' of the 1970s (Goodman and Redclift, 1989), a third regime of accumulation has been postulated from the mid-1980s whose characteristics remain partially established (as is the case with 'post-productionism' or 'post-Fordism'). Accordingly, after the economic turmoil of the 1970s a new productivist model offered panaceas for all of society's ills, including instability. Its reforms (Lipietz, 1992) were radical and carried obvious implications for subsequent transformations in the productivism of second food regime agriculture. It included greater emphasis on the techno-economic imperative; fragmentation of social existence; a wide variety of ways to integrate the individual into the firm; and an overall reduction of administrative-type solidarity.

By the 1990s, the neo-liberalization of western economies was advanced in the form of a 'globalization' project associated with the demise of the development project:

As parts of national economies became embedded more deeply in global enterprise through commodity chains, they weakened as national units and strengthened the reach of the global economy. This situation was not unique to the 1980s, but the mechanisms of the debt regime institutionalised the power and authority of global management within states' very organization and procedures. This was the turning point in the story of development (McMichael, 1996: 135).

2.3.2 Globalization and a third food regime

Several periods of rapid economic change have occurred in the history of capitalist economies, each usually following an economic crisis. At such times, various powerful social institutions attempt to restructure economic, social, political and technological relationships to restore economic stability and growth (Fagan and Weber, 1994: 6). The late twentieth century has been such an ongoing period that is partly captured by the term 'globalization' which implies direction in long-term socioeconomic change (Buttel, 1996: 23). Bonanno et al. (1994: 1) identified a new international division of labour within which 'production and capital investment have spread across the globe at a very rapid rate and an increased concentration of the control of financial resources in the hands of a relatively

small number of transnational corporations and advanced nations'. They argued that several manifestations of change are crucial for understanding globalization (Bonanno et al., 1994: 2–3). These involve a major shift of emphasis on the economic importance of nation states in favour of transnational corporations (TNCs); a change where globalization is a process that permeates everyday life.

Additionally, the authors claimed that although TNCs are now the defining element of capital accumulation, the nation state, rather than supranational agencies (General Agreement on Tariffs and Trade, Food and Agriculture Organization or Organisation for Economic Co-operation and Development) remains essential for the survival of small farmers and the resolution of their problems in relation to the growing power of corporate farming. Bonanno et al (1994: 14) also claim that what characterizes global production and marketing is the continuous expansion of mass production adapted to specialized and niche markets (i.e. Sloanism).

It is well known that agri-foods have been traded for centuries; however, as national constraints have been eased in recent years under the World Trade Organization (WTO) 'a more liberal trading regime' is emerging (Atkins and Bowler, 2001: 39). The increasing global scale of organization of some multinational companies has elevated them to TNCs (e.g. ConAgra, Gruppo Ferruzzi, and Nippon Meat Packers). Unilever was an early corporation to begin applying a global sourcing of raw products (Pyke, 1998). But many others have followed in an increasing trend to reduce their 'bottom line' by globalizing their operations. For Le Heron (1993: 17):

In view of many writers, the distinguishing aspect of late capitalism is the rapidly increasing global integration of production, realization of profits, and the circulation of financial capital. The integrative tendency is seen as part of the accumulation process. This is of considerable importance in understanding agriculture's continued incorporation into the general dynamics of capitalist accumulation.

In addition to global sourcing of products, corporate entities typically employ a set of practices involving centralization of strategic assets, resources and decision-making, and the maintenance of operations in several countries to serve a more unified global market (Atkins and Bowler, 2001: 39). For Fagan and Weber (1994: 14) the process of globalization has resulted in trading conditions where 'firms in one country are put in direct competition with those in others, and appear to pit workers in different parts of the

world against each other in competition for jobs, wages and working conditions'. The results of such strategies often mean a decline in labour costs and the continuing pauperisation of workers and, in the context of this study a serious constraint on the ability of farmers to negotiate adequate prices for their products.

Globalization may well have been a turning point for productivism and a second food regime. Increasing commoditization over the past three decades has drawn and subsumed agricultures within the structures of capitalist industrialization. McMichael (2000) claimed that what is striking and historically different today is the pace at which the restructuring of the world economy is progressing, where large flows of trade are now penetrating Third World agricultures and binding them into a system of agribusiness imperialism – a hegemonic order in the process of expanding (globalising) its control over world production and food flows. Its present processes are overseen by a growth in corporate power and the current push for free-trade regimes. 'Agribusiness imperialism is central to the coercive use of institutional mechanisms to control world agriculture and food flows' (McMichael, 2000: 126–7). Politically, world agriculture now operates under a neo-liberal trading regime increasingly supervised by the WTO and given the 'one-size-fits-all' approach (McMichael, 1996: 167). The resulting levels of concentration, centralisation and rural dispossession, are said to be leading not only to the proletarianization of farmers worldwide, but also to an increase in hunger generally, including among first world underclasses (Magdoff et al., 2000: 8).

In this context, the activities of the International Monetary Fund (IMF) and the WTO 'are central to the emergence of a new regulatory structure in which liberal trading policies are bringing increased global competition to bear on those farming regions, food processors and food retailers in developed countries, which, for many decades have been protected by national regulatory measures' (McMichael, 1992). Atkins and Bowler (2001: 30–31) have noted that:

The processing, marketing, and retailing agribusinesses that were formed during the second food regime have become major players in this new competitive trading of food. The concentration of corporate power is massive in some food sectors, for example, beverages, with corporations diversifying horizontally as well as integrating vertically. With the organization of their operations now taking place at a global scale...transnational corporations (TNCs) in the USA have led the process of

transnational accumulation, which is undercutting the ability of individual states to regulate their domestic agriculture and trade.

A third food regime can be defined in terms of agri-commodity production which 'revolutionizes the process of agri-industrialization whereby foods are reconstituted through industrial and bio-industrial processes promoting flexible global sourcing of generic crops' (McMichael, 1992: 359). New centres of production have emerged ('NACS', Bowler, 2001: 30) including Brazil, Thailand, Chile, Kenya, and Mexico to broaden the global expansion of food production, trade and consumption.

Another important feature of the new food regime is a parallel development from mass production and biotechnological modification of food to fresh and organic fruit and vegetables for a global market (Le Heron and Roche, 1995). This has been traced to separate trends in the characteristics of the global labour force with new 'Fordist' consumers in newly industrialized countries (NICS) served by the large agri-industry complexes on the one hand and new 'green' consumers as social elites served by smaller producers (Atkins and Bowler, 2001: 31).

Although the final form of this regime is yet to be defined, a number of features have been identified. These include the increased global trading of food, consolidation of capital in food manufacturing, new biotechnology, consumer fragmentation and dietary change, and declining farm subsidies (Atkins and Bowler, 2001: 30). At the same time, new trading patterns have occurred in response to the relocation of specific kinds of agro-food production into areas where labour costs are lower and environmental regulations less restrictive than in developed countries (Bonanno, 1994: 19–20).

A global food sourcing system, incorporating a 'fresh food system' can be traced to innovations in the US of the 1970s and 1980s that allowed fresh produce 'to begin moving widely between countries, regions and continents, involving almost every major geographical area on Earth except Antarctica' (Friedland, 1994: 212). Friedland identified four critical elements of this system, noting the importance of counter seasonal⁷ production, mass clienteles for fresh produce consumption, market and the search for value-adding, particularly at retail levels.

⁷ Counterseasonal production or 'contraseasonal' refers to the practice of integrating new regions of production to supply markets on a year-round or near year-round basis with seasonal commodities (Friedland, 1994: 212).

The fresh food system is now characterized by an increase in the number of commodities that were once 'exotic' and have now become ordinary (Friedland, 1994: 213). At the same time, new lines are introduced in a newly created market that Friedland describes as 'Sloanist', in reference to its level of increased differentiation vis-à-vis 'Fordist'. Additionally, value-adding in the same industry has tended to increase where the attractiveness of a simple commodity is enhanced to lure consumers. Consequently, the characteristics of the evolving food system of fresh fruit and vegetable production are:

standardization; mass consumption facilitated by higher incomes; the elaboration of food choices, i.e., great variety and possibilities in choosing foods to be consumed; and the differentiation of the market into a larger number of sub-segments, contrasting with the tendency toward homogenization that characterizes the mass market of less privileged consumers' (Friedland, 1994: 219–220).

In this development, transnational corporations (TNCs) have become some of the most powerful economic and political entities in the world today in developed countries (Karliner, 1997; Rama, 2005) and have received a free ride in establishing global networks of fresh food supply systems. For Friedland (1994: 223–224) this could only have been made possible through two technological preconditions: the cool chains in which products are chilled from the point of harvest to the point of sale, and the transfer of production technologies. TNC requirements were underwritten by enormous state investment in ships, trains and trucks with refrigeration capacity; loading and unloading facilities and equipment; and storage capacity with refrigeration. TNCs were also beneficiaries of decades of state-sponsored research and development required to deal with all the variable circumstances of agricultural production. In developing countries, these services must be supplied by private capital (Friedland, 1994: 223–224).

As a result, food chains tend to be established in developed market countries and marketed basic staples, which millions of the poor need to survive in Third World countries, must be imported and transported from thousands of kilometres away. Thus, the global corporate controlled food chain has reassigned many Third World food producers to growing labour intensive luxury and fresh food crops for consumers in wealthy countries. Prices are subject to market fluctuations as are the costs of commodities imported by poor nations. In bad years, the poor may go hungry, no longer able to supply their food needs from their own land. In so far as all of these developments have produced social and environmental

impacts associated with losses in traditional farming systems, dependency on foreign markets, malnutrition, biodiversity losses and unnecessary expenditures on inputs and use of fuel, they maintain the exploitative ideological rationale of conventional unsustainable productivist agriculture.

2.3.3 Food production chains and external capital

It is arguable whether agri-food companies have developed their businesses to meet the demand for manufactured foods (Ilbery and Bowler, 1998: 66), or that demand for such foods is manufactured by these companies who wield extraordinary marketing power (Schlosser, 2001: 8, 51–52). It is clear however, that the productivist era has seen a growing importance in the power of agri-food companies and the gradual absorption of agriculture into the food supply system (Whatmore, 1995). This development has been geographically uneven and while accepted in some regions, has been resisted in others such as the EU (Ilbery and Bowler, 1998: 66).

Currently, almost all foodstuffs are subject to some form of value-added treatment off the farm by processing companies and food manufacturers before reaching consumers. Restructuring under late productivist regimes has aimed at the incorporation of farming sectors including traditional small farmers, into one industrialized integrated corporate food system (McMichael, 1999). Food production systems have been ‘subsumed’ into a corporate framework in coalition with the state, farm groups and agro-industrial capital (Bowler, 1989). Structuralists give the state a more proactive role in serving the interests of capitalist accumulation (Tabb, 2006: 1; Foster, 2006: 8; Perelman, 2006: 8). Particular interests such as farm groups and agribusiness corporations have also gained more influence in shaping agricultural policies than producers and consumers.

More widely, the greater incorporation of agriculture since the 1980s and 1990s into national and global food supply systems has been dominated by non-farm capital (e.g. input corporations, food processors and food retailers). As a result, agribusiness has increased its control of both input costs to farming and the prices paid for farmer products. Through forward contracts, farmers have also been pressured to invest in cost-reducing and output-increasing farm technologies (Bowler, 2000: 206).

Food chains in themselves are not a new phenomenon. Food products have been exported and imported from across the world at least since imperial Rome. What is radically

different however, are the changes involving the close linking of each of the stages in the food supply systems and value chains. This means that, from the beginning to the end, from growers to buyers, the human links in the chain perform a role in a single process. This is a process in which global food chains are increasingly vertically coordinated (ILO, 2007: 3) by a small number of very large lead firms. For Bonanno et al. (1994: 2), TNCs are the 'central defining element behind [the] configuration of new capital accumulation spaces'. More and more, these firms have appropriated enough power throughout the chain to dictate who may participate (and who may not), how the different partners in the chain will be rewarded, where risk will be concentrated, what kinds of standards will be adhered to, and the prices that will be paid by consumers (ILO, 2007: 4). The lead companies may be powerful food manufacturers, and processors or fast-food retailers, who will typically establish the terms of the forward contracts and the price paid to suppliers. Integration into a chain suggests an equality in the linkages which is clearly inaccurate in the case of farmers and multinational agribusiness companies. The chain metaphor falls down in its inadequate accommodation of power, profits and position on the chain. Farmers, now at the lower end of the chain, will be expected to exert the least amount of influence and derive the least economic gain. Although structural explanations of agricultural change and globalization offer useful explanations in which structure is privileged over agency, the explanations remain only partial. The problem is identifying how global processes of change are incorporated by social actors in localities, firms and institutions. Alternative perspectives to structuralist 'top-down' explanations of agricultural processes consider farmers as active participants, capable of resisting and modifying the dictatorial imposition of corporate and state power. Such perspectives are considered in the following section in relation to relocalization, diversity, social agency and identity.

2.4 Relocalization, diversity, social agency and identity

In the early 1990s, Marsden et al., (1993) noted the neglect of rural restructuring within the analysis of wider economic processes. They claimed a need existed to focus on change as experienced by actors at the local level and to question current political economy perspectives in the literature. These, 'tended to retain an excessive economism and a set of 'top-down' structuralist assumptions about the nature of change. They make insufficient allowance for either local action or non-material considerations in explaining the movement, fixing and accumulation of capital' (Marsden et al., 1993: 20).

Wilson (2000: 85) noted a similar deficit in the conceptualization of post-productivist agriculture, a failure to consider the '*endogenous*' perceptions and attitudes of actors involved in decision-making. An actor-oriented and behaviourally grounded approach would broaden the understanding of the complex processes taking place. Farmers were not homogeneous entities without individual free will. Farmers held a diverse range of opinions on issues surrounding the environment, agriculture and rural change. They made up diverse communities which could not be labelled as 'productivist' or 'post-productivist' since their views and practices reflected aspects of both categorizations. At the same time, other farmers continued to adopt productivist actions and thought in perceptions of themselves as the best stewards of the land, that production maximization was the ultimate goal of farming (Wilson, 2001: 87). Potter (1998: 88) could find little evidence to indicate that farmers were becoming more conservation-minded. Furthermore, research suggested that it would be wrong to assume that policymakers and other state actors were necessarily post-productivist in their own thinking as they also held a spectrum of attitudes regarding agricultural practices (Wilson, 2000: 88). As actor-oriented and behaviourally grounded studies suggested, the PPAR ran concurrent with, rather than counter to a PAR. The two systems coexisted, catering to different socio-economic classes of consumers. Thus, the transition to post-productivism should not imply that productivist institutional forms, networks, ideologies and norms have been superseded. In the European context, post-productivism has not been radical, but rather incremental and accommodationist to productivist action and thought.

Potter and Tilzey (2005) have questioned Wilson's analysis of agricultural change on the basis of its inadequate descriptions of causation and agency (discussed in more detail below). His 'conflation of post-productivism and post-Fordism obscured the extent to which European rural policy has embarked upon a transition towards neo-liberal and post-Fordist modes of governance' (Potter and Tilzey, 2005: 582). Additionally, they claimed, the manner in which an actor-oriented and behaviourally grounded approach is set against an 'agent-less' economy, created a false dichotomy that:

prevents discussion of the wider material and ideological framing of the postproductivist project and thus of the role of political action and state mediation in conceiving and driving forward the restructuring process (Potter and Tilzey, 2005: 582).

The authors located this bias in a reaction to the 'excessive economism' of the 1990s and the 'hyperstructuralist and totalizing accounts being offered by food regime theorists. The effect was a tendency to erase agency and reify the economic sphere' (Potter and Tilzey, 2005: 582). On the other hand, an excessive concern for agency has in turn resulted in further bias that depreciates the 'continuing dominance of capital accumulation and commodity relations, the role of the state in policy making, and the interests of *capital as agency* in particular locales' (Potter and Tilzey, 2005: 583).

The relocation or diversity perspective by the Wageningen School, a prominent multidisciplinary research institute in the Netherlands, is also marked by its opposition to the 'structuralism, economism and determinism of neo-Marxist development theories' (Buttel, 1996: 22). Van der Ploeg, one of its influential proponents, has asserted that 'Agro-industrial globalisation theories, such as neo-Marxist theories, exaggerated the power and homogenising capacity of global macro structural forces' (Buttel, 1996: 22). Instead, the Wageningen perspective argues that farmers maintained a degree of autonomy vis-à-vis external forces. 'A bottom-up perspective should assist us in forging a theoretical middle ground between so-called micro- and macro-theories of agrarian change through the analysis of the heterogeneous reality' (den Ouden, 1997: 35). For Van der Ploeg 'as global-economic forces impinged on agricultures, farmers would not be mere passive recipients of these forces' (cited in Buttel, 1996: 22).

The diverse realities of agricultural communities and rural discourses and their implications have been widely acknowledged and articulated by various other sociologists from the Wageningen School:

In short, we are forced to acknowledge and develop ways of analyzing multiple images of reality and how they shape, and are shaped by, power relations and differential access to material and cultural resources (Long, 1997: xi).

For Long (1992b, 2001), an extension of symbolic interactionism (Blumer, 1969)⁸, can redirect analysis from social structure to agency in an actor-oriented perspective to counter

⁸ Blumer, following Mead, claimed that people interact with each other by interpreting or 'defining' each other's actions instead of merely reacting to each other's actions. Their 'response' is not made directly to the actions of one another but instead, is based on the meaning which they attach to such actions. Thus, human interaction is mediated by the use of symbols and signification, by interpretation, or by ascertaining the meaning of one another's actions (Blumer, 1962).

the determinism of macro perspectives. However, an excessive emphasis on understanding the autonomy and active practices of farmers ‘exaggerates the autonomy and resilience of the farmer and succumbs to excessive voluntarism and utopianism’ (Phillips, 1996: 272). Nevertheless, the notion of ‘agency’ is central to the concept of social actor. It recognises that given the information, and resources available to them, individuals and social groups are capable of actively constructing their social worlds (Long, 1992b: 33). Vanclay and Lawrence (1995: 145) have noted that the importance of ‘agency’ lies in the individual capacity to exercise some degree of power. But for Long (1997: 2), it is the actors’ interactions, negotiations and the social and cognitive struggles which occur between specific social actors that form the focus for study of rural development. In this perspective, structure remains an important part of the analysis where the focus is primarily on the place of social action in a dynamic relationship between the two. For Giddens (1987: 11) individual actions may be ‘embedded within and are constitutive elements of structured properties of institutions, stretching well beyond myself in time and space’. ‘The fundamental notion of the actor perspective is that individuals can always make choices, however limited, between different courses of action, as well as having some process to judge or evaluate the appropriateness of their actions’ (Vanclay and Lawrence, 1995: 145).

Burton (2004) turned to the symbolic interactionist theory of Blumer (1969) to discover causes for the reluctance of a majority of ‘productivist’ farmers to adopt post-productivist practices. He noted that despite a decade’s debate on the conceptualization of ‘productionist/post-productionist change in agriculture, little is known about the farmer’s own perspective in relation to the terms. Failure to adopt has been explained in economic terms such as low returns or high establishment costs or structural factors such as distance from markets or lack of skills by farmers. It was also clear that the very ethos of being a ‘good farmer’ has developed as an important feature of the contemporary farming culture (Winter, 1997; Wilson, 2001). For Burton (2002: 197), ‘The question is whether this is a cultural manifestation of productionism or, simply an inherent feature of commercial agriculture’. Farmers may be wary of change they perceived as a ‘loss of identity or social/cultural rewards traditionally conferred through existing commercial agricultural behaviour. ‘Farmers want to farm. *It gives them their identity* and their sense of achievement’ (Burton, 2002: 196). Thus the importance and centrality of the symbolic

nature of productivist agriculture comes to constitute a reality for contemporary farmers rarely glimpsed by non-farming outsiders:

Within modern agricultural landscapes there lie meanings developed through the performance of everyday farm tasks by members of the farming community that to the farmers speak of their toil and personal victory over the land and yet to us may represent the excesses of the agricultural industry – of pollution, industrialisation and the degradation of the countryside aesthetic (Burton, 2002: 197).

Understanding the farmer's views and the 'symbolic value of production-oriented activities, the means by which such symbolic value is negotiated and transferred throughout the farming community, and the relationship with other aspects of the farmer/farm family identity, may shed light on the motives underlying farmer behaviour and farm practices. Burton's study employed a symbolic interactionist framework in which the individual is viewed as a part of a dynamic interacting system made up of communities of individuals with various symbolic understanding of the world (Burton, 2002: 198).

Gradually, the individual is said to develop a self-identity and a membership of the group through the eyes of others by displaying commitment to a set of symbolic meanings and behaviour. Failure to display symbols of the group may result in social disapproval, and loss of self-esteem. Accordingly, individuals try to avoid such losses by acting in a manner that concurs with both personal and social norms.

Symbolic interactionism is found to be limited by its neglect of social structures and power influencing behaviour from beyond the group (Burton, 2002: 199). However, it continues to find adherents in sociology and psychology in such developments as participant observation methodology and grounded theory (Burton, 2002: 198).

Goffman (1959) extended symbolic interactionism by the addition of a dramatic metaphor. Two types of interactions comprise the individual's behaviour. A 'front stage' activity refers to the individual's performance which regularly functions in a general and fixed fashion to define the situation for an audience. A 'backstage' activity describes the more truthful activities that occur outside the view of the social group where the individual can prepare for the 'next performance'. For example, in the practice of 'roadside' farming, self-identity and social status as a 'good farmer' are developed through the production skills of agricultural commodities which are visibly monitored and assessed from the road

over fences by neighbouring farmers. Farmers draw satisfaction from a good 'performance' of farming competence in the roadside display. The farm therefore becomes the owner's portrait of himself or his family and the expression of their identity. (Burton, 2002: 208). At the same time it must be acknowledged that symbolic interactionist theory lacks a capacity to deal with the multiplicity of external influences that impact the farmers' world. Burton's claim that in failing to acknowledge the importance of the individual's internal state we risk losing the whole inward significance of the situation may be exaggerated concern. Farmers are today generally well-educated, multi-skilled and pragmatic and able to reflect on both their internal states and position in the local and global contexts. Importantly, they are not a homogenous group able to be categorized by a single and somewhat narrow psychological theory.

Additionally, while symbolic interactionism offers an interpretation of farmer resistance to post-productivist change in agriculture, arguing that farmer views of the world and their place within it may vary markedly from that of non-farmers, further clarification is required for the tendency of farmers to ignore conflicting evidence of their unsustainable practices such as erosion and compaction of agricultural soils. Cognitive Dissonance Theory (Festinger, 1957) provides some explanation of farmers' selective perception of farming impacts. In this context, the theory is applicable to situations involving attitude formation and change with particular relevance to decision-making and problem solving. At its heart, Cognitive Dissonance Theory relies on the idea of established knowledge (cognitions) pertaining to a variety of thoughts, values, facts or emotions which exist in peoples' consciousness concerning behaviour. The theory argues that:

Where an opinion must be formed or a decision taken, some dissonance is almost unavoidably created between the cognition of the action and those opinions or knowledges which tend to point to a different action (Festinger, 1957: 5)

The theory argues for a tendency in individuals to seek consistency among their cognitions and that when there is inconsistency between attitudes or behaviours (*dissonance*), something must change to eliminate the dissonance—a source of psychological discomfort (Festinger, 1957: 2). In the case of a discrepancy between attitudes and behaviour, it is most likely that the person's attitude will change to accommodate the behaviour. To illustrate, farmers wedded to productivist intensive farming practices may fail to notice, diminish or rationalize the damaging effects on soil structure by adopting the view that

productivist farming helps to feed world populations. In this case the dissonance could be eliminated by changing the behaviour causing the perceived negative outcomes, but for the individual farmer, it is easier to focus on the necessity of food production while ignoring the results of damaging practices. More specifically, this theory, along with symbolic interactionism, is invoked in Chapters Six and Eight for an explanation of the dynamics underlying farmers' continuing support of productivist practices and their fatalism regarding the impacts of this system as soil degradation.

2.5 Conclusion

This background chapter presented a number of theoretical explanations of food system developments. The diversity of these approaches represents the difficulties in coming to terms with an increasingly complex food system that in the span of half a century has proliferated into vertical and horizontal structures colonizing and integrating the multiplicity of world agricultures. The resulting polarization in theoretical positions suggests continuing uncertainty, a lack of capacity to fully encompass a fragmented area in a globalizing world system. Post-war productivist systems now dominate in some states and regions, coexisting with alternatives in others. Much in the literature suggests a period of transition during which two regimes will coexist spatially in adjoining regions and sometimes contemporarily in the practices of the same farmers. Explanations of agricultural change reflect a focus on structure in some cases and/or agency in others. However, most theorists adopt rational positions that acknowledge multiple sources of mutuality of influence.

The privileged status of agriculture is also found to be geographically variable with state subsidies in some countries (the US, the EU, Japan) and minuscule support in others (Australia, New Zealand). For world-system theorists (Wallerstein, 2003), the coherence of change within this sector is, as in all others, inherently related to broad socioeconomic and geopolitical fluctuations that have come to distinguish the period since the 1970s. During the 1980s and 1990s, a greater incorporation of agriculture is claimed to have taken place into national and global food supply systems dominated by non-farm capital (e.g. input corporations, food processors and food retailers). The process of small family farm adjustment has continued throughout the post-war period in which world farmers have

been dispossessed of land resulting in rural de-culturation, poverty and hunger in the Third World. What remains is a progressive formal subsumption of the production sector with an increase in control of both input and output costs to farming by non-farm capital. Agribusiness pressure on farmers through the conditions of forward contracts has also led them to invest in cost-reducing and output-increasing farm technologies, intensified practices and environmental resource impacts, thus adding to sustainability concerns. For some, the current farm crisis resides firmly entrenched within the structural processes of productivist agriculture:

The ongoing restructuring of the world food system under corporate control, has resulted in a crisis with environmental, economic, and social dimensions. The symptoms of the crisis include loss of farmland and farmers (and in the United States, especially minority farmers), impoverishment of rural economies and decline of small towns, shrinking of the farmers' share of the food dollar, erosion of the soil, pollution of air and water with synthetic pesticides and farm run-off, the spread of monoculture and the correspondent decline of biodiversity (Henderson, 2000: 175–6).

While such common themes of critical discontent can be detected in the focus on the negative impacts of productivist agriculture, there is also little apparent confidence that the globally acknowledged twin requirements of sustainable food production and social equity are remotely possible in a context of looming systemic crises. Nevertheless, some more optimistic theorists argue that the process of transition to another food regime, one more responsive to present demands for sustainability and redistributive justice, has commenced. Sustainability is the subject of the next chapter.

Sustainability in agriculture

Foodgetting, and the activities built around it, will be responsible only when they respect and accommodate living cycles. In other words, after a half century of agricultural subordination to industry, and disruption of the living cycles, the future depends on reviving human capacities to secure necessities in ways that work with, alter, even enhance (from a human perspective) living cycles. This will require subordinating industry to agriculture (Friedmann, 2000: 505)

3.1 Introduction

Chapter Two explored the origins of present agricultural developments, reflecting on the diversity in theorization of an increasingly complex food system. Within this flux, there is an acknowledgement of a growing loss of confidence in twentieth century productivist agricultural systems. The modernization and industrialization of agriculture has subordinated agriculture to industry (Friedmann, 2000: 505) and thereby failed to respond to the nutritional needs of people while exploiting finite agricultural and environmental resources. As a consequence, 'most informed observers recognize that the agricultural sector in developed market economies has reached a crisis in its evolution (Bowler, 1992: 251) and the concept of 'sustainable agriculture' incorporating ecologically based farming systems has emerged as the best option for the future. This chapter traces the origins of the term 'sustainable development' and its relation to agricultural practices, explores 'reflexivity' in farmers' local knowledge in relation to sustainability, contrasts the 'myths' of conventional agriculture with alternatives and assesses the sustainability of agricultural practices in Australia.

3.2 Sustainable development

The earliest reference to sustainable development in the international policy arena was in 1980 in a joint project between the United Nations and green interest groups which produced the World Conservation Strategy defining it as the 'sustainable utilization of species and ecosystems (IUCN, WWF and UNEP, 1980: vi). The anthropocentric and utilitarian approach to environmental issues was associated with a tendency to accommodate the power of big business, more subtly achieved in the report of the World

Commission on Environment and Development (WCED, 1987), otherwise known as the Brundtland Report:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987: 1).

At a time of economic rationalist ascendancy in western countries dominated by Reaganite and Thatcherite economic conservatism, and two years before the dissipation of the Soviet empire, the WCED's *Our Common Future* (1987), became an attempt to reconcile the neo-liberal 'disjunction of jobs versus environmental protection' (Howes, 2005: 111) and the increased environmental awareness of the late 1980s (Buttel, 1993: 180–81). Consequently, its recommendations were conservative. Critics (e.g. Sachs, 1999 and Carley and Christie, 2000) have argued that the Brundtland definition of sustainability was flawed by its ambiguity and desire to compromise environmental protection for economic growth. Its superficial logic overemphasized the role of poverty in environmental damage (WCED, 1987: 32) and underemphasized consumption by the rich while failing to question the persistence of poverty and inequality. And while skirting around these issues, the report focused on the benefits of established industry rather than alternative production methods, quality of life, social equity or the redistribution of wealth. It paid lip service to the damaging effects of extreme wealth and poverty offering welfare funded taxation as a solution to the latter.

In Redclift's view (1990: 85), the lack of progress towards sustainability can be attributed to Brundtland's view of sustainable development as a policy objective needing to conform to an economic view. Natural resources and the environment were a means of generating human income (Brundtland, 1987: 43). Industrial development was prescribed as a universal panacea regardless of its inappropriateness in alternative and traditional sustainable situations. Sachs (1993: 245) traced this now generalised worldview to three major causes. The 1970s oil crisis catalysed urgent concerns for the finiteness of natural resources in regard to growth rather than concern for the health of nature to be manipulated for further long-term development. 'Limits to growth' was transformed into a technological challenge and the discovery of environmental degradation as a worldwide condition of poverty – the poor who are dependent on nature for survival have no choice

but to destroy it. Therefore, a sustainable development would place their resources under the capable management of productivist corporations.

Subsequently in the 1990s, the world entered into a 'managerial' phase, which continues the notion of limitless growth as a solution for development problems and while the Third World development project made way for globalisation (McMichael, 1996: xvi) and the United Nations Conference on Environment and Development (UNCED, 1992) degenerated into a bland compromise for the *status quo*:

A technical effort to keep development afloat against the drift of plunder and pollution rather than a cultural effort to shake off the hegemony of aging western values and gradually retire from the development race (Sachs, 1993: 245).

Progress towards sustainable development was hampered by the US refusal to sign a biodiversity convention and the uncompromising attitudes of First and Third World representatives to subsidies for global forest conservation with foreign aid to poor countries. Environmentally, no other known civilisation had caused such wide-scale destruction of soils, waters, forests, ocean ecosystems and atmosphere in a single century (Harris, 2001: 155). Nuclear fission and pollution, profligate waste of fossil fuel, major contributions to green house gases; soil degradation, loss of forests, woodlands, and grasslands; biodiversity extinctions; water contamination and overdraft; degradation of coastal areas by agriculture and industrial runoff; and overexploitation of major ocean fisheries, have been the legacy of the last hundred years of western European industrialization' (UNEP, 1999: xx–xxii). A neo-liberal capitalist profit-driven economic system, highly incompatible with and antagonistic to sustainability (Gray and Lawrence, 2001: 143) maintained the exploitation and transformation of non-renewable resources. Previously independent states retreated from comprehensive national responsibility for agricultures, no longer capable of determining sustainable policy directions:

We conclude that the growing power of capital to organise and reorganise agriculture undercuts state policies directing agriculture to national ends, such as food security, articulated development and the preservation of rural/peasant communities (Friedmann and McMichael, 1989).

Subsequent environmental summits to *Our Common Future* (1987) tried to promote an international agenda of environmental protection through sustainable resource

management. The Talloires Declaration of 1990 in France convened a worldwide group of university leaders whose key concern was the state of the environment. Discussions at the Rio Conference in 1992 were directed at policies which supported natural resource conservation by governments and international institutions. Yet the lack of effective policies to challenge and curtail the power of corporations meant that in effect the Brundtland Commission and the ensuing 1992 Rio Earth Summit (proposed by Brundtland) merely succeeded in protecting and enhancing business interests. According to Howes (1997: 1), this may be the result of misplaced responsibility where the documents' preparation by the agents of several nation-states were strongly influenced by international business. Middleton et al. (1993: 5) argued that in so far as *Our Common Future* seemed to equate 'needs' with 'wants', suggesting that economic growth was an inextricable part of development without explicitly specifying the natural environment, its framework became a muddled set of ideas. While identifying unequal development as the problem, it suggested that the cure was a revival of growth. Applied to agriculture, this was indeed 'more of the same' productivism, a lost opportunity to reverse the world's lemming-like drift towards environmental failure. Others (Langhelle, 1999: 129), have argued that in much of the literature, sustainable development and economic growth in *Our Common Future* have been over-emphasized, and that other vital aspects of the normative framework have been neglected such as humanistic solidarity, a concern for the world's poor, and respect for the ecological limits to global development. The latter constitute other aspects of sustainable development; which are indeed relevant for the growing disparity between North and South.

3.3 Sustainable agriculture

For Reeve, (1990: 6) *Silent Spring* was a point at which the world began to consider the concept of sustainability in its modern form. Others, such as Rudolph Steiner (1861–1925) and Lady Balfour (1899–1990) had declaimed the need for a holistic view of sustainability, of agriculture's impacts on people, environments and economies. None however, had the impact of Carson's message:

Only within the moment of time represented by the present century has one species – man, acquired significant power to alter the nature of his world (Carson, 1962: 23).

Although human manipulation of natural systems extended food supplies to unprecedented levels by the late twentieth century through the use of industrial, chemical, and

biotechnological aids, fundamental food and resource security problems remained. The benefits of productivist agriculture came at high social and environmental costs. Experiments with chemical agriculture such as DDT in the twentieth century met with partial successes and dangerous failures threatening wholesale ecosystem collapse. Industrial intensive farming continued to increase energy flows and externalize unused output (pollution) from the use of agri-chemicals. Productivist agriculture placed pressure on farmers to disregard the importance of the natural environment (Ilbery and Bowler, 1998: 67) and the nutritional health of its products. Yet proponents (Wild, 2003) continued to cite benefits in support of rural regions and the provision of food for an increasing world population, although the association of productivist agriculture with world hunger was omitted. Advocates such as Wild (2003) claimed that while productivist systems may be imperfect, they can be made 'more sustainable' given further refinements:

The mistakes and improvements already made in more developed countries can serve as guidelines. Biological control of pests may be developed further, and genetic modification may lessen the requirements for pesticides. Given adequate investment in research and extension, intensified agricultural production and the use of more land will provide the food required during this century while causing little damage to the biological and physical environment (Wild, 2003: 180).

Others, less confident about the future sustainability of industrial agriculture (Busch, 1994; Heffernan and Constance, 1994), point to the need for change and that as viable less damaging alternatives exist, productivist practices can no longer be justified. Pretty (2002: 73) has argued that sustainable agricultural systems can be economically, environmentally and socially viable, and can contribute positively to local livelihoods. Others have suggested a certain inevitability regarding the emergence of a sustainable agriculture and a confrontation with contemporary agro-industrial systems (Bowler, 1992: 251).

Without underestimating the extent of the confrontation with conventional systems underwritten by massive state-supported capital (Friedland, 1994: 223–224), calls for sustainable change currently remain at the stage of 'concern'. The processes required for transforming the dominant structures of present food production, on which a major portion of world populations depends, into a universally-supported sustainable project, remain elusive. Since the 1980s, the focus on the environmental impacts of productivist agriculture has increased without significantly altering its trajectory. At least part of the

problem of establishing a global sustainable agricultural system has been the fact that there remains no unified vision of where sustainable agricultural policies should be concentrated (Marsden et al. 2001; Evans et al. 2002; Wilson and Rigg 2003). This lack of clarity is illustrated by the number of varied names associated with farming methods that are now claiming to be 'sustainable'. Pretty (1998: 17–18) identified no less than 17 different terms for forms of agriculture that claim to be more-or-less sustainable, including: organic, integrated, eco-agriculture and biodynamic.

According to Lang and Heasman (2004), the sustainable agriculture debate is fundamentally divided between two competing visions. The 'ecologically integrated paradigm aims for a total break from the productionist past on the path of organic farming and food localization. On the other hand, a life sciences integrated paradigm presents a modified and heightened version of productivism that seeks solutions which maintain dependence on technology with an emphasis on biotechnology. This is essentially a maintenance of high-technology productionism: monocultural, concentrated, large-scale processes controlled by agri-business corporations operating on a global scale (Lang and Heasman 2004: 24).

Both visions can be seen as competing for hegemonic status, each with different and influential backers. Unsurprisingly, the life sciences integrated paradigm is supported by agribusiness and agri-chemical industries which continue the flawed 'Green Revolution' productivist argument that no other form can feed the world (Johnson, 2006: 471). The ecologically integrated paradigm rejects the promises of biotechnology arguing it is beyond affordability for most small farmers and fails to address the fundamental causes of food insecurity for the world poor or the unsustainable use of resources. On the other hand, Rosset, (1999) argues that 'the overall output of organic farms is generally greater than conventional farms and that organic farming is the closest proxy to sustainable agriculture practised on any scale in Europe. It is also the system with the highest animal welfare standards' (Johnson, 2006: 472).

In regulationist terminology, a need exists for a new mode of regulation. As noted earlier, regulationists have theorized the outlines and dynamics of global level projects suggesting that the late twentieth century may be viewed as a transit from one food regime to another. While in the wider economy, the signs of a new regime may be detectable as 'flexible

accumulation’⁹ processes (Burch and Goss, 1999: 90; Scott, 2004: 136), the establishment of a new mode of regulation in agriculture is unclear. Nor does change necessarily imply sustainability. Agricultural transformations of conventional agriculture after the 1980s have not all been sustainable. Their dependence on fossil fuels, environmental consequences and inability to provide global food and environmental security remain problematic.

In the past, simplistic definitions of sustainability have promoted a ‘one-size-fits-all’ definition that ignored natural variability in resource potentials. ‘Low resource’ areas, from chronic land degradation differ from ‘enhancement’ areas with continued potential for sustainable intensive cropping (Redclift, 1990: 87). Additionally, cultural patterns of farming and traditional farmer knowledge are important factors in differential types of sustainable technologies (Pretty, 1998: 30). A practical definition of agricultural sustainability will direct farmers towards a destination for agriculture, to farming practices and results that produced food in adequate quantities for all the world populations while enhancing the condition of the resources and the environment. Advocates of sustainable agriculture aim at reviving traditional systems whose longevity defined their sustainability. In such contexts, people’s beliefs and values and stored knowledge continue to play a critical role (Schaller, 1993).

Brklacich et al. (1991: 1), in a review of agricultural sustainability literature, noted that ‘environmental degradation and its potential effects on ecological and food production systems appears to be at the heart of much of the interest in sustainable agriculture’. However, other issues strongly related, included the decline of the family farm (in North America), the loss of rural land to non-agricultural uses, increasing costs of inputs, volatile prices of agricultural commodities, and the full integration of agrifood sectors into domestic and international economies. For decades now, a consensus of informed opinion has recognized three dimensions in sustainable development as environment, economy, and society (Bowler, 1992: 251). A great deal of emphasis has usually been given to the environmental dimension due to a close linkage between the terms ‘sustainable’ and ‘environmental’. This includes the reproduction of natural capital (soils and waters), the

⁹ Systems of ‘flexible accumulation’ or ‘flexible specialization’ were ‘characterized by niche (as opposed to mass) markets, the growth of service industries (and an associated decline in manufacturing), specialized production with an increasing reliance on out-sourcing and sub-contracting (as against a dependence on economies of scale), and the rise of non-specific managerialism (in contrast to industry and firm specific management)’ (Burch and Goss, 1999: 90).

maintenance of biodiversity, and the control and management of farm wastes and environmental pollution. At the same time, there are important distinctions between ‘weak’/‘economist’ and ‘strong’/‘ecologist’ (Diesendorf, 1997) interpretations of sustainability:

At stake in this dispute over interpretation are rival claims over what is ontologically primary: the natural environment or the human economy. Is the environment a subset of the economy, or is it a prior and sustaining context within which, and dependent upon which, all human systems, including economic systems, reside (Hay, 2002: 215)?

The implications for agriculture are clear: a ‘strong’ definition implies a firm brake on productivist practices which underwrite the present productivity and profitability of global agribusiness. A ‘weak’ interpretation sanctions the primacy of economic profits (as ‘jobs at all costs’) and allows business to control the agenda of the debate. In an attempt to straddle the ‘ecologically integrated’ and ‘life sciences integrated paradigms’, Falvey (2004: 1) argues that the present vagueness of an ‘ecologically sustainable agriculture’ is muddled in its assumptions fixed, intelligible and balanced ecosystems. What exists is largely unknown, evolving, influenced by innumerable variables and includes humans. Falvey’s (2004: 2) own preference is for new ‘wisdoms’ from mainstream agricultural science such as ‘whole-of-system’ approaches that ‘consider interdependencies across social, environmental and economic factors’. In a ‘wise’ view of agricultural sustainability, which is ‘consistent with the natural order’, Falvey (2004: 3) concludes that the discourse may be advanced by a degree of enlightened living within the limits of biospherical systems as against the attempt to dominate them.

In Diesendorf’s view (2000: 32–35), sustainability needs to be developed in an ecologically and socially equitable manner according to a guiding vision in which sustainability policy is developed in all sectors, at all levels with all types of instruments. These may include taxes, bounties and rebates, laws, codes product certification and standards, and a combination of regulatory and economic instruments. The model involves government at all levels, business and community organizations without accepting trade-offs of any kind. In short, it harnesses all the available resources a society can muster as an integrated project that leans towards a regulation theory model of development that is acceptable to society as a whole and produces instead of growth, progress towards sustainability. Diesendorf (2000: 22) has proposed a sustainable development model that

avoids the simplistic interpretations and self-contradictions between environment and economics. Accordingly, sustainability and sustainable futures are the goals or endpoints of a process in which 'sustainable development comprises types of economic and social development that protect and enhance the natural environment and social equity'. The key point for Diesendorf is that any sustainable development addresses social and environmental improvement but may or *may not* involve economic growth. In doing so, it becomes a challenge to conventional capitalist demand for unlimited profits¹⁰. In this light, the emphasis of sustainable development re-emerges as a 'qualitative improvement in human well being' or an 'unfolding of human potential' (Diesendorf, 2000: 22). Also in the same view, protection of the environment is not intended to infer that ecosystems ought to be frozen like museum pieces to the extent that 'natural evolutionary and ecological processes cannot occur, but keeping changes at non-catastrophic, pre-human rates'. In Pretty's view (2002: 82), agricultural sustainability is an exercise in social and environmental co-operative conservation:

In the first instance, a more sustainable farming seeks to make the best use of nature's goods and services while not damaging the environment. It does this by integrating natural processes such as nutrient cycling, natural fixation, soil regeneration and natural enemies of pests into food production processes. It also minimises the risks of non-renewable inputs that damage the environment or harm the health of farmers and consumers. It makes use of the knowledge and skills of farmers, thereby improving their self-reliance, and it seeks to make productive use of people's collective capacities to work together in order to solve common management problems such as pest, watershed, irrigation, forest and credit management.

Returning to Bowler's (1992: 251) 'consensus', the economic dimension of sustainable agriculture concerns the maintenance of supplies of agricultural raw materials and services to both farm and non-farm populations. It encompasses the ability of farmers and other stakeholders to receive an equitable share of the profits from the industry. A social dimension involves the retention of an optimum level of farm population and an acceptable quality of life for this population, including a reasonable share of economic profits. Bowler (1992) notes that, as farm incomes have generally continued to lag behind the rising incomes of the non-farm population in most countries, there has been a worldwide trend of

¹⁰ After the economic collapse of the 1920s, state economic controls were tightened on corporate excessive speculation. This was associated with a period of general prosperity (the "long boom" of 1945 – 1970s).

farm populations migrating to urban areas and non-farm employment. Accordingly, this may be interpreted as a result of an unsustainable form of agriculture, one in which undue emphasis has been directed at corporate power and economic concerns, at the expense of equity and communities. And importantly, with the adjustment of small family farmers there has occurred a corresponding loss in local knowledge and accumulated expertise of farmers, a valuable resource in the development of more sustainable agricultural practices.

3.4 Sustainability and reflexive farmer knowledge

The notion of reflexivity in relation to food consumption first appears in DuPuis (2002) in which the use of biotechnology in the milk industry is examined. The consumer, who in rationally considering the purchase of genetically modified foods, is able to evaluate and change his or her purchasing actions on the basis of what he or she feels is the legitimacy of advertising claims (DuPuis, 2002: 228). A 'reflexive' consumer is traceable to the 'reflexive modernity' of Beck (1994), Giddens (1994) and Lash (1994) who applied the term to explain interactions between society and human action. At the conclusion of western industrial society, 'reflexive modernization' describes an era characterized by a push for individualization, a questioning of scientific monopolies of truth (Beck, 1994: 5), detraditionalization in favour of 'expert systems' (Giddens, 1994) and in a more knowledgeable society, the promotion of human agency and critical thought (Lash, 1994).

Wynne (1996) de-emphasized the influence of 'expert systems' and stressed the validity and importance of 'lay' or 'informal' knowledge in the reflexive processes of everyday people. Accordingly, 'far from emptying indigenous lives of meaning, expert knowledges are typically importing dense but inadequate meanings' (Wynne, 1996: 60). As a result, reflexivity becomes a continuous negotiation between expert knowledge and lay produced informal knowledge.

While equating the modern with industrial agriculture and the postmodern with local knowledge, Bell (2004: 24–25) describes their interaction as a process of dialogue. He questions the notions of reflexive modernists, the idea that people in western societies actively engage in debating scientific, technological and economic issues in an open self-critical manner. When critical awareness does emerge, it 'represents a major struggle against the continuing power of the modernist monologue' (Bell, 2004: 26).

In an agricultural context, Kaup (2008) introduced the related concept of a 'reflexive producer' to describe farmers who actively negotiate between 'expert' and 'local' knowledges. As conscious actors, they are capable of making decisions based on information available to them by assessing the value of expert knowledge in the light of their own knowledge and past experience. In a restatement of actor-oriented perspectives, Kaup (2008: 4) asserts that farmers are not passive actors who merely accept expert knowledge as the objective truth. They question existing expert systems and are more likely to make decisions based on local first-hand experiences using their knowledge to negotiate between the information derived by themselves and that provided by the expert.

In keeping with the aim of the study in Chapter One, the articulation of farmer narratives is introduced as an ingredient in the design of a sustainable agricultural model. It is argued that in a post modernist world of conflicting truths, the reflexivity of farmer expertise is conducive to the development of post-productivist sustainable practices. The importance of local knowledge and farmer participation in rural development was identified in studies of farming systems and indigenous knowledge in developing countries (Millar and Curtis, 1999: 302). Shajaat-Ali (2002) discovered that small holder farmers throughout Bangladesh operated in small but diverse ecosystems and possessed an intimate knowledge of local soils. They developed soil management strategies that helped them attain a high degree of sustainability. Similarly, Bentley and Thiele (1999: 75), identified over fifty publications on farmer knowledge of crop diseases written by plant pathologists and entomologists who had actively collaborated with traditional country farmers in producing integrated management systems for controlling late blight in potatoes. However, as the value of traditional knowledge in farmer societies has been recognized, Millar and Curtis (1999: 303) noted the local knowledge of farmers in developed industrial countries has been overlooked:

It is commonly assumed that farmers involved in capital intensive agriculture are largely influenced by science and production-driven imperatives. Farmers are seen as either adopters or rejecters of science-based technologies, and not as originators of technical knowledge or innovations

Farmers' knowledge is, therefore, a potentially vast resource that should be tapped and incorporated in national scientific databases and utilized in formulating future agricultural development policies. In contrast to conventional agricultural science, where developments

are based on narrow reductionist methodologies, the value of traditional knowledge or 'local' knowledge encompasses social systems and beliefs, non-technical ideas, insights, wisdoms, perceptions and innovative capacities (Millar and Curtis, 1999: 303). And as survival often depends on using this knowledge to adapt to change, it is constantly re-evaluated. In keeping with the tenets of participatory research, an understanding of local knowledge allows farmers to incorporate their own into the testing of newer technologies, making the process relevant to local conditions and arguably, one of the important conditions for the sustainability of diverse agricultural systems. The implications for sustainable transformation in this approach are clear where effective change is unlikely to succeed directed wholly by experts from above without the reflexive participation of producers.

Horne and McDermott (2001: x), writing in the context of a highly industrialized North American agriculture, concluded that the economics of agriculture were inextricably linked to its ecological and social foundations. All three dimensions are necessary and each alone is insufficient. The sustainability of farming could not be simply based on short term economic profitability (McDermott, 2001: x). The authors' critique is an 'indictment' of the whole system of industrial agriculture which has variously:

- failed to fulfill its fundamental responsibilities to the farmers who use it, to the natural environment that supports it, and to the society that depends on it;
- jeopardized the inheritance of our children as well as agriculture's future productivity by endangering essential natural resources;
- peddled addictive agricultural chemicals to farmers for profit while ignoring the environmental and human health consequences; and
- bankrupted farmers, destroyed rural communities and left rural America open to exploitation.

Unlike previous attempts at a definition of sustainable agriculture, which 'don't necessarily cause anything positive to happen on the land', Horne and McDermott (2001: xi) identified eight steps to a sustainable agriculture:

- create and conserve healthy soil;
- conserve water and protect its quality;
- manage organic wastes to avoid pollution;

- select plants and animals adapted to the environment;
- encourage biodiversity;
- manage pests for minimal environmental impact through natural controls and deterrents that prevent any one species from maintaining a dominant position;
- conserve non-renewable energy resources; and
- increase profitability and decrease risk.

The emphasis in the above reverses the productivist stress on the bottom line replacing it with conservation of resources and biodiversity. Sustainable alternative agricultures extend over a range of philosophies including ecological, biodynamic, humus, low external input, permaculture, biological, resource conserving and regenerative systems (Bowler, 2002: 209). Within these, a number of principles are applied including holism of a farming systems, a reduction in the fossil fuel inputs and a return to polyculture.

For Horne and McDermott (2001: xv), the signs of a change can already be identified in the present. Productivist agriculture in the US they claim, is coming to an end. The final stage of industrialization, will see an end of family contract farming and the complete dominance of unsustainable corporate contract-based agriculture. This will coexist with an independent family-based agriculture that balances the economic, social and economic dimensions for quality of life and long-term sustainability:

We are making a difference. We are still a small movement, but growing and evolving rapidly. We haven't gone away; we won't go away. We are influencing the debate on agriculture, and influencing what farmers do in the field every day (Horne and McDermott (2001: 260).

A similar case is made for change to alternative agricultures by Kimbrell et al. (2002) who argue that the expanding power of conventional agriculture over global food production systems is made possible by the promotion of seven 'deadly' myths. Deceptive publicity lulls consumers into a false sense of confidence regarding the safety of conventional agricultural practices and products. *Fatal Harvest* (2002) exposes the enormity of the deception and the threat of long-term damage to biosphere and biodiversity. For example, in the first myth, the claim that industrial agriculture will feed the world is based on the view that hunger is a result of artificial scarcity rather than poverty and landlessness. The authors argue that industrial agriculture increases hunger by raising farming costs, thus

forcing millions of farmers off their land and others into growing high-profit export and luxury crops (Kimbrell et al., 2002: 50). Another example of productivist mythologizing is the claim that industrial food is safe, healthy and nutritious while a central component of the industrialized food system is large-scale dependence on toxic chemicals. Since 1989, overall pesticide use had risen by about 8 per cent or 60 million pounds¹¹ (Kimbrell et al., 2002: 52). As well, proponents of productivist agriculture boldly claim benefits for the environment and wildlife. For the authors, industrial agriculture is the largest single threat to earth's biodiversity. Row-to-fence-row ploughing, planting and harvesting techniques, decimate wildlife habitats, while massive chemical use poisons the soil and aquifers and destroys plant and animal communities (Kimbrell et al., 2002: 60). In addition to misleading myths, Agri-business companies were aided by political support during at least three administrations. After twenty years of active antagonistic campaigns by the US political right following the ascendancy of Reagan conservatives, carried forward during the years of the G.W. Bush administration, sustainability initiatives had been effectively neutralized in the 1980s (Sawyer, 2009). This period witnessed the reassertion of the neoclassical economic paradigm and a highly influential rhetorical industry focused on undermining sustainability policies and initiatives (Sawyer, 2009). The official view was that alternatives such as organic agriculture were a 'primitive, backward, non-productive, unscientific technology, suitable only for the nostalgic and dissatisfied back-to-the-landers of the 1970s' (Lyons and Lawrence, 2001: 3). In Australia, less strident but nevertheless environmentally antagonistic policies were evident from the mid 1990s. A neo-liberal government in Canberra exhibited high approbation for the Bush/Cheney worldview with a corresponding degree of concern for sustainability while focusing on the interests and support of big business (Brett, 2007: 4).

3.5 Agricultural sustainability in Australia

For more than 200 years, Australia relied on agriculture for its wealth and development with sparse interest in the characteristics of the Australian landscape, its seasonal patterns, hydrological and nutrient cycles, geology, and unique native ecosystems. In the main, agricultural systems were the products of a colonial culture, in which inappropriate European styles and practices were imposed on this unique environment. The relatively flat, arid and geologically old soils that are not particularly fertile and are easily damaged,

¹¹ 22,380,000 kg.

take a very long time to recover. The same attitude paid little heed to the cultural complexity of its owners, diversity and sensitivity of its plants, animal life and resources. Little was known about the country's vast reserves of natural salt in the ground, brought to the surface through rising groundwater and leakage past the root zone. Frenzied clearing programmes denuded the land to grow crops and graze introduced animals. Fragile soils were dug, water diverted for irrigation and chemical fertilizers and pesticides applied. Native perennial plants were replaced with seed-bearing annuals such as wheat, rice and maize. Thousands of years of sustainable usage and ecosystem adaptation, practised by indigenous Australians, was overturned in a very short time. It is hardly surprising then, that rural producers are now experiencing the products of unsustainability writ large in soil erosion, declining water quality, loss of biodiversity and salinity.

According to Reeve (1990: 71), the late 1980s and early 1990s in Australia was a time which could be remembered for its expanded use of the term 'sustainable' (if not the application of its principles). Labels such as 'sustainable economic growth' and 'sustainable business management' were well established and the concepts of sustainable development and sustainable agriculture were 'subjected to fairly rigorous analysis' (Reeve, 1990: 71). The Report of the Standing Committee on Agriculture (SCA) Working Group (1991: 4) stressed the economic importance of improving environmental quality through the use of farming practices and systems that maintain or enhance the economic viability of economic production, the natural resource base and other ecosystems influenced by agriculture.

The group identified a list of issues including 'land degradation, water use and quality, chemical use in agriculture, vegetation degradation, the impact of feral and native animals, biodiversity, the greenhouse effect and plant and animal health issues. In addition, as a guide for government policies, an agro-ecological map by region and a set of five principles for sustainable agriculture were developed. The group appealed to farmer pragmatism by warning that a sustainable approach was preferable on the grounds that land degradation had a deleterious effect on the value of their farm. Thus:

Maintaining the farm resource base therefore assists farmers to maintain their equity and this provides them with a stronger basis for surviving periods of crisis. In this sense, sustainability is good business even when there is a rural downturn (SCA, 1991:6).

Furthermore, it was crucial that farmers build sustainability permanently into their management strategies, not as a luxury to be taken up when conditions were favourable. Yet, in an industry prone to downturns, survival often dictates farmers' options, taking priority over sustainable practices (Vanclay and Lawrence, 1995: 172).

In analysing the problems associated with conventional industrial farming methods, the SCA recommended the adoption of sustainable practices to ameliorate the problems it associated with past farm practices. However, the report recommendations contained an implicit assumption that all farmers were independent decision makers, able to select the best of available practices. It overlooked the fact that by the 1990s, many farmers in Australia, including Tasmania, were contracted to food processing companies and retail chains who wielded power over farm management. In noting the existence of policies and programmes relevant to sustainable agriculture in Tasmania, the report made cursory reference to extension services which liaised 'with vegetable and crop processing companies on soil management and trafficking techniques to reduce soil erosion and minimize water logging' (SCA, 1991: 113).

Reviewing overseas government policy on agricultural sustainability and implications for Australian agriculture, Reeve, (1990: 75) concluded that the means for achieving sustainable agricultural goals were unclear:

The key point is that no person working from any disciplinary basis, intuition or ideological dogma can prescribe a course of action that is certain to lead to a social, economic or agricultural system that will endure for all time. Sustainability is the goal that the prescriber hopes may be achieved.

However, having assessed developments in the USA, Canada, the United Kingdom, Europe and New Zealand, Reeve's (1990: 77) definition of sustainable agriculture retained a productivist emphasis on economic profitability, productivity, consumer choice and, as an after thought, the use of renewable resources and minimisation of deleterious off-farm environmental impacts. Reeve (1990: 78) identified three origins of non-sustainability (or barriers to the adoption of sustainable practices) in the incompatibility of business marketing with sustainable farm practices, the complexity of the food chain preventing consumer identification of sustainable production, and the reductionism of non-holistic farm research. Additionally, agricultural policy for a sustainable agriculture ought to be extended beyond the farm to the agricultural input sector. And, since the sustainability of

this sector's products could not be relied upon, then as a further condition for sustainability 'the farm sector reduce its dependence on a materials and energy intensive input sector' (Reeve, 1990: 82). The adoption of organic techniques was not made clear, although Reeve noted that alternative agricultural practices such as organic farming were generally accepted as being more exacting and demanding on farmers than conventional practices. As a consequence, farmers would face added problems and burdens during a changeover. Also for Reeve (1990: 85), serious progress towards more sustainable systems required that supporting policies not be limited to the farm and include the input and output sectors. While it was rational and equitable to share the burden of sustainability among all the participants in the production sector, it was also unclear in what manner input corporations, processors and retailers, who made extraordinary profits from farm products, could be further supported with the same financial incentives.

Near the end of the century and the beginning of a decade of conservative federal government in Australia, the Industry Commission Report (1998: 2) pointed to the 'unwelcome' and 'unsuspected' environmental impacts of agricultural development. It referred to the United Nations World Commission on Environment and Development (WCED) Report (1987) in defining 'ecological sustainability' as insuring that each generation does not compromise the potential wellbeing of the next, and echoed the 'elegant' rationalist sentiments of Margaret Thatcher 'No generation has a freehold on the earth. All we have is a life tenancy – with a full repairing lease' (Industry Commission, 1998). Neo-liberal influences emerged further in the Commission's main proposals recommending deregulatory measures in resource management and mandatory standards only 'as a last resort'. As always, self-regulation was a preferred option. An administering agency would accredit suitably qualified auditors from the 'private sector' to undertake external audits of compliance.

A report, *Sustainable Agriculture: Assessing Australia's Recent Performance* (1998) by the Standing Committee on Agriculture and Resource Management (SCARM, 1998: 2), highlighted far more serious concerns. Australian agriculture, it claimed was becoming more complex, export-oriented, competitive and risky; economic performance was variable suggesting that structural adjustment will continue to be a feature. The sustainability of agricultural practices was problematic as resources degraded and the social infrastructure of the agricultural sector was in decline with the aging of farmers.

The final point, it was suggested, was of particular concern for the future sustainability of the agricultural sector as few newcomers were entering the industry to replace aging farmers. The rising cost of farm units and the economically unattractive rewards from farming were major contributing factors. The efforts of various government instrumentalities was claimed to be evidence of environmental concern by the Australian government. Nevertheless, industrial agricultural practices in Australia had been especially damaging. According to Campbell (1991: 2–3) the consequences of conventional agricultural practices were environmentally catastrophic:

- two-thirds of Australia's forests (40 million hectares) and one-third of all scrub and woodland (63 million hectares) have been cleared;
- forty-six mammal species (15% of the total) have become extinct: a world-record rate of extinction;
- more than 500 species have been introduced as cultivars, weeds, pests or all three;
- more than half of all cropping and grazing lands requiring treatment for erosion, salting, soil acidity, or soil structure decline;
- many of the waterways and wetlands on this dry continent becoming contaminated by soil run-off and algal blooms caused by fertilisers, pesticides and heavy metals; and
- most irrigation areas being flooded from beneath by saline rising groundwater, due to clearing, profligate water use and non-existent water drainage.

Young et al. (1996) reported that in Australia, eutrophication and reduced river flows had led to an increase in the frequency and severity of algal blooms which were directly related to land use and the export of farm nutrients. Clearly, a need existed for the development of more sustainable systems.

SCARM (1998) noted the need for more comprehensive data to improve the quality of sustainability indicators. Following extensive consultations with farmers and other expert groups, Australian government authorities have identified a set of key indicators of agricultural sustainability. Each indicator is accompanied by a set of measurable attributes that provide the basis for sustainability assessments (Table 3.1).

Indicator	Attributes
Long-term real net farm income	<ul style="list-style-type: none"> • Real net farm income • Total factor productivity • Farmers' terms of trade • Average real net farm income • Debt servicing ratio
Natural resource condition	<ul style="list-style-type: none"> • Nutrient balance: phosphorus and potassium • Soil condition: acidity and sodicity • Rangeland condition and trend • Agricultural plant species diversity • Water utilisation by vegetation
Off-site environmental impacts	<ul style="list-style-type: none"> • Chemical residues in products • Salinity in streams • Dust storm index • Impact of agriculture on native vegetation
Managerial skills	<ul style="list-style-type: none"> • Level of farmer education • Extent of participation in training and Landcare • Implementation of sustainable practices
Socio-economic impacts	<ul style="list-style-type: none"> • Age structure of the agricultural workforce • Access to key services

Table 3.1: Key indicators of agricultural sustainability (Source: SCARM, 1998)

Yet in a comprehensive review of literature dealing with the subject of the practical pursuit of sustainable agriculture, and the state of research and development of sustainable land use systems, McMaster and McMaster (2002) found that a ‘sustainability industry already existed in Australia’ (Figure 3.1).

A proliferation of agencies, groups and programmes had mushroomed, which was claimed to have contributed to a widening commitment to ‘sustainability’ concerns. Accordingly, an ambitious undertaking for a National Land and Water Resource Audit (NLWRA, 2000) by the Standing Committee of Agricultural and Resource Management (SCARM) would provide a nationwide assessment of Australia’s land, vegetation and water resources now and in the future. For McMaster and McMaster (2002), the efforts of various government instrumentalities including SCARM was evidence of some environmental concern by the Howard government. However, it was difficult to see anything but the very weakest of definitions for what passes for agricultural sustainability in this context. Productivism in agriculture was an enduring reality and while an indicator industry served a useful political

purpose, it had little impact on productivist industrial practices. It is well known that neo-liberal productionist economics celebrate growth and productivity along with an industrial agriculture based on the narrowness of reductionist science:

The twisted thinking which ignores the integrity of biological systems and the complexities of human/natural resource relations remains a solid part of modern agriculture. In seeking to overcome falling profits (usually resulting from world oversupply, itself a product of a largely anarchic system which fails to meet widespread human need) scientists look at the individual ‘components’ of the system of agriculture. Crops are sprayed with chemicals to prevent insects from devouring the plants; artificial fertilisers are spread on fields to maximise plant growth; animals are placed in feedlots to maximise the food-to-meat conversion ratio, and so on. By looking at the discrete elements of production rather than the entire system, the outcomes are more virulent pests, fertiliser/chemical pollution of the environment and animal waste in vast quantities – all contributing to the continuation of an unsustainable agriculture (Gray and Lawrence, 2001: 141)

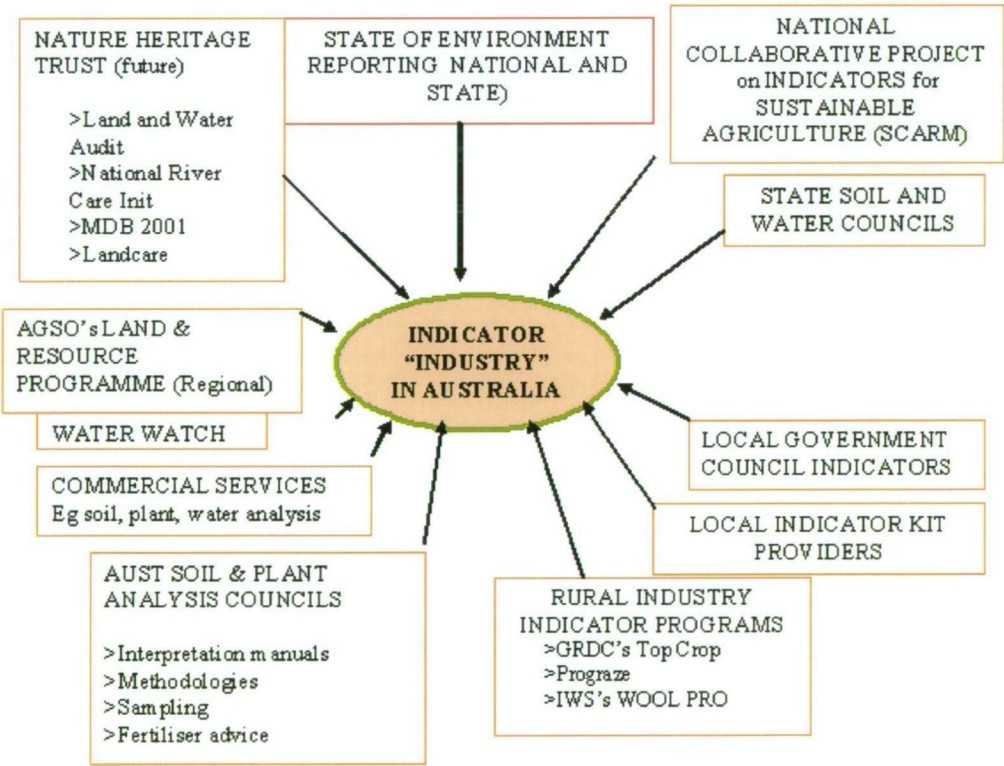


Figure 3.1: The sustainability indicator industry in Australia (Source: McMaster and McMaster, 2002)

For Lawrence (1992: ix), questions which are commonly asked in the form of 'how can farmers increase output while adopting more friendly techniques', or 'how can we best educate farmers to introduce soil conservation measures' and 'what incentives can the government provide to farmers to reduce individual pollution levels', are not technologically neutral questions:

The assumptions underlying the construction of such questions are that agriculture can, and should, pursue its present trajectory, that the provision of more information will lead to changes in farmer behaviour; and that the state's role should not extend beyond providing a 'guiding hand' in assisting farmers in adopting more environmentally sound production methods' (Lawrence, 1992: ix).

In describing the history of Australian agriculture, it is relatively clear that this 'guiding hand' approach has been marked by insensitivity to its special needs. It is one, which began a mere two centuries ago, where 'the climate, the soils, the people, the markets and the technology continue to mix together to form the stream of agricultural development, with new twists to old plots at every turn, often not without paradox' (Dovers, 1992: 15). Australia's soil resources are being mined with little recognition that they are to all intents and purposes, non-renewable (CSIRO, 1990: 12). When lost to erosion, it may require about a hundred years to reform a millimetre of friable topsoil. This means that remediation of soil erosion in Australia is a very long-term process:

Whereas the fertile farming lands of Europe and North America were renewed less than 12,000 years ago as glaciers retreated northwards, the Australian landscape is geologically old and stable. As a result, Australian soils are millions of years old and deeply weathered with high levels of accumulated salt (CSIRO, 2002).

Moreover, while wind and water erosion are extremely important causes of degradation, soil acidity, salinity and nutrient decline are also causes for concern. All of these are signals of inappropriate land use and unsustainable practices. For example, logging and land-clearing policies continue to denude hills and slopes of trees, shrubs and grass cover, alter local hydrology and often result in salinisation. This process is exacerbated by irrigation in semi-arid Australian zones, which also adds to the salinity of soils and streams. There is an increased risk of salinity if the practice of flooding fields is not replaced by methods that use water more sparingly (Watson, 1992: 19).

The Murrumbidgee Irrigation Area (MIA) is a case in point, which should have been a signal for alarm in Australia. Its current condition can only be described as endangered while current practices continue. Rapid development and inappropriate modifications of the natural environment over the last 200 years have resulted in the degradation of many of the natural resources of the Murrumbidgee catchment (MCMC, 1994). Some of the most serious natural degradation issues identified by the community relate to land management, land and water salinity management, and vegetation management and water management. The future for agriculture appears grim:

Vegetation in the Murrumbidgee catchment has been subject to excessive clearing, loss of species diversity, excessive grazing pressures, weed invasion and insect predation (MCMC, 1994). Altered climatic patterns are expected to have significant effects on agricultural operations, one of which may be a catastrophic increase in soil water-induced erosion from which Tasmania also suffers (Watson, 1992: 26).

Yencken and Wilkinson (2000: 225) have argued that if Australians chose a sustainable future, they would need to change their entire perspective on land use. Land must be seen as an ecological system in which agriculture and other activities take place. Such a shift might reverse the obsessive emphasis on a production-at-all-costs approach, which has dominated conventional farming practices for over half a century. A century of European exploitation has transformed an old continent that has endured perhaps fifty thousand years of sustainable use by inhabitants more sensitive to its limitations. Writing on the need for such change in Australia and in reference to Ratcliffe's (1938) comment on the 'boom and bust' cycles of the 1920s, Recher and Lim, (cited in Yencken and Wilkinson, 2000: 225) have painted a grim national picture of what passes for modern farming:

Ratcliffe could have been writing about anywhere in Australia. The image he presented was of a fragile land ill-suited to pastoral and agricultural activities developed on other, more resilient continents. His is the same story that Saunders (1989) and Saunders and Curry...tell of the West Australian wheatbelt, that Ford and Howe (1980) present of the Mount Lofty Ranges, that Lunney and Leary (1988) describe for southeastern New South Wales and that Burbidge and MacKenzie (1989) offer for the arid interior. It is the same story that is being repeated in the North of Australia, on Kangaroo Island, in Tasmania and in Northern Queensland. It is not a scientific story or one that lends itself to statistical analysis. There is no experimental design nor can the experiment be repeated.

Farming and grazing have been the most pervasive of human activities, largely because of the dominance of agriculture where sixty per cent of the Australian continent is farmed and overgrazed by introduced animals (Yencken and Wilkinson, 2000: 226). Synthetic chemicals, repeated cultivation, heavy machinery, irrigation and introduced vegetation species have taken their toll. There is profound damage done to the continent's biophysical properties, to its soils, waters and native vegetation.

3.6 Conclusion

This chapter explored 'agricultural sustainability' as an addition to the thesis background. It traced the origins of the term and its limitations to the UN initiatives of the 1980s. The concept of 'sustainable development' in the Brundtland Report (1987) followed from the utilitarian definition by the World Conservation Strategy of 1980. Both may be said to have introduced 'sustainability' into the international lexicon but little progress in establishing it as a world project.

Applied to agriculture, the term may refer to any of several alternative farming systems including organics, in contradistinction to the dominant damaging and inequitable productivist system of food production. The very necessity for a concept such as 'sustainable agriculture' is itself a criticism of conventional agriculture. If productivist agriculture delivered its promise of food health and security, it would itself be sustainable and alternative agricultures superfluous. Instead, agriculture has been absorbed into the machinery of industrialization with capital accumulation as a primary purpose. No longer the central source of foodgetting, agriculture is now a simple source of inputs for the processing of bulk food products and a source of specialty items for discriminating western elites. As a common result of hegemonization, alternative systems have emerged in response to the integrative tendencies of agribusiness globalization and its unsustainable impacts. However, productivist industry has also attempted to hijack the sustainability debate through a modified productivist paradigm and continuing the flawed claims of the Green Revolution that it alone can feed the world (when patently this has never been achieved) and offering the dubious promises of biotechnology.

Most definitions of sustainability refer to qualities that productivist agriculture lacks, namely, serving the needs of present and future generations and environments. By definition, a productivist system based on the maximization of capital accumulation,

through the exploitation of finite resources, is unsustainable. Thus, the two systems become mutually exclusive as productivist practices degrade world agricultural resources and the present coexistence between productivist and post-productivist agricultures, alluded to in Chapter Two, is made untenable.

A lack of sustainability has been a feature of agricultural practices in Australia since colonial days. European style farming, then as now, paid little heed to the special needs of the land, its water tables, its delicate ecological balances and its environments. Government studies and reports on the condition of agricultural resources, routinely incorporate sustainability in remedial solutions to ongoing resource degradation. Such accounts do little to challenge the dominance of productivism and the persistent obsession that conceptions of sustainability in agriculture must always contain 'trade-offs' between business profiteering and the needs of the environment. Hence, the persistence of industrial agriculture, a common feature of contracted farming in Tasmania's vegetable processing industry, is the subject of the next chapter.

Vegetable processing in Tasmania

4.1 Introduction

Chapter Three contrasted the concept of a sustainable agriculture with the practices of a dominant productivist model in the context of national Australian agriculture. This chapter continues the process of developing a background for agricultural developments, turning to forward production contracts as the primary instruments of agribusiness penetration of local agricultures. As the most direct point of interaction between global agribusiness and local farmers and their resources, the contract system is of major relevance to this study. The chapter outlines the processes and impacts of this system, some characteristics of the Tasmanian industry and an overview of the resources on which the industry relies.

4.2 The contract system

Contract farming is not a recent phenomenon. It has been in existence for many years as a means of organizing the commercial agricultural production of both large-scale and small-scale farmers. From the late twentieth century, changes in consumption habits, such as the increasing number of fast-food outlets, the growing role played by supermarkets in many countries, and the continued expansion of world trade in fresh and processed products, have added to further development of this mode of production. Contract farming can be defined as ‘an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products, frequently at predetermined prices’ (Eaton and Shepherd, 2001: 2).

Such agreements are in principle, a beneficial maximization of interests and profits. They may be seen as a partnership between agribusiness and farmers. According to Eaton and Shepherd (2001: 3) to be successful, the contract system requires a long-term commitment from both parties. While the intensity of the contractual arrangement varies, it usually involves the processor in providing a degree of production support through the supply of inputs and the provision of technical advice. Farmers commit to providing a specific commodity in quantities and at quality standards determined by the purchaser while the company agrees to supporting the farmer’s production and purchasing the commodity. Exploitative arrangements by managers are likely to have only a limited duration and can

jeopardize agribusiness investments (Eaton and Shepherd, 2001: 2). Additionally, the operation of contracted food production systems, with their invariable reliance on synthetic inputs and productivist practices, are not totally benign processes. They pose the possibility of more serious impacts on farmers and their communities, environmental resources and the health of consumers on whose support the whole structure relies.

4.2.1 Social impacts of contract farming

Contracts between growers and agri-capitals substituted new relations for open-market exchanges and thereby increased the integration of the farming sector into the processes of agri-industrialisation. 'Independent family farmers of widely variant assets were linked with a central processing, export or purchasing unit which regulated price, production practices and credit arranged in advance' (Mabbet et al., 1999: 275). Inevitably, farmers ceded power over farm management to processing companies who demanded greater control and restructuring of the production process. Thus, contract farming became a means of effecting agricultural change where small scale commodity production made way for distinctive new work routines and farm technologies and labour processes promoted further concentration and centralization of capital. The contract system 'deepened the process of appropriation in which rural farm production processes (farm inputs and services) were converted into industrial capitals and subsequently reincorporated into agriculture' (Mabbett et al., 1999: 276). Contract farming marked a critical transformation and recomposition of the family farm sector as capital saturated the entire agro-industrial complex, converting growers into a 'self-employed proletariat' without directly taking hold of the point of production (Watts, 1992: 91).

Though the extent to which appropriation is facilitated by contract farming varies sector by sector, commodity and region, in the main, the contract system has sustained productivist methods. The proliferation of contracting is characteristically associated with the obligatory use of chemical, biotechnological and mechanical inputs and with the industrial processing of contracted outputs. In the process, farmers and farm families are drawn into the wider national and global economies by separating land ownership from production and harvesting decision making (Burch et al., 1990: 145).

The effects on the occupations of farmers and their regional communities, the agricultural resources and environments and the food security of consumers become lesser considerations. At the same time, increased corporate agribusiness concentration reduces

competition among processors (Ilbery et al., 1998: 62) which further limits producer choice and options for better conditions and higher price returns. As a result, environmental projects on farms may become less affordable and an indirect means by which processors and farmers contribute to the unsustainability of the industry.

For Davis (1980: 144) contract farming is simply a self-reinforcing capitalist labour process, promoted by the non-farm capitalist firm to ensure the production and appropriation of surplus value. While ‘independent’ producers have been regarded as a barrier to the establishment of capitalist relations, they should be regarded as a firm basis for capitalist development. ‘Independent’ family farmers represent few constraints in dealing with capitalist contractors. They become a propertied labour force, non-unionised, self-directed, and willing to work without the guarantees of minimum wage, job security, insurance, and other benefits commonly demanded by time-wage employees (Davis, 1980: 143). Thus, the contract farmer is relegated to the position of a ‘disguised wage labourer’ (Mabbett et al., 1999: 279). In an extreme form, the position of the farmer under contract may be compared to that of a wage earner who is allowed to live on his land, work under supervision, provide his own tools and produce crops he does not own (Burch et al., 1992: 21–22). In Australia, processors enter into contracts which specify planting by area but harvesting by volume. In the event of a ‘bumper crop’, processors retain an option to reject the surplus product. Consequently, growers may suffer losses where surplus is used for stock feed or ‘ploughing it back into the soil’ (Burch et al., 1992: 31). Growers may also be disadvantaged by the contractual demand that quality assessment of their product is made solely by the processing company who is entitled to reduce the contracted price according to its own subjective assessment standards. The implications of such dependent arrangements are evident in the contract conditions stipulated by one vegetable processing company (Simplot Australia Pty Ltd, 2001–2002 – see Appendix A for a complete text of the contract) and Tasmanian potato growers:

Each load of potatoes shall be inspected, sampled and graded upon receipt at the factory. Any grading decisions of the Company as a result of such sampling shall be final and binding on the grower.

The grower will plant, at the agreed times, sufficient seed to provide the following quantity and variety of potatoes from the recommended areas.

The grower will only plant seed that has been purchased from, or authorised by, the

Company.

The grower will notify the Company immediately if the agreed seed is not planted for any reason.

Other conditions in the Simplot contract with Tasmanian potato growers bind the grower to the company's convenience and minimise its own risk. For example, the type, amount and frequency of application of biocides is entirely left to the company's discretion:

The Grower will spray the crop for weed, fungus and pest control as considered necessary by the Company.

Should toxic residues be detected in the delivered crop, it is the company's right to refuse (or use) the tainted products:

Potatoes with residual effects from chemical pesticides or insecticides, may be deemed by the Company not to meet their requirements and thereby be rejected in accordance with Clause C17 (Simplot Australia Pty Ltd, 2001–2002).

Yet rejected crops are never returned to growers. Contract farming allows the company to purchase a rejected crop of potatoes 'at such a price as may be agreed upon between the Grower and the Company' (Clause C17). While this may represent a significant loss to the farmer who invested and worked for a season, it is a gain for the processing company. There are also risks to consumer health in a system where shortened withholding periods between the last application of chemicals and harvesting of vegetables are ignored or overlooked by company harvesters. A period of fourteen days between chemical applications and harvesting is standard practice to allow toxic levels to subside before the food is processed. However, the system is inefficient and problems can arise from difficulties in coordination:

Under a contract, a decision to spray a crop can be made by a farmer, or a farmer can be advised or directed to do so by a field officer from the processing company. Harvest dates are a processor responsibility and approximate dates are usually agreed upon at the beginning of a contract. But these are often varied according to weather, plant requirements and so on and farmers often receive only 48 hours' notice of harvesting (Burch et al., 1992: 35).

Price 'squeezing' of the grower can also occur where the costs of crop inputs are elevated and price returns remain stagnant or are reduced by processors. A similar process forces processors to accept their own buyers' prices, supply products in the buyers' own brand name, pay product advertising costs in the media and 'rent' shelf space for their brands at supermarket outlets. However, there are significant differences in the position of processors and farmers in that in the case of the former, costs may be defrayed by passing them to farmers, a practice in which the processors' share of the profits remains significantly higher than that of the contracted farmers. Farmers, do not have this option, and may respond by externalizing their costs to the environment (Blunden et al., 1996). Low price returns create conditions where farmers are likely to use agricultural environments as a resource for offsetting downturns and capitalising on the upturns. While 'the contract system enables the processor to avoid direct participation in the riskiest component of the food production system, it leaves the traditional hazards of agriculture – bad weather, drought, disease, pests and environmental degradation – to be borne by the farmer' (Burch et al., 1992: 24). Additionally, in narrowing the farmers' options in the short term to mere compliance with processing company wishes, contract farming may result in the de-skilling of farmers, a loss of traditional knowledge and an inability to adjust in a post-productivist future:

Because contract farming institutionalises and legitimises a reduction in operational flexibility, contract farming is likely to make it difficult to reorientate production along alternative lines of development when economic circumstances or environmental considerations dictate this. In contract farming, growers have no choice but to use the methods dictated by the terms of the contract (Burch et al., 1992: 269).

However, critical views of the contract system are challenged by some Tasmanian researchers. Fulton and Clark (1996) and Miller (1996) held that while family farmers in Tasmania forfeited a certain degree of control to processors, they adopted specific strategies to moderate contractual demands. Accordingly, farmers have been adapting to capital penetration, rather than being subsumed or surviving by default. Managing relationships with external parties has become a major component of the business enterprise for many farm families (Fulton and Clarke, 1996: 236).

For Miller (1996: 204), contract farming in Tasmania has had a productive and even a positive effect on the agricultural economy of the state. Despite some turmoil in relation to

the policies of one agribusiness company in 1995, Miller found little long-term evidence of decline in the numbers of farming operations and their viability. He noted the lack of evidence of change in farmers' skills or status. Miller (1993) asserted that a culture of denial existed among vegetable farmers in the north-west of Tasmania in their tendency to identify soil erosion problems on other peoples' farms while denying losses on their own. Miller associated this complacency with an 'island state of mind'. Thus, Tasmanian farmers were insular and needed to look further afield (Switzerland and the United States) where conservation measures such as the use of ground cover, no-till cultivation and terracing, reduced the amount of soil erosion on undulating and steeper slopes. Though a valid point, the prohibitive cost of establishment and maintenance of the latter may have been a sound economic reason the practice is uncommon in Australian and Tasmanian contexts.

4.2.2 Environmental impacts of contract farming

Concerns associated with the sustainability of conventional productivist agricultural practices have already been noted in Chapters One and Three. Their various impacts pose risks to the security of food production, ecological systems and on occasion, the health of consumers. Productivist intensification of agricultural practices 'significantly reduces the ability of individual producers to adopt more sustainable practices' (Burch et al., 1992: 32). Land-use decisions are made in distant corporate offices far removed from the particular production conditions and concerns of farmers and their environments. These decisions have implications for genetic diversity, chemical pest control and land and water degradation (Burch et al., 1992: 32). In regard to genetic diversity, processing companies in Tasmania specify a particular variety of seed potato (Russet Burbank) 'bred in the Nineteenth Century for US conditions'. These are considered more marketable and preferred by US fast food outlets, who buy by weight and sell by volume. The display of long, firm overflowing chips from Russet Burbank tubers, is calculated to impress consumers. However, this is a heavy maintenance vegetable variety, requiring a greater amount of capital and labour inputs by the grower, but is 'susceptible to late blight, pink rot and hollow heart' as well as 'fold-up' in hot and dry Australian growing conditions. Additionally, 'it is highly dependent on chemical protection' as well as 'high levels of fertilizer application and irrigation to achieve optimum yields, both of which can lead to environmental problems' (Burch et al., 1992: 33). The impacts of intensive practices are felt in reduced plant varieties, chemical toxicity, monopolization of water, and land

resources, all of which are mandatory management conditions agreed to by farmers who sign contracts.

4.3 Contract farming in Tasmania

‘Convenience’ or canned foods first arrived with the imports from the US in the 1920s (Burch et al., (1992: 25). As an industry, the process began with Heinz’s Australian cannery in 1935 whose production was subsequently boosted by wartime demand and the influence and transfer of US food preservation technology to Australia. But it was World War Two that provided the impetus for the vegetable processing industry in increasing the demand for canned rations and production from 4.5 million kg to 50 million kg (Burch et al., 1992: 25).

By 1974, others had joined the industry (Birds Eye, by British-Dutch Unilever, Edgell and Sons, and Petersville), increasing the production of frozen vegetables by 150% and canned vegetables by 50%. In 1986–7, the most important crop grown in Australia under contract was the humble potato, earning \$262 million and grown on family-owned mixed enterprise farms. Most of the increased output during this period was concentrated in Tasmania to cater for the demand for frozen chips at the newly arrived US fast food outlets. Tasmania’s small economy has relied on vegetable processing industry since the 1930s and overall, by 2004, vegetables represented 18% of the value of agriculture, being worth about \$164 million at the farm gate (Department of Primary Industries and Water, 2004). After processing and packing, value is estimated at \$579 million per annum (Department of Primary Industries and Water, 2004) which includes domestic Australian consumption (93%), interstate transfers (73%) and exports (7%).

Tasmanian agriculture is characterized by its diversity where many farm enterprises are typically mixed. Within the mix, processed potatoes are the major single sector and hence the main focus of the study. About 80% of potatoes grown in Tasmania that are produced for the two processing companies are frozen and subsequently used as French fries (DPIWE, 2004). The majority of vegetable crops are produced in the high rainfall fertile land of the north-west, Meander and north-east of Tasmania, an area which is approaching its full exploitation levels. The soils of this area are highly prized for cropping where intensive vegetable growing, in particular onions and potatoes, provide good returns to growers in the short term, but is leading to declining productivity in the long term (Chilvers and Cotching, 1994: 1). According to DPIWE, some production has currently

moved into the drier north of the state where irrigation is available. Vegetable processing, especially of potatoes, has been a major source of income for most vegetable farmers and processing companies in Tasmania. Table 4.1 indicates the gross value of potatoes to Tasmania as being over half the value of all other vegetables. In Australia, although per capita consumption of potatoes fell by 5.8% to 68.0 kg in 1998–99, it remains the most popular vegetable (ABS, 2002). According to the DPIWE (1999: 104), Tasmania produces 25% of the world's total potato crop on the state's north-west coast. There are an estimated 627 owner-operated vegetable growing farms with mixed enterprises including livestock and vegetables.

The 627 vegetable growing farms make up less than 14% of all farming establishments in Tasmania, but included 74 of the 213 establishments (nearly 35%) with an estimated value of agricultural production exceeding \$500,000 (DPIWE, 1999: 104).

That there are only two potato processing companies in Tasmania is a significant limiter of competition among the companies and the farmers' ability to achieve better prices for their products. Clearly, two companies do not constitute a competitive environment, either in the processing or the retailing market sectors. The processors, Simplot Australia and McCain Foods, take about 80% of the state's potato harvest. McCain processes about 20% and Simplot, 60%. Other vegetable products are processed at Smithton on the north east by McCain and Quoiba in the central north by Simplot.

As noted above, the bulk of Tasmania's processed and fresh potato products are sold on the Australian retail mainland market. The quantity of processed vegetables exported is relatively low (7%) and fresh produce is sold both locally and on the mainland, with some varieties of 'pinkeye' potatoes being keenly sought after by interstate caterers. Tasmania's relative isolation and freedom from many pests and diseases has also made it a viable supplier of certified vegetable seed to mainland markets.

Products	Gross Farm Value (food) (\$m)	Processed Value W/S or FOB (\$m)	OS Processed Exports FOB (\$m)	OS Processed Imports (\$m)	Net Interstate Proc Exports (\$m)	Net Interstate Proc Imports (\$m)	Retail Sales (\$m)	Food Service Sales (\$m)	Net Food Revenue (\$m)	Gross Food Revenue (\$m)
Potatoes	76	199	1	0	172	0	107	49	329	329
Onions	24	29	18	0	9	0	11	1	38	38
Beans	6	17	0	0	14	0	3	1	17	18
Peas	11	32	0	1	32	0	2	1	34	35
Carrots						0	12	1	43	43
Broccoli	6	12	0	0	10	0	6	1	17	17
Other Brassicas	6	11	0	0	1	0	26	4	32	32
Tomatoes	1	2	0	0	-5	0	36	7	38	38
Cucumbers and Capsicum	0	0	0	0	-3	0	7	1	5	5
Mushrooms	7	7	0	0	1	0	9	2	12	12
Squash	1	3	1	0	-1	0	4	0	4	4
Other Vegetables	5	7	1	2	1	0	9	2	11	13
Not Accounted For	-1								0	0
Total Vegetables	164	352	23	4	259	0	230	71	579	583

Table 4. 1: Tasmanian vegetable industry crop production 2004-05 (Source: Department of Primary Industries Water and Environment)

4.3.1 Tasmanian farmer organizations

In Tasmania, there are several organizations, which monitor the requirements of growers and consumers. The Tasmanian Farmers and Graziers Association (TFGA) is the peak body representing the interests of Tasmanian farmers at the state and national levels. The Potato Council, a grower organization, supports the potato industry by including representatives from all facets of the vegetable industry within the TFGA. The Tasmanian Certified Seed Potato Growers Association is also linked to the TFGA and concerns itself with the production and marketing of seeds. Nationally, Tasmanian potato growers have representation on Ausveg and on the Australian Potato Industry Council (APIC). APIC is the umbrella organization for the entire potato industry (DPIWE, 1999: 105).

For the processors with contractual agreements for the supply of raw vegetables, each affiliates with a commercial and seed grower association for the negotiation of contracts with grower representatives. Processors also have representatives in the national body called the Potato Processing Association of Australia (PPAA) which is the national peak body representing potato processors in Australia, formed in 1992 to present a united voice on issues of common concern in the processing of potatoes (AUSVEG).

4.3.2 Tasmania's potato industry

As already noted, potatoes are by far the major vegetable crop produced in Tasmania and the mainstay of the vegetable processing industry in terms of capital investment by both processors and farmers. In the early 1990s, Tasmania's 550 growers produced 291,422 tonnes of potatoes (Australian Bureau of Statistics, 1995a) largely for processing with an average yield of 42.5 tonne/ha, which was considered the highest among the Australian states (Fulton and Clark, 1996: 222).

Until the 1990s, there had been little more than sparse academic interest in the vegetable growing industry in Tasmania. Previous research in potato growing (Rattigan et al., 1979; Rattigan, 1981) appeared to focus on the industry from social and economic perspectives. Up to the 1950s, Tasmania had been the major fresh-market potato-producing state in Australia when grower numbers had peaked at 7000 in the mid-1940s (Bureau of Agricultural Economics, 1949). However, mainland markets for fresh potatoes, which had largely determined the Tasmanian crop, had almost disappeared by the middle of the 1970s due to increased production interstate and the rising costs of freight across Bass Strait. The

loss of these markets was soon offset by an expansion of potato processing in Tasmania, made possible by the introduction of imported quick-freezing technology.

By the late 1970s, much of Tasmanian potato growing was geared to the needs of the processing industry (Rattigan, 1979: 223). This necessitated a transformation from an industry, which had primarily supplied the fresh potato markets and needs of other states, to one, which serviced the needs of local processors. These, in turn, supplied retailers and fast-food outlets with frozen vegetables Australia-wide. Also by this time, many potato growers had been adjusted out of an industry, which had become rapidly industrialised according to the preferences of processing companies. In this manner, farmer independence declined in keeping with increased demands of the processing companies delivered through the conditions of potato contracts and supervised by company field officers (Burch et al., 1992: 259).

Production had been expanded from the north-west and east of the state to include farmers in the Northern Midlands grazing regions. In addition, regardless of the low, decade-old prices being paid, the number of farmers wishing to sign what were still considered lucrative potato contracts, remained adequate for the needs of the processors.

Rattigan et al. (1979: 224) identified two types of farmers in the industry. The first, a 'pessimist', was susceptible to economic pressures for structural adjustment, i.e. small production, and low contribution of potatoes to farm income and labour problems. This type expected a large decline in the number of potato growing holdings in the next few years. The second, 'an optimist', did not contemplate retirement until a family member was able to take over the operation. Optimists were a cause of concern in the industry. They doggedly resisted structural adjustment by remaining and contributing to an oversupply of products, encouraged inefficient use of resources and jeopardised the welfare of other growers by selling at lower prices. Such inefficient practices on the north coast of Tasmania led to the degradation of prized krasnozem soils from intensified practices (Ewers et al., 1989: ii). Certain practices such as the use of travelling irrigators, frequent cultivation and heavy harvesting machinery were increasing the erosion and compaction of soils. Yet according to Cotching (1994), Cotching et al. (1998) and Cotching (1999), there had been a dramatic improvement in the management practices previously surveyed (Chilvers et al., 1994: ii). The lower erosion levels reported by farmers were thought to be a result of efforts by organizations such as the DPIWE,

Commonwealth Industrial Gases (CIG) and the Landcare Programme to encourage better agricultural practices. Sims et al. (1998: 2) highlighted the importance of education and information and attributed better conservation management to the introduction of Whole Farm courses.

In 1994, the work of a local influential organization known as the Kindred Landcare Group¹² helped control soil erosion in the area by promoting a need for soil control measures. In the late 1980s, the project received a boost when CIG Pyrethrum required all their growers to establish soil erosion control as part of their contractual conditions (Burch et al., 1992: 263). Maynard (2000) noted that despite the availability of vocational and more formal courses on farm finances and business skills, farm profitability remained generally low and subject to severe seasonal fluctuations. Maynard (2000) expected reduced farm profit to become one of the main reasons for farm business difficulties in the new century.

4.4 Resource conditions in Tasmania

External restructuring pressures in the 1990s began to integrate the local processing industry in Tasmania into the portfolio of international corporate entities (Rickson et al., 1996: 180). Typically, this has resulted in restructuring of relationships between companies and their contracted growers in the vegetable industry as these companies ‘tried to cut costs rapidly and increase their cash flows’ (Fagan and Weber, 1994: 95–96). Consequently, the productivity demands on farmers has increased, which is claimed to have limited farmers’ capacity to pay sufficient attention to the sustainability of soils, waters and ecologies (Blunden et al., 1999: 217). Management practices, which minimise erosion and provide vegetated buffer strips, can substantially reduce the pollutant load from farming activities (Resource Planning and Development Commission (RPDC, 2004). These include stock, vegetation and riparian zone management, dams, and other conservation farming techniques such as contour ploughing. The most effective approach recommended for a specific rural property is the development of a farm management plan (RPDC, 2004), designed to integrate production and economic issues with land capability, resource management and protection issues.

¹² Kindred Landcare Group, formed in 1990 as part of the Kindred community hall committee. Projects included soil conservation. Source: DPIWE.

In Tasmania, agriculture continues along an intensified productivist path, with little but a token acknowledgement of the inherent risks for the medium- and long-term sustainability of the state’s agricultural and environmental resources. While the State is not normally associated with the extreme forms of soil degradation in semi-arid parts of Australia, the change from livestock grazing to irrigated vegetable enterprises in Tasmania, is a signal for concern. Yet according to the Department of Primary Industries and Water (Table 3):

- rates of erosion are less in Tasmania than in other States, under both grazing and cropping systems; and
- erosion in cropping and grazing systems is greater than the rate of soil formation (0.3 t/Ha/yr) in all states (Grice 1995).

Cropping + Cropping/Grazing Rotations		
State	Soil Loss t/ha/yr	% of sites < 0.3 t/ha/yr
Queensland	6.3	17
New South Wales	7.3	8
Western Australia	7.9	<1
Tasmania	3.0	13
Total	24.5	39

Table 4.2: Cropping and cropping/grazing rotations in Australia by state (Source: Department of Primary Industries and Water from Grice, 1995).

Such findings should present little comfort. To date, there is no comprehensive assessment of soil condition in Tasmanian agricultural areas. Reconnaissance soil maps in Tasmania merely cover some of the agricultural areas and few of the designated reserves. The Commonwealth Scientific and Industrial Research Organization (CSIRO) undertook much of the soil mapping in the 1940–60s but only minor regional scale mapping has been undertaken in recent years. There remain considerable areas of Tasmania including highly productive agricultural areas, where no soil mapping exists. By 2004, no comprehensive assessment of soil condition in Tasmania had been performed.

While recognising the importance of soil condition as a key to sustainable land management, the Resource Planning and Development Commission reported ‘unfavourable news’ for Tasmania (RPDC, 2003). Large-scale clearing for agriculture had occurred mostly on the better soils with a general trend towards more intensive production

of commodities for higher yields and profits. This was achieved through increased irrigation of land on gentler slopes. Changes from grazing native grassland to intensive cropping produced serious consequences. Grice (1995) estimated that approximately 15% (317,000 ha) of private land in Tasmania was affected by moderate to severe soil structure decline. According to the Australian Collaborative Land Evaluation Program review by Shields et al. (1996: 106), the north-west and north-east regions of Tasmania, part of the study area, are some of the most intensive production regions in Australia:

The generous rainfall and free draining, well structured krasnozems soils provide high quality vegetable growing conditions. However, much of the land on which krasnozems occur is rolling (10–32%) to steep (32–52%) land and this factor when combined with the relatively high intensity rain storms results in high rates of topsoil erosion in a cropping regime if appropriate soil conservation measures are not used. The krasnozems are often seen as endlessly deep and indestructible by farmers and agricultural advisors.

Limited work by Cotching et al. (2002) indicated signs of soil structure decline associated with long-term cropping on one-third of paddocks of the four soil types used. Extrapolation of the results suggests that as much as 38,000 ha of cropping land could be experiencing similar levels of soil structure decline. Cotching's work indicated that on the red Ferrosols of northern Tasmania, yield losses for potatoes resulting from soil structure decline could amount to 14,500 tonnes (\$3.2m) per annum. Other important issues for Tasmanian agriculture relate to soil acidity, which has affected over eight million hectares of farmland in the south-east of Australia (CSIRO, 1990). However, the situation in Tasmania seems less serious:

Again, limited work by Cotching and Sparrow indicate that the trend for topsoil pH in cropping areas is for increasing pH due to the history of lime applications in these areas, in contrast to large areas of cropping country on mainland Australia (RPDC, 2004).

On the other hand, soil nutrient decline is an increasingly difficult problem associated with the loss of essential plant nutrients due to the erosion of soil and conventional farm production.

Tasmanian agriculture is typically productivist in its heavy reliance on exhaustible energy supplies. Australian per capita energy use is amongst the highest in the world (Boyden et al., 1990) as mechanized farming is exclusively dependent on fossil fuels. In current

agricultural practices oil is essential for powering machinery, for the manufacture and long-haul transportation of inputs and produce.

Fertilisers and pesticides embody considerable fossil fuel energy in their manufacture, while their application often hides a declining soil fertility. Increases in production and even maintenance of existing levels often simply reflect the high rates of fertiliser and biocide used (Watson, 1992: 24).

Shields et al. (1996) discovered that:

In each state in Australia there was a leading agency that has had responsibility for developing a comprehensive, rigorous, and standardized system of evaluating agricultural productivity. The evaluation systems developed by these agencies form the foundation and guiding principles on which other organizations base their assessments.

And additionally:

Land evaluations by valuers within the various Departments of Lands/Land Management and in private employment are concerned principally with obtaining a monetary valuation of individual properties. The value of the most recent sale is their most important criterion for comparing land. *Sustainable land use in the long-term is not a prime concern*¹³ (Shields et al., 1996: 7).

Shields et al. (1996) concluded that the north-west and the north-east regions of Tasmania, the research area of this present study, were two of the most intensely cropped vegetable producing areas in Australia. The good rainfall (often intense) and well-structured krasnozems made for high quality growing conditions. Yet only one regional soil survey of the area existed where much of the land was undulating (from 10–32% to steep 32–56% slopes). The result is high rates of topsoil erosion in many cases where soil conservation measures were not in use. The review also noted the declining condition of other soils in the northern Midlands due to poor management, such as podzolic, deep sands and alluvial, which had been subjected to the same practices as more resilient krasnozems with consequent high erosion, environmental degradation and reduced yields.

¹³ Emphasis added and also, in Tasmania, this function was carried out by officers of the Department of Primary Industries and Fisheries (DPIF) which became the Department of Primary Industries Water and Environment (DPIWE) during the research period and is currently the Department of Primary Industries, Parks, Water and Environment (DPIPWE).

4.5 Conclusion

The vegetable processing industry, in particular potato production, has traditionally had an important place in Tasmania's economy. However, the restructuring of relations in the last two decades, though not unique to Tasmania, is said to have produced undesirable social and agri-environmental effects. Vegetable farmers have complied with the prescriptive conditions of a contract system and in doing so, it is claimed by some, they have ceded their control over farm decision making to processing companies in exchange for the security of marketing contracts. At the same time, it is also claimed there have been significant gains in terms of income security for growers. According to Miller (1996), the problems associated with the industry are largely attributable to an island farming culture. And for Fulton and Clark (1996), farmers were not entirely subservient to the processing companies having evolved social strategies through which they assert their own interests. While it is difficult to dispute the importance of such social strategies, ascertaining the degree this represents in a real or imagined form of resistance to agribusiness demands by hitherto autonomous producers, is problematic. Farmers have also shown a propensity to accommodate change they perceive to be in their interest. This is evident in the uptake of technology and labour saving inputs during the productivist era. There has also been a noticeable willingness to 'borrow' from alternative agricultures such as organics. The latter may represent a moderate attempt at incorporating aspects of change while allowing existing structures to remain in place.

Although the amount of research into the resource impacts of this industry has been limited, it is clear that the condition of agricultural soils and waters is a serious cause for concern. This has been detected in the marked decline in productivity on Tasmania's best agricultural land as well as the value of price returns to farmers. Large-scale clearing of farmland has occurred on Tasmanian land to accommodate irrigation and intensive vegetable cropping. Vast areas are experiencing soil structure decline as a result of intensified productivist practices and the sustainable use of Tasmania's most important soils, the krasnozems, are taken for granted and allowed to erode. The short-term horizon of agribusiness companies places economic imperatives at the forefront while subsuming the growers' control of their practices. All this suggests industry practices that are far from sustainable and the cause of much more concern than is reflected by land management departments and government bodies. In short, it is difficult to avoid the conclusion that

Tasmania's most important resources, in terms of food security, are being mined and squandered through careless and venal collusion between farmers, processors and governments.

If this is an accurate depiction, there is implied responsibility for the damaging impacts of these practices. Farmers who willingly barter their autonomy for economic security must shoulder part of the responsibility as must processors who determine and impose the practices and governments who sit idly contributing little to control the decline of essential community resources. In the case of farmers, there are mitigating circumstances under which they are required to manage a high level of risk in bringing a costly crop to harvest. For the processors, the risks are lesser where their sources of supply are distributed across local and global geographies and gains are more substantial. Such disparities are typical in a capitalist system which offers benefits to all parties, but distributes those benefits according to the accumulation and leveraging power of each. And while it may be argued that economically, socially, agronomically and environmentally, a productivist contract system is both inequitable and unsustainable, the system persists by relying on the support of farmers whom it is said to exploit, thus adding another question to the research: 'why do farmers continue to participate in a costly, human and resource exploitative contract system for the production of profits in which they have a marginal share?'. Answers to such questions will be pursued in the field study interviews with farmers themselves, as reported in the following three chapters.

Phase One – Exploratory interviews

5.1 Introduction

Chapter Four linked the mandatory conditions of the contract system with productivist agricultural practices and their social, agronomic and environmental impacts. In Tasmania, it was claimed that extensive resource damage has already occurred. However, there was a lack of agreement among researchers regarding the residual decision making power of participating farmers. As noted in Chapter Two, structuralists argue that contracted farmers are powerless labourers on their own land, simply following the wishes and directions of processing companies while actor-oriented views claim productivist farmers retain a certain degree of flexibility in production contracts, allowing room to negotiate between their own interests and the demands of contracting capital. However, if contracted farmers were indeed sufficiently autonomous to choose farm practices, they incur responsibility for the impacts of those practices. On the other hand, if farming contracts left farmers powerless to make decisions, then responsibility logically shifted elsewhere (for example, contracting companies). And though the latter mitigates the farmers' liability, it does not exonerate them entirely. As individuals in a democracy, farmers retain the freedom to accept or reject the contract system along with its productivist practices. While this may be so, farmers at the outer limits of survival and adjustment, may have little choice but to submit to dictatorial contract conditions or suffer total loss. From this vantage point, the focus of responsibility again moves to agribusiness and the role of processing companies. It may also be argued as no doubt many farmers would, that as recipients of the smallest share of profits from agriculture, farmers ought only to attract an equivalent amount of responsibility for its damaging effects.

This chapter begins the first phase in the field research of this study which explores the background of the vegetable processing industry in Tasmania as represented by key informants. In chronological order, interviews begin with the state farmer organization, the Tasmanian Farmers and Graziers Association (TFGA), then to farmer commodity representatives, processing company representatives; an agribusiness representative; and an organic industry representative. As indicated in Chapter One, farmer and processing company representatives are the main focus of the study as they represented an interaction

point at which global processes impinge on local actors. In Shute's (1996) terminology (see Chapter Seven), it is where the cosmopolitan and parochial worldviews meet. Phase One is a first step in pursuing the aims of the study which identify the sustainability of the Tasmanian vegetable processing industry and articulate the narratives of some of its farmers.

5.2 Selection of subjects and interview procedures

After approval of the project by the university, it was necessary to determine project participation – to decide on the persons to be involved in the study. This began with telephone contact with an 'executive officer' of the Tasmanian Farmers and Graziers Association whose role was 'maintaining the relevance of the organization to its potato-growing farmer members' (TFGA, 2005). As a key informant in a strategic position between farmers and processing companies, he was logically the first subject for interviewing. The first interview was subsequently carried out at the subject's office in Launceston and lasted about an hour. Several topics were canvassed to gain the subject's views on the major issues relating to the sustainability of the vegetable industry and farmer practices. It was audio recorded, transcribed and analysed. At a second interview, the subject pre-tested the farmer representative survey and offered a list of farmer and processing company representative subjects to be selected for interviewing. The final survey instrument is given in Appendix B.

Twenty-four representatives from the Vegetable Council of Tasmania (VCT), and three representatives from the two processing companies were selected for the interviews (Table 5.1). Two middle level managers, an 'Agricultural manager' and a 'Field service manager' were chosen from Simplot Australia being the larger processor and one senior 'Director of agriculture' from McCain Foods Australia. The members of the VCT were all males, farmers in their own right and elected from the various commodity groups of vegetable growers according to vegetable variety and processing company they supplied. While each group of vegetable growers produces a particular commodity for one of the companies, individual farmers may also contract to produce for both of the companies. For example, potato farmers who grow for McCain Foods elected a representative to the VCT. This farmer represented his group's interests in price negotiations with McCain Foods. Participation in the price negotiating system constituted one of the VCT's most important responsibilities. In their negotiations with the processing companies, this group attempted

to gain the highest price for their members while processing company representatives countered by offering the lowest and usually dictated the final price somewhere in between.

Given the exploratory nature of Phase One and the limited number of the population (44 farmer and 3 processor representatives), it was not considered imperative to use random sampling methods. Instead, with the advice of the TFGA 'rep', twenty-four of the representatives on the Vegetable Council of Tasmania and three processor representatives (Simplot Australia: 2, McCain Food:1) were selected. Selection took into account a desire to cover as far as possible, all types of farmer and company affiliations. All selected members of the VCT and processor representatives, completed the survey interviews.

The interviews commenced in April 2000 (Table 5.1) after ethics approval was granted and one week after introductory letters containing an information sheet were sent to all prospective subjects. Arrangements for an interview were made by telephone to introduce the researcher and the research. This was done with a procedural explanation of the objectives of the research and arrangement of a convenient time and date for an interview.

Organization interviewed	Number of interviews	Date
Tasmanian Farmers and Graziers Association (TFGA)	1 1	April 2000 May 2000
Tasmanian Vegetable Council	24	June 2000– August 2000
Processing Companies' managers	3	September 2000
Agribusiness CEO	1	November 2000
Organic farmers	2	November 2000
Organic agriculture representative	1	November 2000

Table 5.1: Key industry informants interviews

From the beginning of the interview process, a flexible pattern was established:

1. On arrival the interviewer began with some preliminary dialogue about the weather and general farming areas, topics of some interest to subjects. It was also clear from the subject list supplied by the TFGA that all the farmer representatives were male although the subject's spouse was often present at the interview working on the 'books' or making refreshments. Though encouraged to participate by the researcher, all but one partner/wife declined.

2. The interviewer asked permission to begin the questionnaire and to use an audio recorder. Subjects invariably agreed. The researcher restated the purpose of the interview, reminding the subject of data confidentiality and that agreement to participate did not preclude withdrawal from the research at any stage.
3. The questionnaire format was explained as semi-structured and open-ended allowing subjects to express themselves freely. Interviews were subsequently transcribed and copies of individual interviews made available on request.

A list of nineteen questions was prepared by adapting the questions contained in the farmer representatives interviews (Appendix B). As noted above, three processor representatives were selected in consultation with the TFGA. Since Simplot Australia was the major processor with two processing sites, one for potatoes at Ulverstone and another for all other vegetables at Quoiba, central North Tasmania, two representatives were selected from this company. A representative was chosen from McCain Foods at their processing plant in Smithton, north-west Tasmania. All representatives were contacted at their factory sites and interview times and dates prearranged. Subjects were informed of the aims of the project and that farmer representatives had already been interviewed regarding the same issue areas. Representatives were informed of the confidentiality of the interviews and their ability to withdraw from the process at any point. No withdrawals were requested. The same procedure was followed for the processors as for the farmer representatives' interviews. After a short period of casual conversation and refreshments, a request was made to commence the interview and permission asked to use of a recording device. Respondents were encouraged to expand on their replies. All interviews exceeded two hours with much casual, informative and anecdotal information volunteered. While subjects were encouraged to range freely in their responses, a number of questions were introduced by the researcher to explore relevant issues associated with resource sustainability and relations with farmers. These included:

- subject perception of sustainability;
- farmer and processor relations;
- commodity price downward pressure;
- technology;

- green payments;
- government support;
- clean and green image for Tasmania;
- organic production; and
- yield pressure and resource degradation.

To determine subject attitudes to conservation, a list of twenty likert scale items (Appendix B) was added as the final section of the Phase One survey. These items were derived from the literature including surveys incorporating similar scales by rural researchers (Ewers et al., 1989; Chilvers and Cotching, 1994; Sims and Cotching, 1998). Each item was a statement, which required respondents to indicate the extent of their agreement with a letter placed in one of five boxes. The boxes formed a scale from: ‘strongly agree’, ‘agree’, ‘unsure’, ‘disagree’ to ‘strongly disagree’.

The collected views and insights of the respondents were incorporated in the farmer/processor narrative as an important aid in the triangulation of information in this thesis.

5.3 Results

In this section, the results of interviews of farmer and processor representatives, as well as the ‘peripheral interests’ views of an agribusiness and organic representatives, are presented together to identify areas where the views correspond and where they contradict suggesting mutual and competing interests. The interview formats and content were standardized for all participants and reflected the study aim in identifying the distribution and characteristics of practices.

5.3.1 Aging farmers

All representatives in this survey were male, between 25 and 35 (8%), 36 and 45 years of age (37%), 46 and 55 (45%) and 56 and 65 (10%) (Table 5.2).

Age	Number	%
25-35	2	8
36-45	8	37
46-55	10	45
56-65	2	10
Total	22	100

Table 5.2: Age and distribution of farmer representatives

Table 5.2 shows that the largest group (10) was between 46 to 55 years of age, suggesting that a majority of farmer representatives were not at what is conventionally taken as retirement age. However, since it would be expected that farmer representatives would need to be both experienced and sufficiently energetic to cope with the dual role of being a farmer representative and a working farmer, they were more likely to be in the ‘middle age’ range of 46-55 and a poor indicator of aging in the farmer population. The results for the youngest range (2) representing a low level of experience and oldest (2), representing a low level of vigour, are consistent. However, the farmer narrative, a collection of farmer views derived from the interviews, generally pointed to a widely held belief that farming has become unattractive to younger people:

What’s happening now is the farmers with the expertise are getting older and older, and there’s not many young ones coming on with the expertise, and you’ve got ten twelve years down the track, the government needs to start thinking about what’s going to happen (Farmer representative #15).

In agricultural areas, communities were shrinking as productivist farms expanded, becoming highly mechanized and industrialized, employing fewer people and therefore less available to the young:

It’s my view of the future of agriculture for Australia, to be incredibly more productive than we currently are, basically in a cultural and social vacuum, where there won’t be many farmers actually physically there, having all sold out to corporate agriculture, moved to the eastern seaboard, and become no social threat...technology is largely responsible, in a lot of ways in so much as it has allowed us to become more efficient, and in becoming more efficient, we shed all that labour that used to make up those communities that were rural Australia (Farmer representative #13).

According to an agribusiness representative, the economic transformation of rural communities (the way of the world in much of Australia), is now a *fait accompli* including part of the area of this research:

Well, I think it's happened, in north-west Tasmania for example, there's a lower retention rate than in any other state in Australia. There's the lowest tertiary education and the highest for heart disease. It is all linked to this diminution of income from rural land. If you go to rural NSW, Brewarrina, Nginin, the heart of the place is gone. There's no large number of people surrounding them anymore. They don't have people on the land so, I think, maybe it's happened already: whether it's reversible is another question (Agribusiness representative #1).

In views that reflected economic rationalist principles, such changes in rural regions were perceived as inevitable by participants. Accordingly, farmers left the land when they were no longer competitive and able to operate profitably.

5.3.2 Agricultural sustainability

With the exclusion of organic farming representatives, subjects suggested profitability was the defining quality of 'sustainable' agriculture. On the other hand, from the perspective of organic growers, the economic imperative belonged at a lower level of agricultural priorities – below those of healthy food and functioning integrated systems:

The concept was not really to make money. It was basically because people were concerned for the environment of the globe. That's what the originators of the organic movement were all about. They were concerned that the environment was being degraded by the techniques being used and we were getting into specialization, and the whole holistic approach in the management of the land was lost. One piece of dirt may be a source of multiple business opportunity in an integrated system. The other thing is, many people do not appreciate the value of healthy environments and the ability to produce good quality food from places that are perceived as clean and green. Instead we are growing monocultures of radiata which is clear-felled on the same day, and destroys our hill country turning it into eroded moonscapes (Organic representative #1).

The term 'sustainable' has now developed a high degree of elasticity, which can blur important distinctions. Regardless of the vagueness surrounding the concept, it was considered important to determine what significance the term had for participating farmers

and processors. Subjects were asked, 'How would you define sustainable agriculture in your own words?' Their responses are summarised in Table 5.3.

Reference area	Number	%
Economic returns	14	22.0
Future viability	14	22.0
Protection of resource	8	12.5
Good rotations	6	9.3
Environmental protection	5	7.8
Maintenance of future yields	5	7.8
Maintenance of quality	3	4.6
Leaving land in better state	3	4.6
Providing good income	2	3.0
No winter harvests	2	3.0
Good records	1	1.6

Table 5.3: Reference areas in farmer representatives' definition of agricultural sustainability

In defining sustainable agriculture, 22% of subjects' references included the maintenance of the viability of their farm business without causing long term damage to the soil. Another 22% specified economic returns. These are not altogether contradictory expressions of sustainability as productivity in the long term is an essential dimension of sustainability in agriculture. However, only about 5% of the references included being able to hand on their land in a *better* condition:

To be able to produce that crop indefinitely. My philosophy is I want to leave my land in better order when I finish than when I started (Farmer representative #10).

In defining sustainability, respondents generally referred to the importance of environmental management, sustainable agricultural practices and borrowing from organic techniques, which included the use of shelterbelts and minimum tillage. There also appeared to be wide use of green manures, confirming results by Cotching and Sim's (1998) report of a 98% rate of use. The interviews indicated an awareness of soil erosion problems in Tasmania and, in a few cases, the use of grassed irrigation runways to avoid it. Cotching and Sims (1998) also reported similar results about contour drains and grassed irrigation runs.

In Table 5.3, farmer representatives' definition of sustainable practices, two references pointed to the problems associated with winter harvesting of crops such as potatoes. Accordingly, the shortage of storage space for these crops often required farmers to leave a portion of their potato crop in the ground until required by the processing companies. This practice delayed harvesting until the onset of the winter wet season when soil disturbance often became a cause of costly erosion and serious compaction problems.

Given the persistent difficulties in developing a consensus on a universal definition of sustainable agriculture in academic literature, it was hardly surprising to find some diversity among the farmer representatives' own definitions. At the same time, it was also possible to see a degree of congruence in the recurrent references to economic viability and productivity as a measure of sustainable practices. It is of some interest that while 8% of references pointed to environmental protection, only about 2% were in terms of a good standard of living for farmers, suggesting that farmers may value environmental well being ahead of their own. However, the possibility of political correctness as a response effect may have been a factor in this result. Further support for this contention was clearly required.

For processors, the primary attribute of sustainable agriculture was a focus on yield and money. Any other considerations appeared to be extraneous to the business of production for the industry:

Researcher: Some vegetable farmers claim that low returns cause them to lose the capacity to manage their land sustainably.

Processor representative: Yes, if they cut corners, they shorten their rotation. My answer to that is: increase your yields. My clear answer is: guys, you've got no option, you're a farmer, this is the price, the only option. You're a businessman, you've gotta get more dollars from that same piece of land. The best way to get more dollars from that same piece of land, is to increase your yield (Processor representative #2).

5.3.3 Profit distribution

According to farmer representatives, getting more money would not be so difficult for farmers if the industry profits were shared more equitably. Many of the farmer representatives (21) claimed there was an imbalance in the manner profits were allocated within the sectors where vegetable farmers were the most disadvantaged. A majority (17)

stated that retailers appropriated much of the industry's profits while the processors still managed to secure a good share for themselves. In this respect, almost all respondents were critical of the retailers and fast food merchants:

retailers make far too much money. Roelf Voss [a northern Tasmanian retailer] was charging five times as much as the farm gate price to farmers and they reckon they were selling their vegetables at farm gate prices. We get \$200 a tonne for the potatoes: McDonald's sell the chips for a thousand dollars a tonne. They just take the money and run. There's nothing coming back into it and this is [the farm] where the bulk, the resources go into them, this is where the environmental impact happens down on this level, and the profits are made on the other end. Shareholders: they couldn't give a bugger whether there's degradation of your soil or water (Farmer representative #22).

According to 40% of farmer representatives, a key issue was the unbalanced relationship between processors and vegetable farmers. The dominant negotiating power of processors was not only associated with the unequal distribution of profits, but also social and agricultural resource sustainability problems. As noted by Processor representative #2, diminished price returns to farmers, meant shorter rotations. Farmer representatives claimed inadequate returns caused degradation, increased occurrence of disease and losses to farmers as a result of unaffordable best practices. Financially strained farmers survived at the expense of their soils and environments.

However, according to one processor representative, the picture of price distribution was much more complex than reported by farmers and media (Figure 5). He indicated that in the case of potatoes, there were many costs associated with the processing stages through which the raw product passed on its way to the retailer and fast food outlets. Thus comparing the returns for the raw product with the consumer price was in his opinion, unhelpful and even misleading. However, while the processor representative was happy to list company costs, he was unwilling to divulge profit margins to the researcher. But he did note that, as in the farmers' case, company buyers (retailers and fast food outlets) dictated the prices processors themselves received:

We believe that we're price takers too, whereas people like KFC, McDonald's, and supermarkets demand too much of us (Processor representative #3a).

Big boys not all bad guys

LETTUCE grower Anthony Houston is happy dealing with supermarkets.

"I can only speak for ourselves, but the supermarkets treat us pretty damn good," Mr Houston said.

"Then, so does every-one else."

His business, Houston's Farm, supplies 16 wholesalers - supermarkets included.

Supermarkets typically pay about 90c a lettuce and charge their customers an extra 40%.

When lettuce went on special the farm gate price could drop to 80c or 75c for product sold in the supermarket for \$1.

At this time of year supermarket lettuce prices are slightly higher than usual because they have to be brought from the mainland.

Mr Houston said his

VEGETABLE PRICES

	FARM GATE	SUPERMARKET
APPLES	60c/kg	\$3.00-3.70/kg
LETTUCE	90c ea	\$1.30 ea
CARROTS	20c/kg	\$1.25-2.00/kg
POTATOES	18-25c/kg	70c-\$1.50/kg
BEANS	33-38c/kg	\$2.29-3.55/kg
PEAS	34c/kg	\$2.06-3.09/kg
ONIONS	10-14c/kg	40c-\$1.50/kg
PROCESS POTATOES FOR McDonalds	19c/kg	\$14.00/kg

Figure 5.1: Value-adding in the vegetable processing industry (Source: Tasmanian Country, 2000: 5)

The researcher noted that no mention was made of the processors' ability to pass their costs (but not their profits) to farmers. From the perspective of processing company representatives, the economic problems of the industry were directly related to the inability of Tasmanian farmers to increase their yield from vegetable crops. The reason for the low returns to Tasmanian vegetable farmers was due to their inability to become 'export competitive'. These farmers were vulnerable to competition from cheaper imports from regional neighbours such as New Zealand. The same processor representative claimed that US growers were able to supply processors on a 12% profit margin while in Tasmania; farmers received 20% (a claim disputed by some farmer representatives). Another processor representative added that Tasmanian farmers needed to improve their productivity levels from the last four or five years. The growers were said to have an unrealistically high expectation of profit margins from potatoes because this was a crop they relied on to pay most of their bills. Unlike the US where returns from potatoes were on a par with commodities such as wheat, in Tasmania, it was still profitable to grow potatoes:

I think they're [growers] doing reasonably well and, if growers sat down and treated each crop as a different enterprise like we have to here, if growers sat down and worked out their profit from potatoes, peas and pyrethrum and so on, some of them may drop out of some of the other crops and just grow potatoes (Processor representative #2).

Yet these assertions were highly disputed by the TFGA representative:

Now if they wanna do what they have done over the years and compare us to the US, 'you people get more than the growers in the US', current exchange rate, our growers are probably ten dollars at least behind their counterparts in the US (TFGA representative #4)

For the processor representatives surveyed, higher yields were paramount. And yet if Tasmanian potato farmers were in fact 'import vulnerable', then according to the processing company logic, the farmers should be priced out of the potato industry. Clearly they are not, because according to the TFGA representative, there is sufficient demand for the superior quality of the Tasmanian product, which has always been reflected in better prices:

There is no question in my mind that Tasmania has one of the best producing areas in the world for vegetable growing, no question about it. We've got the soils, the climates and the farmer expertise. Combining all these and providing the mechanism for exploring export opportunities is a formula for growth (TFGA representative #1).

This was a point that processing companies understood sufficiently well for the major processor to make Tasmania their Australian centre for potato growing.

Clearly, for processors, productivist practices were the solution to all problems. Representatives stated that intensive management practices were indeed sustainable because by increasing yield through inputs and improved irrigation, this practice allowed the lengthening of rotations. Longer rotations meant less soil damage from heavy harvesting machinery and traffic. Following this line, the only way farmers may become economically sustainable and withstand continuing price decline was by increasing their yield. And the desired and achievable yield agreed by both processors for the industry is in the order of 55-60 tonnes per hectare. Presently, the average is around 45 tonnes (DPIWE, 2003). Increasing their yield inevitably meant that farmers would need to farm even more intensively, thus degrading their soils, or buy or lease more land.

In addition to low price returns farmer representatives also cited a lack of sufficient storage for the growers' product as the major problems of the industry. A majority claimed these were key causes of soil degradation. They consistently argued that a fair price return was essential if operations were to remain profitable. In their eyes, having made all the possible

productivity gains, the only fair outcome to them was an overdue price increase (e.g. Farmer representatives #1, #5, #7, #10). A majority held that the simplicity of this logic was unassailable.

On the other hand, processor representatives claimed that the key to better farmer price returns and sustainable practices, were further productivity gains which were lacking because Tasmanian farmers were too 'complacent' and uncompetitive (Processor representative #3). Yet according to another agribusiness processor view, the causes for the downturn in commodity prices was due to lack of farmer solidarity in price negotiations:

I think it's a couple of things. Increasing productivity at the farm level which means that farmers can produce for less, and the other is fragmentation at the producer end and concentration of buyer at the buyer end, which means that the buyers are determiners. Now there's two issues. The farmers and people like us who contract the farmers and grow our own product whether we do it here or New Zealand or somewhere else, there's always someone who says, 'that's not a bad market, I'll get into that. I reckon I could do it for a dollar less.' That one person at the margin can come into the market place and by offering the product to the biggest supermarket chain in the world or something, or one of the big ones, can corrupt the whole bloody market for the rest of us. You get a highly productive farmer on very good dirt, good water supply; they actually make a dollar with a cheap currency perhaps and sell it in euros. All that means is the supermarket buyers who receive that offer then say, 'I can buy at that price, I expect you to get that price too' (Agribusiness representative #1).

5.3.4 Industry relations

Farmer representatives were asked to describe their level of satisfaction regarding the working arrangements and relations with the processing companies. Twenty-five percent of respondents indicated they were 'happy' with the current situation while 55% were 'unhappy' and 20% were 'very unhappy'. Asked to state what changes they might suggest to improve the situation, 33% referred to getting a higher price for farm products. Other suggestions included an attitudinal change between industry partners towards increased levels of cooperation, consideration, openness, consistency and fairness. The full number of suggestions, as indicated in the following list, expressed a significant level dissatisfaction with processing companies (55%), a lesser level with government

institutions (28%), and even less with retailers (11%) and minor concerns in relations with financial lenders (6%):

- It is time to institute a set of new relations with processors.
- A general attitudinal change is needed to enable all participants to make a living.
- Processors ought to be more considerate of growers.
- Processor contracts need to be more cooperative on a partnership basis.
- Processors to see the limits to farmer price reductions.
- The background to processor dealings and negotiations to be more transparent in so far as it affects growers.
- There needs to be more communication between farmers, retailers and consumers.
- There ought to be more competition between retailers.
- Processor management ought to show more policy consistency.
- Processors need to have a better 'feel' for farming practice.
- There ought to be an independent product-grading body of farmer produce other than by processors or packers.
- Excessive government red tape needs to be reduced.
- There is a need for more localised representation by government members.
- More support is needed for agricultural research.
- The results of agricultural research to be made freely available to farmers.
- There is a need for more respect between all participants in the industry.
- Lower interest rates are required from the banks and other lending bodies.
- There ought to be a reduction in the fuel prices to farmers.

The results indicate a serious lack of mutual understanding among farmer and processor representatives who perceived each other less as partners and more as the sources of industry problems. Some farmer representatives were clearly aware of the power of retailers to make demands and dictate profits to processors, which were then filtered down to reduce farmers' own returns:

They [retailers] seem to be able to go extreme lengths to get prices down. They'll get quotes on a supplier from anywhere in the world whatever the product might be, even if they haven't got the intention of bringing it in, they'll do that to get the Australian supply price lower. There's a case some years ago that's been quoted quite regularly and

I often think about it, where I understand it was Coles, were not happy with Golden Circle in Queensland, who were the only supplier of sliced pineapples and they only packed under their own label. They wouldn't supply the generic market, you know, Farmland or Blue and White or anything else, because that needs to be discounted, and the supermarkets went to the extreme lengths of financing the growing and then the processing operation in Thailand, so that they could get an alternative supply to force Golden Circle into supplying lower priced generic products (Farmer representative #15).

Nevertheless, a majority appeared more affected by the immediacy of confrontations in negotiations with processors. In addition, high levels of dissatisfaction among farmer representatives, who would be expected to have a more nuanced appreciation of causes and effects, pointed to communication problems and industry instability. A consensus among farmer representatives asserted that a price rise for vegetable products for farmers was overdue. This was strongly supported by the TFGA representative who expressed broader views regarding the power structures in the industry:

I've no doubt that the processors are under pressure from the retailers, and the retailers themselves are under pressure from the consumers. I don't believe either of them. I've just had recent indication, that one of the major processors has increased the price for their product in the market place-twice in the last twelve months. And they're about to implement another price increase. Now, I can't verify that, but I have it from a pretty good source. If I could, I'd show you. I believe my source, and when I look at what the growers are receiving, for the crops and for the length of time that they've been taking a price which has been essentially flat or lower since 1991-92, I have to ask what is fair? It's all about the weakest link in the chain being bashed the hardest. That's the grower, because he can't pass the price cut from the processor onto anyone else (TFGA representative #1).

About a third of farmer representatives expected that processors and retailers would oppose a rise in a decade old price. One farmer representative suggested that some objection might come from consumers. However, in general, farmers attributed their low returns directly to processors. They reasoned that processors could afford to forego a very small percentage of their profits, which would improve the farmers' situation 'immensely'. For example, out of the dollar processors made on a kilogram of potatoes, an increase of ten cents could be paid to the farmers. This would be enough to change the farmers' economic returns and allow for improved practices. In respect of increased returns to

farmers, processors argued they were unable, being themselves squeezed and dictated to by retailers and fast food sellers. The latter, they claimed, appropriated much of the power to influence both the cost and sale price of farm products. The effect was further pressure on farmers to produce more for less. Thus, 'price squeezed' between rising costs of farm inputs and falling product returns, farmers have little choice but to comply.

Thus, a third of farmer representative responses indicated a decrease in their expected incomes in the next five years, while about a half indicated their incomes would remain unchanged. None anticipated a rise was imminent. Farmer representatives pointed to the decade old prices they were being paid while input and machinery costs had risen markedly. This was a crucial point underlying the discontent reported by most farmer interviewees. Under normal business conditions, production costs are passed to the buyers. Farmers accepted mark-ups when purchasing their own machinery, fuel, inputs and labour. Yet, through the conditions of the contract system (as 'price takers'), they were prevented from passing on their increased costs in full and compelled to compensate by working harder and more efficiently, as well as investing in more powerful and expensive machinery. Most respondents claimed that farmer profits had been halved in the last five years and that many producers had reached the limit of their capacity in terms of efficiencies and productivity gains.

Several farmer representatives declared they would need to make a more robust response to the dictatorial price setting by processing companies. Farmers needed to become 'price makers' and, for this to occur, individual farmers would need to show more solidarity. This was an important point as it meant a break from traditional conservative farmer attitudes and behaviour. As a result of productivist pressures, conservative farmers were becoming 'militant'. And, from the strength of views expressed by respondents, the traditional distinction between a farmer association and a union organization appeared to be blurring. This observation was borne out in subsequent events which saw large numbers of farmers mounted on tractors and trucks, military style, blockading the McCain Food processing company in Smithton. They demanded and received an improved price return. All this occurred with an unprecedented degree of public and media interest and support for the farmers and their demands. This level of consumer support was unexpected by this researcher but not, apparently, by the farmers themselves. Farmers were portrayed in a

sympathetic manner, standing up for their rights against corporate greed and power, a situation which ensured public support.

5.3.5 Technology

Distinctly productivist views were detected in the farmer representatives' responses on technology, biotechnology and genetic engineering. Seventy-five per cent of respondents claimed that there was a great deal of advantage to be gained from the use of new technology. While subjects appreciated past technological gains in terms of efficiencies, yield and a release from the drudgery of physical labour, representatives had some reservations regarding the overall benefits and gains from the constant application of new technology to agriculture. A fraction (25%) stated that the benefits might only be 'small':

I don't know if that's [technology] a good thing or a bad thing. It's produced more food; it's reduced the amount of physical work but by the same token, instead of us trying to make a living out of growing ten acres of potatoes, and running a hundred beef cows, we've now got to grow sixty acres of potatoes, run three hundred and fifty beef cows, and plus go into growing onions and other crops to utilise the machinery. It's basically gotta be full-on all year. Like, to own a tractor now, you've got to use the bloody thing between 800 to a thousand hours a year. So you gotta utilise what you've got to the maximum (Farmer representative #14).

For some farmer representatives, a technology-enabled intensification of agriculture has meant added pressure on farmers to increase the size of their operations and on the land, to produce larger volumes of cheap food. This development in current agricultural practices may have serious implications for the sustainability of natural and human resources. When productivity goals outweigh all other considerations driven by diminishing profit returns to farmers, sustainable practices may be given a lesser priority.

A strong connection was also made between technology-enabled efficiency and depletion of rural communities. Increased pressure on farmers to use new technologies has decreased the demand for rural labour leading to some migration from the countryside. Many farmers have found it necessary to substitute expensive labour with machinery as a cost-saving measure and where necessary, farmers have undertaken to use their own labour and that of their families, working long hours and themselves to exhaustion in order to save on costs. This trend has resulted in reduced rural employment for young men wishing to learn and enter into farming.

In 2000, the debate surrounding genetic modification of food was intensifying in Australia and Tasmania. Activists began to highlight the food effects and dangers to the environment and in agriculture, the likelihood of weed resistance and increased use of chemical biocides. As the interviews occurred during this period of controversy surrounding the introduction of genetically modified organisms into Australian food systems, it was appropriate to inquire about the farmer representatives' attitudes and responses to the new technology. Farmer acceptance would be a significant factor in the diffusion of genetically modified crops. It was assumed that participants had some rudimentary knowledge of the subject through general media and farmer publications.

When asked, 'What do you think might be the advantages to be gained by vegetable growers from new technologies?' Half of the farmer interviewees (12) indicated confidence in the ability of biotechnology to deliver higher profits to farmers. Some representatives pointed to a pattern where efficiency gains from new technology had often been eroded by price decline. When introduced technologies were affordable, there were short-term gains by early adoption. As the technology became more affordable and widely dispersed, competitive edge was reduced and quickly followed by a return to a *status quo ante*. The suggestion here was that a similar process was likely to apply in the case of biotechnology. Consequently, a significant number of farmer representatives (10) expressed uncertainty regarding gains from such innovations. Importantly, the uncertainty was based on economic concerns rather than environmental and consumer safety.

While farmer representatives (17) indicated their approval of genetic engineering, a majority (19) expected benefits in several areas:

- Achieving better price returns;
- Development of blight resistant cultivars in potatoes;
- Controlling weeds;
- Increasing alkaloid levels in poppies;
- Use of less chemicals generally; and
- Decreasing of pesticide resistance in insects.

Nineteen representatives responded in the negative when asked if a ban on all genetically modified farm products was reasonable. However, *all* respondents asserted they would not allow the use of a biotechnology that increased herbicide residues in vegetables. Apart from the increase in production costs, it would seem that public interest in food health and quality has become a source of some farmer concern.

At the same time, a majority of farmer representatives were confident that genetic engineering would improve their system of production. There is a suggestion here that since none of the farmer representatives claimed expertise in biotechnology, their strong confidence in genetic engineering may be driven by confidence in technology in general and an optimism that genetic engineering will reduce their production costs. At the same time, a significant number of interviewees (11) indicated that biotechnology contained potential dangers. Only a very small number (2), were confident of its safety.

The general view of farmer representatives was that all new technologies needed to be 'scientifically' and rigorously evaluated. Furthermore, only when there was public approval and acceptance, would processors and farmers begin to use the technology and its products. Any other approach that attempted to 'shove it down the public's throats' would fail. The research detected agreement on this point between representatives of both growers and processors. Put simply, it would be a market decision and many respondents stated emphatically that consumer resistance would be short-lived. This indicated an overwhelming confidence in not only technological progress and its benefits but also the power of marketing. The interviews contained an implicit suggestion that regardless of the impacts of productivist farming practice in the short term, (which may lead to some resource degradation), science may be relied upon to compensate.

For the processor representatives interviewed, biotechnology was the way of the future. The adoption of genetically modified food in their product lines was neither an ethical nor a scientific issue. It was a pragmatic market decision based on a commercial absolute – consumer acceptance:

What we sight at the moment is that the customer is not ready for it. So we've made a point that we will not be putting any GMO products into our potatoes or our operations or our vegetables simply because the customer is not ready for it yet (Processor representative #3a).

5.3.6 Green payments

‘Green payments’ is a term used in the UK, Europe and the US to describe a form of agri-environmental subsidy paid to primary producers when they signed a management contract with the government ministries of agriculture (Morris and Potter, 1995). Under this scheme, in the UK, some farmers were paid to recreate wildlife habitat reduce overstocking and input use and, if they had land under an Environmentally Sensitive Areas Programme, to open it up to greater public access.

In Australia, programmes such as the Australian Government’s Envirofund under the Natural Heritage Trust (now replaced by ‘Caring for our Country’) were intended to achieve similar goals. Since 1999, under the National Reserve System, the Federal Government began the work of protecting rare and threatened ecosystems on private land which was not for sale:

With the need to connect whole landscapes to help species to adapt to climate change, the Australian Government is now working with partners to expand the investment in protected areas on private land. Tasmania has led the way in this new partnership (Australian Government, Department of the Environment, Water, Heritage and the Arts, 2009).

Farmer participants were required to enter into a voluntary conservation covenant between a landholder and the state or territory to conserve the natural environment on the property. It became a legally binding commitment tied to the title of the land in perpetuity. Future owners, therefore, were also bound to the conservation management commitment. Landowners were expected to:

1. supply at least one-third of the establishment costs, and cover the full costs of ongoing management;
2. enter into a contract with the state or territory agency involving an on-going commitment to manage the property and report on management outcomes; and
3. develop and implement a management plan and monitoring program (Australian Government, Department of the Environment, Water, Heritage and the Arts, 2009).

Having had the concept explained to them, farmer representatives were asked if they thought that a green payments subsidy would be attractive to Tasmanian vegetable farmers. A clear majority (17) claimed that they would support such a proposal, and a period of five yearly green contracts was considered 'about right' by a slightly lesser number (15). Others were wary of the 'strings attached' to potential green payment schemes, which they believed were likely to involve added bureaucratic monitoring and an unwanted degree of external interference into farm operations. However, a significant number (11) stated that fifty per cent of their members would support such a scheme. They also claimed that to be accepted, the scheme should not entail any loss of income to farmers. Such a decision would necessarily be a short-term economic decision. Farmers who now generally see themselves as businessmen would simply look at their bottom line:

If they said, well you can put a hundred acres of your farm aside for five years and we don't want you to be doing anything and I'll give you a hundred dollars for it, you'd say go and get stuffed. But if they said I might give you ten thousand dollars a year, or five thousand or twenty thousand you would say you was doing business. And if the business was alright, you'd be in it and if it wasn't, if you could make more out of it by farming it you'd say no. If you could make more out of it by doing the other or about the same, or thereabouts, you'd say yes, do it. Just straight-out business (Farmer representative #18).

I would expect that a lot of the growers would accept the challenge and be more than willing if the government made available funds to be able to repair degradation on their properties. I've got no problems at all that growers would take that up. I definitely would support that. By the time you assess a problem and get expert advice on how to fix the problem and come in and do the job and then maintain the particular project for a period of time, I can see that five years will go away pretty quickly. I think five years is a reasonable time frame (Farmer representative #15).

Other farmer representatives believed that such schemes were liable to be abused by a number of vocal farmers who understood the workings of the political bureaucratic system. The result would be misappropriation and worse:

From what I've seen of that, the few people who make all the noise get most of the money. They concentrate on the rivers. That's where all the money's been spent around here. Around here they've taken out all the willows, which can be a nuisance. But in some areas where the rivers have been fairly wide, it's probably only gonna cause erosion, so I don't think some of that money has been all that well spent, and it does

seem to be concentrated on the few who speak up (Farmer representative #17).

It was generally held that no scheme, which was solely administered by bureaucrats and did not include farmer input, would succeed. This view found some support in Farrier (1996) who claimed that the best course of action lay in designing policy instruments which contain a mix of regulation and incentives, and which rely on a combination of 'top-down' and 'bottom-up' strategies. Farmers have an important role in biodiversity conservation and their involvement is essential:

there is a powerful argument that private landholders should be induced to play a real role in implementing management plans. Many of them know their land very well indeed, and this expertise is lost when land is taken into public ownership. In the face of substantial scientific uncertainty, we should build on to the existing knowledge base Farrier (1996: 14).

On the other hand farmers have traditionally thought of themselves as independent land managers. About half of interviewees (12) agreed with the proposition 'there was too much outside interference with the way you farm these days', while the same number disagreed.

Another important consideration for some farmer representatives was that although environmental schemes may be beneficial in terms of resource conservation, implementing them would be likely to make demands on the farmers' time, expenses and energy. For farmers experiencing economic hardship, a full cost subsidy would be required to help undertake such projects. Eleven of the interviewees claimed that the most reasonable and achievable type of incentive for a green payments scheme would need a farmer subsidy of about half the cost of the environmental projects. Additionally, although six respondents preferred an 'up front' payment and four, payment 'by results', a majority considered that a method, which combined the two types of payment would be the best option in the long term (14). This would, in their eyes, discourage abuse of the programme.

Abuse is also an issue in setting aside environmentally critical land for the conservation of biodiversity. Farmers have been known to opportunistically offer their most marginal land for resting while intensifying production on land with more arable qualities (Morris and Potter, 1995: 59). According to Farrier (1996: 19):

Although strategies which encourage those already committed to conservation ideals

clearly have a role to play, we cannot afford to leave to individual landholders the choice of areas to be protected. Ecosystems cut across property boundaries. By refusing to cooperate, one person with a strategic landholding can effectively destroy a wildlife corridor or leave a destructive gap in a buffer zone. Even worse, core areas may be left to the tender mercies of economically marginal landholders, pressed by their perceived short-term economic self-interest to bring them into agricultural production.

The interviews also indicated that where soil degradation was serious and in an advanced state, pragmatic farmers would be more likely to accept a lesser subsidy, which may simply involve an interest-free loan. These results were consistent with those of Blunden, et al. (1996: 30) in which 80% of farmer respondents suggested that it would be some encouragement if an environmental fund was established that would pay half the material cost of environmental projects. Characteristically, farmers in both cases were ready to supply their labour and machinery in lieu of monetary contribution.

Interviews generally indicated a degree of scepticism among farmers regarding government encouragement of sustainable management. About three quarters of interviewees felt that governments, both federal and state, demonstrated scant interest in farmer problems and the manner in which farmers managed their land:

I mean we're sitting here with our hands tied and the government don't really want to know how it works (Farmer representative #11a).

Some farmer representatives claimed that there was marginally more concern from federal authorities than state. Interview narratives also pointed to a high level of uncertainty among farmer representatives in respect of government support, which may derive from a lack of communication between farmers and official bureaucracies. Generally, interviewees suggested governments were remote entities whose main electoral support derived primarily from metropolitan areas particularly in southern Tasmania. Consequently, rural issues were low on a politician's list of priorities. Some farmer representatives also claimed it was illogical to place government agricultural departments and decision makers in the southern part of the island when the majority of farming activities occurred in the north:

The nature of caring for people is such that it's a political decision every time and, sadly, Australia is so centralised in urban areas that there's not many votes in the rural areas. Let's be blunt, Melbourne and Sydney do determine what happens in Australia. While I

mention Melbourne and Sydney, I could come back to a local area. The urban areas of Tasmania still do determine what happens politically, Hobart and significantly so, Launceston (Farmer representative # 8).

On the issue of general support for farm sustainability, interview narratives further revealed a widespread belief that the responsibility for sustainable agricultural practice ought not be the sole responsibility of farmers. Many respondents claimed that the beneficiaries beyond the farm gate had some obligation to help in ensuring that agriculture was sustainable. Where a community has had its food needs supplied by farmers and was benefiting greatly from historically low food prices, at the expense of producers and their soils, this community had a clear obligation to help in the mitigation and avoidance of resource degradation. This responsibility might be best met through significant government support for the agricultural sector. Interviewees stressed that Tasmania's farmers operated under a double disadvantage being distant from both national and international markets. Consequently, their needs for public support were even more pressing than those of mainland growers:

probably the biggest problem we have in Tasmania is the freight across Australia for our product. That's where we have problems competing against even mainland processors, the same companies with factories on the mainland or competing with New Zealand, which can put French fries into Sydney for the same price we can out of Tassie – all because of our freight across the Strait (Farmer representative # 22).

While the Australian economy has undergone some teething problems since deregulation in the 1980s, it has adjusted. During this period, adjustment pressures on farmers have been heavy at times. Yet to claim they have been unrepresented politically, is a likely overstatement. They are led by a peak national body as well as state organizations and commodity groups. Their views are widely sought after by media through which they muster significant support in the community. Yet, from their own perspectives, their concerns are misunderstood and problems neglected. One explanation for their discontent may be an inability to adjust to a less privileged status after the heady productivism of the post war years when government support was at an all-time high and farming a less onerous lifestyle.

5.3.7 Clean and green

Given the increased interest among national and international consumers in healthy food produced in an environmentally benign manner, determining what barriers might exist for the adoption of best practices would seem to be an important issue for the agricultural industry. A majority (17) of respondents agreed that a 'clean and green' image was important as a marketing device although two noted that it would be more useful if it could be substantiated.

At present only limited use of the concept is made by Tasmania's vegetable industry because processors marketed under their own brand with no reference to the state of origin or conditions of production. Farmer representatives were generally aware of the possible benefits of a clean and green marketing image in spite of their reservations that a government would seriously entertain such a scheme.

Processor representatives on the other hand, were more convinced that there was a great deal to be gained in maintaining and supporting the strength of their own brands. Being geographically mobile¹⁴ an emphasis on the source of their products would lessen this mobility by shifting the value of their market from brand name to product source. This would reduce their bargaining position in negotiations with farmers seeking higher prices on the strength of a Tasmanian product's clean and green image. Processors marketing according to product source such as Tasmania, would be tied to that source and less able to use the threat of relocation convincingly. For farmers and the Tasmanian economy on the other hand, the pursuit and promotion of a clean Tasmanian image, may be the path to better prices on the world market and the an opportunity to employ more sustainable practices. It is being practised on King Island to the north in King Island Dairy, a successfully marketed producer of quality world renowned products based on a clean pristine image:

More than 9,000 cows and 80,000 head of beef graze on some of the cleanest and greenest grass in the world and produce the best quality beef and most pure and sweet milk (King Island Dairy, 2009).

Resource sustainability from diversification into clean and healthy products has clear long-term advantages for all stakeholders. But a change from the present system is difficult to

¹⁴ Companies that claimed to be mobile are able to relocate their factories nationally or further within a short time.

contemplate. In one interview, a farmer representative set out the economic dimensions of the problem:

We have to get to a situation where we do not need to rely so much on food processors. We have to be more diversified. Most growers are growing a range of crops, and potatoes are about over 50% of the gross value of vegetables. That's a lot of vegetables in one basket, and they know they can't opt out overnight. The problem is when you look at your rotation for this year, it's no good growing potatoes in Tasmania 'less you've got a market. It's too risky to grow fresh potatoes on 'spec', say for supermarkets, or anyone (Farmer representative #10).

Under the present circumstances, marketing a clean and green Tasmanian image remains merely a small consideration from one processing company perspective:

There are some perceived advantages, for example, McDonald's advertise their French fries as coming from Tasmania. They have them made from Tasmanian Russet Burbank potatoes. I'm not saying there are no advantages from the Tasmanian name, but our company doesn't rate it highly (Processor representative #3a).

Another consideration underlying attempts to develop a market based on clean and green conditions is that it is not an automatically available option in Tasmania. Decades of heavy industrial metal pollution into its rivers and surrounding oceans, toxic agricultural biocides and phosphates into its soils and waterways, and the devastation of its forestry industry, have left an environmental wasteland in their wake. The extent of the outrage is sufficient to provoke a productivist farmer into voicing his dismay:

We're no cleaner or greener than anywhere else. Everybody, and I mean globally, is trying to minimise their chemical applications, we're no different here. I don't know really if the green image has got any value, but I certainly know that the environment is worth preserving. If the emphasis is on image, I don't give a monkey's about the image, it doesn't mean anything to me, but the clean green image for making a positive contribution to making sure that we're environmentally conscious, well that's important (Farmer representative #13).

5.3.8 Organic farming

Similar considerations are important for the development of an organic vegetable industry. Organic farming and a clean and green image are not necessarily synonymous. Although an organic agriculture would need to be clean and green, the reverse does not always apply. According to Blunden et al. (1996), conventional farmers continue to be locked into an industrial agricultural model that is neither clean nor green, nor is it organic:

The continued emphasis on conventional agricultural production methods is emphasised by the finding that these farmers do not view alternative farming regimes, such as organic or biodynamic farming, as either viable propositions or contributing to sustainable agriculture.

However, Lyons and Lawrence (2001: 1) have pointed to the emergence of an 'integration of organic practices within conventional food systems – something that many commentators would not have predicted, but which appears to fit well with theories of greening'. This was confirmed in this research where a significant number of farmer representatives (15) claimed that they found some value in organic production and some had already adopted techniques such as green manures, shelterbelts and minimum tillage. However, the majority of respondents qualified their answers by suggesting a lengthy list of reasons for 'caution' about the widespread adoption of organic production. The consistency of this view among respondents suggested some support for Blunden et al. (1996), that farmers have a distinct bias against alternative farming methods and as Burton (2004) discovered, associate notions of good farming with a productivist model. According to respondents in this research the obstacles to the widespread acceptance of organic agriculture in Tasmania were as follows:

- red soils are unsuitable – contain insufficient organic structure;
- unworkable in a broad cropping setting – a labour intensive system would not be workable in broadacre cropping;
- would not yield sufficient quantities – low organic yields would not be competitive;
- no significant improvement for health of consumers over conventional agriculture;

- niche market only – insufficient consumer demand for organic products;
- presentation of produce unattractive for mainstream consumers;
- price too high for mainstream consumers;
- short potential only on price – the more widespread the adoption, the less the returns;
- high labour costs;
- soil depleting after about 2 to 3 years; and
- may lead to widespread diseases – difficult to crop without pesticides and weedicides.

It is however, more likely, as the list suggests, that rather than being ‘biased’ against alternative agricultural methods, pragmatic productivist farmers are selective regarding the practices they employ, basing their choices on costs and efficiencies. About two-thirds of farmer representatives stressed that they would have no ‘philosophical objections’ to changing to organic production, providing there was demonstrable proof that such a system would be economic in the long term. Some interviewees added that it was also unhelpful of dedicated organic producers to quote high organic industry growth rates from a low base.

When asked if they would be willing to try a crop on their land if there was a profitable market for organic products, a third of farmer representatives responded that they would do so, while a quarter would not. However, the general impression was that for the moment, organic production must remain a niche market with a small producer and consumer base. Vegetable farmers may borrow from organic farming practices through either economic or buyer pressure, but they were clearly unwilling to alter their way of life to accommodate the deep philosophic demands of some organic practitioners. This would entail a profound shift of emphasis and demands on their farming culture and practices. As Burton (2004) has argued, after over a half century of productivism in agriculture, in which stewardship and sustainability have been subsumed into productivist economic imperatives, a change to an environmental view of sustainability is likely to be far too

‘radical’. Thus, the ability of farmers to pick and choose from organic alternative practices merely for reducing costly inputs is productivist in intent:

has allowed producers to feel they are farming sustainably by embracing industry best practices, while leaving the basic elements of a polluting and ecologically-damaging agriculture in place (Lyons and Lawrence, 2001: 2).

The overall impression from interviewees’ responses suggests that for the moment, a change to organic production (and indeed sustainable practices), was impractical for most conventional and conservative Tasmanian vegetable farmers. For agribusiness however, the major factor inhibiting the change to organics was simply the bottom line. Organic sales were simply not profitable:

Well, that’s what the market is telling us, even the most ardent of the environmental consumers, are en masse not buying organic products. The price differential is all significant. We do see some hopeful signs in that there is a growing trend to buy organic. But it’s not enough for large scale production. You don’t get economies of scale with organics because there’s so much labour involved. Weeding and hoeing, things that went out of fashion with the industrial revolution, are a part of the makeup of organic agriculture. That’s why the organic base to Europe is trending to Egypt (Agribusiness representative #1).

And for processors, organics is simply a small market the development of which depended on the demand by fast food sellers and the consumers:

I think the consumers of organic products gotta be willing to pay more, and I think the users of organic have got to accept the fact that they’re not going to get a perfect product, and once they realise that they’re not going to get the rosy red apple without any skin blemishes, they’re going to have blemishes on the skin and all the rest of it, they’re going to be paying a higher premium for that and till they realise that. I won’t say organics haven’t got a place (Processor representative #2).

As a test of their flexibility, farmer representatives were asked if they would trial an organic crop on their farm and almost to a man, all agreed, providing a profitable return was guaranteed. The research also detected a view among some farmer representatives that the days of high volume, low value crops such as potatoes, were numbered on the rich red soils of the north coast:

I'm saying the high value land on the north coast here, is too valuable to be producing for commodity type prices, so they're going to move the commodities somewhere else where they can get critical mass, volume, you know scale of production, whatever else that we can't achieve on these type soils, purely because of the history, the topography, the geography if you like, and go to high value type crops. Yes, floriculture, bulbs, as I say, orchard type set-ups, high value agricultural production. I'm currently looking at a couple of options there. We are working with DPIWE¹⁵ and TIAR¹⁶, trying to look for more opportunities for high value crops, because potatoes, peas, beans etc, while they are still important for the producers, it is important to try and find some higher value products (Farmer representative #13).

This view may have serious implications for the processing industry. A movement by some farmers into non-food crops such as poppies, pyrethrum, essential oils and flower bulbs, areas of high value and low volume with correspondingly lower input and transport costs has already begun (Wood, 1994).

But according to Maynard (2000: 2), diversification contains hidden dangers for the processing vegetable industry. When vegetable farmers are constantly searching for alternative crops from which to increase their profit returns, these will be crops grown on a small scale and 'can detract managers from the big picture' preventing economics of scale on the 'mainstream crops'. Maynard's is a productivist view of sustainability in narrow economic terms. His findings suggest that in a period of reduced crop income, under conditions of intensified cropping to maintain profitability, the risk of low returns was still common. Accordingly, low crop margins were caused by 'reduced yields, reduced price and higher costs, particularly sprays (new crop protection strategies) and irrigation (drier and windier season)'. Maynard's results were based on the study of a 'hypothetical farm' (Maynard (2000: 5). According to the present research interview narratives, many farmer representatives believed that farms in Tasmania were too dissimilar in terms of management, geography and soil types for comparison with model farm results. In reality, farmers must tailor their choices in accordance with their particular circumstances.

¹⁵ Department of Primary Industry, Water, and Environment in Tasmania in 2000, now altered to Department of Primary Industry, Parks, Water and Environment (DPIPWE).

¹⁶ Tasmanian Institute of Agricultural Research

5.3.9 Soil degradation

It is difficult to overstate the importance of healthy soil. Soil is the planet's most fundamental asset. It provides, along with sunlight and water, the basis for all terrestrial life: the biodiversity, the field crops and animal products. Healthy soils also enable a range of 'ecosystem services' - they support healthy plant growth, resist erosion, receive and store water, retain nutrients and act as an environmental buffer in the landscape. Soils supply nutrients, water and oxygen to plants, and are populated by soil biota which are essential for decomposition and recycling processes.

Soil is the product of an ecosystem. It has been created by living plants and animals and it continues to rely on them to remain fertile and productive. Before the earliest forms of life emerged from the sea there was no soil; all the land on Earth was bare, eroded rock and deserts. Soils build up over thousands of years through physical, chemical and biological processes as rock is weathered into minute fragments and incorporated together with the remains of dead plants and animals to form a medium that supports bigger plants and trees as the ecosystem develops to a climax (Ponting, 1991: 15).

Farmer representatives naturally understood the value of soil health and claimed that the degree of soil degradation was a major issue and an indicator of the sustainability of the Tasmanian vegetable industry. This was directly connected to farmers' management practices, which as already noted, have an economic dimension:

And what's happening now, most farmers rely on a contractor. I've got my own harvester, so it's a bit more flexible than a fella who's getting a contractor. If you're getting a contractor, it's the luck of the draw what the weather's like. You've got heavy trucks and heavy harvesters in the wet and you've got compaction. That's why most people say that has been one of the biggest problems (Farmer representative # 10).

The north coast of Tasmania, the main cropping area, with its distinctive red soils, is subject to relatively high rainfall during winter. Serious erosion can occur on paddocks with insufficient grass cover or crops. Often, erosion occurs when the soil is disturbed, after ploughing before planting and then around harvests. Such erosion is usually accompanied by a certain amount of compaction from the use of heavy vehicles and machinery on wet ground.

In response to the question regarding soil erosion on their land, a majority of farmer representatives (19) stated that they did have 'mild' erosion and this was by far the worst type of land degradation problem (15) caused predominantly by the combination of bare soil and rain (11).

Cotching and Sims (1998) reported that 98% of farmers in their study intended to take some action to reduce soil compaction on their land during the coming twelve months. Only a small number in this research (2) listed compaction and soil structural decline among the worst degradation problems. Clearly, there is further research required to ascertain the level of soil compaction and the importance placed on this type of degradation problem by farmers. This issue is taken up in more depth in Phase Two of this study.

In the Cotching and Sims (1998) survey, 23% of respondents claimed a degree of soil structure decline had occurred on their land during the last five years. Reasons for such decline included harvesting in wet conditions, heavy machinery traffic, working the soil in the wrong conditions and inappropriate stock grazing. For many farmers, this was a cause of serious concern:

I'd like to see our prices increase, not from the greed point of view, that'd be nice, but for our industry to be sustainable, we've got to get a better price. The emphasis has got to be taken off production, like at all costs, and put back on sustainability so that we can stretch our rotations out—the life of our soils and our own lives (Farmer representative #14).

Forty per cent of interviewees admitted to acidity problems while about thirty per cent claimed it was 'mild'. No soil salinity was reported.

In relation to soil degradation, there appears to be a wide disparity between the views of farmer representatives as in the above and those of processors. While farmer representatives considered low price returns were an important factor in resource sustainability, the latter claimed it was solely related to inadequate crop yields:

I think we should be able to grow vegetables with continual increase in yields in a hundred years, compared to what we are doing today. And that's really where we are (Processor representative #2).

Asked if their company had taken any specific steps to minimise soil degradation in Tasmania by giving advice or manuals to growers, one processor representative responded:

There's advice through the field officers, there's assistance from the department or any one else who is doing work on soil degradation. We cooperate with the department very well, unlike all the other industries, potato growers put in fifty cents per tonne towards the HRDC (Horticultural Research and Development Corporation) levy, and the processing company puts in fifty cents a tonne. So when you look at us, we put a \$150,000 into research. We work directly from Tasmania so any work is done through the HRDC. I guess we gotta say we're assisting in that. Yeah, we've done our bit (Processor representative #2, 2000).

It has already been established that processing company priorities are predominantly related to short-term economic productivity and the ability to source products at the lowest possible price. From this perspective, interest in long-term resource sustainability is likely to be academic. It is also clear that vegetable farmers are not philosophically opposed to a productivist view of sustainable agriculture, a view they share with processors. Thus, they coexist in a relationship which is reported at times to be a 'truce' among adversaries:

Yeah, with the onions it's straight out confrontational. I mean it's sharing the risk whether it's sharing in a shared agreement or whether it's sharing in a straight agreement. It's whether the good times, I mean this year, we've had the problem with the onions - has been because it's been a poor season and there's been some disease they've wanted to chop the contract to bits, really to offset the losses that they gonna make. But in the good year, when they have good season, and good sales and good packing and everything goes perfectly, there's never any say, 'Oh, we've had a good year, we'll give ya an extra twenty dollars' (Farmer representative #22).

Farmers understand that they need the security of contracts to market their potatoes and are aware of the damage their mandated practices impose on the soils. So, they will cooperate for a time while their economic interests are being served. They will service their mortgages and bring up their families while searching for better opportunities. However, living in such close proximity to their land, they cannot fail to notice after the rains, coloured streams carrying away their topsoil, or the compacted clumps after cultivation. For processors on the other hand, social concerns are of marginal importance. Farming is a business with focused economic goals. They have other options and will remain only while conditions are favourable. In the end, farming and processing are a working relationship.

5.3.10 Attitudes, values and sustainability

It may be argued that there is an implied responsibility for sustainable practices on the part of farmers and other stakeholders from processors to consumers. All participants in this food chain are economic beneficiaries and dependents on what are clearly important community assets. Farmer and processor representatives stated that conservation issues were both relevant and important because sustainable agriculture (in terms of productivity) relied on the maintenance of healthy productive resources. The difficulty was that there was no apparent agreement between farmers and processors on how to apportion the responsibility. With a focus on yields and the bottom line, processors had little interest in the resource base. Farmer representatives on the other hand, repeatedly expressed an association between poor price returns and the deteriorating condition of agricultural soils. They claimed that low prices were an obstacle to the adoption of conservation practices. The farmers' own hierarchy of obligations began with the welfare of their families, the maintenance of debt repayments, the replacement of farm essential machinery and many others, which they placed above environmental conservation priorities. The allocation of financial resources to conservation measures relied on a farmer's financial situation and this they claimed, depended on what share of their final profits processing companies were prepared to pay. Agricultural machinery and input suppliers, contractors for certain farm tasks and the processing companies (all beneficiary and dependent occupations on farming), made immediate demands on farmers' finances. While it may be argued that all such dependent industries shared responsibility for the ultimate fate of the resources, farmer representatives generally reasoned that as processors determined the farmers' share of profits they also shared the responsibility for practices. And at the time of this research, processing companies were in the direct aim of farmer criticism as the main cause of their economic grievances.

Although attitudes may influence, they cannot consistently be relied upon to determine behaviour (Vancly and Lawrence, 1995: 79; Mitchell, 1979: 121). However, there appears to be considerable support for the view that 'values are the basis of beliefs and attitudes and are causally antecedent to personally held norms, intentions, and other causes of particular actions' (Rokeach, 1979; Stern and Dietz, 1994; Stern et al., 1995a, cited in Winter and Lockwood, 2004). It follows that knowledge of farmer values may be a useful indicator of the sustainability of their farm practices.

As already noted, farmer representatives' definition of sustainability clearly underlined the primacy of economic viability (62% of responses). It was therefore not surprising that almost half of the responses strongly agreed with the proposition that 'managing the land sustainably ought to be a big consideration around here'. For the majority of respondents, their expressed attitudes contained some weak references to agro-environmental issues.

In response to the twenty likert scale items (Section 5.2), approximately 60% of respondents' values lay between 'agree' and 'unsure'. This result was in keeping with farmer narrative views that times were uncertain and that while farmers in general were aware of important issues beyond personal economic survival in farming¹⁷, they remained uncertain about putting their attitudes into practice. At a time of continuing farm restructuring and poor commodity prices, farmers were choosing against extending their management beyond conventional practices:

Well, farmers are generally not expanding anymore, they are sticking to what they've got, they're consolidating and that's a bit sad because we're not keeping up with the modern day machinery, because we can't afford to. That's affecting the sustainability of the land because we are not working it with better ways than we are used to. More importantly, if farmers did more of a cost analysis of the commodities they are growing, I think they'd realize that they are growing for a net loss. They're growing only because they've got used to growing the same crop year after year, and they're doing it on tradition not on economic sense (Farmer representative #1).

Rationality at such times dictated the sustainability of practices as farmers attempted to weather the 'hard times'. When returns improved, less intensive management of the resources would become affordable. This optimism and confidence in the resilience of the land and the economy may be a reason many farmers allowed damaging and degrading practices on their properties:

There are occasions though when particularly say, with pea harvesting, in the past ended up with a very wet January. It was too wet to put equipment on the soil. The peas were ready to harvest, and we asked the farmers, 'Do you want us to harvest your peas or not, because we need all sorts of things to make sure that the harvesters don't get bogged, and they'll make a bloody mess of your paddock?' So we put the responsibility back to the growers, and they all said 'Yes, go in', because they saw the immediate short term as

¹⁷ One incorporating the conservation of natural and social resources and intergenerational equity.

more important than we did (Processor representative #1).

Assuming some generalizability of these anecdotal reports, the process of rationalisation may lead to a denial of the severity of ongoing damage. When asked about the environmental effects of their practices, a majority of respondents appeared to become defensive. For example, a majority (approximately 75%) of subjects in this survey agreed that the environmental problems of growers were exaggerated by people who were not farmers. In some subjects' eyes, many of those included soil scientists, politicians, bureaucrats, researchers and the public. A majority of consumers mistakenly viewed farmers as reckless environmental miners. For farmer representatives, such 'bad press' was both unwarranted and unfair. The regulated use of chemical inputs was after all, both necessary and harmless. Constant applications of acidic superphosphate, herbicides and insecticides, though costly, had little adverse effects on the condition of food, resources, biodiversity and human health. Clearly, the problems associated with productivist processes were not perceived as problem areas in conventional agriculture. But some farmer representatives were more candid about the use of chemicals when arguing that genetic engineering might reduce the levels used:

and if the consumers knew of half the chemicals that went on ninety per cent of the vegetables that are growing, they wouldn't eat them. And I grow a certain vegetable I don't like eating because of that, and if this certain vegetable being an onion, was genetically engineered, so it was resistant to Roundup, say, or a knockdown weed killer, you'd probably go through the season and put fungicides probably five applications on it, compared to now where we go probably fifteen to twenty (Farmer representative #14).

Others seemed well aware of the unsustainable effects of intensive agriculture and their own contribution to the process:

My philosophy is I want to leave my land in better order when I finish than when I started. There's soil erosion on every land, it's just a matter of degree. It's not a problem of red soil. Tasmania, you'd say, had no serious problems with salinity. The biggest problem for most farmers is to have to crop and crop to make ends meet. The structure of their soil is getting knocked that much about, because they're continually cropping it, and they're not putting enough back into it (Farmer representative # 10).

Denial also appears to be evident in responses to Item 2 of the survey 'Growers should not be held responsible for environmental problems resulting from farming because the

production of food is an essential activity required by the rest of society'. While many respondents volunteered the view that farmers were all 'by and large, conservationists at heart', a majority supported the item statement. In addition, as a 'business' oriented activity, farming may justify the externalisation of its costs as a means of maintaining the all-important bottom line:

So I say the only way you can have a sustainable system [is] if you're making enough money, to sustain it. If you aren't making enough, you gotta look at other ways and means. I think because our commodity prices are the poorest I've ever known, at the moment as least as possible, you sometimes resort to some drastic tactics to make ends meet...It's not enough to sustain the land, it's sustaining the bank balance too (Farmer representative #18).

Additionally, a large majority of farmer representatives (70%, Item 7) denied that their activities could be associated with significant environmental effects off their farms. On face value, responses to Item 4 'Even when soil material has left the farm, it is still the responsibility of that farm', appear to contradict the responses in Item 2, in terms of farmer responsibility for farm impacts. But a key point here is that while a majority of farmer representatives denied responsibility for environmental damage, they argued that the damaging effects of erosion onto their farms ought to be the responsibility of neighbours or councils whose poor management was the cause of the erosion. In other words, while externalising operating costs to the environmental commons was an acceptable business practice, costs to private land (particularly one's own) from external sources, was not.

Yet this interpretation seems also contradicted by the results of Item 5, 'Protecting the environment is not a big part of being a farmer', where over 85% of respondents indicated disagreement with the proposition. However, the lack of references to environmental matters throughout the research documented in the volume of farmer narratives, suggests that the environmental impacts of farming and by implication, its sustainability, was not a major preoccupation for Tasmanian vegetable farmers. At the same time, agreement with the above statement would be clearly perceived as politically incorrect. Once again, the expression of socially benign opinions and attitudes cannot be reliably expected to guarantee the holding of corresponding values.

The responses to Item 9, 'The farmer should be held responsible for environmental damage caused by farming activity' are almost equally divided (33% each) between

agreement and disagreement with about 18% unsure. This result may suggest a growing concern for sustainability. However, it is more likely that some farmers have responded to the agricultural crisis by adopting hard and fast positions while others continue to assess the situation. Item 10 'Growers need more information on land management practices' is some support for this interpretation, (namely, that the current situation is uncertain) with about 80% of respondents in agreement regarding the importance of information.

The high support for Item 6 by farmer representatives 'The control of farm environmental problems is an issue for everyone in the community', again requires close analysis of respondent attitudes. In the first instance, by dispersing the responsibility for farm environmental impacts, farmers may be diluting their own. In this way, they may be better able to meet community criticism of their productivist operations. Secondly, respondents' frequently made references to the problem of interference in their affairs by outsiders. These included government officials, bureaucrats, environmentalists and others from the city, who they claimed, did not appreciate farmer problems. Even consumer-driven corporate demands by retailers who insisted on quality assurance and low price, were a form of unwelcome interference and grudgingly agreed to:

Yes, I mean I think it's gonna happen [interference]. It's gonna be a bigger issue. You see it's easy if you'd be sitting in the middle of Sydney, or Melbourne or London you wanna see the little native things running around when you go for a Sunday drive. I can see where it's coming from. But I don't think they really understand all the issues. You would think it was driven by consumers. You would think Tesco must have been trying to get a marketing edge to say that these onions come from a sustainable farm where they recycle their oil and they look after their wildlife. And probably the consumers feel nice and fuzzy about buying the onions. And farmers here are just going to cop it because it's not going to go away—like it or lump it. We're going to have to cop more and more of that. I can see it coming (Farmer representative #17).

Clearly, as in Item 8 'In my case, increasing farm sales is a far more important consideration than reducing environmental degradation' farmer representative priorities were directed primarily at survival issues:

Well for a crop to be sustained like any other business, it's got to be profitable, and to take the sustainability a bit further and start to look at land production, capabilities and even protection, there's got to be enough profit margin in there to allow and encourage

farmers to start and do something about it. First and foremost any individual has got to live and eat, and the economics of agriculture have got to be such as to allow that, and the income has got to lift significantly, to allow for sustainable agriculture to be pursued to where it ought to be into the future (Farmer representative #8).

It is not altogether surprising that about 80% of respondents supported Item 12 'Sustainable land management should just be considered another cost of running the farm'. Given that the term 'sustainability' has now become defused of almost all its radical environmental implications and become a mainstream motherhood concept, respondents could hardly object to the statement. This does not necessarily imply that they did not support the broad dimensions of the term but merely, that the response cannot be taken as a reliable indicator of farmer values. Item 13 is an even more dramatically positive response (90%) to a similar statement 'Most farmers around here are in favour of using environmentally sound practices'.

A more explicit position of farmer representatives on the issues of sustainable management is clearly indicated by the responses to Item 14 'Growers should be allowed to produce all they can even if some environmental degradation results from their farming activities'. The dis-endorsement of this view by over 80% of respondents is consistent with respondents' reluctance to support politically incorrect attitudes.

Also, the high endorsement level (80%) of the statement in Item 15 'Growers would be willing to take further measures to control environmental damage if they could be sure that land management practices would do the job' may not necessarily indicate underlying sustainable values. The statement is lacking in sufficient specificity thereby allowing farmers to hold it without being committed to any particular practices.

The 65% disagreement level with the statement 'Farmers in general do not give enough consideration to undertaking environmentally sound land management practices' is inconsistent with previous item results again suggesting a degree of defensiveness on the part of farmer representatives. Alternatively, respondents appeared to accept that the small amount of consideration farmers give to environmental practices (evident from the farmer narratives) sufficiently discharged their responsibility.

A strong disagreement response to this negative item (85%), 'Not much point in planning more than a few months' certainly suggests that respondents approved of long-term

planning but again, positive attitudes do not necessarily indicate that farming practices would be sustainable or become so. The farmer narratives consistently reinforced the importance of short-term priorities for the decisions made by farmers increasingly struggling to survive the imposition of neo-liberal economic restructuring policies and low commodity prices.

Throughout the interviews, vegetable processing farmer representatives consistently delivered the message that sustainable land management was contingent on economic factors of which the maintenance of economic productivity was the most important element. Farmer representatives generally claimed they and other farmers have become more resourceful to survive in a global industry in which 'a level playing field' was no more than myth held by bureaucrats and policymakers. Faced with diminished state support, increasing powerlessness to influence price returns and rising costs, farmers have needed to make productivity gains through efficiencies and mechanization. These have been imperatives for economic viability but not sustainability. Some farmer respondents suggested that survival has involved some costs to human and agricultural resources, but this was the way of the world. There was some concern that over-cropping has become a necessary adjunct to survival when price returns have declined to an inadequately low level. Two respondents claimed that some farmers were growing for zero or negative margins and living below the poverty line. However, the narrative reports also suggested that a majority appeared to be managing reasonably well. This is in keeping with findings by Gray et al. (1993: 75) who proposed a 'stratified farm structure of large, viable producers, small semi-viable producers and a group of economically vulnerable farmers unable to diversify despite economic signals from the marketplace'. The broad outlines of this structure appeared to be reflected in this study of Tasmanian farmer representatives. The effects of restructuring were always going to be uneven as were the demonstrated attitudes and priorities of farmer representatives towards resource conservation in this research.

The lack of alignment between farmer representatives and processor views on the solutions required for continued viability of the industry in relation to prices and many other issues including soil conservation, pointed to a fundamental industry problem. There was no lack of confidence in the dominant industrial agricultural model, which was generally unquestioned by both farmers and processors. Yet the relations between these key players

appeared to be competitive and at times adversarial. This was particularly in the area of price returns to farmers. The interviews suggested a picture of an industry attempting to resolve a deepening crisis specifically in the relations between these two groups in competition for a residual share, while the bulk of the finite profits was extracted by fast food corporate retailers.

Neither processors nor farmers exhibited any serious concern for the sustainability of resources under conventional farming. Major concerns were consistently associated with the distribution of surplus profits for farmers and productivity (for processors, code for farmers producing more for less).

The narratives also indicated that no member of the farmer representatives considered leaving the industry at the time of the interviews. Most participant farmer representatives could not contemplate the idea of giving up their farm although a few thought their livelihood might be at risk. The majority expressed a strong determination to 'outlast' current problems having survived to the end of the 1990s. Some suggested that the relative stability of farmer numbers in the processing industry may be threatened by pressure from processors to restructure the industry further by aggregation of small farms. Other respondents reasserted that the sustainability of their operations and resources was only possible when the price returns (via 'the market') allowed them. They asked, 'How could the management be green when the ledger was in the red?' The answer here is likely to involve a great deal more than a simple suggestion involving community sharing of responsibility for resource conservation as offered by Cotching and Sims (1998: 44):

Processing companies have an important role to play in ensuring that good soil management practices are used. They should respond to the farmers' request for them to share the responsibility for sustainable soil management rather than dictating what soil management practices occur without taking responsibility for preventing associated problems of soil compaction, soil erosion and stream turbidity.

This statement is somewhat vague and superficial. Firstly, it overlooks the worst of corporate processor practices in the undue pressure they place on farmers and their resources by constantly reducing farm profit margins and demanding higher yields. The justification by processors that they are merely responding to pressure on themselves from their own buyers, though plausible, lacks total conviction. A more effective, though unlikely, response by them might be aimed at the retailers and fast food merchants rather

than at farmers – the latter being the ‘weakest link in the chain’. Nevertheless, if the growth in capital power of the retail sector appears to be overwhelming the processors to a degree that they must respond by extracting more profits from small farmers, then this response would seem to be in conflict with acceptable norms of justice and fair play one associates with a civilised culture.

It would be informative to discover why processors who identify themselves with farmers as co-producers and equal victims of dictatorial power, do not join with farmers to strengthen both their leveraging positions. This question was posed to one processor representative during the interviews in an exchange in which the interviewee seemed unable to countenance the idea of farmer and processor solidarity:

Researcher: Some people have mentioned that perhaps processors and growers can align to try and get better returns from retailers. Is that a possibility?

Processor rep: Say a Tasmanian quality label or something like that, so if it’s got some justification to demand a higher price than it might achieve? I have trouble seeing it. I’d love to be able to say yes. But no-one will ever eat it just because it came from Tasmania or because it involved Australians. I mean they’ve tried it before and no, there’s no government policy along that way, and the retail outlets or whatever it is, they’ve got no compunction to buy other product or use it as a leveraging tool to reduce the price on the existing stuff, which they do frequently (Processor representative #3).

The market-driven, cosmopolitan approach of the processors, has apparently found less than total support among the family farming communities of vegetable growers in Tasmania. This was to be expected. Processors represent the dominant power of modern accumulation capital, increasingly in control of an economically vulnerable, traditionally driven, small business culture. It would be naïve to assume that in the current economic climate, the relationship between the two can remain cooperative and amicable when a dominant party is repeatedly perceived as a dictatorial partner in the vegetable production contracts.

5.3.11 Farmer action

During the early interviews, subjects often claimed that low price returns had fallen to a critical level and that it was time for farmers to act directly to have the prices raised. And since (according to the same subjects), processing companies’ interests lay in driving down

prices for farmers, processors could not be expected to cooperate with farmers. As a result, farmers did join together, led by one of their own (independently of the farmer organization, which appeared remarkably silent during the events) and took direct action to increase prices some months after the completion of these interviews. It is possible that the same interviews became a catalysing factor in the decision of farmer representatives to act against the processors. Certainly, farmer representative statements during the interviews suggested that relations between processors and contracted farmers were coming to a head:

If we could only show the likes of McDonald's, in a relatively friendly atmosphere a pie chart, (showing the grower share of profits). We haven't gone out and picketed McDonald's stores at this stage, but it's not far away, I can tell you. Perhaps better dialogue is preferable at first, but in the end, that may be an option that we need to exercise. Before we even did that, we might even want to dialogue with McDonalds' other raw providers such as the bakers and others who might be in the same situation and through some collective action or bargaining, we might be able to get somewhere we have not done in the past. It's those major players including the Coles and Purity that we need to get to, who all seem to be price driven, that are really giving us grief and aggravation (Farmer representative #13).

During the progress of the interviews in Phase One, there was little doubt that the level of tension in the industry was reaching a climax. Farmer interviews indicated that action and change were imminent. As the research directed questions at particularly sensitive areas in the widening dispute such as farmer profits and industry power, the study appeared to merge into the dynamics of the research. Consequently, it became reasonable to assume a connection between exposure to the interviews (through extended concentrated discussion and reflection on industry problems¹⁸) and subsequent action by farmers. At that point, the research method may well have become a form of participatory action research.

5.4 Conclusion

Throughout the interviews, vegetable processing farmer representatives consistently delivered a message that sustainable land management was contingent on economic factors. Economic productivity was essential for maintaining profit. This left few doubts that the industry was productivist and therefore unsustainable and profit was the

¹⁸ Often, the interview sessions extended over several hours of in depth discussion and consideration of important issues in which individuals reviewed their own positions and that of the industry as a whole.

unquestioned goal of both processors and farmers. However, the attitude and actions of many farmers as reported by their representatives signalled optimism that the industry is capable of transformative change in the direction of sustainability, as summarised in Table 5.3.

The claims by interviewees that farmers have learnt to be more resourceful in a global industry without ‘a level playing field’ is itself also another cause for optimism. Faced with diminished state support, rising costs and powerless to influence price returns, farmers have made productivity gains and efficiencies. This suggests that farmers can use the same capacity to implement sustainable change as was demonstrated by onion growers in 1998. Imperatives for economic viability do not necessarily exclude resource conservation and sustainability but ought to include them. Two respondents claimed that some farmers were growing for zero or negative margins and living below the poverty line. Such practices become unsustainable when farmers attempt to compensate for lack of income by externalizing their costs to the environment or the community. However, the narrative reports also suggested that a majority appeared to be managing reasonably well. This is in keeping with findings by Gray et al. (1993: 75) who proposed a ‘stratified farm structure of large, viable producers, small semi-viable producers and a group of economically vulnerable farmers unable to diversify despite economic signals from the marketplace’. The broad outlines of this structure appeared to be reflected in this study of Tasmanian farmer representatives. The effects of restructuring were always going to be uneven as were the demonstrated attitudes and priorities of farmer representatives towards resource conservation in this research.

Productivist/unsustainable	Post-productivist /sustainable
<p>Lack of adequate prices to farmers impacts on social/economic/environmental sustainability</p> <p>All farmer processor representatives male in a gendered productivist model</p> <p>33% believed income will decline 45% will be stagnant</p> <p>16% believed livelihood at risk</p> <p>Connection reported between technology and intensification of practices</p> <p>62% reported soil erosion worst problem for farmers; acidity 8%; soil structure decline 8%</p> <p>Highest references (48) to economic dimension in sustainable agriculture; (21) ,to conservation and</p>	<p>80% support for ‘green payments’ for set aside land;</p> <p>79% agreed a ‘clean and green’ image important for Tasmanian agriculture</p> <p>66.6% had no objection to organic production if proof of economic viability</p> <p>Farmers reported to be consolidating rather than expanding production land</p> <p>85% agreed a big part of farmers’ work is protecting environment</p> <p>90% support for claim that most farmers in favour</p>

<p>environment</p> <p>95% reported unfair profit distribution in vegetable contract system</p> <p>55% 'unhappy', 20% 'very unhappy' with processors</p> <p>70% denied farm activities could cause environmental damage</p> <p>Overconfidence regarding ability of soils to recover from damage</p> <p>75% claimed environmental problems by farmers exaggerated</p> <p>Overuse of chemicals reported by one farmer after several drinks</p> <p>Intensive practices reported to cause worst soil damage</p> <p>General lack of references to environment; and 60% of farmer statements contain 'uncertainty</p>	<p>of sound practices</p> <p>80% disagreement with proposition that farmers should be able to produce regardless of environmental damage</p> <p>80% support for farmers' willingness to use effective environmental damage controls</p> <p>Farmers want to plan for the future</p>
--	--

Table 5.4: Phase One summary of findings on industry sustainability

Processing companies have an important role to play in ensuring that good soil management practices are used on farms producing their vegetables. The justification that processors were equally subject to economic pressure from their own buyers lacks conviction as a sufficient reason for exploiting farmers. If the growth in capital power of the retail sector appears to be overwhelming the processors to a degree where they must respond by extracting more profits from small farmers, 'the weakest link in the chain', then such a response would seem to be in conflict with acceptable norms.

Researcher: Some people have mentioned that perhaps processors and growers can align to try and get better returns from retailers. Is that a possibility?

Processor rep: Say a Tasmanian quality label or something like that, so if it's got some justification to demand a higher price than it might achieve? I have trouble seeing it. I'd love to be able to say yes. But no-one will ever eat it just because it came from Tasmania or because it involved Australians. I mean they've tried it before and no, there's no government policy along that way, and the retail outlets or whatever it is, they've got no compunction to buy other product or use it as a leveraging tool to reduce the price on the existing stuff. Which they do frequently (Processor representative #3).

The market-driven, cosmopolitan approach of the processors, has apparently found less than total support among the family farming communities of vegetable growers in Tasmania. This was to be expected. Processors represent the dominant power of modern accumulation capital, increasingly in control of an economically vulnerable, traditionally driven, small business culture. It would be naïve to assume that in the current economic

climate, the relationship between the two can remain cooperative and amicable when a dominant party is repeatedly perceived as a dictatorial representative of global capital.

Yet while the processor and farmer representatives' positions reflected an adversarial relationship, both parties appeared content to let productivist practices remain unquestioned. Sustainability was consistently expressed in economic terms although farmers naturally exhibited more concern for the long-term condition of their resources. For processing company representatives, interest in the sustainability of processing in Tasmania extended merely into the medium term (5-10 years) after which the future of the industry will be reconsidered. Issues dealing with practices affecting soil condition and the environment were left to the growers.

The importance of economic survival often resulted in neglect of conservation and environmental projects leading to degradation of the surrounding environment through run-off pollution and the effects on wildlife ('vermin'). This was also a cost to the wider community towards whom farmer attitudes seemed somewhat ambivalent. While expressing a belief that the convenience of inexpensive food to consumers implied some responsibility for the manner in which it was produced, subjects were adamantly opposed to outside interference from 'Greens'. In total, farmers wished for community support to farm in their own ways on their own terms. The research observed a tendency among farmer and processor participants to indulge in other forms of denial such as serious soil degradation and environmental damage.

While farmers regarded poor social relations were a source of tension within the industry, processors expressed little concern. What farmers thought were harsh attitudes by the processors, were normal business dealings for negotiating profit margins. Social and environmental priorities were apparently secondary to productivity and economic returns. In such terms, the processors merely demanded that farmers risk the degradation of their own, their childrens' and society's main source of food security for short-term profits that will largely flow to off-farm interests such as the processors and their buyers. Impacts were a farmers' problem and the fewer of farmers on land, the better. Aggregation of farm units would reduce their numbers and establish bigger farms under more compliant management though with questionable practices.

On the other hand, small farmers in Tasmania have demonstrated a degree of pragmatic flexibility and resourcefulness for implementing sustainable practices when offered fair incentives by retail corporations. Interviews also contained suggestions that farmers needed to farm out of habit or a passion for working the land, even when farming resulted in financial loss to themselves, or because they lacked the skills for other occupations. Taken together, these simplistic accounts of farmers' motives ignored more complex realities. A farmer's world view is enmeshed in natural processes, attuned to the passage of seasons, and the understanding that change and struggle were relentless and must be accommodated. Farmers appear to view the intrusion of agri-business companies from the perspective of the colonised as a temporary inconvenience that must pass. In the meantime, farmers will survive the ordeal for the sake of their families, their communities and their land. Thus while Phase One indicated that social, political and economic relations in the processing industry were generally productivist, it was important to identify the specific characteristics and distribution of these practices at the level of individual farms. This is taken up in Chapter Six which expands the field study by interviewing working farmers.

Phase Two – Interviews with vegetable farmers

6.1 Introduction

In the previous chapter, it was concluded that although practices in the vegetable industry were predominantly productivist farmers were capable of implementing beneficial change with the appropriate inducements. ‘It may be that farmers’ economic priorities reflect less their rejection of the multi-dimensional nature of sustainability than the immediate, short-term economic imperatives which they face’ (Blunden et al. 1996: 29). Also relations between contracted growers were said to have reached critical levels as a result of the heavy pressure placed on producers for higher yields and lower prices. Such symptoms reflected the inefficiencies in centralized corporate agribusiness management structures and limits to corporate growth (Canals, 2000).

This chapter will add to these results by discovering further characteristics of productivist practices, their distribution and the reason farmers continue participation in an industry which makes heavy demands on families and resources and delivers very mediocre economic returns which in turn are claimed to constrain resource and environmental protection.

In this second phase, the research moves to working farmers using a telephone interview method. These interviews examine the main practices farmers use to cultivate and conserve their soils: erosion controls, rotations, agro-ploughing, and green manuring. Farmers were requested to outline their priorities and views of sustainability in agriculture. The interviews concluded with a request for a follow-up farm visit by the interviewer to enable a final Phase Three for corroborating previous phase results (Chapter 7).

6.2 Research instrument and procedure

A semi-structured open-ended telephone questionnaire (Appendix C) was designed; ethics approved¹⁹ and pre-tested with the assistance of colleagues associated with agricultural science at the University of Tasmania. As a result, the questionnaire underwent some refinement in accordance with their recommendations. Problems occurred however, when

¹⁹ Ethics Approval Number H6340, 12 November 2001

a subject list was sought from the TFGA executive officer interviewed in Phase One. Most research into the vegetable industry in Tasmania has tended to rely on the TFGA for access to its comprehensive list of vegetable growers. A majority of growers are members of this organization and in Phase One, the TFGA allowed ready access to their farmer representative list. Thus, it was assumed that the same access would be forthcoming in Phase Two. It was not. Evidently, political events had overtaken the situation so that by the time the questionnaire was completed and sampling about to commence, a grower list could not be acquired from the TFGA. This may have been due to the deteriorating relations between vegetable growers and the processing companies where the intermediary role of the TFGA became complex. Grower lists were perhaps thought to be sensitive material, which required restricted access. Consequently, a great deal of time and effort was spent looking for alternative sources.

After some four weeks of delay, a list of vegetable growers was sought and obtained from each of the two processing companies through the managers interviewed in Phase One. The two lists were collapsed into a master list containing names, addresses, towns and postcodes of current growers who had contracted to grow for the individual companies. Many contracted farmers were included on both lists with errors and variations in the names and addresses and, curiously, neither company supplied contact telephone numbers for growers. Since this was a telephone survey, these numbers were essential. They were eventually found by trawling the Yellow and White Pages directories of the three regions. Many growers had formed or bought companies and were listed several times under different names with addresses as post boxes. This process required close matching, which made the task of list compilation a lengthy one.

All sampled subjects were farmers who grew vegetables under contract for the vegetable processing industry. Although according to Agriculture Australia (2000), the number of vegetable farmers in Tasmania was 602 during 1997–98, the number reported by the Department of Primary Industries Water and Environment (1999: 104) was 627. This research assumed a figure of 700, based on the lists supplied by the two processing companies in 2001. Discrepancy may be due in part to the lack of consistency in how farmer lists are maintained by the companies and the TFGA. Farmers contribute to the imprecision by contracting to grow for one or both of the companies, grow under the contracts of other farmers and at times did not grow crops at all. This means that at any

particular time the number of farmers supplying the processing industry is merely an estimate.

Farmers on the master list were assigned numbers from 1 to 700. Numbers from a table (of random numbers) were used to select respondents for the sample, choosing every fifth number. The process began with the last three digits of the fifth row of each column beginning at random with the third number from the top moving downwards to the bottom of the first column, then restarting at the second column and continually selecting every fifth number. If the random number was outside the population range or if the number had been selected previously, then that number was ignored and the selection moved to the next. This procedure was continued until a hundred random numbers were collected. The resulting sample size was 14.3% of the assumed processing vegetable farmer population.

In accordance with the difficulty of the task and the limited human resources available, it was crucial to employ a systematic straightforward method for this survey questionnaire. The process of contacting a potential subject was carried out methodically, following a set system, where potential subjects were initially telephoned and asked if they consented to viewing the survey questions before deciding to participate. It was expected to and did produce a high response rate. Some respondents indicated that researchers had often given farmers little time and choice to make an informed decision before being asked to take part in research. The importance of allowing subjects to preview the questions before the commencement of a telephone interview can be important in securing a high response rate (Dillman, 2000: 218). A strictly consistent process was duly followed.

The subject was telephoned and the interviewer proceeded according to the following telephone protocol:

- (a) greeted politely and asked to speak to the subject;
- (b) introduced self by name, institution, and a procedural explanation of the survey aims and length of the survey;
- (c) read a brief summary of the questions to the subject;
- (d) listed the survey requirements of the subject-an agreement to accept a 'kit' by mail containing an introductory letter, a list of the questions, and an information

sheet. These would enable the subject to make an informed decision regarding participation in the research;

(e) informed the subject that he or she was not required to fill out the questionnaire or return any material – merely to peruse it and decide whether to participate;

(f) informed the subject that he or she would be contacted approximately one week subsequently to enquire regarding a decision to participate; and

(g) opened a file for each subject containing details of name, address and telephone numbers (including mobiles). When the subject agreed to accept the kit on first contact, details of the date and material sent was entered into the file *after* the material was posted. When a subject's spouse was unsure about accepting the kit, she was offered the choice to participate in an interview²⁰ or an arrangement for another telephone call was made when the (male) subject was available. This detail was also entered into the file and noted on the work diary to ensure the follow-up call was made in a timely fashion. Both the diary and the subject file became essential tools during this part of the research.

The subject was telephoned a second time a week after initial contact to ask if the kit had been received and whether the subject had decided to participate. At completion, the acceptance rate was 96%. Subjects offering to participate at first contact were still required to maintain the standard procedure and receive the kit before choosing to participate. Many subjects indicated that they appreciated this courtesy because it gave them the choice to participate with full and prior knowledge of the questions and a telephone interview avoided the need for subjects to spend their evenings filling out a long self-administered questionnaire.

On second contact, if the subject agreed to participate, he or she was asked to name a convenient time for the interview and, if they wished, a reminder call on the day preceding the interview.

As in most interviews, a short period of 'breaking the ice' was adopted, in which some inquiries about the weather and work were found to be a positive means of engaging

²⁰ Six farmers' wives did agree to participate and subsequently completed interviews.

subjects. Often this period also yielded some useful background information about the subject's attitudes to farming. At this stage, subjects often had an idea of the purpose of the questionnaire having had only a cursory glance at the information sheet sent to them two weeks before the interview. For these reasons, it was useful to reiterate the objects and aims of the research. Subjects were then asked if they agreed to the use of a recording device. All consented.

As a majority of subjects took advantage of the opportunity to expand on various topics, the planned 'forty-five' minutes usually exceeded ninety. All respondents appeared increasingly more comfortable and co-operative with the progress of the interview. A cordial relationship was established. The last item of the interview asked respondents for their consent to a follow-up participatory visit to their farm. The subsequent 55% positive response rate was considerably higher than expected among a group of farmers who were constantly busy, over-surveyed and customarily shy of outsiders.

The survey asked vegetable processing farmers for information in several areas related to farm practices and opinions. Specifically, farmers were asked for background information relating to the size of their farms and areas cropped, their years in vegetable farming and the vegetables they grew for the processing industry. The survey also asked about rotations, use of cover crops, implements, profits from crops, harvesting times and the condition of soils. Farmers were also asked for their opinions on the responsibility for sustainable practices, conservation methods and their own spending priorities. At all times during the interview process, the researcher encouraged subjects to respond expansively on the understanding that they did so under conditions of absolute confidentiality.

6.3 Results

6.3.1 Gender in agriculture

As noted in Chapter One, this research acknowledges the critical roles of farm women in Australian agriculture, whose contribution spanned a multiplicity of roles (Alston, 1995; Liepins, 2000: 609) and where there are:

common divisions of labour in which men perform much of the physical work on farms while women contribute primarily to the administrative, domestic, and pluriactive tasks that aid the economic and social reproduction of the farm unit (Liepins 2000: 609).

Random sampling did not discover independent women farmers who managed the day-to-day business of farming, taking sole decisions and responsibility for farm practices. However, six farmers' wives agreed to be interviewed. These interviews returned results in which the views and opinions differed in some respects from those of most male farmers interviewed. For example, farming men rarely acknowledged the amount of work expected of farm wives:

When harvest time comes I work on the back of the potato harvester. I milk the cows and do those types of jobs and often you get asked to go and pick up chemicals or parts or anything else so somebody else can keep working: those types of jobs which add up to about a fair bit of your day at times (Vegetable farmer's wife #92).

Researcher: You also have you normal tasks?

Yeah, and running after children and all those other things so – and there's the financial side of things: doing the finances and that's just been overloaded lately with the GST and everything else and not fitting into patterns of when you wanna do things – like sometimes in certain months of the year, paperwork time gets put aside. Well, you can't do that because of the GST. January was the month where I used to think it was really bad because there's extra work in the farm, plus children on school holidays – so that makes it more difficult (Vegetable farmer's wife #92).

At times, this contribution is in the form of pluriactivity, in which farm wives take employment in the wider community. For farm women, this means extra demands on their time for home and farm tasks; occasionally with disastrous results:

Well, sometimes it creates other things that people don't see – like a girlfriend, she said, 'Well that's it. I don't know what I'm gonna do now', because she fell asleep behind the wheel of the car and wrote it off because what she was doing was milking the cows, getting the children off to school, coming back to feed the calves and then doing a day's work, getting the kids home, finish milking of a night and doing those things and going out because their cows were calving at that particular time and getting very little sleep. So one morning it did the ultimate tell, and she was lucky that no-one was hurt in that car accident – ok the car was a write-off, but she wasn't – but it could have been the reverse (Vegetable farmer's wife #92).

And often their contribution requires a level of intelligence and diplomacy not usually associated with down-to-earth male farmer stereotypes. After noticing the long hours her

spouse spent in the fields sitting on an old tractor, the farm wife needed to suggest a new modern version and help to pay for it before the farmer agreed to the change:

And he said it was a pleasure to work in and it was much easier all round to have that piece of machinery that could do things faster. And he said it takes a third of the time with a machine that's big enough. Yeah, sometimes I see farmers and I think, you're making life difficult for yourself, but they don't like it when you tell them that (Vegetable farmer's wife # 92).

According to Alston and Wilkinson (1998: 391–3), the existence of a gendered hierarchy in agriculture prevents women from access to power because of their exclusion from resources, the processes of patrilineal inheritance and the full range of choices available to male counterparts. Thus:

The expectation that women will perform the domestic work associated with the farm household and their limited access to property, shape and restrict all other choices that women make. Whatmore (1991) sees the patriarchal structures that typify farming, the gendered division of labour and the ideology of 'wifedom' as the key factors which affect farm women's sense of identity, their secondary status and the gender inequalities which are normalized in rural societies (Alston and Wilkinson, 1998: 393).

The authors note the 'tragic loss to an agriculture that fails to accept the alternative perspectives and intellectual capacity of the workforce which contributes 48 per cent of its income' (Alston and Wilkinson, 1998: 405). And more importantly, 'Women have shown in their own conferences that they are not shy of addressing the need for a clean, green agricultural image, of being acutely conscious of the need for ecological sustainability and of challenging chemical overuse and other practices that may be impacting on the health of Australians' (Alston and Wilkinson, 1998: 405). Allowing farm women more power in decision-making may be a first step in turning the productivism of Australian agriculture towards more sustainable practices. However, while the empowerment of rural women may enable sustainable change, the reverse does not always apply. Meares (1997) discovered that a gendered hierarchy persisted among males who made the transition to sustainable agricultural practices and 'values'. It appears that the values attributed to sustainable agriculture were largely those of the male farmers:

For their wives, descriptions of quality of life are largely entwined with their highly elastic gendered roles and responsibilities on the farm, in the household, in paid and

unpaid work in the community, and much less with their involvement in the movement. Because women's different and important contributions to the farm and family are not institutionally recognized and addressed by the sustainable agriculture movement, the movement's goals, vision, and activities are gender-specific, dominated by men's participation and contributions (Meares, 1997: 26).

An explanation here may lie in the finding that food socialization was strongly gendered (Roos, 1995), food being a symbol for social interaction among girls and competitiveness for boys. Liepins (1995) concluded that while half the rural population is 'unseen and unheard', there will be no possibility of sustainable agriculture:

Women in agriculture demonstrate a social dimension of sustainability. They highlight the need to integrate gender equity and a 'wider-than-economic' conceptualisation of sustainable agriculture. Their actions can stimulate rural geographers to further consider the social and political aspects of rural sustainability beyond the conventional farm/industry and community service sites we usually consider (Liepins, 1995: 1).

This is clearly an area for subsequent social research that presents enormous possibilities and challenges in the development of twenty first century agriculture.

6.3.2 Aging of the farm population

According to the Australian Bureau of Statistics Population and Housing Census data (ABS, 2001), the Australian population is aging, as are the populations of most developed countries. The median age of farmers rose from 45 years in 1996 to 48 years in 1996. Garnaut and Helali (1999 cited ABS, 2001) calculated the average age of principal decision-makers in broadacre agriculture had risen to 52. The ABS report also makes several relevant points regarding the rise in the median farmer age:

- the increase is a result of decreased numbers of younger persons entering or remaining in agriculture;
- farmer age is generally greater in the high rainfall grazing districts along the Great Dividing Range of Eastern Australia and along the coastal fringe;
- farmer age increases were greater in the rangelands;
- farmer age increased in districts surrounding many regional centres; and

- age increases tend to be lower in both irrigation districts close to major population centres.

The report (ABS, 2001) also noted the median rise in farmer age was unevenly distributed among Australian rural populations. Other sources (*Australian Farm Journal*, 2000) predicted in four people in rural inland New South Wales will be above 65 years of age by 2026, compared with one in eight in 2000. This result was expected to hold for rural communities across Australia. Such demographic change poses major challenges for communities in rural areas. It is also predicted that the number of farms will diminish while farm size will increase, with a greater percentage of leasing rather than freehold ownership. In addition, new ways will need to be found to fund and maintain rural infrastructure (*Australian Farm Journal*, 2000: 79–81). However, the literature is by no means unanimous:

The myth of an aging and poorly qualified farm workforce damages the image and reputation of Australia's rural industries. Although some surveys have indicated an age increase, they have tended to represent specific groups, which skew the age distribution of farmers (Australian Institute of Agricultural Science, 1998: 28–30).

As in Phase One, Phase Two interviews suggested that many farmers currently chose to continue in farming because they had few other options:

I reckon I will keep growing but it's gonna be a battle. They've got me over a barrel, I'm just at that age of 'what am I gonna do if I chuck it in?' I just love growing potatoes – it'd be like cutting my arm off to stop growing them. But I know you gotta draw the line somewhere. I'll have one more go (Vegetable farmer #44).

Consequently, farmers reported that the social dimensions of the situation have reached crisis point as farm numbers shrink and farm area expands:

I don't know what's going to happen. Our youngest farmer in the district would be forty. It costs a fortune to set up – it's all done by machinery, but it costs a lot of money. The losses of younger people to farming are too high at the moment. What's been happening around here is that some farmers have been getting bigger and buying out other locals. Since the trees (plantations), we've lost 60 out of the community of 160 (Vegetable farmer #48).

Respondents repeatedly expressed concerns regarding community losses. They pointed to a ‘flow-on effect’ when farmers left the industry, the aggregate impact of which was a widespread social and economic contraction. Although the precise chronological age of respondents was not sought directly (to avoid the effects of an intrusive personal question), farmers were asked to indicate the length of the period during which they had been cropping vegetables. Although the responses *per se* are not valid indicators of an aging population, they are pointers to the depth of the subjects’ experience. According to responses, the average number of years cropped was 21.7 years and assuming that farmers began working at an average age of 17, that would translate into a mean age of about 39 years.

The survey data indicates that approximately 63% of farmers had cropped for less than 30 years while 34% had cropped for 30 years and more. Although not definitive, these figures do not indicate an aging farmer population.

6.3.3 Farm size

It was expected that survey results would show an increase in the average size of vegetable growing farms and areas specifically cropped. This would be consistent with ongoing adjustment in farm numbers, an example of restructuring (*Australian Farm Journal*, 2000: 79–81). Also farmer narratives generally reported pressure to increase the size of cropping areas:

You’ve either got to get bigger or you’ve got to get out. Getting bigger is not without its problems. I’ve got the pressure of all the little things getting bigger – such as debt. You’ve got to try and work smarter, be more efficient. Most farmers I know are expanding – the younger ones. Probably for a lot of reasons: need, choice, opportunity (Vegetable farmer #6).

Yet many respondents expressed an awareness of limits to increasing the size of their farms. They questioned the view that bigger farms meant best practice, quality, productivity and sustainability of resources:

... but now I think as farms grow bigger I can see where there may be problems – you take short-cuts; you do other things that you don’t normally do, that aren’t best practice to survive, don’t you? They get locked into the companies – they could end up losing a crop and having to grow the next one to pay for it. The companies prefer larger growers.

They'd rather deal with one rather than ten or twenty (Vegetable farmer #40).

Farmers generally claimed there was an optimum size for a farming property, after which management practices began to deteriorate and the risks to profits and sustainability increased. Those who exceeded their ability to manage the size of their landholdings suffered from diminishing returns. Some growers offered uncited studies as proof of this point:

The results they got were that the small grower is still by far their best grower, as far as quality, and probably, quantity. Economics of scale works to a certain point at which you start to go backwards (Vegetable farmer #40).

There is wider international support for these views. In particular, a 1989 study by the US National Research Council found that bigger industrial farms were comparatively inefficient. 'Well-managed alternative farming systems nearly always use less synthetic chemical pesticides, fertilizers and antibiotics per unit of production than conventional farms'. More support came from a 1992 US Agricultural Census Report which claimed that 'relatively smaller farm sizes are two to ten times more productive per unit acre than larger ones' (cited in Kimbrell et al. (2002: 57). Bowler (1992: 15) found similar limits to economies of scale in agriculture.

The data in the current research indicated a marginal increase in areas cropped (mean, 63.9 ha) and overall property size (mean, 272 ha) from those reported by Chilvers and Cotching (1994) areas cropped (60 ha), property size (124 ha). The results for area cropped were, however, less than the 75 ha, cited in Sims and Cotching (1998) whose property size had grown to 152 ha. The lack of correspondence in data sets with those in the Cotching studies may be partly explained by the limited sample areas surveyed by Chilvers and Cotching (1994) and Sims and Cotching (1998). Their studies were restricted to samples from the western- and central-north coasts of Tasmania; the most intensively cropped vegetable growing areas of the state. The present research sampled more widely, including the three regions along the north coast. Some farmers were relatively new to vegetable cropping and used smaller areas on larger holdings. While the latter study by Sims and Cotching (1998) may be a more accurate reflection of the increase in traditional cropping areas, the data of the present study is a wider representation of the cropping areas in the state.

Results also indicated that a majority of processing vegetables are grown on krasnozems soils in the north of Tasmania (Figures 6.1 and 6.2). In this research, krasnozems represented 62% of the total soils reportedly cropped. Though not exclusively Tasmanian, krasnozems soils or 'reds' are tertiary basalt, reddish-brown, strongly structured, gradational clay loams to clays. According to Chilvers (1996: 12) a darker 'A horizon' (topmost layer) indicates a surface accumulation of organic matter. In Tasmania, this soil type is predominantly found along the coastal areas from western Marawah to Sassafras, Pipers River, Deloraine, Scottsdale, Winnaleah, Breadalbane, and a small area around Campbelltown':

It is found on gently undulating landforms and rises to steep hills associated with volcanic lava flows, which occurred some thirty to fifty million years ago. On the north coast of Tasmania, rainfall increases and temperature decreases with distance inland and the krasnozems generally become darker, more acidic and higher in organic matter. In the cold dry climate of the midlands, krasnozems are characteristically bright red with lower levels of organic matter and high pH. Land capability of areas of krasnozems soils generally depends on slope, ranging from class 1 to 6 (Chilvers, 1996: 12).

Because the Tasmanian vegetable industry relies most heavily on its northern red soils, importance that is reflected in the high prices paid for this land, the practices of its farmers are significantly interlinked with the economic and environmental welfare of the state. For this reason, management issues have become critical for agricultural sustainability and the concern of this research. The following analysis and assessment of farmer practices was carried out with particular reference to the characteristics of the krasnozems soils in the north of Tasmania.



Figure 6.1: Krasnozem soils, north-central Tasmania (Source: School of Agricultural Science, Cradle Coast Campus)



Figure 6.2: Krasnozem soils with darker horizon in northern Tasmania (Source: School of Agricultural Science, Cradle Coast)

6.3.4 Soil erosion

For vegetable farmers, soil erosion is a major challenge on Tasmania's krasnozems soils (Chilvers, 1996: 12). Topsoil is the most vulnerable and valuable part of the resource and on steeper paddocks that, according to farmer reports, are increasingly being brought into use with a consequent potential for increased erosion. A millimetre of topsoil lost to 'washing' is equivalent to trucking ten to fifteen tonnes per hectare and dumping them elsewhere (Hamlett, 2002: 23). Much of the eroded material is generally dissolved and carried away into streams and rivers (Figure 6.3). A major problem for research in this area is that there is little uniformity among the conditions that contribute to such erosive events, a problem which will undoubtedly become exacerbated with the expected rate of climate warming and change:

The rate of soil erosion depends on climate (precipitation and wind), topography (angle and length of slope), soil properties (soil texture, soil structure and organic matter), vegetation cover and management. Climate, slope angle and certain physical characteristics of the soil cannot be directly controlled (Hamlett, 2002: 23).

When cultivation is excessive, there is an increased likelihood of degradation in soil structure and organic matter levels (Hamlett, 2002:26). In the DPIWE and TFGA approved *Soil Management: A Guide For Tasmanian Farmers* (2002), Hamlett describes soil erosion as the result of a combination of factors when water is allowed to flow freely across the surface of cultivated land carrying with it valuable topsoils.

Erosion controls become necessary when topsoil has been disturbed and left without plant cover (Hamlett, 2002: 24–29) including minimum tillage and residue retention with stubble and vegetable covers. The latter include the use of perennial pasture, green manure and cover crops. Such cover provides a root system to anchor topsoil into lower strata and aids water infiltration. Thus, there is reduction in the volume and velocity of water flows by absorption and vegetable matter. Several other effective erosion management controls are available to farmers such as cut-off drains, which are used in conjunction with grassed waterways that divert water flows to a cultivation area.

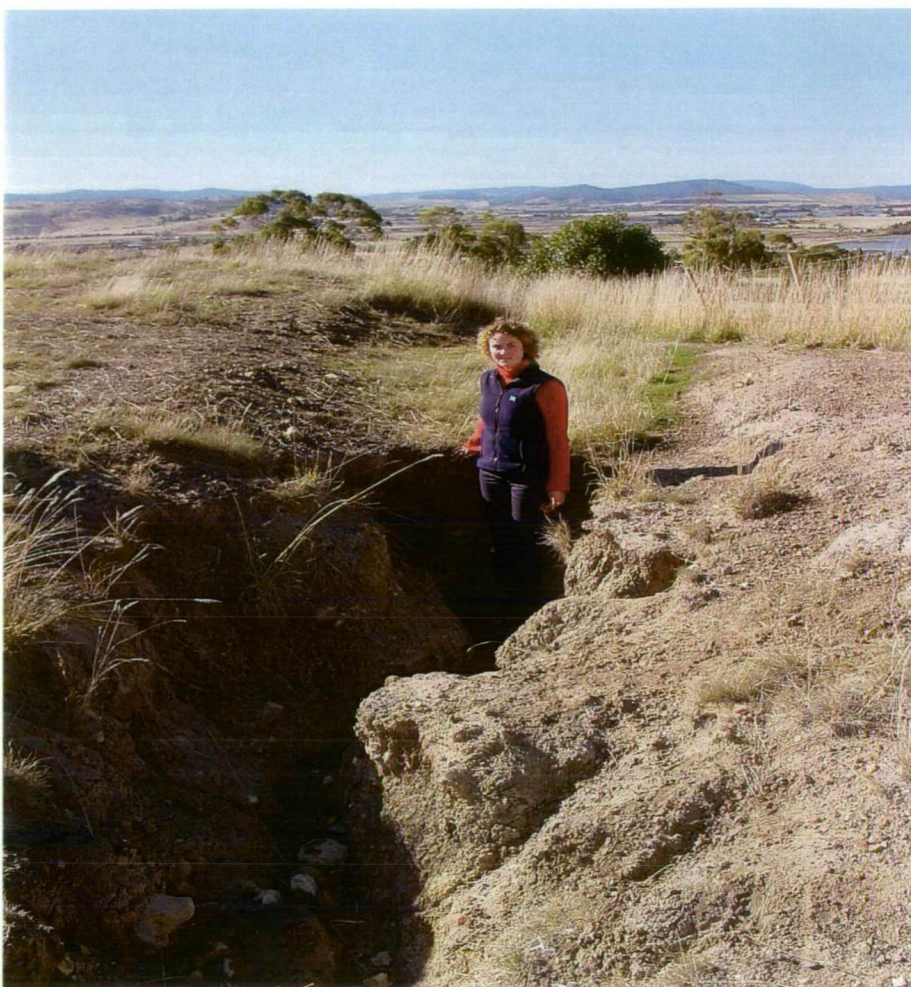


Figure 6.3: Soil erosion in northern Tasmania (Source: School of Agricultural Science, Cradle Coast)

Mulched rip lines (Figure 6.4) are used on sloping paddocks along the contour lines, allowing increased infiltration of water into the soil and increasing sub-soil moisture, thus reducing the need for other surface drains. A new technique involves the addition of mulched cereal straw along the top of rip lines to further improve infiltration and reduce run-off speed.

Grassed surface methods may also be used as grassed irrigator runs and cut-off drains to transport water into grassed waterways that carry surface flows along natural drainage lines. Raised beds with adjoining furrow beds are also recommended for continuous cropping systems where livestock are excluded from the cropping area and where the gradient is no greater than 3%. And finally, cut-off drains are sometimes incorporated within raised beds can divert drainage before accumulating along the furrows between the beds.



Figure 6.4: Mulched rip lines hay in furrows to slow erosion on newly ploughed land, a Tasmanian innovation, Tasmania central north (Source: School of Agricultural Science, Cradle Coast)

As survey participants were encouraged to enlarge on their responses to the questionnaire by giving their opinions on any of the topics, the following list of themes emerged and was condensed on the subject of soil erosion:

- inevitability of erosion;
- responsibility for erosion;
- diversity of practices;
- price and practices;
- run-off;
- awareness;
- cover crops;
- erosion-prone crops;
- sustainability; and
- attitudes and actions.

Although farmers surveyed generally indicated an awareness of the dangers and wastefulness of soil lost to erosion, the farmer narratives from Phase One suggested a degree of fatalism among many, who accepted that ‘some’ erosion was an inevitable result of cropping. This was confirmed by survey results in Phase Two where 25% of farmers expressed, a ‘little’ concern for soil erosion and 24% claimed they were concerned only ‘sometimes’. There was a widely held view that regardless of what preventative measures a farmer might take to avoid erosion, when soils had been disturbed (Figure 6.5) before planting or during harvest time, a heavy unexpected downpour must cause some degree of ‘washing’ (erosion):

It doesn’t matter what implements you use or methods – if there is an extreme downfall at the wrong time, there will be erosion (Vegetable farmer #56).

It doesn’t matter what you do, it’s difficult to stop it entirely. It’s all to do with management, wholly and solely (Vegetable farmer #4).

The time of year you are preparing your ground affects the amount of soil erosion. So, it doesn’t matter what vegetable you put in. If your ground is not sown to something, in the winter time, it’s gonna erode (Vegetable farmer #18).

In addition, it is important to note that severe soil erosion is not exclusively a winter phenomenon in Tasmania:

Sometimes, when you get a heavy downpour in summer, when the ground is dry and not much cover, you could have some of the worst erosion (Vegetable farmer #8).

Most farmers claimed that in all cases under conventional planting practices and for fairly simple reasons, there was a likelihood of soil erosion occurring:

Most crops go through a delicate period when they’re vulnerable – until they get root establishment. You put drains in and all the other things, but if you get torrential rains, there’s very little you can do. You take all the precautions you can, but sometimes, it’s not enough (Vegetable farmer #5).



Figure 6.5: Disturbed krasnozem soil in northern Tasmania (Source: School of Agricultural Science, Cradle Coast, Tasmania)

Such fatalism, though widespread, is to some extent based on misinformation and archaic practices. Given the knowledge, technologies and controls currently available, there is little reason to accept any degree of erosion as unavoidable (Dillon, 1996: 58; Richley, 1996: 24–25; Cameron, 1997: 25–27). For example, soil disturbance during known rainfall periods ought to be unnecessary and is therefore an example of poor practices. With improved management including better weather forecasts, erosion can be mitigated to the point of eradication. Farmers who continue to hold a fatalist view may be consciously or unconsciously relying on a pretext for justifying intensive and inadequate farming. They may be arriving at false conclusions by selectively altering the basis of their beliefs:

If a person is committed to some behaviour, which is inconsistent with information he receives, the resulting dissonance may be reduced or eliminated by altering the behaviour *or* by altering the perception of the meaning, significance or validity of the information (Mitchell, 1979:121).

Fuller (1996: 8) used the demarcation point of over thirty years' cropping when looking at the most common problems regarding soil erosion and farmers' perception of potential degradation problems in the hill country of south and west Gippsland in Victoria. He reported that those farming over 30 years perceived less severity in soil erosion problems

than those farming for a lesser period. He concluded, 'younger farmers may be more aware or have a better understanding of erosion problems' (Fuller, 1996: 9). This finding is partly supported by the present study.

A higher percentage of those farming for less than 30 years (23%) were more concerned about soil erosion problems than those farming over 30 years (8%). Also 50% of those farming for less than 30 years indicated taking some action to reduce soil erosion while only 12% of those farming for over 30 years claimed they were taking any action at all. Nevertheless, it appears that 'traditions die hard', where some degree of fatalism among younger, more progressive farmers persisted in their reluctance to accept that soil erosion can be completely eliminated:

I believe that there are some very inexpensive practices that can be adopted to stop 85% of soil erosion with equipment that farmers already own and getting some learning from what other people have done (Vegetable farmer #14).

Interestingly, a farmer's wife expressed the view that soil erosion may be prevented altogether, if farmers were a little more imaginative:

I think sometimes people say, 'Oh well, it's always happened, it's going to continue happening', instead of saying 'It's happened once let's stop it'. I think that's the difference of some traditional farmers and others who think, 'Let's have a new think about this' (Vegetable farmer's wife #29).

This 'woman-in-farming' view is consistent with that of Alston and Wilkinson (1998) in the association between empowerment of women in agriculture and sustainable practices.

The opinion that soil conservation was largely a farmer's responsibility was widespread among the survey subjects. Many respondents readily accepted responsibility for erosion on their land, even when it reflected adversely on their management practices, '[Erosion] is mainly caused by bad farming practices' (Vegetable farmer #52).

This view may be associated with the inability of many respondents to see agricultural soils, at least in part, as community resources. It was explained by one respondent that many farmers could not contemplate a wider responsibility for agricultural resources because this would entail relinquishing some of their traditional property rights to outside interests. And in this regard, there were suggestions made that 'outsiders' did not have the

interests of farmers at heart. Consequently, a degree of ambivalence persisted: that though farming practices and their outcomes were decisions by farmers alone, the responsibility for their consequences ought to be shared more widely. Some farmers offered a reasoned compromise where the community and individual farmers shared the responsibility for the sustainability of resources:

I think that everybody's got a responsibility for the catchment. But I also think that the emphasis has got to be on the farmer, or whoever it is that's disturbing the environment, to try and minimize it. The people whose land is more likely to erode have more responsibility (Vegetable farmer #14).

I think it's the farmer's problem – it belongs to us [the land] – it's our problem. I suppose a bit of help on information like the barley straw was good. I think it should be up to the farmers to do it (Vegetable farmer #32).

Others implied that processors and governments had a part in erosion control:

The final decision does finally rest with the farmer. It's his decision when he digs in the wet or when he plants his crops. We should be getting adequate returns. Potato prices have decreased in the last ten years. The same applies to most processed vegetables. We have not had the increase we are entitled to considering what the consumers are paying. The point is that the consumers are paying too much considering what the farmer actually gets for it (Vegetable farmer #30).

Participants' responses regarding their preferred choice of erosion controls on cropping land did not confirm the findings by Chilvers and Cotching (1994: ii) that 'overall, there has been a spectacular increase in the adoption of soil conservation earthworks'. Nor did responses indicate a widespread adoption of minimum tillage techniques. This research discovered a variety of opinions on the use of recommended methods. Some farmers' lack of confidence in recommended controls also reflected a lack of confidence in government official experts who promoted them:

The Department people hardly ever talk to farmers and, most of the time, have the wrong idea of how things happen on a farm. For example, they say when there's soil build up on a fence line, that's evidence of soil erosion. But that's hardly ever true. Usually that's from working the paddock with machinery that throws big clods onto fence lines and it builds up. They really need to talk to us more. If you wanted to know how to fill a tooth, you wouldn't go to a vet (Vegetable farmer #9).

If there were some more cost free services from DPIWE for soil sustainable issues, I think you find more farmers willing to embrace it. It's the fact that whatever you do, you've always got somebody turning around telling you, 'That's wrong', and 'You should do it this way' and 'It's going to cost you more'. People are very keen to tell you how you should not be doing things. Nobody's willing to help finance you into the new improved methods for the benefit of humanity over the long term (Vegetable farmer #29).

As far as Dr Llewellyn [then Minister for Agriculture] trying to tell us what to do – I doubt he knows which side his toast is buttered on. Farmers like the potato growers are now speaking their mind (Vegetable farmer #41).

Although many respondents accepted the inevitability of erosion, some appeared to be using at least some of the officially prescribed controls (Table 6.1).

Erosion controls					
Controls	Cut-off drains	Grass irrigator runs	Contour drains	Grassed waterways	Diversion banks
Number of Respondents	39	24	28	28	4

Table 6.1: Number of respondents using an officially recommended erosion control

However, farmer statements often contained a subtext that expert information and knowledge was something that needed to be evaluated and modified for the particular context, including the farmer's own history:

My average slope is about 10%. You still gotta use your cut-off drains. I'm not into grassed irrigator runs-contour drains are also good and used most for cropping. I've got two cropping paddocks that I call a winter drain. They are just permanent grass. Hopefully you can stock it hard enough to keep it clear but never sprayed and killed or anything like that. They're always a grass waterway and that's designation grass waterway. I never crop them or work them in or do anything like that. Virtually [use minimum tillage] all the time. Official information is all to be used when it comes (Vegetable farmer #56).

Most erosion controls worked pretty well except when cut-off drains overflowed. Otherwise, they are good. What I used to try and do is have as much mulch in the ground as possible and to me that is still the best soil erosion prevention that there is (Vegetable farmer #43).

Sims and Cotching (1998: 27) claimed that fewer farmers were using soil conservation techniques in 1998 than in 1993, 'even though an increase in the usage of soil conservation earthworks has been recorded'. They also added that 'soil conservation earthworks, such as grassed irrigation runs and grassed waterways which are known to reduce erosion, are not being readily used by the majority of farmers today' (Sims and Cotching, 1998: 28). These findings are consistent with those of the present research.

Survey results indicated that adoption of all recommended erosion controls was below 10% while 42% of farmers responded that they did not use any of the controls listed. This does not necessarily indicate that some form of erosion control was not being employed. It may be that farmers are not using the measures investigated here, preferring to use alternatives. For example, some respondents claimed that deep ripping was an acceptable form of erosion control as it allowed rapid surface water penetration and absorption. Other farmers have made use of the 'ripper mulcher'. In addition, a significant number of farmers (78%) claimed that they used crop residues to maintain soil structure and this practice was effective in reducing the soil's erodability. The latter was a much higher rate than the 12% reported by Sims and Cotching (1998). It may be that this practice has seen accelerated adoption rates in the past three years. With the imperative to intensify cropping on their soils, it was expected that erosion problems would be a primary concern for most farmers. Yet, only 36% had considered erosion to be a high priority in the previous year. At the same time, the recycling of crop residues is also considered a useful aid to improving soil structure, a major concern for farmers and may explain the rapid uptake of the practice.

A cover crop is an effective means of protecting vulnerable topsoils during heavy winter rains. In the 1996 Department of Primary Industry and Fisheries (DPIF) *Managing Tasmania's Cropping Soils: a practical guide for farmers*, Chilvers appears to be promoting a method of soil conservation based on the use of a particular (and controversial) chemical herbicide:

In the future, cover crops are set to play an increasing role in the growing of clean and green produce. The Tasmanian DPIF conducted very encouraging trials in 1994/5 using a rye corn cover for brassicas planted as seedlings. The rye corn cover was allowed to reach about 600 mm high before spraying off with glyphosate two weeks before planting. Not a single herbicide spray was required during the life of the crop and soil

losses were negligible. The main barrier to wider adoption of sowing into cover crops is that modification of the drill is required for added trash clearance (Chilvers, 1996: 63).

Five of the farmers surveyed in this research claimed they had used a cover crop. Other farmers generally stated that they thought the gains in this practice, when there were any, did not justify the effort and/or expense. All things considered, there was a remarkably low uptake of cover crops as a recommended erosion control.

These findings have some support in the work of Sims and Cotching (1998: 28), who noted that cover cropping in Northern Tasmania decreased in popularity from 32% in 1993 to 19% in 1998. Rather than the heavy application of a toxic herbicide, the reported difficulty in the use of cover crops appears to be largely in the added management demands on farmers:

There's a fine line between having them [cover crops] there for too long where they can do a lot of damage to your crop by smothering. Sometimes the difference is only two weeks and if that happens in August when you're having ten inches of rain, you're in trouble if you can't get on there to spray them off. A cover crop can become uncontrollable (Vegetable farmer #37).

If I were growing onions, I certainly would be growing a cover crop (Vegetable farmer #41).

Yes, we only use them [cover crops] when we grow on light sandy soils (Vegetable farmer #3).

Not done [cover crops] because packers like clean paddocks – also helps to harbour diseases – easier to stop with nice clean paddocks, which make it hard for diseases to grow. The wrong cover would compete with the crops for nutrients if you don't clean up your cover after every crop. What you'll find, say, after potatoes, if you've got a lot of waste that was on the ground that wasn't destroyed as in eaten by stock or destroyed totally, those ground keepers do grow and yes, they do compete very hard against your next crop. So you've got the next thing of more chemicals to go on the ground to try and get rid of them. So if you've got a ground cover and you want to take a certain element out of that paddock, you've wasted all your time putting the ground cover in because you'll have to destroy that to get rid of peas or beans or it could be nightshade (Vegetable farmer #58).

Although many respondents claimed an association between potato growing and soil erosion, many added that this was not a major concern since the plants themselves tended to reduce erosion by their close proximity (Figure 6.6).



Figure 6.6: Potato paddock in north-east Tasmania (Source: School of Agricultural Science, Cradle Coast)

However, since the soil in which potatoes are grown requires a high level of cultivation to a fine consistency and shaping into mounds about 300–400 mm, there is always potential for serious erosion given the intensity of new rainfall patterns. Additionally, the possibility of erosion is increased on marginal and sloping land. In the case of onion crops with short surface root systems, the danger is even more marked with increased need for the application of cover crops.

This practice was claimed to prevent the type of soil erosion common with onion growing. Yet the manner in which farmers now generally grow potatoes in ‘ridges’ made up of finely worked soil in long narrow mounds, also makes the soil highly susceptible to water-borne erosion:

Potatoes are irrigated more and are grown in ridges. The ridges fill with water and away it goes! To my way of thinking, they’re irrigating far too much (Vegetable farmer #59).

I would say it [erosion] is becoming more significant especially in the lighter soils that are being used for poppies and potatoes. Some people have stopped growing potatoes

because of the damage to the soil structure (Vegetable farmer #7).

You don't need to look to see it. You know it's going to happen when it rains, if certain things haven't been put in place. I don't think the crop causes the erosion. The worst problem I have ever had has been onions because you don't have any ground cover (Vegetable farmer #35).

When you dig potatoes so late, either it's too late to put in grass or it won't do any good in the middle of winter. It only works if you dig early enough. All winter crops are prone to causing erosion problems especially brassicas, which are in rows and in between the rows there's nothing to hold the soil (Vegetable farmer #41).

Potatoes [are erosion prone because] you're doing a maximum soil disturbance before you plant and when you harvest. It doesn't matter what implements you use or methods (Vegetable farmer #56).

Erosion problems with potatoes are usually associated with late or winter harvesting of these crops, a practice that is declining as processing companies make more above-ground storage available and the need for wet winter harvesting is reduced:

Potatoes used to be when we couldn't dig before August. Now you can be finished June before the wet – go straight in with the agro-plough and you wouldn't know there's been spuds in. In winter digging, it was different. Now you can get a bloke in to dig the whole lot in one hit (Vegetable farmer #81).

On the other hand, some farmers claimed that potato growing has not yet become a benign cropping activity in relation to soil damage:

I stopped growing potatoes for Simplot because although I was close to the factory in Scottsdale, they have a policy of harvesting their joint ventures first and I always seemed to be digging in the middle of winter. I stopped growing for them because it was doing too much damage. A friend of mine said 'potatoes are a good crop to grow on someone else's land' – not your own (Vegetable farmer #35).

I mean there is pressure to harvest in the winter at some time but I think it's a strange kind of pressure. It's the pressure of mismanagement to a degree. I wouldn't say you're pressured – you don't have an option and I put this down to a lack of capacity. They [processing companies] are pretty much Scrooge McDuck [miserly] when it comes to any sort of investment – it's all got to stack up and it doesn't stack up if it helps the

growers (Vegetable farmer #64).

At the same time, 52% of farmers responded that there had been no pressure to harvest in the winter while 20% claimed some constraints to do so and 4% indicated only 'sometimes'. The unevenness of processing company behaviour may be understandable given the recent changes in harvesting policies and the geographical dispersion of farmers. Changes will require a certain amount of time to pass before they are fully implemented.

Some respondents also reported serious erosion effects from 'run on' water flowing from public roads especially where roadway culverts were installed. However, it seems that councils may be generally unresponsive when it came to farmer concerns. This was claimed to be so serious that farmers sometimes felt the need to take direct action:

I try and be very soil conscious. I'm probably not the world's best farmer and when I went down to see them at the council it was 'We want to get the water off the road as quickly as possible. It doesn't matter where it goes, as long as it gets off our road' because the more there's water build-up in the drain. I reckon it's disgusting. And I blocked up all drains up one road. I know they're gonna come along one day and unblock them. And then I'll just go along on the other side and block 'em up there. The government should be looking at stopping local councils from doing these sort of things (Vegetable farmer #57).

One of our erosion problems is water flowing off the public road onto our neighbour's farm, then onto ours (Vegetable farmer #9).

They're useless. They don't care about water coming onto your farm. You shouldn't have to put in your own ditches. They do ridiculous things that affect water movement across your property without consultation with owners (Vegetable farmer #9).

Forestry activities in which large areas of forestland were clear-felled can also cause increased erosion onto farmers' paddocks and serious soil and nutrient loss.

In the last five years, our level of erosion has increased mainly from forestry activities – they've decimated hillsides. When we get heavy rain our dams are the same colour as the hill. They spray this stuff that stops anything growing for a period of time, which washes onto our land as well as the dirt. It's a pretty contentious issue in this area (Vegetable farmer #13).

State government officials reportedly also failed to fully understand the farmers'

problems because of a lack of willingness by officials to communicate sufficiently with farmers. 'The Department people hardly ever talk to farmers, and most of the time have the wrong idea of how things happen on a farm' (Vegetable farmer's wife #29).

The majority of respondents held a pragmatic view that conservation of resources was a high priority for them. But they were human with other important demands such as the welfare of their families, and sometimes, they did make mistakes:

Too much cropping on steep ground is causing a lot of serious soil erosion in my area. I would say that local farmers do want to reduce their soil erosion but they've just made mistakes overworking their ground (Vegetable farmer #18).

I would know a lot of farmers who are switched on to sustainability but they just have to do things that they don't like doing because they got families to feed (Vegetable farmer #7).

I reckon farmers are the best conservation people you can get – most of them are. The ones who are there to get everything they can get and not put anything back in; don't last long anyway. The long term ones don't want to lose their topsoil into the creek. They do it quietly (Vegetable farmer #8).

During the interviews, farmers often seemed very concerned about how they were perceived by the wider community. Many tried to send a clear message that they understood the importance of sustainability issues and were attempting to make changes:

Farmers are becoming aware of having sustainable practices – they notice each other's management and I think that [mining] is a very old thing. I don't think that any farmers think like that any more. Younger farmers realise that unless they maintain their soils, they're not going to crop for long (Vegetable farmer #3).

Sixty-four percent of farmers asked to identify signs of erosion on their own property reported it as 'minor' and 14% as 'moderate' in their district. Chilvers and Cotching (1994: 14) found these figures to be approximately 69% 'insignificant' on their own property and 53% 'moderate' in their district. Their results pointed to a decrease in 'substantial' and 'moderate' levels of erosion with a high increase in 'insignificant' levels (17% to 39%) in the farmers' district. In the same research, Chilvers and Cotching also reported an increase in the 'insignificant' response on farmers' own properties from 36% to 69%.

However, if as widely reported in the narrative of this research, farmers are becoming more aware of the serious consequences of soil erosion in the 2000s, then a decrease in all levels of erosion should be expected. Consequently, 64% reporting 'minor' levels of erosion may be considered reasonable but unlikely given the lack of erosion controls used.

A majority of farmers (53%) indicated that erosion levels had decreased in their districts in the past five years, which may be consistent with improved attitudes and levels of awareness about the seriousness of erosion, if one knew the level of decrease. It is notable that none of the farmers from the most heavily cropped areas along the north central and western coasts of Tasmania reported increased levels of erosion in their districts. Those of the six who did indicate increases, worked in less intensively farmed areas such as Longford, Ringarooma and Scottsdale. The comments of non-intensive vegetable croppers about intensive croppers suggests serious concern for the resource:

Up on the Forth Road, they're cropping all the time, 2–3 crops a year on the same paddock. Down there, the farm costs 3 times up here, so they've got 3 times the cost to pay (Vegetable farmer #8).

In the front country, on that 10 k strip back from the coast, in North Motton, I've seen paddocks that would not have grass sown in them between 10–15 years. There are paddocks that have been worked up every year of my entire lifetime (43 years) but farmers are getting better educated. Reasonable cropping land now costs up to \$7,000–\$8,000 a hectare. In Kindred and Sassafras it could be up to \$10,000–\$12,000. So you have to grow a lot to even pay for the property (Vegetable farmer #56).

Soil conditions relate to how much is being cropped; we got a neighbour who's on a merry-go-round because his yields are down which brings his gross margin down. He seems to be cropping more and more which in turn is affecting his yield again and his gross margins. He'd find it hard to get off (Vegetable farmer #22).

It is possible that north coast intensive farmers with shorter cropping rotations, who reported 'mild levels' of erosion, were engaging in denial by refusing to acknowledge that degradation problems are as severe as reported by other farmers. If soils are consistently worked, and left unprotected during heavy rainfall, there are bound to be erosion problems. To accept the full reality and implications of such events on their land may entail a rejection of intensive cultivation practices. And currently, intensive farming practices are the accepted means of ensuring the viability of farm operations (Maynard, 2000: 6). The

increasing cost of land referred to above, simply compounds the problems. Heavily indebted farmers may simply not have other options but to intensify:

I wouldn't crop as much, half as much. I'd have longer pasture rotations like the good rich farmers. This would give better yields and more accurate practices. A lot of things you would do if you had a lot of money and wanted to look after – I mean, we all want to look after the farm. I do a lot of things on this farm that I know I shouldn't by growing ten years of a crop in a row in a paddock. When the bank manager comes out and asks, 'How you gonna make money this year?' You're under pressure then. If I owned my farm outright, I'd get about \$80,000 more income a year. But I'm not going backwards (Vegetable farmer #37).

In reality such farmers, for a variety of reasons, and regardless of their struggles against the 'pressures' forcing them to degrade their soils, albeit temporarily, in the eyes of many of their fellow farmers, are miners:

There's too much over-cropping going on. They're depleting the soil structure. We haven't got enough water to do the whole lot and we wouldn't want to do it. You've got to work on a balance. It's not a cropping rotation. It's a pasture cropping rotation (Vegetable farmer #19).

It is also possible that many simply consider the immediate benefits of over-cropping outweigh the less visible long-term costs of erosion. This allows them to accept the negative outcomes as inconsequential (Jackson, 1977 cited in Mitchell, 1979: 130) and avoid the costs of preventative measures such as for example, cover crops.

6.3.5 Deep ripping

Many farmers have combined recommended controls with deep ripping practices modified to suit the individual conditions:

I use deep ripping to let the water into the soil after compaction to give the soil a chance to breathe right down deep; rip about fifteen inches twice before spuds and once after. My land varies in slope. I use cut-off drains to turn the water off the top of the paddock. I use grassed irrigator runs, I use grassed waterways, diversion banks to stop the water going down the paddock (Vegetable farmer #6).

However, this popular practice may be a contributing cause of compaction and soil degradation, due to a misplaced dependence on its benefits. The survey narrative suggested

that some farmers will follow practices which they know may cause compaction in the (mistaken) belief that only temporary soil damage will result, which can be simply reversed by a pass or two with a ripper:

One reason is they let heavy equipment on paddocks and don't do nothing about it till they get soil erosion because all the water runs off and some farmers haven't got the equipment to agro-plough or work the paddock up so there's no runoff and no compaction. If we take a truck in a paddock somewhere we keep it on the headlands, and even then I've usually got a tractor hooked on the agro-plough (Vegetable farmer #26).

Many farmers considered that deep ripping was a way of allowing natural processes to work for them in helping to rejuvenate soils damaged by machinery and overcropping:

Open the soil up you let the air and the water in so when you open the soil on top, the plant goes down looking for water and he gets it when he needs it. But you gotta rip at the right time. Before the winter, open it up before the winter, not during the winter – if you do, you're only compacting your soil for a start, and it's a lot harder to work your ground when its wet (Vegetable farmer #66).

[Deep ripping] does a lot more than any artificial fertilizer will do, for your soil. It lets the sun the wind the frost and the rain in – lets the air in, lets Mother Nature help you do the work. I used to rip after the crop but it has become common practice to deep rip prior to planting. I rip between 12 and 18 inches (Vegetable farmer #43, 2001).

If you agro-plough at optimal conditions the benefits are incredible. If farmers don't, they should (Vegetable farmer #14).

On the other hand, not all farmers agreed that the practice was beneficial:

I haven't seen any difference between deep ripped and not deep ripped (Vegetable farmer #92).

A lot of farmers if they used a curly tyne instead of deep ripping, they'd save money on the water. A lot of 'em this way are going in too deep. The ones who've deep ripped, their structure is shocking – there's lumps as big as tennis balls and you know how small poppy seeds are. And the ones who didn't rip, just ploughed it, it's gone in just beautiful (Vegetable farmer #33).

I use it (deep ripping) with trepidation (Vegetable farmer #16).

On our soil we've found the less work you do on the soil the better. We've found the cost of ripping didn't justify the expense – better to use a form of minimum tillage (Vegetable farmer #53).

According to Sims and Cotching (1998: 44) a 100% of their respondents indicated that they tilled their soils with an agro-plough. Some farmers used homemade and yeomans rippers. This is consistent with Sims and Cotching's finding that the level of compaction had risen to 75%. Deep ripping is the first treatment used by many farmers to regenerate soil to a level where it might be suitable for more cropping.

In this survey, the responses to the question, 'Do you rip?' was an affirmative 78% but not the 100% reported by Sims and Cotching (1998: 44). Eleven percent responded in the negative and 7% replied 'Sometimes'. Not all farmers 'now perceive that their ground requires deep tillage'. Some made extravagant claims about the value of deep ripping while a small number remained sceptical about any benefits. It seems that while there is a high adoption rate in ripping, it remains a controversial 'panacea', it is often seen as a quick fix by those whose land is being degraded in the everyday operations of conventional vegetable cropping:

Over the years we have a scarifier that we go down just below plough level and break down the hard pan underneath. Well, a lot of people never did that up until the last 10–15 years and now of course, well, everybody's doing it and now the water is going down further and that's one reason why they are getting less wash. If you do it the right way at the right time of year, you won't get erosion, but if you do it at the wrong time of year, it fills up with water and away it goes (Vegetable farmer #54).

Some farmers associated deep ripping with potato scab (a reference to any of various potato diseases characterized by roughened, scab like spots on leaves, stems, or tubers). But this is also controversial:

Scab's the biggest problem with potatoes. One of the field officers reckons deep ripping causes scab. There's a bloke at Rianna who used to get scab every year and he ripped every year. This last year he didn't rip and he never got scab (Vegetable farmer #48).

We rip where it's compacted and we also deep rip our potato ground before we're ready to plant because it breaks the bottom up and you don't have as much scab. We have a problem with scab sometimes and if you break it up underneath and let the water get

away it seems to help a fair bit. We rip before and after potatoes – we reckon it helps with scab problem. That's pretty well accepted by other farmers. We usually rip about 12 inches (Vegetable farmer #23).

As expected, the majority of farmers indicated a strong preference for deep ripping to reverse the effects of compaction (67%), to increase drainage (25%) and aeration (19%). The latter was similar to Sims and Cotching's (1998) results. It is of some interest that only 31% of these indicated reversing the effects of compaction as a benefit from deep ripping. Over 35% claimed they had moderate to substantial compaction. In the present research, 76% of farmers responded with 'mild' levels of compaction and 12% said it was 'serious'. One problem in interpreting this data is semantic. It is unlikely that there was a high degree of congruence in the various meanings of the terms 'mild', 'moderate' and 'serious' among all participants in the research. For Sims and Cotching (1998), the terms 'insignificant' and 'moderate' are also insufficiently defined but evidently thought to be useful. Most research in this area relies on terminology that is based on an acceptable level of imprecision, an appeal to context and an abundance of 'common sense'.

There is a degree of diversity in farmer views on management practices. Yet, some farmers, having been handed down working knowledge through past generations, were at times reluctant to change on the advice of young experts from government departments and input suppliers. This is often a point of contention where farmers have a long-standing understanding of their land and its capability, and must endure the demands of outsiders, such as processing company field officers with formula practices.

6.3.6 Soil structure, fertility and compaction

According to Hamlett (2002: 7), 'Soil structure is defined as the way in which soil particles and the pore spaces between them are arranged. Soil with good structure tends to have a high proportion of stable aggregates (ranging from 2–10 mm in size) with many interconnected and resilient pores. This allows for improved plant productivity as a result of enhanced aeration, infiltration, drainage and increased activity of beneficial soil organisms. It also allows for improved root growth to access water and nutrients'. The problem with degraded soil is that it has a high proportion of small particles and few water-soluble aggregates (Hamlett, 2002: 7). This means that action to rectify damaged soil and prepare it for further cultivation is often a kind of 'Catch 22' for farmers who crop intensively:

The reduction of pore size and continuity results in massive blocks that restrict root growth and plant productivity. Compacted soil requires more cultivation to prepare a seed-bed and this additional cultivation causes further deterioration in soil structure. A surface crust may develop that prevents seedlings emerging and reduces infiltration of water (Hamlett, 2002: 7).

If there are farmers who do not understand the importance of good soil structure, they were not encountered in this research. All respondents indicated that they valued good structure highly:

Always thinking about soil structure – that’s the important one because that’s your livelihood. We test every paddock that we are going to crop every year. When we started growing broccoli, the field officer couldn’t get over the organic matter we had in the soil. Our last potato crop got a yield of 25–30 tonnes an acre. Plenty of worms too (Vegetable farmer # 34).

Our biggest limiting area [soil structure]. We crop for about seven years then [allow] about the same period of pasture to bring and re-establish organic matter and soil structure (Vegetable farmer #3).

The research also detected a similar fatalism about soil structure as about soil erosion:

Its [soil structure] not as good as I’d like it to be but finances don’t allow it to be any better (Vegetable farmer #56).

According to some farmer subjects, soil structural decline has not received enough attention in soil conservation practice. Intensive cropping often involves overworking soils using powered equipment. This is not compatible with agricultural sustainability because of the damaging effects to soil structure, which often results in decreased yields and added costs. Yet, while some farmers in this sample acknowledged a ‘structure problem’, a majority appeared reluctant to call it a serious problem. Sixty-four per cent claimed their soil structure was ‘good’, 28% that it was ‘fair’ and 1% ‘poor’. These results were largely incompatible with more candid farmer statements (farmer knowledge) in the survey narrative in which farmers expressed serious concerns about the sustainability of intensive practices, especially in relation to soil structure:

Yes, I have been thinking about soil structure in the last 12 months – very important to monitor the levels. My levels are medium. I don’t think we’re ever high enough. When I

say we're not low, probably only saying that because there's a lot that are worse. Whether we're not low and others are even lower – that's a good question. Yeah, where we are winning on the soil erosion, certainly on the soil structure, we're losing. I don't think any farmers do very well on the soil structure. Mine is fair (Vegetable farmer #69).

Very important to monitor your soil. God, yeah. My organic levels are not good – in some instances, low to medium. Soil structure generally varies, but I put down fair. Soil structure is affecting my business negatively, definitely (Vegetable farmer #64).

Many farmers claim to have an 'organic' view of their soil. As a living resource, it is best nurtured, maintained, kept alive and robust. In contrast, those who mine, abuse their soil like a cruel owner of a dying pack animal, pushing it harder and working it to exhaustion. For some, this is patent folly:

If you can keep your soil in good condition with residues, you don't have to belt it with power harrows to powder it up. Then it holds together well and doesn't erode away easily (Vegetable farmer #28).

According to Sims and Cotching, the future for soil condition is bleak:

Since 1988, over 50% of farmers perceived that they had an insignificant problem in relation to soil erosion and soil structure. These farmers either don't have a problem or they won't admit to it. Consequently, it is unlikely that there will be any increased adoption of more sustainable soil management practices by these farmers (Sims and Cotching 1998: 44).

Given the aversion of a majority of Tasmanian vegetable farmers participating in this research to altering their conventional practices, this research found it difficult to disagree with the above conclusion.

6.3.7 Fertility and organic matter

The benefits of high levels of organic matter in soils are universally recognised by farmers. Organic matter 'contributes to improved soil structure and reduces the risk of compaction by binding soil particles into stable aggregates' (Hamlett, 2002: 7). Organic matter also contributes to an improved capacity for the soil to retain nutrients, retain moisture and support a greater population of beneficial soil organisms. Such organisms include bacteria, fungi, earthworms, ants, dung beetles and slaters. In turn, beneficial soil organisms help to

maintain soil organic matter turnover and nutrient cycling. Soil structure is improved when thread-like fungal growths and mucus coverings of soil organisms help to produce soil aggregates.

The DPIWE officially recommended guide on soil management for Tasmanian soils contains information regarding the usefulness of maintaining organic matter (Hamlett, 2002). A well-managed pasture phase (which exceeds two years) is said to improve soil organic matter levels by allowing vigorous root growth. If long-term pasture is not possible, a green manure crop such as lupins for nitrogen and organic matter is recommended between cropping phases. This stimulates biological activity to improve the rate of nutrient cycling. Incorporation of these green manure crops and residue stubble is also recommended. However, there are optimum levels that can be usefully added to the soil body before they begin to hinder cultivation and increase the risk of pests and diseases. Effective decomposition may range from months to years (Hamlett, 2002: 10). The main danger to soil structure decline is excessive cultivation. Biological activity also declines as a result of physical injury to beneficial soil organisms and soil organic matter decline. This is non-technical information that is well known and accessible to most farmers:

Somewhere near Kindred and Forth area where they've cropped and continually cropped, there's no life in the soil. Don't get me wrong, it's still good soil. There's no life in it. It's sorta dead soil. On the downside, it takes a bit of time to do it. If you've got a crop, say for instance, you've got a lot of organic matter there and you've gotta incorporate it into the soil so you've gotta go through with either a rotary hoe or something like that or something to cut it down to let it go into the ground when you plough, it's a significant cost and some farmers who are strapped for cash wouldn't worry. They would be looking at a cheap way of doing it just to get rid of it, burn it – do anything with it. But it's cutting your nose to spite your face is the way I look at it. There's no up side when you don't put the residues back as far as I can see (Vegetable farmer #61).

Organic matter levels depend on the number of years in cultivation and in rotation but no doubt that cultivation rapidly deteriorates it. Yield diminishes markedly in some paddocks nearing the end of their cropping phase (Vegetable farmer #3).

6.3.8 Soil compaction

When farmers were asked if they had observed any compaction in their soil, a high number answered 'yes'. It is well known that intensively cropped soils in Tasmania, as elsewhere, are subject to structural decline from compaction, so that an 84% response as 'yes' is a reason for some concern. Soil compaction is a major cause of productivity decline, as well as erosion and depletion of organic matter. For sustainable resource use, it is an area requiring close scrutiny and often, remediation. When farmers were asked whether they had thought about compaction in the past twelve months, 71% reported 'always', while 9% claimed 'sometimes', 13% 'hardly', and 2% 'not at all'.

Of the farmers in the sample, 65% per cent reported soil compaction on their land as a result of winter harvests, while 21% claimed general soil damage due to the same cause. All compaction with its accompanying soil remediation treatment involving the use of powered implements causes severe soil body damage (or degradation). And in view of the increasing weight of machinery and traffic on the one hand, and increases in intensive cropping reported by farmers on the other, there is bound to be an increase in compaction levels.

While 'always thinking about compaction' may be useful in some respects, actively taking steps to alleviate and prevent the problem is quite a different matter. Sims and Cotching (1998) found that although 90% of farmers reported they were thinking about compaction problems, it was doubtful that farmers were managing these problems better. The present data did not indicate that farmers perceived the severity of soil compaction on their land as serious. On the contrary, it appears that while there were competing demands on their time and finances, it was unlikely that farmers would pay more heed to compaction problems in the near future. Economic survival was likely to take precedence over conservation practices (Vanclay and Lawrence, 1995). In the present survey, a majority of farmers reported only 'mild' levels of compaction (76%) while only 12% reported 'serious' levels and 1% 'extreme'. Sims and Cotching (1998: 30) claimed that 44% of farmers indicated their compaction levels were 'insignificant', 52% 'moderate, and 5%, 'substantial'. Subsequently, the same authors concluded that either 'farmers know the signs of compaction and are taking appropriate measures to minimise it, or they were just paying less attention to soil structure'. The data from this research suggests that the latter was more likely.

A great deal of soil structural damage can be directly related to excessive cultivation and the associated amount of traffic on farm soils. In wet conditions, the risk of compaction increases and in very dry conditions soil aggregates can become pulverised as a result of cultivation (Hamlett, 2002:18). The use of controlled traffic systems such as raised beds to restrict heavy traffic to permanent wheel tracks was reported as an increasing trend in the present survey. While this system has clear benefits for farm managers, such as the elimination of soil compaction in the cropped area and many other areas, there are situations in which raised beds are not always appropriate. According to Hamlett, 'This system is most effective in continuous cropping systems, where livestock is excluded and where the gradient is no greater than 3%'. Many farmers do not have the option of excluding stock from cropping areas at all times. In addition, farmers in this survey indicated that they cultivated land well above 3% slope and this proportion was expected to increase as more cropping land was needed. Responses indicated that 22% of vegetable farmers were cropping on land as high as 15% gradient. However, it is more likely that farmers are underestimating the slope of the land they are cropping (as they appear to underestimate and under-report the level of their soil erosion, degree of soil structure decline and compaction).

At the same time, some farmers expressed what seemed a candid view about vegetable cropping problems. These were associated with the use of raised bed systems, which appear to have been overlooked by Hamlett (2002):

We got some major problems in lettuce at the moment in our wheel ruts eroding like buggery and we've got some serious issues since we've gone into raised beds. We've created some real problems for ourselves there – Well, basically you've got ditches and once you've driven up and down a few times well, basically, they don't absorb any water – particularly with irrigation and that. Water builds up and starts to run down the raised beds. A little bit of soil comes off the side of the bed or gets washed down. And you get this acceleration of water at the bottom end and then any leakage out of pipes anything like that it really rifles down – we're going to have to look at the system of getting some straw in (Vegetable farmer #64).

In this survey, 35% percent of the reasons given by farmers as causes of compaction were related to an excessive amount of traffic on cropping soils:

Heavy vehicles on potato paddocks are a disaster. We have that problem with peas and

potatoes. You get compaction doing peas and you get compaction regardless (Vegetable farmer #22).

Farmers' responses to the question of reasons for compaction indicated that (35%) excessive traffic (Figure 6.7) on disturbed soil was a major perceived reason for compaction on farm cropping land:

The best way to pack down sand is to wet it. And the more we crop our soils, the more the soil structure gets deteriorated, then we pour water on it with less organic matter, less structure and it naturally compacts (Vegetable farmer #3).

I'd say carrots were the worst compaction paddocks you can have because they dig one row at a time with a machine and a tractor and a truck beside it. And they absolutely compact the ground that tight that you got a job to work it up when they finish – worse than potatoes. With potatoes, the harvester goes up the paddock and back. The truck stands at the end. With carrots, they're going up beside the digger every twelve inches and nine times out of ten, they'll be in there digging when it's raining. I've ploughed 2 or 3 carrot paddocks, ripped them and they've come up in lumps and they've never got a crop off it next year because the texture of the ground is just all wrong. Pea harvesters don't do much damage – they weigh about 24 tonnes. With pyrethrum you don't have much compaction – they come up and do that when it's dry (Vegetable farmer #89).

If I had soil compaction it would be serious. It's an ongoing thing that you do not stock your wet ground. You don't drive all over the paddock. You concentrate it highly on one position rather than spread it over twenty acres. Planning my guess is the ultimate. If you don't plan what you're going to do, you end up in trouble (Vegetable farmer #67).

Some farmers referred specifically to the combination of cropping and growing stock on the same land with stock being a serious form of traffic that can be extremely damaging:

[A] major problem [is compaction]. Traditionally, paddocks are overworked. Today it's not the number of passes but the way the soil has to be bashed about to get it fine enough to get crops in. When structure breaks down, there's more chance of compaction. With crops like potatoes and heavy machinery, the compaction is a real issue. That's why people are going into raised beds, controlled traffic avoiding machinery when soil is wet (Vegetable farmer #7).

I'm finding that my problem in winter is cattle – I'd rather grow grass in paddocks to three feet high in a cropping rotation. I'm moving away from having cattle through the

winter. I'd rather spray the grass off than eat it off two months before I want to use the paddock. I've had all degrees of compaction from mild to extreme. It's an ongoing battle. You only need one day with cattle in the paddock after an inch of rain and you can tell the difference when you go to work it. Soil structure and compaction are directly related depending on the history in the prior year (Vegetable farmer #37).



Figure 6.7: McCain's harvester and truck, examples of heavy traffic on north-west Tasmania
(Source: School of Agricultural Science, Cradle Coast)

Another often cited cause of severe compaction was the traffic involving heavy machinery (Figure 6.8), be it tractors or harvesters or any other machine. There is always a resulting increase in the amount of soil compaction and structure decline. A number of respondents claimed that some farmers were 'machine happy' – they enjoyed the comfort of their new powerful 'toys' and therefore tended to overuse them:

Farmers work their ground too much and they're on their ground too much. Machinery is bigger and heavier. The less you can be on the soil the better. We find we use our little 35 hp tractors more for most jobs like spraying. The big ones [are used] for ripping and tilling (Vegetable farmer #42, 2001).

But this view is controversial, as farmers also reported that given the constraints of fuel costs and machinery parts as well as the numerous tasks associated with farm work, there is no question of any frivolous waste of resources. In addition, there is the recurrent fatalism characteristic of many soil management problems:

Machinery is getting bigger and bigger. Whether it's any better is another matter. All farmers get compaction (Vegetable farmer #9).

You're always gonna have some [compaction] after trucks and irrigation runs, gateways. You're always gonna have it. It's just that I'm trying to manage it the best way I can (Vegetable farmer #28).

Other farmers continued to associate compaction with the control of the harvesting process by the processors, especially during winter months:

[The reason for compaction] It's because you've got no say in the time of harvesting (Vegetable farmer #19).

In a study of perceived soil management problems among onion growers in northern Tasmania, Ewers et al. (1989: 24) found that some have adopted intensive practices, including high inputs with heavy applications of pesticides and fertilizers. The same growers used up to eight cultivations with each crop. This pointed to a high degree of soil body damage and costs to farmers. According to the authors, one of the main reasons for the multiple cultivations was preparation of a fine seedbed needed for onion growing. Of the farmers in this study, 10% cultivated only twice before sowing onions, whereas 20% cultivated six or more times.



Figure 6.8: Pea harvesters, examples of heavy machinery, and a major cause of compaction in northern Tasmania (Source: School of Agricultural Science, Cradle Coast)

Ewers et al. (1989: 25) also claimed that those who reduced cultivations to two or three passes, 'have achieved this objective by planning their rotations carefully, maintaining high levels of organic matter and applying weedicide when necessary'. Farmers who used less cultivation had more favourable attitudes towards soil-management goals. Many farmers in the present study also made reference to the need for multiple cultivations when preparing very fine (powdery) seed beds for potatoes, but especially for onion crops which were prone to soil erosion because the soil had been 'processed' to a fine granular level.

When farmers in this study were asked to name the number of passes before sowing their onions, some indicated that they made about four or five while the average number was three. However, these figures are somewhat problematic as many respondents seemed unsure of the precise number of passes.

According to Sims and Cotching (1998: 21) over 75% of their sample favoured the use of a powered implement (roterra) for the final cultivation of soils. Only 27% used a tined implement. This suggests that farmers are relying more on powered implements to prepare fine seedbeds when sowing crops such as onions and poppies, which increases the risk of soil structural damage. In this research, 54% of farmers growing onions reported using a 'roterra' powered implement.

6.3.9 Conservation practices and price returns

Farmers reported widely that increasing economic pressures over the last decade have become a heavy strain on their incomes. As a result, a high degree of economic efficiency has become mandatory for survival in agriculture. Small farmers have needed to restructure their operations to maximise savings and minimise waste. Consequently, many now relied on contractors rather than the older practice of investing in expensive farm machinery. But this change has brought with it some constraints on farmer flexibility and impacts on soil resources from traffic at inappropriate times:

If the processor comes around and says, 'OK, we are planting in your district, we will be here on Thursday.' What do you do? If you don't plant when they're here, then you've gotta wait till they're back in the district or you may lose your contract. With some crops they basically work in districts for both planting and harvesting because of the cost of transporting harvesters all over the place so they like to keep farms near each other

(Vegetable farmer #55).

The time of planting is not usually up to the grower, but to the processor. Farmers have virtually no choice – you get a bit of a window to plant and if you can't, especially with peas, then you miss out. Also, it's the same with a lot of other crops where they're planting (Vegetable farmer #6).

The more we make on the land the more we put into it. I think a lot of farmers are strapped for cash and it's usually the land that suffers. In my opinion, that's the first thing that we look after – the land. All the soil erosion controls are a must (Vegetable farmer #42).

It's a situation where economics does rule, but there are a lot of 'corporates' – I wouldn't say farmers – who tend to look at the bottom line and not at the sustainability of getting there. I think most farmers, who have been farming for a time, have sustainability at the forefront, really. The corporate industrial types are more interested in money and mining than in creating a sustainable environment. They are answerable to their directors and shareholders. The independent family farmer is not (Vegetable farmer #13).

Pronouncements such as the above may be oversimplifications. Farmer situations are diverse. Affordability of conservation or environmental practices, while being manageable for some, may be completely unaffordable for others merely coping. Some individuals took a longer-term view:

To say that farmers would do better looking after their soil with better prices is an easy answer. Soil erosion should be prevented regardless of price returns. If you let your soil wash away or deteriorate, you're not gonna grow anything eventually. So whatever the returns are, you should not turn your back on soil erosion. It doesn't cost much to put contour drains in – a couple of hours work. I put first importance on erosion and resting the soil next (Vegetable farmer #38).

And even where returns were profitable, there are hierarchies of demand on farmers' income such as family welfare, education of children and many other requirements to make the occasional erosion event seem somehow less important:

I think if you got more money for your produce, nine out of ten farmers are not going to put it towards soil erosion, there are too many other wants before that (Vegetable farmer #2)

According to Maynard (2000: 6), there is a trend on the north-west coast of Tasmania to intensify practices for increasing returns. There is some support for this assertion from farmer reports in the survey narrative:

Farmers are working steeper ground in this district, to find a wider crop rotation, and this causes more soil erosion. There is pressure to grow more potatoes. They're probably putting the pressure on themselves to make more money. They have to grow more to make the same returns. The potato industry has picked up and they're using more potatoes (Vegetable farmer #33).

Where there was no extreme pressure to alter practices, some respondents claimed the association between profit returns and environmentally sound management was 'fundamental':

Sustainability in the long term is a matter of having enough returns to put in environmental projects. My wife and I are the only ones working on this property and we really need another labourer and then a lot more of the projects could be done, like tree planting, fences and trees relate to one another. As well as the cost of labour, there's the need to concentrate the maximum amount of effort into getting the maximum return from the crops. So you haven't got the time to do these other issues. If the return is better, the whole overall cycle is better-the financial pressure is fundamental (Vegetable farmer #5).

6.3.10 Rotations

It was crucial to discover whether farmers were allowing sufficient time for soils to recover from the planting, growing and harvesting cycles. Resource sustainability depends on working with soil systems through rotations. If farmers in this research adopted intensive practices and paid insufficient care to the condition of their soils and water quality, this was a serious indicator of unsustainable management.

Although widely advocated, the disciplined use of good crop rotations was never a feature of the modern US agricultural model imported into Australia after the 1950s. As chemical fertilizers and pesticides became more readily available, the need to practice crop rotations declined and the use of rotation-based farming systems seemed obsolete. The miraculous productivity of the 'Green Revolution' merely reinforced this break with traditional methods. And as with all things foreign, Australian farmers were quick on the uptake of

chemical agriculture and the abandonment of old world rotation systems. However, in today's conditions, the character of farming is changing, even in the US. With the high cost of off-farm inputs, the growing incidence of pesticide and fertilizer contamination of water, the increasing resistance of certain weeds to pesticides, soil conservation requirements for farm programmes and surplus production of major crops, many farmers recognise a need for a renewed effort to adopt rotation-based farming systems.

Crop rotations are fundamental to sustainable cropping systems and have been used for thousands of years. The general conclusions from research on rotations are well known (Angus et al., 2004). The use of legume crops leads to increased soil organic matter and continuous non-legumes to a decrease. Fallowing accelerates the decrease. Yield is higher for crops grown after different crops: for example, cereals perform better when grown after broadleaf crops and vice versa.

Selecting the crop or pasture best suited to each paddock on a farm in terms of production and resource conservation is a complex process. A well-designed crop rotation creates farm diversity and improves soil conditions and fertility. In spite of the importance of legumes to a good rotation, many paddocks are not planted to a soil-building legume such as alfalfa or clover as a green manure crop for many years. Instead, some farmers rely on the constant application of chemical fertilizer to supplement the nutrients they remove by cropping intensively. This is one means of mining the soil. By moving to a different crop such as wheat on barley ground, usually results in higher grain yields when compared to continuous cropping of wheat (Peel, 1998). Even greater benefits can be obtained by rotating two distinctly unrelated crops, such as small grain seeded into land where the previous crop was a legume or other herbaceous dicot, such as flax or sunflower. Broadleaf brassicas planted after wheat can control disease problems in wheat as bio-fumigation. For some, crop rotations in combination with cultural practices plus necessary fungicides, is the most desirable method of disease control (Peel, 1998).

The benefits usually associated with a good crop rotation according to the Kansas Rural Center (1998) are manifold suggesting an essential role in sustainable agricultural systems. At the same time, it is clear that the benefits from well-designed and managed rotation systems require a great deal of farmer effort which is increasingly in short supply as farmers compensate for the cost of hired labour with their own and their family's time. Processing companies' representatives in Tasmania claimed that they insisted on a five-

year rotation for soil damaging crops such as potatoes and many farmers in this research acknowledged this condition. But some farmer respondents also noted that this practice was not altogether obligatory. It was not seriously monitored by processors nor always adhered to by farmers. Although farmer records were available to processing companies, farmer narratives suggest that farmers often shortened their rotations to increase profits and where this did not happen, there was still severe pressure from back-to-back cropping, which did not incorporate a pasture phase between crops:

Quite a lot of farmers are double cropping each year. As soon as they take a paddock of peas off, they put a paddock of cauliflowers or carrots or something afterwards. That means two crops in the same twelve months, and your soil's been cropped continuously. No grass in between or anything like that every year, which is wrong – but they have to do it. Someone needs to tell someone the problem. On fresh soil you could re-crop in three years, but it's not recommended. They force you to grow more frequently on the same ground – the pressure to grow more and more now to maintain your viability. There's a lot of economic pressure at the moment (Vegetable farmer #29).

I hope to improve the soil structure. I don't graze it. I let all the root systems grow. Then I mulch it and plough all the green stubble in (Vegetable farmer #41).

You've got to work on a balance. It's not a cropping rotation – it's a pasture cropping rotation (Vegetable farmer #19).

Nevertheless, farmer respondents overwhelmingly reported a high usage of rotations (90%). In areas that are intensively cropped, the process of the practice of fixed rotations presents complex and often challenging problems for farmers:

On farms that grow crops continuously or grow both crops and pastures, there is a decreasing proportion of paddocks managed in fixed rotations. Increasingly, the sequence of crops and pastures is decided tactically each year, based on factors such as product price, input costs, soil reaction, the weed-seed bank and the residual water, nutrients, pathogens, allelochemicals and herbicides (Angus et al., 2004).

According to the authors, in the 1980s, there was less interest in pastures and more interest in crop sequences, initially those containing grain legumes, and then in sequences containing canola. In the 1990s, interest in the pasture phase returned, firstly because of the interest in revitalising pastures which were believed to be in decline, and secondly, to

encourage the use of perennial pastures to reduce environmental problems of soil acidification and salinization. Additionally, the development of new species of annual pasture legumes has created opportunities for the inclusion of pastures in cropping systems. Short-term 'phase' pastures have assumed increasing importance in intensive cropping systems as a strategy for control of herbicide resistant weeds and for improving soil fertility. New pasture cultivars have also been developed to increase productivity of poor and difficult soils.

Vegetable farmers in this research were expected to have been using a pasture phase. Many combined vegetable growing with stocking (at least three-quarters of the survey sample required pasture for stock). At the same time according to Revell (2001), the change to a 'phase' pasture system presents a number of advantages. It restores declining soil fertility (organic matter and soil nitrogen) due to frequent cropping and provides control of herbicide resistant weeds in combination with grazing management and non-selective herbicides. As expected, the majority of respondents (79%) confirmed the inclusion of pasture in rotations. However, asked the reasons for the use of pasture crops, subject responses suggested economic pragmatism, namely the use of pasture for stock feed (74%) and healthier (more productive) soils (50%).

6.3.11 Potato profits

Seventy-seven percent of farmers responded that they grew potatoes annually, while 62% indicated that potatoes were their main vegetable crop. As noted in Phase One, potatoes are one of Tasmania's most important vegetable products and many farmers claimed that they needed to grow potatoes because of their debt structures and the lack of other options.

Yet only 24% of farmers reported their profit levels from potato growing were 'adequate' 9% 'good' and 2.6% 'very good'. Sixty percent of farmers claimed that potato profits were between 'low' and 'very low'. If these reports are accurate, and given such a low return for their products, it was important to ask why farmers continued to grow this crop. Some respondents suggested that for farmers who specialized in potatoes, potato cropping has become a way of life. Even when their profits were low, these farmers continued to grow by habit. For others, it was often simply due to capital investments in the industry, which they claimed, left them no option but to maintain cropping practices that caused degradation of the resources:

It's like widespread damage, compaction, erosion, poor soil body – it's really very detrimental because it takes a long time to get that back. We'd like very much not to be growing potatoes, but we're locked into the industry because we have such dedicated equipment so we will continue to grow whether we like it or not (Vegetable farmer's wife #3).

However, for others farming under different constraints, withdrawal from the industry is a rational decision not only on account of soil degradation but also because the reduced profits, when calculated accurately, make this crop unattractive:

I got out of growing potatoes, mainly in our sort of country, the sustainability of growing potatoes damage to soil structure – weed problems of potatoes themselves, (and) not fitting into our rotations. Fifteen years ago, potatoes were so profitable you couldn't afford not to grow. The economics of growing them has become more and more marginal, plus damage to the soil and following crops plus the attitude of processors. Very stressful crop to grow! Marginal soils are not suited to growing potatoes. They have to almost be lost in a long rotation (Vegetable farmer #3).

Other farmers on good quality cropping land often had their own constraints and imperatives with little choice in decision-making in regard to potato growing:

With potatoes we don't have control over time of harvest. Late harvests pretty much ruins that paddock for about a year, so you don't have much hope of growing anything much straight after. But a year or so later, it comes back. In a perfect world, you would not contemplate growing potatoes – they create huge problems afterwards, not only with soil structure but with volunteer potatoes in every other crop. In onions and poppies that's a major problem, also in carrots. It's a major issue – but we're under heavy obligation to grow things to make money. You've got to grow several different things at least and rotate them. Since there's more money in potatoes than in grass, so you gotta grow potatoes. The land here is worth too much to just run stock on it. You need enough returns to make the repayments on the loan you took to buy it at \$3,000 per acre. In other words cattle is not an option with cropping ground unless you're an older farmer that's paid off the farm and they're the ones that could stop growing potatoes if they want to. I reckon I could look at my neighbours and according to what they're doing tell you what their debt level is (Vegetable farmer #37).

Given that most vegetable crops may be grown with a cover crop or stubble retained from a previous crop and that the principles of minimum tillage are well known, there is little

reason to accept that crops such as onions and potatoes need to be the cause of any soil erosion. Sims and Cotching (1998: 29) found that only 40% of onion growers had ever used cover crops, 98% of whom stressed they grew these crops for soil erosion control. Assuming that farmers are practical people concerned about soil erosion, this suggests that many do not fully understand the benefits of the practice perhaps due to a lack of information available on the subject. Direct drilling into existing stubble for example, is a variation on the principle of cover crops and is another effective means of reducing or eliminating soil erosion.

Also there is the problem of growing crops during periods of high rainfall. Any crop grown during the wet winter months, with shallow root systems and without the benefit of cover crops or surface stubble, will undoubtedly exacerbate soil erosion on Tasmanian farms. The data indicated that more onions (19%) were grown during the winter wet period and only 5% of their growers used cover crops.

6.3.12 Attitudes to action

There are many reasons for farmers' positive attitudinal support of conservation, and why such sentiments may not lead to high levels of adoption of conservation practices. Often, it is a question of inadequate information and capacity:

Farmers are unlikely to adopt soil conservation technology to the satisfaction of soil scientists if they have differing perceptions about the nature and extent of land degradation. Furthermore, even where they do perceive land degradation, they are unlikely to adopt soil conservation technology if they lack appropriate information and/or have other demands on their capital and time (Vanclay and Lawrence, 1995: 78).

In reference to a study of Darling Downs farmers by Rickson et al, (1987: 187-200), Vanclay and Lawrence (1995) also noted that the subjects not only scored highly on 'stewardship', 'conservation is important', and 'conservation is economic' scales, but also believed that erosion problems were exaggerated by people who were not farmers. Many tended to doubt the 'seriousness of off-site damage'. Farmers also considered that most of the work required to be done to protect farms against erosion was already done (or soon would be) and that no major changes to agricultural management practices or technology were required. Vanclay and Lawrence (1995: 81) concluded that 'farmers may be less concerned about land degradation than soil scientists consider they should be and that

farmers may not appreciate the full implications or seriousness of the erosion problem'. The present research results contained support for this view with 69% of farmers reporting 'minor' degrees of soil erosion and 74% taking some action to prevent it.

Rickson et al, (1987: 187-200), also pointed to an important common human perceptual problem. Other people's failings are more likely to be perceived than one's own. Farmers are more likely to see the results of inadequate practices on adjoining farms. In the Darling Downs it was claimed that soil erosion was a 'major problem' for the area in general (88%), the local area (47%), and on their 'own farm' a mere 11%.

In the present research, nearly equal numbers of farmers claimed that they were always concerned (36%) and not concerned (35%) about soil erosion, which suggests a degree of perceptual discrepancy on the subject amongst respondents which is accommodated by both Symbolic Interactionism (Blumer, 1969) and Cognitive Dissonance theory (Festinger, 1957). Productivist farmers are bound within a dynamic interacting system and form communities of individuals with commitment to a set of shared symbolic understandings, meanings and behaviour (Burton, 2002: 198). Therefore, farmers' perception of the negative impact of their practices can become selective where the importance of productivist symbols such as industrial processes overshadow the need for soil conservation and the protection of biodiversity. Cognitive dissonance theory offers a psychological process through which farmers may rationalize the obvious degradation of their resources by adopting a fatalistic attitude towards soil erosion, compaction and soil structure condition as necessary outcomes of all farming. Alternatively, they may dissipate the discomfort of inconsistency in their practices by underestimating the damage on their own farms.

The results of the present study may also indicate that many farmers do not have a shared meaning of the terms 'small', 'medium', 'major' and 'problem' in relation to soil erosion due to insufficient definition of the terms to allow more accurate discrimination. According to Sims and Cotching (1998), most farmers reported that erosion was not increasing in their district. The authors concluded that this could be due to 'an increase in the adoption of soil conservation techniques, less erosive events in the recent past, or an increasing acceptance of erosion as a part of farming' (Sims and Cotching, 1998: 24). They added that the latter explanation was unlikely in light of the increasing focus of environmental and government groups, on the effects of soil erosion (Sims and Cotching,

1998: 24). The same survey contained an inconsistency between farmers' reports of soil erosion levels as 'insignificant' on their own farms (63%) and in their district (47%). For 'moderate' it was 35% and 52%. It is more likely when reporting soil problems on their own properties, farmers were under-reporting erosion levels, rather than exaggerating the erosion levels of their district. In this research, 69% of farmers reported 'minor' levels of erosion on their farms and 16% 'moderate' levels in their districts, which further suggests an underestimation of erosion levels on farmers' own land as reported in Rickson et al, (1987: 187-200).

While survey results indicated that a relatively high number (74%) had seen officially recommended information on soil management and found it useful, only one respondent had applied all the five controls, 42% had used none at all and 35% had used one or two methods. As already noted, surveyed farmers have apparently been reluctant to adopt erosion control measures such as cover crops (5%) where such methods would seem to be most beneficial (with winter onion crops). Sims and Cotching (1995: 28) claimed there was an over-reliance on leaving a rough plough finish, green manure crops and deep ripping across the contour as part of normal farm practice to prevent soil erosion. Their concern was that these practices were untested and being used often to the exclusion of those known to reduce soil erosion such as grassed irrigation runs and grassed waterways. There was little support in this research for the view regarding the uptake of recommended earthwork controls but wide agreement on the use of alternative measures particularly deep ripping (85% of respondents). This is partly explained by the already mentioned differences in study areas. Sims and Cotching's conclusion that effective methods such as grassed irrigator runs and grassed waterways, methods involving the use of temporary or perennial soil cover, were being neglected by the majority of farmers, was supported by this research.

Part of the explanation here is that economic pressures are now dictating farm practices particularly in the intensive cropping areas. Farmers often commented during this survey that they needed to make use of every available part of their paddocks. This meant that the poorly perceived danger of soil erosion may often be outweighed by the need to maximize production levels when profit returns were marginal. This would leave little capacity for using soil controls such as headlands and grassed waterways, which reduces the amount of land available for planting crops.

The same authors claimed to have found high-adoption rates for non-earthwork erosion controls with 82% reporting the use of deep ripping after harvests and 62% with stubble retention. There is an indication in the present data that the number of farmers retaining stubble may have increased (78%) since 1998, the year of the Sims and Cotching survey. The number using ripping seems to have also stabilised at the 85% reported.

Sims and Cotching (1998: 24) claimed that their respondents identified ‘the major causes of soil erosion in their district as unsuitable management practices (47%) and cultivation in a high rainfall area (40%)’. Essentially, these are all inappropriate management practices. Individual farm conditions ought to dictate the practices as best practice but some farmers claimed this option was not always available. Sims and Cotching reported that 93% of their respondents selected onions as the crop most prone to causing soil erosion and 55% chose potatoes with some 25% for carrots and 17% poppies with only 4% responding ‘none’. However, many subjects suggested that soil erosion was an outcome of cropping in general and onion cropping in particular. However, there is no evidence to suggest that the growing of any particular vegetable or crop is a direct cause of soil erosion. The most likely factors are related to ‘farmers’ own management practices. Farmers themselves sometimes made this point during the research. They claimed that farmers had the most direct impact on farming processes. They made the all-important decisions, which prevented or allowed soil erosion to occur. To draw a connection between a particular crop and soil erosion was simplistic:

It’s not the crop, it’s the way you work your land. It’s to do with how you work your land that’s more to do with erosion than the crop itself. It’s back to management and occasionally we had one year there when we had to put a quarter of an acre of a ten acre paddock back in potatoes – because we just barely put them in they were just getting up and running when this heavy ridiculous rain came and washed about a quarter of an acre off the paddock in patches away, and we just hand replanted that bit and he [the farmer] said next time we’ll leave an extra grassy patch there or put a drain along that part (Farmer’s wife #57).

6.3.13 Farmer knowledge

Farmers also rely on unusual sources of information, sometimes accumulated over generations. This is a less structured, intuitive form of memory, often depending on familiarity or a ‘sixth sense’. It is also likely to be based on trial and error, eliminating one

solution after another until the problem is solved. It may also rely on tradition and authority where the initial rationale is long forgotten while a practice is maintained because things ‘have always been done that way’. However this does not mean that it is always an invalid form of knowledge:

Some people can tell the weather – I’m lucky I come from a family who can. Me dad can tell it day to day as good as anyone I’ve ever seen. One of me uncles is a good long range [forecaster]. Some people haven’t got a clue – even farmers. Me dad can just look at the clouds and tell you when we’re gonna get a shower in the middle of a summer’s day. It’s sort of in your blood really – you know, some people know cattle, some people know horses (Vegetable farmer #49).

And according to farmer reports, traditional farmers know their land more intimately than any professional ‘experts’ sent by governments and contracting companies to ensure a high yield. At the same time, according to Kaup (2008), farmers are ‘reflexive’ actors who negotiate between ‘expert’ and ‘local’ knowledges but are more likely to be influenced by their first-hand or local experiences than by state or expert observations. The influence of a farmer’s education and a ‘farmer’s knowledge’ about a particular innovation also exemplifies how knowledge informs farmer decision-making processes. The reflexive producer makes decisions about technology based on what he or she knows. As a result, a farmer will use the technology that he or she perceives will work the best with the least amount of risk:

I used to grow poppies, then I’d put onions following them and I used to chop all the stubble off the poppies and then I’d put oats in them and then I’d mulch the oats off sort of minimum tillage straight into it with the onions. I’d always get into a bit of a row with them [contractors] – they never had the gear good enough [for planting] I thought to plant the onions in it. You wanna leave that stubble laying around the top of your land to stop the water wash – the idea of it. They tried to get you to put drains in. I had no problems at all – you didn’t need drains if you had that stubbly stuff on top. They wanted to get it drilled with a driller – that was all that was wrong. I would never plough because you’d lose all that stuff underneath and just have bare soil on top because it breaks down. You want to just incorporate as much of that stuff on top. I could show them a few things, but they reckoned I was silly, I think (Vegetable farmer #44).

Under conditions of uncertainty, a majority of farmers indicated that ideas and practices must above all be practical. The farmer in the above example was guided by the same

necessity and it is of some interest that his practice of maintaining plant residues or stubble on the ground has now become a recommended practice by the DPIWE in a modified and more expensive form. A mulched straw ripper is being used by farmers to spread dry straw into furrows over bare soil as a means of erosion control. Yet, if, as the farmer suggested, the stubble had been allowed to remain in the ground, there would be little need for the added work, compaction and expense incurred in laying it down again.

When farmers were asked the way they treated new ideas, by far the largest number of respondents (71%) referred to other farmers for advice or example. It appears that farmers were inclined to value and trust the opinions and example of other farmers above most other sources. Government departments, private agronomists and field officers were less likely to be consulted before other farmers in the area. A significant number also indicated that they would try out new ideas for themselves before incorporating them into their practices. Nevertheless farmers are generally a cautious group:

Farmers are more likely to take the view that if someone else is trying out a new idea, they'll wait and see how it turns out before they try it (Vegetable farmer #55).

Although a majority of farmers are more likely to consult with other farmers, it is doubtful that many would rely solely on such advice in making a major investment involving costly inputs. When confronted with difficult decisions, farmers indicated that official experts were consulted:

Probably with crops that we grow, poppies and potatoes we have the field officer pretty regularly and they're pretty good on advice for sprays and the way you work your soil, and they've gotta be happy with a particular seed, they've gotta be happy with your soil before you plant it. We take anything in, we read fairly widely – yes, we probably take more notice of the field officer than anyone else. We're involved in farmer discussion groups organized by the Department – particularly with dairying, a very good way of picking up ideas if you go to other people's farms (Vegetable farmer #12).

These days you really can't afford to make too many mistakes. I think we learn a lot from one another. We might have a stuff-up here and there, but they'll only be minor (Vegetable farmer #54).

A majority also indicated that they are always trawling widely for new information. Many (61%) claimed to have visited demonstration farms and would visit more had they not

been constrained by time and distance. A majority (69%) also stated that they would like a demonstration farm in their area.

The survey narrative also indicated that farmers were limited by the time and energy available to them. Some pointed to the high demands of farm management, which were now such that there was little time to indulge in reading the copious amounts of literature that arrived in the mail:

There's plenty of information out there if farmers want to get it (Vegetable farmer #5).

We trial, we watch, we look and we listen (Vegetable farmer # 42).

I don't want to know everything that my agronomist gives me to read. If I did read it all I'd have to sit up every night when I'd like to get a bit of rest (vegetable farmer #95).

We're usually that tired by the time we get home that we haven't got time to read all the rubbish you get. If they spent as much money helping us as they do on paraphernalia and glossy photos we'd be wealthy fellas (Vegetable farmer # 42).

With new methods, if a field officer from Simplot came here and said to use a certain chemical fertilizer on your spuds, I'd use it because they recommend it. I don't rely on what other farmers tell me but I always listen. I wouldn't wait until other farmers are using a new method to try it – I'm not frightened to try it out myself. We tried out this Vicmill stuff I just told you about. I wouldn't ask the department – I'm not against the department at all but they've sorta cut back on all them things to what it used to be like (Vegetable farmer #27).

Asked if they found official information useful, many respondents politely replied that government information, when it was available, was 'interesting'. The 'no response' rate (14%) casts some doubt on the usefulness of such information. Many respondents reported that the lack of concern for the sustainability of farming communities by official bodies was due to government negligence. The farmers cited the much-reduced presence of extension personnel in rural areas as further evidence of this lack of concern:

The government can do a lot more. A few years ago when I was a lad, the growth of the country came from the primary industries and unfortunately, there's more vote power in the cities now and that's where a lot of the money is spent and if the governments worldwide were to do things that would help the primary industry a bit more, it would be

a lot better off. Then they could spend money and it would flow on. We've got to get more for our products...the tree plantations got a 130% subsidy in their first year (Vegetable farmer #31).

I don't recall any assistance from governments in forty years (Vegetable farmer #65).

I wouldn't ring DPIWE – a lot of the blokes that are in the department, I know of one that was here farming, he went broke farming and he got a job in the Department and went around trying to tell everyone – that's what they got (Vegetable farmer #68).

So I wouldn't think they [governments] were doing anything to make us sustainable. They bring in glossy pamphlets to tell you what to do, but they never give you any money to do it – not that I've seen any (Vegetable farmer #74).

I think there's too much interference from governments at the moment in what we are doing. They wanna know too much about us – they wanna git off our back. I get that wild with all the forms I get here about things. It doesn't make any difference. They ask the wrong questions and there's never any feedback – it's just unreal. You get jack of it. This is a good survey – lets you say it all (Vegetable farmer #44)!

However, there were useful areas in which governments still made a contribution and exceptional individual cases of remarkable employees helping farmers beyond the call of duty:

I'm not over impressed with the DPIWE – but they got their place in doing trials. We can't do trials. But there are good officers from the Department who I can't speak highly enough of – they'd come and give you a hand and it wouldn't matter if it was six o'clock at night sometimes. They couldn't do enough (Vegetable farmer #74).

6.3.14 Farmer priorities

This research also sought to identify a general understanding of the spending habits of vegetable farmers in order to assess the level of importance they placed on resource conservation and sustainability. In Phase One, it was widely claimed by respondents that the constraints of diminished price returns were an inhibiting factor on farmers' abilities to institute and improve conservation management practices. Phase Two tested this claim by asking vegetable farmers to list the ways they would spend the profits from their earnings:

One thing is if you get more money you probably don't have to crop as much. The

pressure's not there to keep growing flat out for the money. But I guess since we all like money you'd probably still do so that you could spend it on new machinery and whatever – tractor, car (Vegetable farmer #66).

The thing everyone is looking at is debt-reduction, General improvement whether it be additional lime dolomite gypsum or something for paddocks. Whether it be improved equipment or whether it be just back off and don't flog off your ground so hard. I think that'd have to come into it fairly high. Yeah, they [environmental projects] are important, but how do you say, welcome to the real world (Vegetable farmer #65).

If farmers had more returns, they'd have more choice (Vegetable farmer #10).

We would buy more land if we could (Vegetable farmer #9).

Look, I've been around farms for a long time. They can go and afford a new tractor, a new car, or a new shed on the farm. But they can't afford to go and do something that's going to stop their soil getting washed away. Some people can cry poverty (Vegetable farmer #32).

We put it back into our business and then our machinery comes second. We make sure our machinery is good – probably as good as there is on the market that you can afford (Vegetable farmer #42).

If we had any spare money, we'd probably be upgrading our machinery first. That's something we haven't done for a long time. It is important because today with high costs you have to have everything just right and that has been a little bit of a problem because returns haven't been good. Our machinery has got a bit old. We need to upgrade that. You've got to be efficient in every area that you can...so many are just doing the same as us – you just keep going with the old stuff, get it fixed and get it fixed because there's just not the returns to spend on expensive equipment (Vegetable farmer #27).

According to this survey, 65% of farmers indicated that they would buy more farm machinery as a first priority. This in itself is a complex decision for most farmers mainly because of the high costs involved. A new tractor is said to cost in the vicinity of a hundred thousand dollars, a sum not easily affordable by small farmers. And yet for many, a new tractor may be an essential part of their equipment to compensate for farm labour. At the same time, for many who have needed to economise during the 1980s and 1990s, their old equipment may have lasted beyond the point of repair. And although many reported that

the trend was contracting rather than buying expensive machinery, some farmers found the added expense unavoidable:

That's one of the reasons why we bought our own potato harvester. We got caught with a contractor that dug late into July (Vegetable farmer #88).

We put it back into our business – into our machinery. Land comes first. You've got to look after your business and your land is your business. And then our machinery comes second. We make sure our machinery is good –probably as good as there is on the market that you can afford (Vegetable farmer #67).

You've just gotta keep churning the machinery over – it's like a roundabout. Once you're on it, you can't get off (Vegetable farmer #85).

All new machinery has to be financially justified. Farmers tend to overcapitalise because it's 'handy' (Vegetable farmer #57).

They've got to have nice machinery to work with but a lot of it is being paid for. Many farmers only get enough money to feed themselves. They work seven days a week and they don't get holidays. Townspeople can't believe what it's like till they have a day on the farm with you (Vegetable farmer #45, 2001).

Yet a potato harvester (Figure 6.9) is a very expensive piece of equipment, not easily afforded by a small family farmer or an indebted younger farmer trying to make repayments on a large mortgage. One respondent noted a connection between the issue of machinery upgrades and resource management. In the past, where some farmers have needed to own two or three different-sized tractors for different jobs, many were now managing with one large vehicle for all farm jobs. The weight of modern large tractors can result in increased compaction and soil degradation when used frequently and unnecessarily on cropping paddocks. For example, while a large and powerful tractor might be necessary for deep ripping, a smaller and lighter model may suffice in chemical and fertilizer applications:

Farmers use their big tractors because they can't afford to have several sized ones-so they always use their big one (Vegetable farmer #14).

I'd rather do more passes with a smaller tractor when the conditions are better and it doesn't knock your soil around (Vegetable farmer #28).



Figure 6.9: Potato harvester behind a modern tractor on Tasmania's north-east coast (Source: School of Agricultural Science, Cradle Coast)

Often the root cause of the problem lies in the restructuring pressures of the past decade. The drive for efficiency has often dictated the purchase of new and more powerful machinery to replace labour costs. Although 62% of respondents considered reducing debt was a high priority, others claimed they were willing to take advantage of low interest rates to upgrade farm structures and increase farm capital values:

We don't have a policy of reducing our debt too much. We just pay the interest off: a typical example is we bought a farm 20 years ago for \$20,000, the market value for 200 acres. And now one paddock of poppies will actually buy that farm. I'd rather pay the interest, have a tax deduction for the interest and use that money in improving the farm and getting it up and running with drains, underground mains, irrigation, decent fences and plenty of lime and fertility. We want to put our money into that rather than owning the property. With margins so low, it's the only way you can get in front (Vegetable farmer #28).

The priority is – get your land to perform. We spent a \$100,000 on underground drains and liming it to get the PH up. So with the water off it, we can now start to improve the fertility and the structure. We can then re-borrow on that farm where it's been improved. The first couple of years you sacrifice, but after that you start to get good yields. Environmental issues are secondary to me. Viability is primary. We have a family

business. It's very rewarding in the end when you take something that nobody else wants and slowly turn it into a good cropping farm. I'm basically rehabilitating agricultural land. Doing it off your own back takes a heap of capital. You're pouring in your profits every year and eventually end up with a decent farm (Vegetable farmer #28).

However, for debt-burdened farmers, the urgency to pay off loans, which add to the constant drain on farm incomes, is understandable:

Debt – that's nearly always the top priority (Vegetable farmer #3).

We have got some debt which is not a lot – about \$90,000 and that's all. I use that of course. It's not a priority to reduce it. If you've got it there because of the interest, paying on that much is pretty minimal – it's cheap money. I keep my capital free so I can use it. I could use it to buy more land. Somewhere in this area with the same soil: no good further up, different soil and hilly land. It'd take me ten years to learn it again (Vegetable farmer #68).

In this survey of farmer opinions and attitudes, debt seemed to be a major obstacle for those wanting to buy and/or lease land. These options were given a considerably low priority (31%), at a similar level with buying a new car (29%) and working on the house (26%). This was an unexpected result given reduced interest rates and the pressure on farmers to increase their holdings to activate economies of scale.

6.3.15 Farmers' environmental image

The farmer preoccupation with economic issues such as adequate returns and debt servicing, may have been the result of rational choices and necessary survival strategies, yet a low emphasis on environmental matters was evident in the majority of responses to the question, 'What does sustainable farming mean to you?' If stewardship for Australian farmers was a concept which 'embraced the notion that there is more to farming than economic management' (Vanclay and Lawrence, 1995: 77), it was not indicated by Tasmanian farmers in the context of this research. While some farmers expressed positive views regarding soil conservation, some added their reservations about the 'political' side of environmentalists who had no conception of the harsh reality that is farming:

I think most farmers are reasonably conservation minded – I don't think that there's a lot of farmers now that haven't got some consideration for their farms. I think that the thing is with a lot of people that are really green is that they don't have to put anything into

practice – as a farmer you have. It shows in what you do. It's all right to say 'Oh yes it's all right to have this beautiful country and we don't want anyone to walk through it'. Is that practical? (Vegetable farmer #27).

The reports of Tasmanian vegetable farmers as for their counterparts on the Australian mainland (Rickson et al, 1987) supported the view that there was little correspondence between positive environmental attitudes and the adoption of soil conservation practices. This point was reflected in the low adoption of recommended erosion controls by vegetable growers in Tasmania, particularly in the use of cover crops. Nevertheless, there was some evidence from Phases One and Two interview results of farmer concern for the conservation of farm resources and their sustainability across generations. While these are commendable goals, they do not immediately translate into ecological concerns. The low level of environmental references by farmers is one basis for this view. But according to the survey narrative, a lack of environmental references does necessarily translate to 'most farmers are not environmentally concerned'. Farmers do not always deserve their negative environmental image:

We are doing more environmental projects at Smithton. We are trying to create native blocks even to a point where we'd like to get some government money somewhere but we never found out where to get it from. But we do have a problem with wallabies as well. We put in 5 k of wallaby fence to try and keep them out but now we try some coastal bushland. We've fenced a few of them and we only let the stock in about one day a year just to tramp down the fire hazards (Vegetable farmer #64).

A lot of farmers this way are doing it themselves, replanting and fencing waterways (Vegetable farmer #53).

We're fencing off areas of bush blocks set aside-that's always a priority. I want to leave this place in a better condition than when I got it by continually improving the health of the land (Vegetable farmer #92).

I've been involved in landcare remnant vegetation fencing off bush areas to keep stock out. The under-storey in particular re-grow very quickly in the fenced area. Wildlife has not made a big difference. The benefits outweigh the losses. I believe it has created an interest with farmers, an example of the community saying we don't like seeing vast open plains with dead trees. Here's some money to fence off and create shelterbelts, corridors for animals to migrate and not have isolated communities. But the community

should not then try to hop the fence and dictate to farmers because they've actually helped in these projects (Vegetable farmer #53).

The only farmers that I can see who have a chance to be sustainable are the ones who have grassed land as well as cropping land. Some of the bigger ones are using the whole area for crops which to me is a recipe for disaster...Twenty years ago they said it was sustainable to crop every year which has proven to be a failure. You have to have pasture (Vegetable farmer #43).

While the necessity of working and living at the coalface often puts the damaging effects of their occupations in sharper public focus, adverse criticism of farmers by environmental activists may even, according to one farmer, become the cause of a reactionary response:

I think that's been an area that a lot of the older generation in particular are wary of because it's like a lot of things. I think there's certainly minorities that go overboard with environment and are not looking at the balanced picture and I think that's been a pity because it turns those who make a living off the land very wary of where it's all going, and instead of encouraging them, turns them back even further (Vegetable farmer #93).

According to Sims and Cotching (1998: 40), 73% of respondents in their survey strongly agreed that farmers should take more responsibility for soil management (and sustainability) on their properties. But when farmers talk about 'farmer practices' they are often excluding their own and are merely referring to those of their neighbours' with whom they are more likely to find fault. And if 73% of farmers found fault with their neighbours' practices, this may indicate serious deficiencies in management practices, including their own. Also, if farmers believe that they should take more responsibility for soil management on their properties, then one may ask who is currently responsible for the deficit or perhaps the question implies that farmers are allowing the responsibility for managing their farms to slip away from themselves to other parties such as processors or to no-one in particular. There is also an implicit suggestion that farmers are capable of wresting soil management from whoever is dictating it and that they are being negligent in failing to do so. The Sims and Cotching findings are questionable in light of the results in this research, where a mere 17% of respondents nominated farmers themselves as having responsibility for the sustainable management of farm practices. Another 73% in Sims and Cotching (1998: 40) also claimed that processing companies have a share in the responsibility for soil management. Again, there was a wide discrepancy between

Cotching's findings and the results of the present findings, where 25% of the responsibility was directed to vegetable processors. Some 19% indicated that the general community had a responsibility while 12% claimed retailers and fast food outlets should also be involved.

Farmer narrative statements suggest that farmers have more authority over their operations than is often stated in the literature (Burch et al., 1990). By taking decisions independently of processing company advice, some farmers claim they are making the best conservationist choices:

I think the farmer is the one who makes the decisions. I think everything falls back on him. If the field officer wants to grow something and you know it's going to cause a problem, well, you just say no [even if this may mean you don't get a contract]. Well, you've got to look after your soil, that's the main thing. I've had pressure wanting to sow crops at different times when I know it's not suitable, I know the capabilities of my property. Just say no (Vegetable farmer #45).

Other farmers were firmly convinced the problem was largely one caused through a degree of ignorance or lack of education among the ranks of both farmers and processor field officers:

Yes, farmers should take more responsibility for soil management. Processors should too. They don't act like that at times. The farmers should do a lot but it comes down to education. It depends on who should be educating farmers. Or it should be a government thing or not. Have the field officers got the expertise? Some may and some may not. With Simplot, I know a lot of their field officers are ex-diesel fitters from Northern Harvesters (Vegetable farmer #63).

Sims and Cotching (1998: 46) claimed that 72% of farmers in their survey reported processing companies showed low concern for sustainable practices:

It appears that most processing company field officers are not pro-active in promoting soil erosion control measures. But it is likely that farmers would respond positively if field officers were to recommend such practices.

An apparent consensus among farmers suggests that many are in trouble and simply making ends meet and refusing to be 'adjusted', refusing to bow to market economic and political pressures to drive them out. In this struggle, the casualties are both social and environmental:

Next time you drive through the country, have a look generally at the fences, any rubbish growing in paddocks and things like that and you'll find that, OK, the farmer's still there and he's still feeding the family. And have a look at what's happening to a lot of properties. They are literally falling apart because the money's being spent just to survive, not to do improvements. That's when you'll notice your soil erosion because the money's not there to do improvements (Vegetable farmer #67).

6.4 Conclusion

In Phase One, farmer representatives expressed discontent with participation in the vegetable processing industry and that industrial restructuring changes associated with globalization will substantially alter farming and its dependent communities. Yet, it was also clear that the economic rewards of farming were unevenly distributed even among small farming sectors on the north coast of Tasmania. Farmers surveyed varied markedly. Some had inherited their operations while others borrowed to buy the land. Some owned large acreages while others managed small-holdings. Some were young and eager with growing families and others on the verge of retirement. Yet, many farmers maintained they had little choice but to grow vegetables such as potatoes, regardless of damaged soils and poor economic returns. Phase One concluded with a sense of fatalism among representatives, regarding the unlikelihood of price increases, the degrading condition of their soils and the opposition, disagreement and even hostility in relations with the processing industry. This was not however, the general atmosphere encountered in the next phase.

In Phase Two, the interviews occurred shortly after a moderately successful action to blockade a processor and resulting rise in prices to farmers. Subjects appeared buoyant and eager to co-operate in the research. The results of interviews indicated an increase in areas cropped with a small increase in overall property size. This was consistent with intensification under productivist agricultural regimes and farmer consolidation during periods of uncertainty. As many aging farmers left or were adjusted, a number of interviewees expressed concern that a restructured agriculture without the variety and resourcefulness of small farmers would become merely a collection of large agri-industrial estates. Examples are easily found in extreme applications of the industrial model in its home country, the US. But some farmers doubted the possibility of such a scenario occurring in Tasmania on account of its history and geography which make wholesale

aggregation difficult to achieve. At the same time, many farmers reported a degree of pressure to increase the size of their cropping land²¹, a 'get big or get out' mentality that many farmers believed was not conducive to efficiency or sustainability. Because of several factors including the increased cost of good farming land and the uncertainty of commodity prices, farmers have responded by choosing other options available for increasing their output, such as double cropping, cropping on higher slopes, reducing the length of their rotations, bringing their more marginal land into production or leasing from other farmers. All these and other productivist practices have the effect of rapid resource degradation and the ultimate unsustainability of the vegetable industry. Table 6.2 indicates that although the signs of productivist unsustainability far outnumber those of post-productivist change, farmers have begun responding to the imperatives of agricultural transformation even where they fail to recognise that the return to rotations and green manuring and integrated pest management systems are evidence of sustainable farming.

Productivist/unsustainable	Post-productivist/sustainable
<p>Marginal increase in areas cropped (mean, 63.9 ha) and overall property size (mean 272 ha)</p> <p>Fatalism about soil erosion - 25% of farmers expressed, a 'little' concern for soil erosion and 24% claimed were concerned only 'sometimes'</p> <p>Farmer's responsibility for resource conservation widespread Some farmers' lack of confidence in recommended controls government and official experts</p> <p>Inevitable soil erosion by 78% of farmers</p> <p>Deep ripping widely used to refine compacted soils</p> <p>Gendered soil erosion control-association between empowerment of women in agriculture and sustainable practices</p> <p>Practices and erosion: Many respondents readily accepted responsibility for erosion on their land, even when it reflected adversely on their management practices, '[Erosion] is mainly caused by bad farming practices'</p> <p>Recommended erosion controls: used by only 24% of farmers reported using some of them</p> <p>Deep ripping: a 'quick fix' for damaging practices by many farmers</p> <p>Adoption of all recommended erosion controls was below 10% while 42% did not use any of the controls</p> <p>Compaction: 76% of farmers reported 'mild' levels of compaction and 12% 'serious'</p> <p>Contractors: reliance constrains farmer flexibility and impacts on soil resources from traffic at inappropriate work times</p> <p>Hierarchies of demand: on farmers' income family welfare, education of children and many others makes erosion event seem less important</p> <p>Conflicting signals: farmers concerned for manner seen by the wider community and send a clear message that they understood the importance of sustainability issues and making changes, but 64% of identified erosion on their own property 'minor' and 14% as 'moderate' and in their district.(53%)</p> <p>Cover crops: only 5% reported - however, not a sustainable practice when the cover is 'burned off' with chemicals</p> <p>Potato profits: 24% of farmers reported profit levels, 'adequate', good' 9%, 'and 'very good', 2.6% - 60% of farmers claimed that potato profits were between 'low' and 'very low'</p> <p>Intensified practices: economic pressures now dictating farm practices</p>	<p>Crop residues: 78% farmers claimed used crop residues to maintain soil structure</p> <p>Farmer knowledge: expert information and knowledge was something that needed to be evaluated and modified for the particular context, including the farmer's own history: (71%) referred to other farmers for advice or example. It appears that farmers were inclined to value and trust the opinions and example of other farmers above most other sources</p> <p>Farmers own methods: deep ripping was an acceptable form of erosion control as it allowed rapid surface water penetration and absorption. Also use of 'ripper mulcher'</p> <p>Winter harvesting: 52% of farmers no pressure to harvest in the winter while 20% claimed some constraints to do so and 4% indicated only 'sometimes'</p> <p>Rotations: overwhelmingly reported a high usage of rotations (90%) the majority of respondents (79%) confirmed the inclusion of pasture in rotations. Subject responses suggested economic pragmatism, namely the use of pasture for stock feed (74%) and healthier (more productive) soils (50%)</p>

²¹ This is the processor preferred means of increasing output from farming operations through economies of scale.

<p>particularly in the intensive cropping areas.</p> <p>Onions and potatoes reported to be the most resource damaging crops</p> <p>Soil structure denial: 64% claimed soil structure was 'good', 28% that it was 'fair' and 1% 'poor'. results incompatible with more candid farmer statements</p> <p>Soil compaction:84% response as 'yes' is reason for some concern. major cause of productivity decline, as well as erosion and depletion of organic matter</p> <p>Compaction: 65% of farmers in the sample reported soil compaction on their land as a result of winter harvests while 21% soil damage due to the same cause. 90% of farmers reported they were thinking about compaction problems</p> <p>Excessive gradients (slope) 22% of vegetable farmers were cropping on land as high as 15% gradient – however, it is more likely that farmers are underestimating the slope of the land they are cropping (as they appear to underestimate and under-report the level of their soil erosion, degree of soil structure decline and compaction)</p> <p>Excessive traffic (cultivation) 35% of reasons given by farmers as causes of compaction related to excessive traffic on cropping soils</p> <p>Priorities 65% of farmers would buy more farm machinery as a first priority Although for 62% of respondents reducing debt was a high priority</p> <p>Attitudes and actions: little correspondence between positive environmental attitudes and the adoption of soil conservation practices</p> <p>Responsibility: 73% of farmers found fault with their neighbours' practices, this may indicate serious deficiencies in management practices, including their own</p>	
--	--

Table 6.2: Phase Two summary of findings in productivist/post-productivist terms.

As with wider society, the interviews indicated that farmers were far from being a homogenous group of rural dwellers with a single worldview. However, in general, subjects gave the impression they shared connected lives within families, communities and their land. The often difficult conditions that governed the successful management of their farms were better met with the support of other farmers in the area. Other researchers such as Shutes (1996) have referred to the ‘parochial’ outlook of such farmers, for whom agriculture is not simply an occupation, but a complex and fulfilling lifestyle, with traditions and histories often spanning generations. In Tasmania, such farmers tended to be small and medium-family businesses in contrast to the larger, independent and production-oriented ‘corporates’. The research suggested that in Tasmania, the former prevailed by far, not only in property size but also in attitude to farming.

Such farmers also shared a common view regarding processing companies as the source of pressure to intensify practices and increase the area of their cropping operations. They suggested that the sustainability of these operations was being jeopardized as a result company demands. Farmers reported that the application of an industrial model, demands for higher yields, lower price returns and the use of ineffective conservation methods were leading to degradation of the state’s best farming land: its krasnozem ‘reds’ and other productive soils. Many of these were being eroded, compacted and depleted of biological

matter under processing company pressure to increase the yields of resource demanding crops such as potatoes. These subjects concluded that this situation was unsustainable.

The research noted the major but generally unrecognised contribution of farm women to agriculture in Tasmania and the 'tragic loss' that fails to accept their alternative perspectives and intellectual capacity. This perspective may also be associated with the introduction of more sustainable practices.

In regard to specific practices, the research concluded that a degree of farmer denial permeated the widespread occurrence of soil erosion, compaction and degradation through damaged soil structure. Many farmers shared the mistaken view that soil degradation was inevitable. This was a fatalism encountered in Phase One and merely reflected farmer preference for short-term economic gains at the cost of resource conservation, a view that was extended to social and environmental impacts. However, the research discovered that such attitudes were age-related. Farmers under thirty years of age were more likely to perceive degradation and take action than those over that age. Younger farmers were more willing to try inexpensive measures to prevent erosion, notwithstanding a low uptake of recommended measures for soil conservation controls and earthworks. Most farmers indicated a preference for 'quick fixes' with agro-ploughs or 'rippers' whose benefits seemed inconclusive and controversial among interviewees. The survey narrative suggested that farmers will follow practices which they know may cause compaction in the (mistaken) belief that only temporary soil damage will result, which can be simply reversed by a pass or two with a ripper.

Similarly, the use of cover crops was extremely low (5%) among erosion/compaction-prone onion and potato growers. Although the time-tested use of rotations, an important tool among sustainable farmers, was enjoying a revival among conventional growers in this study, its application was flawed by the brevity of rotations and the lack of a pasture phase in the rotation. The demands for ongoing production required many farmers to cultivate 'back to back' after a two or three year period. The most resource-degrading crop, potatoes, was grown annually by 7% of farmers interviewed. Farmers, who generally claimed responsibility for farm practices, were maximizing production at the expense of conservation and while they refused to accept the severity of degradation on their farms, the adoption of sustainable practices was unlikely. The reliance on productivist solutions in maintaining yields in chemical inputs, heavy machinery, 'ripping' and the cultivation of

land with inappropriately severe gradients have merely compounded the resource crisis in an agriculture struggling to meet the increased demands of expanding populations.

It is important to reiterate the diversity within the farmer population although some subjects distinguished merely between two types: those in small family holdings, were claimed to be very conscious of sustainability concerns, while larger 'corporates' main concern was mining the soil. These answered only to their directors and shareholders while the former felt responsible to their communities. Heavily indebted farmers had no option but to accept contracts that stipulated productivist practices. Crops such as potatoes remained a lucrative source of farm income with which debts may be serviced and farm bills paid. Both of these were a high priority for farmers as was the constant and costly upgrading of specialized farm machinery in which many farmers had invested specifically for the cultivation and harvesting of crops such as potatoes. These farmers found it difficult to switch to other enterprises. Yet the effects on soils and the environment were dire regardless of the circumstances and motivations of growers. In the eyes of many of their fellow farmers, these were indeed, productivist 'miners'.

The dilemmas in which many indebted farmers found themselves, where farming may represent the sum total of their life investments, economic pressures undoubtedly dictated practices, particularly in intensive cropping areas. Such farmers were easily recognized from a cursory glance at their paddocks, where every available part of the land was planted. Any perceived danger of soil erosion is outweighed by the need to maximize production yields particularly when profits were marginal. In such cases, soil erosion controls such as headlands and grassed waterways, which reduced the amount of erosion and compaction but also the area available for planting crops and sustainable management, were simply unaffordable. Once again, such practices fell short of minimum requirements for sustainable practices.

Should Tasmanian farmers choose to look more widely as suggested by Miller (1996), they would find disturbing glimpses of a productivist future reflected in the degraded condition of US farmers and their soils (Lasley, 1998). Without subsidised advantages, Tasmanian farmers have demonstrated a capacity to manage the increasing demands of a productivist system although the social and environmental impacts of this 'success' make it highly questionable. What is less clear however, will be the ability of this system to adapt to emergent conditions attending altered climates and demands for a reduction in the

noxious impacts of agriculture. These will undoubtedly make further demands on farmers' capacity to adapt. Increasingly, problems from pest numbers, volatile markets, crop selection and time of harvest will make the business of farming certainly more challenging. The interviews during Phase Two confirmed the expectation that farmer practices in the vegetable processing industry were entirely productivist and that for these fossil-fuel dependent farmers, will be added crises associated with diminishing liquid fuel supplies and prices associated with input scarcity. But above all, will be concerns regarding the sustainability of food production, which will focus more acutely on the question of survival itself.

Phase Three: Farmer follow-up studies and macro-micro articulations

7.1 Introduction

Phase Two of the study concluded that Tasmania's vegetable farmer practices were as indicated in Phase One, part of the ongoing restructuring of the world food system under corporate control. They remain essentially productivist and contribute to an agricultural crisis with environmental, economic, and social dimensions. Tasmanian vegetable farmers, who generally claimed autonomy over and responsibility for farm practices, were intensifying production at the expense of conservation, while refusing to accept the severity of resource degradation. Yet many did acknowledge some symptoms of this crisis in the loss of adjusted farmers and their accumulated knowledge, the resulting contraction of rural economies and decline of small towns, the impoverishment of farmers and the degradation of soils. None acknowledged the pollution of air and water with chemical pesticides or that farm run-off and the spread of monoculture accelerated the decline in biodiversity and for all these reasons, the agricultural system they supported was unsustainable. However, as these conclusions were the result of farmer reports in telephone interviews, it was considered important to corroborate their statements first-hand through direct observation in farm working visits:

Many farmers only get enough money to feed themselves. They work seven days a week and they don't get holidays. Townspeople can't believe what it's like till they have a day on the farm with you (Vegetable farmer #45, 2001).

Phase Three of the study takes up this challenge to corroborate such farmer claims, by offering an analysis of the three follow up farm visits. This is followed by an outline of Schutes' (1996) results of a study involving two European Union (EU) farming economies. These offer useful comparisons with the case studies described in this chapter.

7.2 Farm visit method

During Phase Two, the final question of the interview was a request for a farm working visit:

A researcher would like to spend a working day observing and learning about farm practices by visiting farmers. During this time, it is hoped that he will come to have a better appreciation of the problems and conditions of vegetable farming. If you are willing and able to extend this invitation please indicate your agreement (Phase Two question #60).

After the granting of University of Tasmania ethics approval for this Phase, three participants were randomly selected, telephoned and an appointment made for a visit. A cordial relationship had already been established during the telephone interview so that a visit was expected. On arrival, the researcher introduced himself sharing refreshments and a short period of 'breaking the ice' as occurred during Phase One interviews. The remainder of the day was spent accompanying farmers and helping with rudimentary tasks such as repairing fences and inspecting irrigation systems while making enquiries about soil conservation practices and observing the condition of the farm. It was obvious that in most cases, farmers set themselves an exhausting pace with a large number of tasks that labourers might undertake had they been affordable. One farmer had been working since four in the morning milking his herd of dairy cows. It was later concluded that a visit of a week or longer may have been more appropriate.

7.3 Case study #1

This first corroborative study was a 'big grower' by Tasmanian standards, in the sense that he farmed a large area of 10,000 hectares and claimed a farm income of three million dollars in 2002; therefore well able to afford farm labour. Several were observed manning his fleet of large tractors. He came of an established farming family (since 1823) through seven generations of farmers. In years gone by, the farmer's ancestors had been rural gentry. While these had enjoyed the comforts of large landholding as owners of a profitable grazing property, the present farmer has understood the reality of restructuring and taken strategic steps to make his operation more profitable. This has meant a break from the traditional enterprises of raising cattle and sheep as the mainstay of farm income. The subject emphasized a strong connection with his land in expressions of responsible

stewardship and a concern for the condition of the soil. After the 1990–91 wool crash in Tasmania, the farm moved to irrigated cropping after a period of four years to establish infrastructure for irrigation. ‘Travellers’ were used at first and later ‘centre pivots’ to deliver water onto the paddocks. Initially, this farmer leased about twenty hectares to potato growers for ‘four hundred dollars an acre which for cash-strapped wool growers was like manna from heaven’ (Case study farmer #1). But this arrangement did not endure as the farmer began to notice the effects of potato cropping on his soil:

I considered that they weren’t paying enough for the damage they did – you know you had thousands of tons of spuds going out damaging the roads and people sorting potatoes, were leaving litter all over the place – they had multiple applications of chemicals-they’d never really provide any accurate record of what was going on so it was all a bit of arm’s length and out of control. I wanted more effective control. More importantly though, the soils here aren’t as resilient as the north-west or the north-east soils where they traditionally grow spuds, and the contractor was a rapist – he’d come in and pulverize the soil with all sorts of hidden machinery and then move on to the next paddock so it didn’t worry him – it wasn’t his land so, he didn’t have to pick up the pieces, the results of his work and you know even five years later we’ve got potatoes coming back through as weeds in the following crops, whether it was poppies or wheat or grass seed or whatever. The only thing I could say about spuds is that it introduced us to irrigated cropping which is basically our main enterprise now (Case study farmer #1).

By responding to market signals, which indicated high profits from growing potatoes, this farmer could have easily moved into potato production on a large scale himself and earned a substantial income. But one of his main concerns was the amount of compaction caused by the use of heavy machinery while potatoes were being grown and harvested. As he weighed the returns against the dire effects on his soil, he claimed to have had little difficulty in deciding to replace this crop with a more sustainable one:

Cotching did a soil pit sown a meter deep, this after the potato crops and he came out showing the tremendous amount of compaction and the result of the heavy machinery used and so basically no spuds here. I don’t want spuds here – our main crop is poppies and poppies return a lot more than leasing a potato field for \$400 an acre. Poppies are far easier on the soil – any soil. Poppies require less cultivation and earth disturbance than potatoes do. Potatoes require a much higher input of chemicals – I mean, they’re applying fungicides maybe fortnightly on potatoes - they’re either being grown because the farmers are very traditional and are not prepared to look outside the square, or they

need the potatoes as part of their rotation between other vegetable crops or obviously their returns from spuds justify growing them. They're as competitive as others (Case study farmer #1).

The farmer also claimed to manage his operations sustainably by getting the right mix of cropping and pasture. Direct-drilling and minimum tillage reduced traffic and by building up organic matter with roots of pasture plants and manure, as well as resting the paddocks when required, he allowed the ground to recover:

Without sustainability obviously it's a very short-term operation. We always like to try and take the long term and look way down the track, hence the capital dressings of lime to benefit for the years going on and on. I basically think that what we're doing is sustainable indefinitely because we're not heavily working the soil (Case study farmer #1).

Appreciating the connection between irrigation and salinity problems, this farmer installed a comprehensive drainage system including the replanting of vegetation to help prevent waterlogging and salinity.

In the seventies, eighties and nineties, the lifestyle of the northern midlands farmers in Tasmania had collapsed basically around the increased cost of farm labour after the changes made by the Whitlam Labor Government in 1973:

Whereas in the fifties and sixties, the farmers had cocktail parties and lived the life of Riley with three or four employees to do the work, in the eighties and nineties, those guys lost all their labour and had to do the work themselves. The party time was over and their quality of life deteriorated (Case study farmer #1).

To compensate for the depopulation and the problems caused for isolated properties²², the farmer has instigated a plan to bring semi-retired people back to the countryside by supplying them with accommodation and facilities for growing food and craftwork. The aim is to recreate the community that existed in the area a century ago with benefits such as dealing with poachers of farm stock and making the country roads safe at night.

²² The farmer claimed to have had recurrent problems with vandalism and theft of stock and machinery due to the isolation of depopulated rural areas when there are fewer people to notice outsiders in the area.

This case study confirmed the view that some (but not all) individual agricultural producers were capable of managing the requirements of international capital (Fulton and Clark, 1996) and state policies. Some farmers were finding their own paths to sustainable stewardship and tailoring their responses in accordance with what they considered were reasonable compromises between their own needs, those of their resources and the demands of the market. Though this farmer well understood the advantages of modern technological advances, he demonstrated an equal appreciation of sustainable practices selecting the best features from what was available. The case study also demonstrated the need for caution when using categories such as 'productivist' and 'sustainable' since, clearly, such practices are not mutually exclusive and if they are at opposite ends of the spectrum then some farmers had the ability to straddle both extremes.

7.4 Case study #2

The second study subject owned a 1000 hectare property in the central north of Tasmania and farmed 80 hectares of it. He had been cropping for 21 years and now grew potatoes annually, often as the main crop with poppies, beans, peas and barley. His soils varied but some of them were of the krasnozem type.

The entrance to the property presented a typical landscaped English garden with the farmhouse nestled among European trees and shrubs. The farmer's gendered view of farming was expressed in his explanation for the incongruity of the garden, as his wife's hobby, a woman's project she had planned entirely on her own. It suggested a 19th century view that the real business of farming was men's work and that farming women merely languished in the countryside in search of something useful with which to pass their time. This quaint view of a bygone English era was also obvious in the interiors, the presentation of the tea and the precisely cut lunch. Both farmer and spouse were naturally conservative (in his own words) but simple folk who took a great deal of trouble to ensure 'things' were done properly.

The attention to detail was reflected in the management of the farm. One worked according to simple, tried and tested principles. Risk was endemic in farming and needed to be minimised; hence the reliance on experts along with information from other farmers. For this grower, there was little room for innovation and experimenting. And while he was not antagonistic to the importance of conservation management, he was not devoted to the

idea. Accordingly, he stated that all farmers were fairly interested in maintaining the integrity of their soils because they relied on it for a living. For this reason it was necessary and sufficient to refer to the experts, the field officers and agronomists from agribusiness firms. He appeared resigned to the fact that processing companies were constantly forcing down the prices to farmers. He also accepted the companies' solution, which of course was calculated to drive out small farmers from the industry by lowering prices to farmers. But they would not be driving him out:

The way I see it, the only way we're gonna survive is: we're not going to get huge price increases, the only way we're going to survive is by getting better yields (Case study farmer #2).

Coming from an established farming family of several generations, the farmer claimed little had changed in terms of production levels and soil management on his land:

We'd be very dubious about new crops – we've been considering growing pyrethrum for four or five years but we've been putting it off – some people are really good at trying out new crops and things but I'm not one of those people – pretty conservative in that way (Case study farmer #2).

I like to see pretty much how things are going before I change – I just observe as well as talk to other growers. With pyrethrum it takes a longer time to get started because you don't get anything for the first eighteen months. It ties the ground for eighteen months (Case study farmer #2).

The farmer claimed that he knew the limits of his abilities and preferred not to go beyond his means by innovating or experimenting. This was in keeping with what he considered an adequate and traditional approach to farming and perhaps life in general. This approach demonstrated a low level reflexivity in which expert systems are overvalued in relation to locally accumulated knowledge based on trial and error of what is appropriate for individual contexts. Such an approach, also accepted the inevitability of soil loss to erosion. Given the available preventative methods for this problem, such as minimum tillage, direct drilling and straw incorporation, which can potentially achieve near-zero erosion, there was little reason for maintaining this view. Nevertheless, this farmer was fatalistic about what could be achieved regarding erosion control:

People have to be practical in what they can expect of farmers-if you've just sown a

paddock of poppies that you have to get ready, to get a decent seed bed you have to get to a fine bed otherwise poppies are not going to come up in crumbly soil which won't wash in the paddock. If you get 3–4 inches of rain that night, it doesn't matter how many furrows you've got in or what you do and quite often if you put the furrows in what is recommend, then you lose nearly as much soil as you do if it runs off because I mean it runs down a furrow and it gets lost. So often the things that you can do in that area don't really help. This is the thing that really frustrates me, is that people just don't understand that if you go into crops – you'll never get that (erosion) to a non-existent. You'll always see your rivers with red soil in them. Either that or you give up cropping in my opinion (Case study farmer #2).

In areas that remain under the management of older and somewhat tradition-constrained farmers as in this case, there seems little chance of any significant resistance to, and modification of productivist macro-policies. This fifty-five year old vegetable farmer may be representative of many Tasmanian small family farmers being trapped in a bygone era when the business of farming was more or less a given, handed from father to son and so on. Today the demands of modern agriculture are such that many older practices are no longer considered adequate. Industrial agribusiness and neo-liberal politicians insist that farmers must mechanise and adopt technologies to deliver higher yields. Conservationists demand that farming become more sustainable and ecologically sensitive and that the new, powerful and heavy machinery causes debilitating soil conditions with increasing dependency on diminishing fossil fuel supplies. Consumers in their turn have aided the process by insisting on cheaper, better quality food. All these requirements ultimately become demands on farmers and their land. This farmer made the case for the farmer's dilemma in an emotion-laden but eloquent speech:

I don't think you can ever say that you are doing it well enough. There's always room for improvement – no matter what area you're in. Most farmers try really hard. You haven't many people left on farms now who really don't care. Generally speaking, most of the farmers are fairly keen to see things improve. Providing the cost isn't too high to them, they'll do whatever they can. I think it is better than what it used to be, but I still think there's a long way to go. I know we don't do it perfectly – there's times when we don't do it at all well. There's times when we try fairly hard to make it come out right but you'll be caught out. You get really busy and you don't always do the things you should do to make everything right (Case study farmer #2).

On the question of rules, the subject seemed well entrenched in parochial community values having settled on a certain type of enterprise mix which was adequate for his own and his wife's survival without the need for expensive machinery and a larger holding. His statements suggest the importance of moral behaviour, of doing one's best and of being a good person without reference to an overarching need for efficiency and productivity. He expressed concern about a general tendency towards extremism in the statements of some politicians and environmentalists both of whom tended to misunderstand the business of farming. However, he was confident that, by and large, farmers themselves could always be trusted to take care of their land because most of the 'miners' had got out of farming.

7.5 Case study #3

This farmer on the central north of Tasmania owned a 400-hectare property and farmed 150 hectares of it on krasnozem soils. He had been farming for thirty years, some of which was by proxy through his brother. For twenty years, he worked with a supermarket chain as a wholesaler of fruit and vegetables. He insisted that his expertise lay in wholesaling rather than farming, although the enduring partnership with his brother has meant that he had never been totally out of farming.

This farmer held quite strong views on the problems of the vegetable processing industry in Tasmania. He suggested that the reality of being in agriculture is the same as that of any other business enterprise. Whatever is produced must be properly marketed. This was in his view the greatest weakness in the Tasmanian industry – marketing. The history of farming in this state has always had a focus on agronomy and production:

We set up this wonderful thing called the Department of Agriculture, and there wasn't one thing in the Department that had anything to do with marketing. And our great weakness in Tasmania is that for years and years we went to show people how to grow everything but nobody's put any effort in how to sell it and in the business skills that are required to sell stuff, and in the need for correct distribution and the skills required for distribution (Case study farmer #3).

According to the same view, while most farmers could manage to grow crops, the ones who made a living on the land were those who marketed their produce effectively. While Tasmania had been expending its energies in production and agronomy, the New Zealanders were investing in marketing boards and similar structures. In those areas, they

were significantly ahead of Tasmania, particularly in their marketing skills, which required proactive leadership. It was also important to identify what the market required and drive the product towards fulfilling it. This, in his view, was the secret of success in today's world economy:

It gets back to why McDonald's make all the money. It's because they've got the marketing. And marketing is where you make money. If you're a commodity producer, you make nothing, but if you've got the market sown up, you get fat very, very quickly (Case study farmer #3).

Also according to this farmer, the Tasmanian Government needed to establish an incubator marketing organization similar to the New Zealand marketing board for kiwi fruit and apples; to develop a pool of people with a skills base in selling their products. This was badly lacking in Tasmania because policy makers in the past have simply allowed the state economy to coast along with farmers growing their products happy to let the processors do the rest. For the processors, the 'rest' has meant especially promoting their own company brands, rather than Tasmania's. The farmer concluded that suggestions to promote distinctive qualities of a Tasmanian product were by themselves inadequate.

Tasmania's clean green image is a crock of shit unless somebody markets it. It will never come to anything unless it's marketed (Case study farmer #3).

But gradually farmers have come to realize that control over their operations was being transferred off the farm. In spite of their valuable resources, they are finding it increasingly difficult to make a reasonable profit. The reality for this farmer was that Tasmanian producers did not have control in the market place. Opportunities existed in areas where clean and green products could be marketed profitably under a Tasmanian brand, but they required efficiency and marketing skills, leadership to invest in a concept with potential, supporting it and allowing it to gain market strength. What exists instead is a mentality that predominantly values a traditional reliance on bricks and mortar over innovation and risk taking.

Also, for producers, farming has generally become more high risk, high cost, highly taxed, highly-regulated and very heavy on effort, a business that's expensive to run as a business. A few decades ago, the farming lifestyle was a sustainable existence where people could

live on their farm, make some money and have a reasonable life. That is now almost impossible and becoming a less attractive option:

There's labour intensive effort and a reasonable intellectual effort, and then you start to compare those inputs of your capital, your effort, and your intellectual property and your energy levels and if you've got that kind of effort and that drive and determination, then the fact is that in other areas you could be making three to four times as much with your money. And no smart person is going to stick at it. That's the reality; if they're clever, they're gonna take their money elsewhere (Case study farmer #3).

The most likely problems in the foreseeable future for the Tasmanian vegetable industry, according to this farmer, lay in the possibility of human resource failure. Small farmers may well exhaust themselves trying to continue in an industry where economic costs have progressively risen and profits fallen:

In the big picture, I reckon actually that farmers will wear out before our land does (Case study farmer #3).

The power of international capital and the marketing skills of the fast food outlets have created a situation where there is almost no competition between the corporate players. In an industry, which is extremely aggregated and industrialized beyond the farm gates, a competitive environment is almost non-existent. What exists, is a high concentration of power and 'capacity to leverage'. According to this farmer, when international comparisons are made, Australian consumers who believe they are getting the best prices as a result of retailers battling for their dollar, are misled:

In the Australian marketplace, there's very soft competition, there isn't any competition between Coles and Woolworths on price (Case study farmer #3).

For small farmers themselves, aggregation strategies are the only weapons remaining for those who want to survive. Like agribusiness, farming needs restructuring from within to make it more profitable. Aggregation of administration of the large number of small farms is a useful method of reducing effort and costs to individual farmers trying to manage the same kind of issues. Pooling farmer resources in a co-operative structure would allow buying groups under one purchasing officer who would negotiate contracts in bulk for chemicals, fertilizer and machinery. And with the increased leverage, farmers would be in

a better position to influence the price of their inputs in a similar manner that processors dictate the prices to farmers and in their turn fast food outlets dictate to processors.

7.6 Two case studies from Europe

Schutes (1996) study is a world system approach in which systems are ‘studied up’ from ‘micro’ structures such as farming cultures for an understanding of local social changes taking place within small farming populations. These produce outcomes which modify supra-state institutional policies from above. His results, in a period of escalating globalization, though from an EU context, have implications for the structure-agency debate and the Tasmanian vegetable industry regarding the autonomy of farm operators. Shutes’ study incorporated two farmer groups: one in Ireland’s south-west and the other in the Northern Peloponnesos, Greece. Both are members of the European Union (EU) and share certain characteristics with those of the subject group in the Tasmanian processing vegetable industry.

All the histories of the groups (Irish, Greek and Tasmanian) over the past hundred years reflected a common transition from mixed farming production with a significant subsistence component (cows, cattle and root crops for the Irish group and wheat, grapes and olives for the Greek group) to commodity production for the national and international marketplace. For each, the transition had been ‘sporadic and unpredictable, as various forms of capital accumulation impacted upon local production plans’ (Shutes, 1996: 3). Also common among the three groups, was the imperative for farmers to adjust their production strategies according to the introduced conditions while resolving the value conflicts and upheavals in social relationships that came with the changes. In addition, as with the Irish and Greek groups, Tasmanians were themselves marginal to the larger economies in their region.

7.6.1 Mono-cropping versus multi-cropping

Given the prevailing conditions, Irish farmers opted for choices that require a mono-cropping style of farming. They now only have a few practical choices in dairying and sheep stocking. This has had a serious impact on the country’s agricultural resources:

In Ireland, at present, two major negative impacts of agriculture are reportedly; increased water pollution, and overgrazing, mainly of sheep. The latter problem arose as a

consequence of the EU headage payments to farmers. Quantities of pesticides used in the country have more than doubled over the past 20 years, although it is low compared to some other EU countries. A voluntary code of good practice intended to avoid damage by pesticides has recently been produced (UNEP, 2001–04).

On the other hand, in Greece, where the farmers' best option has been to multi-crop, they have expanded their inventory of mixed farming products to include fresh fruit and vegetables for the marketplace. This has meant that Greek farmers have needed all available land to accommodate their multiple commodity strategy. Not only have they found themselves, in direct competition with other kinds of enterprises but the pressure to over-utilize existing land resources has placed a severe burden on the local ecology, available water resources and biodiversity:

In Greece, an inventory project of indigenous breeds of cattle, goats, sheep and equines is being carried out. The programme for the 'conservation of rare farm animal races' allows incentives for the preservation of 31 races of cattle, goats, sheep and equines, and in particular, 6 races of cattle, 18 races of sheep, 1 race of goat and 6 races of horses – all of which are endangered, critical or vulnerable. The programme will attempt to preserve 63 species and 281 varieties of agricultural plants and about 100 species, subspecies and varieties of native plants, which possess some financial interest (UNEP, 2001–04).

Farmers in Tasmania had more choices in designing their enterprise mix. Some have continued in mixed cropping along with dairy and cattle while others have selected a number of commodities that suited their personal situations. Both choices are reversible depending on market prices. A majority have chosen the security of contracts with the processing companies in the most widely grown crops such as potatoes, poppies and pyrethrum.

When Tasmanian vegetable processing farmers are compared with their Greek and Irish counterparts, there is an indication that they are moving in the direction of the Irish group in responding to pressure to increase the size of their cropping areas, reduce the number of enterprises and to further industrialise their operations by increasing inputs, upgrading machinery and raising yields. This has involved certain social changes as with the Irish farmers who generally reduced hired labour to rely solely on full-time family workers. Irish farming community households who had previously been strongly tied to each other were now increasingly disconnected and isolated. Greek farmers on the other hand, whose

farming style had previously been familistic, because of an increased variety of crops, have increased their labour dependency and become more connected and interdependent at the local level. It appears that as the diversity of crops diminishes in the direction of monoculture, mechanisation and disconnectedness increase with a contraction in the demand for labour. In the case of Tasmanian farmers, this is a well-established pattern and one which is encouraged by the processing industry as a means of reducing production costs to farmers to offset the lower prices received for their vegetables.

While Irish farmers have needed to invest heavily in labour-saving dairy equipment to remain competitive, actions, which tied them into the industry by reducing their enterprise flexibility, the Greek farmers have found that the need for an increased variety of crops has meant becoming more flexible and so have not invested in costly specialised technology. Tasmanian small farmers have generally kept their options open in regard to investment in technology. Many have seen the disadvantages of being locked into a specific commodity and have preferred to use contractors where there was a need for crop-specific machinery. Those who invested in dedicated machinery now report being on a treadmill between low prices, input costs and debt. The relatively low prices paid by the vegetable processing industry have forced farmers to restructure their operations and like their Irish counterparts, reduce their paid labour. As a result, many also depend on family labour as a cost-saving measure. When outside labour is used, it is on a part-time basis, without the security that many workers would prefer. Consequently, there tends to be a shortage of farm labour when it is most needed, when the heavy pressure of work takes its toll on farmers and their families.

7.6.2 Under-utilization versus over-utilization

As with Greek farmers, the research discovered a tendency for Tasmanian farmers to overcrop when constrained by financial pressures. As a result, many are over utilising their best land by continuously cropping soils without sufficient respite in pasture phases. There are implications for sustainability here. When soils are overburdened, the pressure on ecologies and water resources are increased. And as also with Irish farmers in a highly specialised industry, land that is considered useful for their enterprise is much sought after and overvalued thus limiting the entry of younger farmers. Available marginal land is used in a way that does not compete with the core business of commodity production. Often,

this can be sold or used as tourist amenities, housing and light industries by entrepreneurial Irish and Tasmanian farmers.

7.6.3 International versus local

The processing industry has offered economic security and marketing convenience to vegetable growers in Tasmania. And because of the highly competitive international market in this commodity, demand for Tasmanian produce has been limited to the national arena where agribusiness competition is merely between two processors. The result has been a decline in price for farmers. Until recently, a national market has suited the processors whose products have been well-known and supported as high quality Australian food. But the current pressure to expand production has meant processors now need to find outlets beyond Australia. Several attempts to locate an export niche have failed for reasons, which are claimed to be associated with processor marketing strategies (TFGA Representative#1). According to processor representatives who discuss the matter in very general terms, the failure is solely due to the high price of raw product paid to farmers. The latter claim their returns are in fact in line with international prices and when the high costs of inputs and machinery are factored, their profit margins are well below international competitors. Nevertheless, all parties recognise that exports of processed potato products are essential to the growth of the industry where national markets are now said to be 'saturated' with little capacity to absorb further productivity. Yet processing companies continue to increase their throughput with preference for larger farms to specialise in potato growing as a bulk commodity. Farmers surveyed feared this would encourage a decrease in farm prices, lower processing costs and make Tasmanian French fries more competitive on the international market. This is precisely the outcome that processors have aimed for.

Greek farmers on the other hand have found that 'the expanding of local and regional markets for highly perishable fresh fruit and vegetables can prove more profitable than bulk commodities for the EU. These farmers were wary of the highly regulated pricing systems and internationally standardised EU markets and more concerned about developing local and regional markets for their produce' (Shutes, 1996: 5). This localisation of production and consumption, is more in keeping with the requirements for a sustainable form of agriculture. At the same time, Tasmanian farmers are highly disadvantaged when in competition with international competitors such as US and EU

farmers (TFGA representative #1). The latter have cheaper inputs and machinery, have the benefit of substantial economies of scale and are closer to major markets. Even in competition New Zealand farmers, Tasmanians are handicapped by the exchange rate disadvantage and economies of scale in New Zealand. More widely, competition on the international market is hardly a level playing field for Tasmanian vegetable farmers when competitors include subsidised growers in the US, Europe and Japan.

7.7 Rules negotiation

In a situation where farmers must make decisions on changes in production strategy, there are many variables at work affecting their decisions. Often there is much at stake where crop failure can mean high financial loss. In a typology of social rules which harks back to the symbolic interactionism of Blumer (1986), Shutes (1996) calls 'parochial' and 'cosmopolitan' to elucidate some of the farmer decision making processes. Parochial rules are 'social constraints that lead individuals to define their role as a farmer/producer primarily in terms of local standards. These standards are typically couched in terms of moral and ethical ideals about the manner in which a 'good person' should behave towards fellow 'locals'. In other words, parochial rules reinforce community norms and shared responsibility and a sense of belonging to that community. Such rules tend to predominate among farming populations strongly dependent on each others' support. On the other hand, cosmopolitan rules are also social constraints that lead an individual to define their role as a farmer/producer primarily in terms of the practical realities of being a 'good farmer' and the need to ensure the success of one's enterprise. These rules tend to predominate where there is less dependence on outside labour. They approximate the differences between productivism (cosmopolitan) and post-productivism (parochial) and can be applied to farmers in Tasmania. According to the survey narratives, it would be expected that parochial rules are applicable among more traditional communities of small family farmers less able to afford modern and expensive farm machinery. Typically, these individuals expressed concern for the future of rural communities on which they depended. The larger farmers surveyed, expressed aims in keeping with processor preferences—higher yields, economies of scale and efficiency through increased inputs, mechanisation and technology:

We moved to irrigated cropping on our own account in 1995, by building a big dam here
— two big dams and buying the associated kit and every year we doubled the area of

irrigated country by having three travelers in '95 and one centre pivot bought in '96, two more bought in '97. So we went from one pivot servicing three circles each one 27 hectares, so we had three circles in '96. We bought two more pivots, so we had 9 circles in '97, and then we bought three more pivots so we had 18 circles in '98. And in '99 we bought three more pivots again, so we had 9 pivots servicing 27 circles in '99 and since then we've developed other sites so we've got between thirty and forty sites now that are all plumbed in to be irrigated (Case study farmer #1).

Where labour was required, it was hired. Farmers of this type and size accepted that neo-liberal productivism was the way of the world and farmers followed market dictates or got out of farming. However, it is clear that in Tasmania, these social rules are not mutually exclusive. A farmer may be economically cosmopolitan and socially parochial in an eclectic style of farming. Many interviewees in this research indicated an adherence both to market-driven and communitarian norms. There did not appear to be a serious conflict between the goals of being a good farmer and a respected member of the community. Farmers often claimed they gained the respect of their neighbours precisely by being good farmers. Others stressed the importance of applying both marketing and co-operative strategies:

I put the emphasis on the way we operate our businesses almost more than the way we farm. I think we need to look at the structure of the way we farm and the possibility of cooperative arrangements, looking at groups of farmers can take costs out of business by aggregating certain things (Vegetable farmer # 100).

Nevertheless, whilst productivist practices did not preclude social interconnectedness, there was some evidence in farmer narratives that farm size and productivity were important factors in determining social approval. Large farmers were dubbed 'corporates' whose management efficiency was questioned and sustainability doubted. The basis for such exclusion is more likely to be economic where the use of expensive technologies, large farm machinery and economies of scale by farmers with more extensive holdings added to the pressure on smaller farmers to increase their yields, their debt structures and reduce their prices to processing companies.

7.8 Conclusion

The results of the follow-up studies suggest that as the diversity of crops diminishes with mechanisation and monoculture (as in the case of Irish farmers), social disconnectedness

occurs in the case of large farmers. This is a pattern that is encouraged by the processing industry in Tasmania whose stated preference is for dealing with large farmers rather than farmer groups. However, while Irish farmers have needed to invest heavily in labour-saving dairy equipment to remain competitive, which tie them to the industry by reducing their enterprise flexibility, Tasmanian small farmers have generally kept their options open in regard to such decisions. Many have seen the disadvantages of being locked into a specific commodity, preferring to use contractors where there was a need for crop-specific machinery. The relatively low prices paid by the vegetable processing industry have forced farmers to restructure their operations and, as with their Irish counterparts, reduce their paid labour. As a result, many sometimes depend on their families as a cost-saving measure. Consequently, there tends to be a shortage of farm labour when it is most needed.

While some farmers were able to negotiate between productivist practices and concerns for sustainability of farm resources, others were reportedly struggling. In case study reports, the demands of farming are now such that increasing costs, effort and risk will reduce farmer and farm numbers before the land becomes unsustainable, suggesting a stronger causal connection between productivism adjustment and sustainability. This was a common theme throughout the phases of the study. In Tasmania, agricultural research has been concentrated on increasing productivity in agriculture with less concern for the interdependent conditions of farmers, resources and environments. Case studies suggested that new directions and emphases were now overdue.

Case studies reiterated the expectation that processors share the burden for the sustainability of farm resources. The productivist practices they demanded were largely the causes of resource degradation and off-farm impacts. The lack of harmonious relations among farmers and processors implied future tensions encountered in Phases One and Two between worldviews with little in common but the pursuit of economic rewards in the case of the former and profits, the latter. This is a major distinction between the two stakeholders which governs their entire approach to the sustainability of agriculture in Tasmania. In seeking 'rewards', farmers consistently pointed to parochial norms such as a fair price for reasonable effort which implied social, resource and environmental equity. For business-minded processors, equity was not a consideration. Cosmopolitan aims sought 'maximum short term profits' at any cost. All distortions were market related. Thus, while small family farms persist as the backbone of farming in Tasmania, the entry

and demands of corporate capital will continue to be viewed as unrealistic, alien and temporary with scant knowledge and concern for local conditions:

It's all very well for Simplot to say they want bigger farms. That's almost naive, we don't have the Snake River irrigation scheme running through the north west coast. I may well have a 180 acre farm. But I might only have dams capable of irrigating 30 acres of that at only one time. You've got to look at the resources that are tied to that farm. It's not practical in most cases to say let's pull ten farms together. We'll put spuds in that blokes farm this year-we'll put peas in there this year, we'll rotate it all the way round because the resources mightn't be there to operate that way. It might work in specific instances. I think Simplot want to put this generic approach to it. There's not one hat that fits all. You've got some people who have got an ideological approach to it; they've been to America, they've been told this is the way the countryside should look (Case study farmer #3).

Analysis and conclusion

He himself is out of fashion, as are his problems. He struggles to keep farming because it is his life: He is bound to the soil by his own toil and by the toil of his ancestors, and by the hope that one day his children will be able to earn an honest living from that same soil (Horne and McDemott, 2001: 2)

8.1 Introduction

According to Lawrence (1999: 197), ‘agriculture is coupling with corporate capital in ways that are helping to reconstitute both world markets and the farming systems that serve them’. And since changes in the food system have been central to the ‘widening and deepening of capitalist relations within the world economy’ (Friedmann, 1982: 256), the effects on food producers have been dramatic. In the case of the Tasmanian vegetable processing industry, the study discovered an atmosphere of pervasive tension. The discontent among participants suggested a period of continuing stresses associated with the widespread application of productivist policies and farming practices and their impacts on the sustainability of farming in the State.

Farmers repeatedly expressed negative attitudes towards the conditions of production contracts while processors failed to be impressed by the growers’ low productivity and reluctance to accept lower prices. The mandatory conditions of the processing contracts, which specified the application of inorganic and toxic inputs, was some confirmation of the industry’s productivism. Phase One of the study was dominated by economic considerations and poor relations between processors and farmers while interviews with a farmer organization (TFGA) representative emphasised the plight of farmers and the lack of leadership from governments for developing export markets to provide alternatives to the dependence of farmers on a consolidated industry of two processors.

8.2 Marginalization of family farms

Throughout the interviews, vegetable processing farmer participants asserted that sustainable farm management was contingent on the adequacy of economic returns. Only when processors paid reasonable prices for vegetables, could farmers afford conservation and environmental projects. The interviews left few doubts that economic concerns were

primary in the minds of farmer representatives and farmers more widely. For these, economic viability was a means to an end, no less than the survival of the family farm. From a commoditization perspective, ongoing restructuring of agriculture during the latter part of the 20th century marginalized small independent farmers for adjustment or integration into corporate controlled food systems (Atkins and Bowler, 2001: 56). Lured by the security of forward contracts, farmers have allowed their autonomy to be eroded. One farmer reported being only left the choice of time to get up in the morning, a casual reference to serious developments in which subsumption reduces farmers to the status of paid workers on their own land (Mabbet et al., 1999: 276; Watts, 1992: 91). Yet farmers continue to own the responsibility for the impacts of productivist farming in degraded soils, polluted rivers and damaged environments. In effect, agribusiness corporations who now dictate almost all management practices on farms where their crops are contracted, have hedged responsibility for the impacts of these practices by outsourcing production to compliant farmers. If farmers reassessed their contracts including the full costs of resource and environmental damage, they may discover the true extent to which they have been short-changed by agribusiness and the extraordinary concessions they made for the dubious benefits of processing contracts.

But farmers often have little choice but to accept the conditions of farming contracts, to becoming part of a 'self-reinforcing capitalist labour process' (Davis, 1980: 144). Many were reportedly facing a grim future and the possibility of adjustment (TFGA representative #1) while 16% of farmer representatives in the study believed their livelihood was at stake. From a regulation theory perspective, power imbalances within systems represent a failure in a mode of regulation by which capital accumulation is restrained (Aglietta, 1979). In a deregulated neoliberal context, government controls on agribusiness companies are minimized or absent. Farmer discontent lends weight to regime theory constructions of agribusiness imperialism penetrating local scales through increasing levels of concentration, centralization and rural dispossession (McMichael, 1996). However, the organizing value of structuralist explanations has been questioned since the early 1990s (see Marsden et al., 1993) with a refocusing on change as it is experienced by actors at the local level. A 'bottom-up' or 'actor-oriented and behaviourally-grounded' approach therefore broadens the understanding of the complex processes taking place (Wilson (2000: 85). At the same time, an overemphasis on the role of agency in agricultural change risks bias in reverse. If the importance of 'agency' lies in

the individual capacity to exercise some degree of power (Vancly and Lawrence (1995: 145), then several questions arising from the study results are thrown into relief:

Why are farmers unable to 'make' prices for their produce and thus resume control of farming and the sustainability of operations?

Why does agriculture continue to be archaically gendered when women contribute over 45% of its income?

Why is farmers' income in decline and incommensurate with the value of its products?

Why does a significant number of farmers consider their livelihood at risk?

Why is modern technology not used for sustainability rather than productivist intensification?

Why is resource degradation continuing apace despite the availability of technologies to control it?

Why are 55% of farmers 'unhappy', 20% 'very unhappy' with agribusiness companies?

Why are farmers (70%) in denial about their level of soil degradation and the connection between farm activities and environmental damage?

Why do farmers continue to overuse chemicals rather than biological controls?

If farmers are 'the best conservationists' why is this not reflected in their practices?

Responses to many of these questions can be related to the integration of the farming sector into agribusiness structures after the mid-1980s which saw increased marginalization in the social and economic status of farmers. Loss of privilege can relate to loss of farm support programmes (Cloke and Goodwin, 1992; Winter, 1996) while food health crises give rise to questions regarding farm practices and representations of farmers in the media (Marsden et al., 1993; Harper, 1993). Such developments shake the public confidence in farmers and the food they produced, but do little to alter the direction of productivist agri-food systems. Thus, to argue for an emphasis on the power of agency in the present global context dominated by a neoliberal agenda for agricultural policy reform (Potter and Tilzey, 2005: 587), would seem appropriate while suggestions that individuals retained sufficient influence to redirect the monolithic structures of 'an inherently productivist agriculture increasingly integrated into the wider circuits of an industrialized agro-food system' (Potter and Tilzey, 2005: 596), may be optimistic.

And while the present study detected themes of critical discontent within the vegetable processing system in Tasmania, there was little apparent evidence of a desire for structural

change. Farmers merely sought to modify existing processes emphasising 'fair' returns. Such piecemeal modifications do not suggest post-productivist (Wilson, 1993; 1994; Potter, 1998) change but a continuation of the status quo. Thus, a majority of farmers in Phases One and Two could claim to be the 'best conservationists', a view consistent with productionist conceptions of farmers as protectors of the countryside (Newby, 1985; Harvey, 1997). Phillips (1996) discovered that conceptualizations of good farming differed markedly among producers. On larger aggregated units, good farming required farmer versatility to manage, with heavy reliance on technology and agricultural science. In the present study, smaller farmers associated farming efficiency with limits to farm size and therefore did not regard large industrial farmers as good farmers, but 'miners'. The extent to which such views were the result of economic class bias was difficult to ascertain. According to commercialization theory, family farms have been transformed by market supply and demand relations (Ilbery and bowler, 1998) leading to a dual farm economy comprised of traditional small farmers and more 'modern' technically efficient capitalist farms. For the latter, good farming was measured in standard business terms as 'maximization of profit', 'economic efficiency' and 'competitiveness' which also signalled increasing integration into the food supply system. In Schute's (1996) typology, large industrial farmers were subject to 'cosmopolitan' rules of good farming in the same practical modern economic terms. On the other hand, good farming among small family operators relied on 'parochial' rules, subject to community norms, morals, ethical ideals, and interconnected responsibilities.

The compatibility of these constructions goes some way in explaining the reluctance of many small farmers in the study to fully accept the pressures and demands from processing companies for what they (farmers) considered unrealistic demands in productivity levels and lower prices. Processors viewed the industry in simplistic business terms, uncomplicated by social and stewardship concerns. This perspective reflected the reality of power held by global food industries and their capacity to manipulate alternative product sources (Rickson and Burch, 1996). For the majority of study participants, the place of small family farmers in traditional rural communities remained important but under threat. Farmers expressed a sense of nostalgia for the old days in the processing industry (before the arrival of the present corporations) when business and producers socialized on special occasions and relations were more cordial. Then, processing companies formed a part of the community, gave and were given a considerable degree of loyalty by the community.

Such contrasts with views of the present may have contributed to the unsatisfactory compromise euphemistically described by processors as a 'business relationship'. Expectations of 'higher yields' were rarely met and loyalty between farmers and processing companies was uncertain. Within this macro-micro tension, the question of sustainable practices becomes complex in an industry which was in the process of 'refashioning nature' (Rickson and Burch, 1996, 173).

8.3 Sustainability

Johnson's (2006) analysis of the debate on sustainability as a rift between 'the life sciences integrated paradigm' and an 'ecologically integrated paradigm' suggests that only the latter offers real resistance to the hegemonising tendencies of a productivist food system (Horne and McDermott, 2001: 3). Farmer representatives in the study consistently expressed a bias for a modified productivist model, misrepresenting the capacity of organic agriculture to produce sufficient quantities of high quality food for world consumers. However as an afterthought, many pragmatic interviewees expressed a willingness to adopt organic practices on the condition that adequate prices and markets were guaranteed.

On a micro productivist level, while environmentalists have shown that degradation poses imminent threats to human living standards and well-being (Buttel, 1993), it is also clear they have focused more on resource and environmental impacts than on the condition and fate of farmers. This thesis argues that the futures of all three are interconnected. When family farmers no longer farm the land, and are replaced by agribusiness conglomerates, issues concerning farming stewardship, culture and sustainability may cease to be important. There is added risk that the undervalued commodity sometimes referred to as farmer local knowledge will also be lost. Yet the value of traditional farmer accumulated wisdom, some of which was collected during this study, has been demonstrated (Millar and Curtis, 1999; Shajaat-Ali, 2002; Wynne, 1996; Bentley and Thiele, 1999). Kaup (2008) adopted the notion of a 'reflexive producer' who is capable of making complex decisions based on his/her assessment of expert systems in the light of accumulated local information and experience. Farmers, Kaup (2008) concluded, were not merely passive actors accepting objective truth from above. While they negotiated between various sources of information they were more likely to rely on local first-hand experience in their own community. This level of farmer autonomy implies a degree of responsibility for the impacts of farm practices which cannot be solely attributable to reduced farm incomes

given a tendency by producers to gamble with resources in order to secure their farming future (Lawrence, 2004: 259).

At the same time, interview results suggest that the issue of sustainable practices in agriculture had not dominated farmer attention to the same extent as economic matters. It was apparent that such ideas were part of a less considered discourse perhaps construed as a criticism of conventional practices and farmers. Farmers were therefore eager to stress the primacy of economic considerations when assessing the sustainability of farming operations on the grounds of survival. Processing representatives postulated a direct relationship between crop yield (productivity), farmer profits and sustainable resource management, which they claimed, was entirely the province of the farmer. While an association between farm finances and environmental damage has been identified (Bryant, 1992), that between productivity and price to farmers is a complex mix of business and market economic policy. Nevertheless, farm productivity is a basic requirement for productivist farmers. In symbolic interactionist terms, it gives them a sense of identity and achievement' (Burton, 2004: 196) represented by hard work and a sense of victory over natural resources (Burton, 2004: 197). The process of cognitive dissonance allows farmers to redirect their perception from long term damage to short term gain.

8.4 Contract system

In Tasmania's vegetable production sector, the contract system is a focal point representing agricultural development at both global and local scales. Changes here reproduced 'wider tendencies for the reorganization of agriculture by various fractions of capital' (Lawrence, 1999: 2). Thus, small scale commodity production made way for distinctive new work routines, while farm technologies and labour processes promoted further concentration and centralization of capital in agriculture. Contract farming marked a critical transformation and recomposition of the family farm sector as capital saturated the entire agro-industrial complex, converting growers into a 'self-employed proletariat' without directly taking hold of the point of production (Watts, 1992: 91). The study noted supporting evidence of formal subsumption in the declining significance of farmer decision making and dependence on the opinions of productivist institutional experts, particularly those of the processing companies. The high priority attributed to reducing debt in Phase Two of the study suggested that memories of the 1990s debt crisis in agriculture have not been easily forgotten. Yet many farmers also considered the

maintenance of up to date farm machinery was an important characteristic of being a good farmer thus reflecting the persistence of productivist values, farm debt and agricultural impacts.

Under the contract system, processing field officers and input supply representatives, encourage the greater use of agri-chemicals which foster a dependency between the growers and agribusiness (Lawrence, 1999: 188). Study results consistently reported decline in the economic condition of farmers who claimed processors exerted downward pressure on their price returns, severely limited their capacity to afford soil conserving practices resulting in shorter rotations, degradation, increased disease outbreaks and serious losses in productivity. At the same time, financially strained farmers often survived by externalizing their costs by exploiting agricultural and environmental resources, having little capacity to pass their higher costs to their buyers.

The impact of productivist practices was not only realized in degraded agricultural and environmental resources and the poor health quality of farm produce, but in a 'detraditionalization' (Lawrence, 1999: 193) of rural communities. Concerns were expressed that a restructured agriculture without the variety and resourcefulness of small farmers, would merely become a collection of large agri-industrial estates without the benefit of traditional farmer knowledge and expertise.

8.5 Practices

While farmers reportedly held a strong stewardship ethos (Curtis and De Lacy, 1997: 191; Vanclay and Lawrence, 1995: 78), it was clear in all phases of this study that their practices had the reverse effects. For individuals reputedly averse to risk taking, farmer practices suggested a reckless disregard for their land. But farmer perceptions and responses to risks may be rationally-based given a trust in expert scientific institutions that are supposed to control the risky processes involved (Wynne, 1998: 51). Hence the continuing confidence in chemicals and the assurances of chemical companies.

As expected from a reading of the literature on the state of Tasmanian agricultural resources in Chapter Four, reports of common farming practices in Phase Two of the study confirmed the essential productivism of the industry and its continuing negative impacts. Farmers indicated a preference for compromise – those pressed to increase property size were simply increasing the areas cropped while declining to enter into debt. By acceding to

the major demands of processing companies for higher inputs and yields, farmers were modifying the intensity of these demands by achieving only moderate yields. The study results however indicated a consistent preference by a significant number of farmers for productivist 'quick fix' solutions such as agro-ploughing ('ripping') to compensate for intensified practices in situations where high farm debt meant constant 'mining' and where soils could not be better managed through rotations or pasture phases.

Study reports also confirmed the intellectual and physical contribution by farm women, which may be associated with the introduction of more sustainable values, innovative thinking, networking and farm practices (Roberts, 1995: 192).

8.6 Corroboration

The results of the follow up studies strengthened the view that productivist practices dominate the vegetable processing industry even among the practices of small family farmers. It appears that farmers have little choice of methods apart from the use of rotations, green manures and on occasion, no-till methods. There was also a suggestion that as the diversity of crops diminished with mechanisation and monoculture, social disconnectedness increased among large farmers with a decrease in reliance on farming community supports and farm labour (Schutes, 1996). In the case of Tasmanian farmers, this was a well-established pattern and one which is encouraged by the processing industry whose preference is for dealing with individual large farmers rather than a large number of smaller farmers. This suggested a neoliberal bias in corporate farmer relations to diminish the power of collectivities and farmer organizations (Lipietz, 1992).

However, in relation to the autonomy of contracted farmers in the vegetable processing industry, there was support for Schute's (1996) assertion that when new capital is introduced into a farming area, it was neither accepted or rejected, but evaluated by farmers in terms of community benefit according to locally negotiated rules. One large farmer in the study expressed sustainable views regarding the production of potatoes and the use of alternative systems. At the same time, this farmer's reliance on heavy machinery and irrigation systems indicated productivist conformity. Nevertheless, the results lent support for the relocation or diversity perspective for a middle ground position (den Ouden, 1997) in which 'macro' policies are almost never realized in their entirety but accommodated by micro actors to suit particular contexts and in the process the global and

local culture of farming is ‘continually constructed and reconstructed’ (Fulton and Clark, 1996; Phillips, 1996). In Tasmania, farmers reported that processing companies maintained access to all farm records as a condition of contracts in which the processes on individual farms were closely monitored by agribusiness companies in an increasingly integrated system.

8.7 Conclusion

This study was undertaken on the basis that healthy food should be available without damaging the lives and environments of people who produce and people who consume it. It should be grown without jeopardising the inheritance of coming generations. Yet productivist systems have fallen short. Industrial processes in modern agriculture have encouraged farmer dependency on fossil fuels, inorganic fertilizer and biocides while concealing the real costs of their use. Among these have been the desolation of rural societies, impoverishment and corporate exploitation of farmers, and threat to the food security of populations. In this process, farmers have been both perpetrators of the crimes, or at least accessories, and victims of it, ironically in the name of survival.

On a mundane level, vegetable processing remains an important industry to Tasmania for which the great majority of vegetables are produced and exported, and whose social and environmental impacts remain productivist and significant. In response to its aims, the study identified and assessed the sustainability of the dominant practices in this industry through the views and narratives of the main stakeholders—the farmers and processors. From the interview narratives, the study began a compilation of locally-specific farmer knowledge, an under-recognized resource comparable to the contribution of farm women, and an essential ingredient for further developments in a sustainable agriculture.

The study concluded that the majority of agricultural practices in the vegetable processing industry reproduced a productivist agricultural model with all its impacts and whose structures were increasingly integrated into a globalized system of food production. The continuing dependence of this latter day ‘green revolution’ model on inorganic and toxic inputs, industrialization and mechanization and its exploitation of human, agricultural and environmental resources, suggests that in Tasmania, the variable economic benefits to local producers are outweighed by the long term negative agricultural, environmental and health impacts. While the present structures of the industry are maintained, it must be

considered unreservedly unsustainable. This reflects not only on the sustainability of the vegetable processing industry, but on the credibility of State marketing agencies' reliance on a 'clean and green' image which cannot be substantiated in a state where productivist practices extend beyond the subject of the study to several other sectors.

While claims for 'clean and green produce' at present cannot be supported excepting on accredited organic farms, a transformation to sustainable systems will lend added support for such assertions and their economic value. In this respect, the study detected a demonstrable degree of flexible pragmatism among the sampled farmer population suggesting that given the appropriate rewards, farmers retained an ability to alter the direction of Tasmania's agriculture, perhaps moving it into a post-productionist phase and ultimately to sustainability. This conclusion was derived firstly, from the utterances of many interviewed farmers and secondly, from concrete farmer actions which confirmed an ability to transcend a history of productivist ideology and masculine self-reliant individualism and act against the global power of local agribusiness processors. The success of this action along with farmers' capacity to borrow from alternative practices, also suggests that notwithstanding a willingness to accept a limited amount of formal subsumption, Tasmanian farmers retained considerable reserves of autonomy and traditional local knowledge, essential for decoupling from a monolithic productivist agri-food system to a sustainable locally-oriented agriculture.

Additionally, during the study, farmers reported strategies of simple survival, 'holding back' their support for a system whose demands were considered excessive. This was further proof of their pragmatism. Agribusiness corporations also appear to have become more flexible in terms of global sourcing, niche marketing and the resort to smaller production units (Lawrence, 1999). However, given the support of governments (Bowler, 2002) and the entire community (Diesendorf, 2000), the development of agricultural sustainability in a post-productivist future, should not be too readily discounted.

Building on the present study, future research could be pursued in several directions. The study results demonstrate that while conventional farmers negotiate between the demands of an input driven mechanized industrial system of farming, a bank of locally-accumulated knowledge and more sustainable systems, they are amenable to further change in the direction of sustainability given appropriate incentives. Research in the area might identify incentives and methods for specific localities increasing farmer confidence in the

possibilities of organic practices. Education here would seem to be an obvious place to commence. Other studies may further connect the development of sustainable practices to the gendered barriers limiting farm women's roles of both conventional and alternative producers. Further research into the survival of small family farms as a precondition for agricultural sustainability would also seem to be a fruitful area. Further studies are also needed of the means by which conventional farmers may reduce adjustment rates through innovative application of co-operative systems for buying inputs, or machinery, setting up rival processing companies and supermarkets in which more sustainably-grown 'clean and green' products become available and affordable would seem to offer practical opportunities for relocalization. Studies promoting further alignment between conventional and alternative farmers, recognizing the value of women's' contributions, while maintaining full autonomy over practices, are likely to offer constructive outcomes.

Suggestions by participants for a re-examination of co-operative processes may be effective for re-establishing connectedness and local control of food production. This is a process already in train through the practices of alternative farmers which re-establish relationships between producers, consumers and food. In taking up the challenge to control their own future, farmers may demonstrate they are not mere recipients of macro economic policies, not merely 'price takers', but 'makers' of sustainable and equitable change.

References

- ABARE (2009) Farmers' use of sustainable management practices, report for the National Land and Water Resources Audit, Mark Oliver, Dale Ashton, Andrew Hodges and Daniel Mackinnon, Canberra <www.nlwra.gov.au/products/pn22376>, (accessed 16 November 2009).
- ABS (2009) Agricultural Commodities, Cat. No. 7125.0, <<http://www.dpiw.tas.gov.au>>, (accessed 15 Sep. 2009).
- Aglietta, M. (1979) *A Theory of Capitalist Regulation*. Verso, London.
- Aglietta, M. (2000) *A Theory of Capitalist Regulation: The US Experience*. Verso, New York.
- Allen, P. (2004) *Together at the Table: Sustainability and Sustainance in the American Agrifood System*. Illinois Institute for Rural Affairs, Western Illinois University, Illinois.
- Alston, M. and Wilkinson, J. (1998) Australian Farm Women – Shut out or Fenced in? The Lack of Women in Agricultural Leadership. *Sociologia Ruralis* 38(3): 190–218.
- Alston, M. (1998) There are Just No Women Out There: How the Industry justifies the exclusion of women from agricultural Leadership. *Rural Society* 8(3): 161–296.
- Altieri, M. A. (2009) Agroecology, Small Farms, and Food Sovereignty. *Monthly Review* 61(3): 102–144.
- Alvesson, M., (2002) *Postmodernism and Social Research*. Open University Press, USA.
- Amin, A. (1994) Post-Fordism: Models, Fantasies and Phantoms of Transition. In Amin A. (ed.), *Post-Fordism: A Reader*. OUP, UK.
- Angus, J.F., Kirkegaard, J.A. and Peoples, M.B. (2004) *Rotation, Sequence and Phase: Research on Crop and Pasture Systems*. CSIRO Plant Industry, Canberra.
- Arrighi, G. (1999) The Global Market. *Journal of World-Systems Research*, 2, 217–251, <<http://jwsr.ucr.edu>>, (accessed 25 May 2009).
- Atkins, P. and Bowler, I (2001) *Food in Society*, Oxford University Press, New York.
- Australian Government Land and Water (2004) Australia's Farmers, Past, Present and Future, Research project number DAV41, of the Social and Institutional Research Program of Land & Water Australia. Available on-line at <<http://lwa.gov.au/files/products/social-and-institutional-research-program/pp040778/pp040778.pdf>>, (accessed 11 Oct. 2009). [Check source]
- Australian Government, Department of the Environment, Water, Heritage and the Arts, National Reserve System (2009) <<http://www.environment.gov.au/parks/nrs/getting-involved/private.html>>, (accessed 2 October 2009).
- Babbie, E.(1992) *The Practice of Social Research*. Wadsworth Publishing Company, Belmont, California.
- Brcklacich, M., Bryant, C.R. and Smit, B. (1991) Review and Appraisal of Concept of Sustainable Food Production Systems. *Environmental Management* 15(1): 1–14.
- Beck, U. (1992) *Risk Society: Towards a New Modernity*. Sage Press, London, UK.
- Beck, U. (1994) *The Reinvention of Politics: Towards a Theory of Reflexive Modernization*. Polity Press, Cambridge, UK.
- Beck, U. (2006) *Cosmopolitan Vision*. Polity Press, Cambridge, UK.
- Bell, M.M. (2004) *Farming for Us All*. The Pennsylvania State University Press, University Park, PN.

- Benachour, N. and Gilles-Eric, S. (2008) Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embryonic, and Placental Cells. *Chemical Research in Toxicology* 22(9): 1–39.
- Bentley, J.W. and Thiele, G. (1999) *Bibliography: Farmer Knowledge and Management of Crop Disease*. Kluwer Academic Publishers, Netherlands.
- Blumer, H. (1969) *Symbolic Interactionism: Perspective and Method*. University of California Press, Berkeley.
- Blunden, G., Cocklin, C., Smith, W. and Moran, W. (1996) Sustainability: A View From The Paddock. *New Zealand Geographer* 52(2): 24–34.
- Bonanno, A, Busch, L., William H., Friedland, Lourdes Gouveia, L. and Mingione, E. (1994) *From Columbus to ConAgra*. University Press of Kansas, USA.
- Bourdieu, P. (1990) *The Logic of Practice*. Stanford University Press, Stanford.
- Bowler, I. (1992) *The Geography of Agriculture in Developed Market Economies*. Longman Scientific & Technical, England.
- Bowler, I. (2002) Developing Sustainable Agriculture, *Geography* 87: 205–212.
- Boyden, S. V., Dovers, S. and Shirlow, M. (1990) *Our Biosphere Under Threat: Ecological Realities and Australia's Opportunities*. Oxford University Press, Melbourne.
- Boyer, R. (1990) *The Regulation School: A Critical Introduction*. Columbia University Press.
- Brett, J. (2007) Exit Right: The Unravelling of John Howard. *Quarterly Essay*, 8.
- Brown, L. (2006) In *The Globalist*, How Food and Fuel Compete for Land article adapted by Lester Brown from Plan B 2.0: Rescuing a Planet Under Stress and a Civilization in Trouble by Lester R. Brown, published in 2006 by WW Norton and Company.
<<http://www.theglobalist.com/StoryId.aspx?StoryId=5077>>, (accessed 18 May 2008). Brown, Lester, R. (1999) Feeding Nine Billion. In Brown et al. (eds), *State of the World*, Chapter 7.
- Brown, L and Flavin, C, Worldwatch Institute Report, New York.
- Bryant, L. (1992) Social aspects of the farm financial crisis. In Lawrence, G., Vanclay, F. and Furze, B. (eds) *Agriculture, Environment and Society: Contemporary Issues for Australia*. Macmillan, Melbourne, 157–72.
- Burch, D. and Goss, J. (1999) An End to Fordist Food? Economic crisis and the fast food sector in Southeast Asia. In Burch D., Johns, J. and Lawrence, G. *Restructuring Global and Regional Agricultures Transformations in Australasian agri-food economies and spaces*. Ashgate Publishing Ltd, Sydney.
- Burch, D. and Goss, J. (1999) Global Sourcing and Retail Chains: Shifting Relationships of Production. In *Australian Agri-foods, Rural Sociology*, 64(2) 334–350.
- Burch, D., Rickson, R. and Thiell, I. (1990) Contract Farming and Rural Social Change: Some Implications of The Australian Experience, *Environmental Impact Assessment*, 10: 145–155.
- Burch, D., Rickson, R., & Annels, H., R. (1992) 'Agribusiness In Australia: Rural Restructuring, Social Change And Environmental Impacts', in *Australian Environmental Policy*, Walker, K (Ed) New South Wales University Press, NSW.
- Burch, D., Rickson, R. E., Lawrence, G. (eds) (1996) *Globalization and Agri-Food Restructuring: Perspectives from the Australasia Region*. Ashgate Publishing Ltd, England.
- Burch, D. and Goss, J. (1999) Transformations in Australasian Agri-food Economies and Spaces. In Burch, D, Goss, J. and Lawrence, J. (eds), *Restructuring Global and Regional Agricultures*. University of Queensland, Brisbane.
- Bureau of Agricultural Economics (1949) *The Australian Potato Industry*, 5. Australian Government Publishing Service, Canberra.

- Burton R.J.F. (2004) Seeing Through the 'Good Farmer's' Eyes: Towards Developing an Understanding of the Social Symbolic Value of Productivist' Behaviour, *Sociologia Ruralis*, 44(2): 195-215.
- Buttel, F. (1993) The production of agricultural sustainability: observations from the sociology of science and technology. In Allen, P. (ed.) *Food for the future: conditions and contradictions of sustainability*. Wiley & Sons, Inc., New York, NY, USA.
- Buttel, F. (1994) Agricultural Change, Rural Society and the State in the Late Twentieth Century: Some Theoretical Observations. In Symes, D. and Jansen, A. (eds), *Agricultural Restructuring and Rural Change in Europe*. Agricultural University, Wageningen.
- Buttel, F.H. (1996) Theoretical Issues in Global Agri-food Restructuring in Burch, D., Rickson, R. E. and Lawrence, G. (eds), *Globalization and Agri-Food Restructuring: Perspectives from the Australasia Region*. Ashgate Publishing Ltd, England.
- Buttel, F.H. (2000) *Hungry for profit: the agribusiness threat to farmers, food, and the environment*, Monthly Review Press, New York.
- Campbell, A. (1991) *Planning For Sustainable Farming, The Potter Farmland Story*. Lothian Publishing Company Pty Ltd, Melbourne, Victoria.
- Canals, J. (2000) *Managing Corporate Growth*. Oxford University Press, Oxford, New York.
- Cargan, L. (2007) *Doing Social Research*. Rowman & Littlefield Publishers Inc., UK.
- Carley, M. and Christie, I. (1992) *Managing Sustainable Development*. Earthscan, London.
- Cary, J., Webb, T. and Barr, N. (2002) *Understanding Landholders Capacity to Change to Sustainable Practices: Insights about Practice, Adoption and Social Capacity for Change*. Bureau of Rural Sciences, Canberra.
- Castles, I. (1998) From the desk of Malthus: How the population debate began. National Academies Forum. <<http://www.naf.org.au/desk.htm>>, (Accessed 28 Dec. 2008).
- Centre for Plant Biodiversity Research, and Australian National Herbarium, <<http://www.anbg.gov.au/cpbr/index.html>>, (accessed 5 Oct. 2009)
- Chambers, J.W. (2009) *Agriculture and War, The Oxford Companion to American Military History*. Oxford University Press, Oxford, UK.
- Chilvers, W. (1996) *Managing Tasmania's Cropping Soils: A practical guide for farmers*. Department of Primary Industry and Fisheries, Tasmania, and the National Landcare Program, Devonport.
- Clinard, M.B. (1990) *Corporate Corruption: The Abuse of Power*. Greenwood Publishing Group, New York.
- Colborn, T., Dumanoski, D. and Myers J.P. (1996) *Our Stolen Future*, <<http://www.OurStolenFuture.org>> Columbia University Press, New York, <<http://www.biodynamiceducation.com/documents/AgriculturalChemicals.doc>>, (accessed 8 September 2009).
- Conway, G. (1998) *The Doubly Green Revolution: Food for All in the Twenty-First Century*. Comstock Publishers, New York.
- Cook, C.D. (2004) *Diet for a Dead Planet, Big Business and the Coming Food Crisis*. The New Press, New York.
- Courtney, P. (2001) Potato Price War: A Warning to Big Business. ABC Landline, 20 October, <<http://www.abc.net.au/landline/stories/s391826.htm>>, (accessed 1 Oct. 2009).
- Cox, C. (1998) Glyphosate (Roundup), *Journal of Pesticide Reform*, 18, (3). Updated 01–02, Northwest Coalition Against Pesticides, Eugene, Oregon.

<<http://www.biodynamiceducation.com/documents/AgriculturalChemicals.doc>>, (accessed 8 Sep. 2009).

CSIRO, (2009) Why do we need new agricultural systems and land uses?
<<http://www.clw.csiro.au/issues/landuse/agricultural.html>>, (accessed 21 Oct. 2009).

Davis, J. (1980) Capitalist Agricultural Development and the Exploitation of the Propertied Labourer. In Buttel, F. and Newby, H. (eds), *The Rural Sociology of the Advanced Societies: Critical Perspectives*. Croom Helm: London, 133–154.

De Haan, H. and Long, N. (eds) (1997) *Images and Realities of Rural Life: Wageningen Perspectives on Rural Transformations*. Van Gorcum, The Netherlands.

Den Ouden, J.H.B. (1997) Some reflections on anthropology in development studies. In de Haan, H. and Long, N. (eds), *Images and Realities of Rural Life: Wageningen Perspectives on Rural Transformations*. Van Gorcum, The Netherlands) (21–38.

Department of Primary Industries Water and Environment (1999) Tasmanian Food Agriculture and Fisheries Scorecard. <<http://www.anra.gov.au/topics/land/landuse/tas/index.html#diff>>, (accessed 12 Sep. 2007).

Development & Cooperation (2008) *Food and Biological Diversity*, 05, (49),
<<http://www.inwent.org/ez/articles/070224/index.en.shtml>>, (accessed 18 Oct. 2009).

Diesendorf, M. (2000) Sustainability and sustainable development. In *Sustainability: The Corporate Challenge of the 21st Century*. Dunphy, D. and Beneviste, J. Allen and Unwin, Sydney.

Dillman, D.A. (2000) *Mail and Internet Surveys: The Tailored Design Method*. John Wiley and Sons, Inc., New York.

Dovers, S. (1992) The History of Natural Resource Use in Rural Australia: Practicalities and Ideologies. In Furze, B., *Agriculture Environment and Society*, Macmillan, Melbourne.

Dowie, M. (2001, *American Foundations: An Investigative History*. MIT, Cambridge, MA.

Department of Primary Industries Water and Environment, capability survey as per the revised Tasmanian Land Capability Handbook Environment (1999) Land by Gfull.zap?&tarose (1999), <http://asdd.ga.gov.au/asdd/tech/zap/advanced-get=tas-=1> <accessed August, 1999>.

Department of Primary Industries, Water & Environment (2004–05) The Contribution of Agriculture to the Tasmanian Economy, Commodities Australia 7121.0 2003-04s<http://www.bing.com/search?q=DPIWE+%282004%E2%80%932005%29+and+Agriculture&go=&form=QBRE&filt=all&qsn> <accessed, 23rd January, 2005>

DuPuis, E.M. (2002) *Nature's Perfect Food: How Milk Became America's Drink*. New York University Press, New York.

Eaton, C. and Shepherd, A.W. (2001) Contract Farming: Partnerships for growth, FAO *Agricultural Services Bulletin*, 145, A guide, Rome.

Ehrlich, P. (1975) *The Population Bomb*. Rivercity Press, Mass., USA.

Evans, L.T. (1998) *Feeding the 10 Billion: Plants and Population Growth*, Cambridge University Press, Cambridge, UK.

Evans, N., Morris, C. and Winter, M. (2002) Conceptualizing Agriculture: A critique of post-productivism as the new orthodoxy, *Progress in Human Geography* 26(3): 313–332

Ewers, C., Hawkins, H., Kennelly, A. and Cary, J. (1989) *Onion Growers' Perceptions of Soil Management Problems in Northern Tasmania*, School of Agriculture & Forestry, The University of Melbourne, Victoria.

Fagan, H. and Weber, M. (1994) *Global Restructuring: The Australian Experience*. Oxford University Press, Oxford New York.

- Falvey, L. (2004) Technology and Ancient Wisdom in Sustainable Agriculture, Australian Academy of Science and Engineering, ATSE, *Focus*, 130, January/February, <<http://www.atse.org.au/index.php?sectionid=127>>, (accessed 1 August 2009)
- Festinger, L. (1957) *A Theory of Cognitive Dissonance*. Stanford, Stanford University Press, CA.
- Fine, B., Heasman, M. and Wright, J. (1998) What we eat and why: social norms and systems of provision. In Murcott A. (ed.), *The Nations Diet: The Social Science of Food Choice*. Longman, London, 95–111.
- Fontana, A. and Frey, J.H. (2003) From Structured Questions to Negotiated Text. In Denzin, N.K. and Lincoln, Y.S. (eds), *Strategies of Qualitative Enquiry*. Sage Publications, Thousand Oaks, CA.
- Food and Agriculture Organisation of the United Nations (FAO) (1996) *The Sixth World Food Survey*. Rome, Italy.
- Fowler, F.J. (1995) *Improving Survey Questions: Design and Evaluation*. Sage Publications, Thousand Oaks, London.
- Frank, T. (2001) *One Market Under God: Extreme Capitalism, Market Populism and the End of Economic Democracy*. Secker & Warburg, London.
- Friedland, W.H. (1994) *The New Globalization: The Case of Fresh Produce*. University Press of Kansas, Lawrence.
- Friedmann, H. (1982) The Political Economy of Food: The Rise and Fall of the Postwar International Food Order. *American Journal of Sociology* 88 (Supplement): S248–286.
- Friedmann, H. (1993) A Global Crisis, *New Left Review* 196: 29–57.
- Friedmann, H. (1994) Distance and Durability: Shaky Foundations of the World Food Economy. In McMichael, P. (ed.), *The Global Restructuring of Agro-food Systems*. Cornell University Press: Ithaca.
- Friedmann, H. (2000) What on Earth is the Modern World-System? Foodgetting and Territory in the Modern Era and Beyond, *Journal Of World-Systems Research*, 1 (2, Summer/Fall 2000, pp. 480–515, Special Issue: Festschrift for Immanuel Wallerstein – Part I, <<http://Csf.Colorado.Edu/Jwsr>>, (accessed 2 May 2001).
- Friedmann, H. and McMichael, P. (1989) Agriculture and the State System: The Rise and Decline of National Agricultures – 1870 to the Present. *Sociologia Ruralis* 29: 93–117.
- Frison, E. (2008) Green Revolution in Africa Will Depend on Biodiversity. *Development and Cooperation*, 49 (5), 190–3. <<http://www.inwent.org/ez/articles/070224/index,en.shtml>>, (Accessed, 4th February, 2009).
- Frobel, F., Heinrichs, J. and Kreye, O. (1980) *The New International Division of Labour*. Cambridge University Press, New York.
- Fulton, A. (1997) Growing Potatoes Is Not Only About Soil, Water And Plants – It's About People. *Potato Australia* 8: 44–45.
- Fulton, L. A. and Clark, R. J. (1996) Farmer decision making under contract farming in northern Tasmania. In Burch, D., Rickson, R. and Lawrence, G. (eds), *Globalization and Agri-Food Restructuring: Perspectives from the Australasian Region*. Avebury, England.
- Garnaut, J. & Helali, S. (1999), Age Profiles of Australian Broadacre and Dairy Farmers in *Australian farm surveys report, financial performance of australian farms 1996-97 to 1998-99*. pp 65-70, ABARE, Canberra.
- Gaud, W. S (1968) Speech to the Society for International Development, <<http://www.agbioworld.org/biotech-info/topics/borlaug/borlaug-green.html>>, (accessed 18 October 2009)

- George, S. (1997) *How the Other Half Dies: The Real Reasons for World Hunger*. Allenheld, Osmun and Co, Montclair, N.J.
- Giddens, A. (1994) Living in a Post-Traditional Society, 56–109. In Beck, U., Giddens, A. and Lash, S. (eds), *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order*. Stanford University Press, Stanford, CA.
- Glennie, P.D. and Thrift, N.J. (1993) Modern Consumption: Theorizing commodities and consumers, *Environment and planning D: Society and Space* 112: 603–606.
- Goldstein D.A., Acquavella J.F., Mannion R.M. and Farmer D.R. (2002) An analysis of glyphosate data from the California Environmental Protection Agency Pesticide Illness Surveillance Program. *J. Toxicol. Clin. Toxicol.* 40(7): 885–92.
- Goodman, D. and Redclift, M. (eds) (1989) *The International Farm Crisis*. Macmillan London.
- Goodman, D. and Redclift, M. (1991) *Refashioning Nature: Food, Ecology, and Culture*. Routledge, London.
- Goodwin, M. and Painter, J. (1996) Local governance, the crises of Fordism and the changing geographies of regulation. *Transactions of the Institute of British Geographers* 21(4): 635–48.
- Gramsci, A. (1971) *Selections from the Prison Notebooks of Antonio Gramsci*. Lawrence and Wishart, London.
- Gray, I., Lawrence, G. and Dunn, T. (1993) *Coping With Change: Australian Farmers in the 1990s*. Centre for Rural Social Research, Charles Sturt University, Riverina.
- Gray, I. and Lawrence, G. (2001) *A Future for Regional Australia: Escaping Global Misfortunes*. Cambridge University Press, UK.
- Hall, T.D. and Jones, L.M. (1995) New Developments in World-Systems Theory: Challenges for the Social Sciences. New Developments in World-Systems Theory: Challenges for the Social Sciences, in Kardulias, P., N. (ed.), *New Developments in World-Systems Theory: Challenges for the Social Sciences*. Paper presented at the Plenary Session of the International Studies Association, Midwest, Indianapolis.
- Hamlett, A.G. (2002) *Soil Management: A Guide for Tasmanian Farmers*. Department of Primary Industries, Water and Environment, Hobart.
- Harris, J.M. (1996) World Agricultural Futures: Regional Sustainability and Ecological Limits. *Ecological Economics* 17(2): 95–115.
- Harris, J. M. and Kennedy S. (1999) Carrying Capacity in Agriculture: Global and Regional Issues. *Ecological Economics* 29(3): 443–461.
- Harvey, G. (1997) *The Killing of the Countryside*. Jonathan Cape, London.
- Hay, P. (2002) *Main Currents in Western Environmental Thought*. UNSW Press, Sydney, Australia.
- Henderson, E. (2000) *Rebuilding Local Food Systems From The Grassroots Up*. In Buttel, F.H. *Hungry for Profit: The Agribusiness Threat to Farmers, Food, and the Environment*. Monthly Review Press, New York.
- Higgins, V. (1999) Economic restructuring and neo-liberalism in Australian rural adjustment policy. In Burch, D., Goss, J. and Lawrence, G. (eds.) *Restructuring Global and Regional Agriculture Transformations in Australasian Agri-food Economies and Spaces*. Ashgate Publishing Ltd, Aldershot, England.
- Horne, J.E. and McDermott, M. (2001) *The Next Green Revolution, Essential Steps to a Healthy, Sustainable Agriculture*. Food Products Press, New York.
- Howes, M. (2005) *Politics and the Environment: Risk and the Role of Government and Industry*. Allen and Unwin, NSW.

- Hua Lu, Prosser, I.P., Moran, C.J., Gallant, J.C., Priestley, G. and Stevenson, J.G. (2003) Predicting sheetwash and rill erosion over the Australian continent. *Australian Journal of Soil Research* 41(6): 1037–1062.
- Ilbery, B. and Bowler, I. (19) From Agricultural Productivism to Post-productivism. In Ilbery, B. (ed.), *The Geographies of Rural Change*. Longman, UK.
- International Labour Organization (2007) Sectoral Activities Programme. The Impact of Global Food Chains on Employment in the Food and Drink Sector, Issues paper for discussion at the Tripartite Meeting to Examine the Impact of Global Food Chains on Employment, Geneva.
- Johnson, R. B. (2006) Sustainable agriculture: Competing visions and policy avenues *International Journal of Sustainable Development and World Ecology* 13(6): 469–481.
- Johnston, N. (2001) Potato Farmers Blockade McCains. ABC transcript from *The World Today*. 12:10 p.m. 1 Aug. 2001, on ABC local radio.
<<http://www.abc.net.au/worldtoday/stories/s339062.htm>>, (accessed 1 October 2009).
- Kansas, Rural Center (1998) Sustainable Agriculture Management Guides. Crop Rotation.
<<http://kansasruralcenter.org/publications/rotations.pdf>>, (accessed 7 July 2005).
- Karliner, J. (1997) *The Corporate Planet: Ecology and Politics in the Age of Globalization*. University of California Press, CA.
- Kaup, B.Z. (2008) The Reflexive Producer: The Influence of Farmer Knowledge Upon the Use of Bt Corn. *Rural Sociology* 73(1): 20–62.
- Keats, D. (2000) *Interviewing, A Practical Guide for Students and Professionals*. University of New South Wales Press Ltd, Sydney.
- Kimbrell, A. (2002) *Fatal Harvest: The Tragedy of Industrial Agriculture*. Island Press, California.
- Kindred Landcare Group (1994) *Keeping Your Soil On Your Farm*. Department of Primary Industries and Fisheries, Tasmania.
- Kloppenborg, J. Jr (1991) Social Theory and the De/Reconstruction of Agricultural Science: Local Knowledge for an Alternative Agriculture. *Rural Sociology* 56(4): 519–548.
- Krasner, S (ed.) (1983) *International Regimes*. Cornell University Press. Ithaca.
- Lang T and Heasman M. (2004) *Food Wars: the global battle for mouths, minds and markets*. Earthscan, London.
- Langhelle, O (1999) Sustainable Development: Exploring the Ethics of Our Common Future, *International Political Science Review*, Vol. 20, No. 2, 129–149.
- Lash, S. (1994) Reflexivity and Its Doubles: Structures, Aesthetics, Community. In Beck, U., Giddens, A. and Lash, S. (eds), *Reflexive Modernization: Politics, Tradition and Aesthetics in the Modern Social Order*. Stanford University Press, Stanford, CA, 110–173.
- Lauria M. (ed.) (1997) Concrete research, urban regimes, and regulation theory [More details?]
- Lawrence, G. (1987) *Capitalism in the Countryside: The Rural Crisis in Australia*. Pluto, Sydney.
- Lawrence, G. 1996, Contemporary agri-food restructuring: Australia and New Zealand in *Globalization and Agri-Food Restructuring: Perspectives from the Australasian Region*, edited by Burch, D., Rickson, R., and Lawrence, G, Avebury, Ashgate Publishing Ltd., England.
- Lawrence, G. (1999) Agri-food restructuring: A synthesis of recent Australian Research. *Rural Sociology* 64(2): 186–17.
- Lawrence, G. and Burch, D. (2007) *Supermarkets and Agri-food Supply Chains: Transformations in the Production and Consumption of Foods*. Edward Elgar Publishing Limited, UK.

- Lawrence, G. and Gray, I. (2000) The Myths of Modern Agriculture: Australian Rural Production in the 21st Century, in *Land of Discontent The Dynamics of Change in Rural and Regional Australia*, University of New South Wales Press Ltd., Sydney, NSW.
- Lawrence, G., Richards, C. A. and Cheshire, L. (2004) The Environmental Enigma: Why Do Producers Professing Stewardship Continue to Practice Poor Natural Resource Management? *Journal of Environmental Policy and Planning* 6(3/4): 251-270.
- Lawrence, G., Vanclay, F. and Furze B. (eds) (1992) *Agriculture, Environment and Society: (Contemporary Issues for Australia)*. Macmillan, Melbourne.
- Le Heron, R. (1993) *Globalised Agriculture: Political Choice*. Pergamon Press, Oxford, UK.
- Liepins, R. (1995) Women in Agriculture: Advocates for a gendered sustainable agriculture. *Australian Geographer* 26(2): 118–126.
- Lipietz, A. (1987) *Mirages and Miracles*. New Left Books, London.
- Lipietz, A. (1992) *Towards a New Economic Order, Post-Fordism, Ecology and Democracy*. Polity Press, Cambridge, UK.
- Lloyd, C. (2008) Australian Capitalism Since 1992: A New Regime of Accumulation? *Journal of Australian Political Economy* 61: 30-55.
- Long, N. (1992) From paradigm lost to paradigm regained? The case for an actor-oriented sociology of development. In Long, N. and Long, A. (eds), *Battlefields of knowledge: The interlocking of theory and practice in research and development*. Routledge, London, 16–43.
- Longo, S., York, R. (2008) Agricultural Exports and the Environment: A Cross-National Study of Fertilizer and Pesticide Consumption. *Rural Sociology* 73(1): 82, 23.
- Lowe, P., Murdoch, J., Marsden, T., Munton, R and Flynn A. (1993) Regulating the new rural spaces: the uneven development of land. *Journal of Rural Studies* 9(3): 205–222,
- Lyons, K. and Lawrence, G. (2001) Institutionalisation and Resistance: Organic Agriculture in Australia and New Zealand. In Tovey, H. and Blanc, M. (eds) *Food, Nature and Society, Rural Life in Late Modernity*. Ashgate Publishing Ltd, <<http://hdl.handle.net/10072/841>>, (accessed 13 Sep. 2009).
- Mabbett, J. and Carter, I. (1999) Contract Farming in the New Zealand Wine Industry: An example of real subsumption. In Burch, D, Goss, J, Lawrence, G. (eds), *Restructuring Global and Regional Agricultures Transformations in Australasian Agri-food Economies and Spaces*. Ashgate Publishing Ltd, Sydney.
- Magdoff, F., Foster, J.B., Buttel, F.H. (2000) *Hungry for Profit, the Agribusiness Threat to Farmers, Food and the Environment*. Monthly Review Press, New York.
- National Natural Resource Management Task Force (Australia) (1999) Managing natural resources in rural Australia for a sustainable future: a discussion paper for developing a national policy. Department of Agriculture, Fisheries and Forestry, Canberra.
- Marsden, T., Banks, J., Renting, H., and van der Ploeg, J.D. (2001) The Road Towards Sustainable Rural Development: issues of theory, policy and research practice. *Journal of Environmental Policy & Planning* 3:75-83
- Marsden, T. K., Whatmore, S., Munton, R. and Little, J., (1986) The restructuring process and economic centrality in capitalist agriculture. *Journal of Rural Studies* 2: 271-80
- Marsden, T. and Wrigley, N. (1995) Regulation, Retailing and Consumption, *Environment and Planning A* 27: 1899–1912.
- Massey, D. (2004) Uneven Development, Social Change and Spatial Divisions of Labour. In Barnes, T., Peck, J., Shepherd, E. and Tickell, A. (eds), *Reading Economic Geography*. Blackwell Publishing, [Location?] <<http://books.google.com.au/books?hl=en&lr=&id=->

- WOg8H4tK1oC&oi=fnd&pg=PA125&dq=third+regime+of+accumulation&ots=MRNvUZJ3iO&sig=56YHcktYAGohw89wGICUAZXGb4#v=onepage&q=&f=false>, (accessed 30 July 2009)
- Maynard, J. (2000) *Economic Sustainability of Vegetable Farms*, HRDC VG97028, Dec. 2000.
- McMaster, L.C. and McMaster J.S. (2002) Literature Review of Sustainable Agriculture to June 2001: Part A – Theoretical Considerations, Outsourced Environmental, <<http://www.outsourcedenvironmental.com.au>>, (accessed 5 June 2004).
- McMichael, P. (ed.) (1994) *The Global Restructuring of Agro-food Systems*, Cornell University Press, Ithaca.
- McMichael, P. (1996) *Development and Social Change: A Global Analysis*. Pine Forge, Boulder, CO.
- Meares, A.C. (1997) Making the transition from conventional to sustainable agriculture: gender, social movement participation, and quality of life on the family farm. *Rural Sociology*, 62 (1), 21–27.
- Mickey, L. (ed.) (1996) *Reconstructing Urban Regime Theory: Regulating Urban Politics in a Global Economy*. Thousand Oaks, Sage, CA.
- Millar, J. and Curtiss, A. (1999) The Nature and Role of Farmer Knowledge. In Temperate Pasture Management in the Murray-Darling Basin. *Rural Society* 9(1): 301–312.
- Millennium Ecosystem Assessment Synthesis Report (2005) Prepublication Final Draft Approved by Millennium Assessment Board. <<http://www.millenniumassessment.org>>, (accessed 23 May 2005).
- Miller, L. (1993) Contract Farming in North West Tasmania and Global Agribusiness Linkages. unpublished Ph.D thesis, Griffith University, Brisbane.
- Miller, L. (1996) Contract farming under globally oriented and locally emergent agribusiness in Tasmania. In Burch, D. Rickson, R. and Lawrence, G. (eds.), *Globalization and Agri-Food Restructuring: Perspectives from the Australasian Region*. Avebury, England.
- Morris, C. and Potter, C. (1995) Recruiting the New Conservationists: Farmers Adoption of Agri-environmental Schemes in the UK. *Journal of Rural Studies* 11(1): 51–63.
- Morrow R.A. with Brown D.D. (1994) *Critical Theory and Methodology, Contemporary Social Theory*, Vol. 3. Sage Publications, Thousand Oaks, London.
- Murrumbidgee Catchment Management Committee (MCMC) (1994) *Natural Resources Management Strategy for the Murrumbidgee Catchment*. Wagga Wagga, NSW, <http://www.environment.nsw.gov.au/soe/95/9_4.htm>, (accessed 30 September 2002).
- National Land and Water Resources Audit: Underpinning Decision Making Now and for our Future (2004) National Land & Water Resources Audit, A program of the National Heritage Trust, <http://www.gov.au/minimal/30_themes/themes.html>, (accessed 5 April 2005).
- National Parks (2000) *The Australasian Journal of Natural Resources Law and Policy* 3(1).
- Newby H. (1985) *Green and pleasant land? Social change in rural England* (Second edition). Hutchinson, London.
- Nierenberg, D., Halweil, B. (2005) *State of the World 2005: Redefining Global Security*. Norton, New York.
- Oliver, M., Ashton, D., Hodges, A. and Mackinnon, D. (2009) Farmers use of sustainable management practices, report for the National Land and Water Resources Audit, ABARE, Canberra. <<http://www.nlwra.gov.au/products/pn22376>>, (accessed 16 Nov. 2009).
- Phillips, E. (1999) Linking the global and the local: Ethnographic perspectives on farm practice and the globalization of agriculture. In Burch, D., Rickson, R.E. and Paterson, R., (2006) *The Invisible Farmers—women in agriculture*

,<http://www.abs.gov.au/Ausstats/abs@.nsf/Previousproducts/1384.6Feature%20Article5102002?opendocument&tabname=Summary&prodno=1384.6&issue=2002&num=&view=>>accessed (accessed, 12th April, 2007).

Polanyi, K. (1957) *The Great Transformation*. Beacon Press, Boston.

Ponting, C. (1993) *A Green History of the World: The Environment and the Collapse of Great Civilisations*. Penguin Books, New York.

Potato Processing Association of Australia (PPAA)

http://www.ausveg.com.au/about_us_partners_PPAA.cfm>, (accessed 3 June 2009)

Potter, C. (1998) *Against the Grain: Agri-environmental reform in the United States and the European Union*. CAB International, Wallingford.

Pretty, J., N. (1998) Supportive policies and practice for scaling up sustainable agriculture, in Roling, N.G., and Wagemakers, M.A.E., *Facilitating Sustainable Agriculture*, Cambridge University Press, Cambridge, UK

Pretty, J., (1998) *The Living Land*. Earthscan, London

Pretty, J., Brett, C., Gee, D., Hine, R., Mason, C., (2002) Policy and Practice: policy challenges and priorities for internalising the externalities of modern agriculture. *Journal of Environmental Planning and Management* 44(2): 263

Pretty, J., N., (2002) *Agri-Culture*. Earthscan Publications Limited, USA.

Pretty, J., (2002) *Agri-culture: Reconnecting People, Land and Nature*. Earthscan Publications Limited, UK.

Pyke, D.F. (1998) Strategies for Global Sourcing, *The Financial Times*, Part Four of Mastering Global Business, pp. 2–4.

Rama, R. (2005) *Multinational Agribusiness*. Food Products Press, New York.

Redclift, M. (1990) The Role of Agricultural Technology in Sustainable Development. In Lowe, P., Marsden, T. and Whatmore, S. (eds) *Technological Change and the Rural Environment*. David Fulton Publishers, London.

Reeve, I. (1990) Sustainable Agriculture: Ecological imperative or economic impossibility? The Rural Development Centre University of New England, Armidale, Publication No. 169, Armidale.

Rengam, S.V. (1999) Breaking the Cycle of Poison, Pesticide Action Network Asia and the Pacific, New Study Links Worlds Biggest Pesticides to Cancer, June 21.

<http://www.ourplanet.com/imgversn/122/rengam.html> (accessed 25th August 2009).

Resource Planning and Development Commission (RPDC) (2003) State of the Environment Tasmania Conditions and Trends Summary Report,

<<http://soer.justice.tas.gov.au/2003/file/66/summary%20and%20recs.pdf>>, (accessed 23 Oct. 2004).

Revell, C. (2001) Annual pastures – roles to play in cropping systems. Growing Crop Updates, Presentations. *Agriculture Western Australia*, Northam.

Rickson, R.E., Saffigna, P., Vanclay, F and McTainsh, G (1987) Social bases of farmers' responses to land degradation. In A Chisholm and R Dumsday (eds) *Land Degradation: Problems and Policies*, Cambridge University Press, Sydney.

Rickson, R.E. and Burch, D. (1996) Contract Farming in Organizational Agriculture: The effects upon farmers and the environment. In Burch, D., Rickson, R. and Lawrence, G (eds), *Globalization and Agri-Food Restructuring: Perspectives from the Australasian Region*. Avebury, England.

Rickson, R.E., Saffigna, P. and Sanders, R. (1999) Farm Work Satisfaction and Acceptance of Sustainability, Goals by Australian Organic and Conventional Farmers. *Rural Sociology*, 64 (2), 266–283.

Robins, N. and de Leeuw, B (2001) Rewiring Global Consumption: Strategies for Transformation. In Charter, M. and Tischner U. (eds.) *Sustainable Solutions: Developing Products and Services for the Future*. Greenleaf, Sheffield.

Robinson, D.M., Freebairn, J, Huda, A.K.S., and Cawley, S.T. (2001) A view of science, agricultural science and farming systems research in these postmodern times, Proceedings of the 10th Australian Agronomy Conference, The Australian Society of Agronomy, <<http://www.regional.org.au/>>, (accessed 11 October 2001)

Roos, G. (1995) Relationship between food and gender, among fourth-grade children. *Crosscurrents* 7: 97–108.

Ross, E.B. (1996) Malthusianism and Agricultural Development: False premises, false promises, *Biotechnology and Development Monitor*. 26, p. 24, Environmental Studies, Institute of Social Studies, The Hague, The Netherlands <<http://www.biotech-monitor.nl/2607.htm>>, (accessed 18 Oct. 2009).

Ross, Eric B. (1998) *The Malthus factor: population, poverty, and politics in capitalist development*. Zed Books, London.

Rosset, P., Collins, J. and Lappe, F. (2000) Lessons from the Green Revolution, *Tikkun Magazine*, March/April.

Rozin, P. (1999) Food is fundamental, fun, frightening and far-reaching. *Social Research* 66: 9–30.

Sachs, W. (1993) Global Ecology and the Shadow of Development. In Sachs, W. (ed), *Global Ecology: A New Arena of Political Conflict*. Zed Books, London, 3–20.

Sassen, S. (1991) *The Global City*. Princeton University Press, Princeton.

Sassen, S. (1996) *Losing Control? Sovereignty in an Age of Globalisation*. Columbia University Press, New York.

Sawyer, J. E. (2009) Anti-Sustainability Rhetoric: Sketching Ideological Responses, Institute of Public Service and Center for Nonprofit and Social Enterprise Management Seattle University, USA Research Network on Innovation, <<http://www.cairn.info/revue-journal-of-innovation-economics-2009-1-page-49.htm>>, (accessed 21 October 2009)

State of the Environment Australia 1996, An Independent Report Presented to the Commonwealth Minister for the Environment by the State of the Environment Advisory Council, <<http://www.rpdc.tas.gov.au/soer/>>, <accessed, 20th June 2003>.

State of the Environment Tasmania 2003 - Tasmania's second State of the Environment report, Resource Planning and Development Commission Report, Released 10 March, 2004, <<http://www.rpdc.tas.gov.au/soer/>>, <accessed, 20th June 2003>.

Sustainable Agriculture 1998, Assessing Australia's Recent Performance. A report to the Standing Committee on Agriculture and Resource Management (SCARM) of the National Collaborative Project on Indicators for Sustainable Agriculture, <http://www.anra.gov.au/topics/agriculture/pubs/national/agriculture_scene.html> (accessed, 20th May 2009).

Schlosser, E. (2001) *Fast Food Nation: The Dark Side Of The All-American Meal*. Houghton Mifflin Company, New York.

Scott, A.J. (2004) Flexible Production Systems and Regional Development: The Rise of New Industrial Spaces in North America and Western Europe. In Barnes, T., Peck, J., Shepherd, E. and Tickell, A. (eds), *Reading Economic Geography*. Blackwell Oxford, UK.

Shajaat-Ali, A. (2002) *Farmers knowledge of soils and the sustainability of agriculture in a saline water ecosystem in Southwestern Bangladesh*. Department of Social Sciences, The University of Texas, Elsevier Science, TX.

- Shields, P.G, Smith C.D. and McDonald, W.S. (1996) *Agricultural Land Evaluation in Australia, A Review*. Australian Collaborative Land Evaluation Program, ACLEP.
- Shiva, V. (1991) *The Violence of the Green Revolution, Third World Agriculture, Ecology and Politics*. Zed Books, Malaysia.
- Short K. (1994) Quick Poison, Slow Poison. Available on-line at <<http://www.biodynamiceducation.com/documents/AgriculturalChemicals.doc>>, (accessed 8 September 2009)
- Shutes, T. (1996) Tailored Research: On Getting The Right Fit Between Macro-Level Theory and Micro-Level Data, *Journal of World-Systems Research* 2(5): http://jwsr.ucr.edu/archive/vol2/v2_n5.php, (accessed 11 February 2003).
- Simplot Australia Pty Ltd (2001–02) Potato Contract, Ulverstone–Scottsdale.
- Sims, C. and Cotching, W. (1998) Tasmanian Onion Growers' Perceptions of Soil Management. A report prepared as a part of the Sustainable Use of the Intensively Cropped Krasnozems Project. Department of Primary Industries, Water and Environment, Devonport.
- Smith, B.D. (1995) *The Emergence of Agriculture*. Scientific American Library, New York.
- Stake, R.E. (1995) *The art of case study research*, Sage Publications, Thousand Oaks, California, USA.
- Stake, R.E. (2000) Case Studies. In Denzin, N. and Lincoln, Y. (eds), *Handbook of Qualitative Research* (Second Edition). Sage Publications, London. 1–29.
- Standing Committee on Agriculture (SCA) (1991) Sustainable Agriculture, SCA Technical Series, 36, CSIRO, Australia.
- State of the Environment Tasmania (2003) Tasmania's Second State of the Environment Report, Resource Planning and Development Commission Report. Released 10 March 2004, <<http://www.rpdc.tas.gov.au/soer/>>, (accessed 20 June 2005).
- Steingraber, S. (1997) *Living Downstream*. Vintage Books, New York.
- Tabb, W.K. (2006) The Power of the Rich. *Monthly Review*, 58 (3), <<http://www.monthlyreview.org/0706tabb.htm>>, (accessed 10 Aug. 2006).
- Tasmanian Farmers and Graziers Association (2009) <<http://www.tfga.com.au/>>, (accessed 29 Sep. 2009)
- The Talloires Declaration of 1990 <http://www.ulsf.org/programs_talloires.html> (accessed, 18th January, 2007).
- Tickell A. and Peck, J. (1992) *Accumulation, Regulation and the Geographies of Post-Fordism: Missing Links*. Amos Tuck School of Business Administration Dartmouth College Hanover, USA.
- Troughton, M. (1986) Farming systems in the modern world. In Pacione, M. (ed.), *Progress in agricultural geography*. Croom Helm, London, 93–123.
- Troughton, M. (2005) Fordism Rampant: the model and reality, as applied to production, processing and distribution in the North American Agro-food System. In Essex, S.J., Gilg, A.W., Yarwood, R.B., Simthers, J. and Wilson, R. (eds), *Rural Change and Sustainability Agriculture, the Environment, and Communities*, edited by CABI Publishing, Cambridge, MA, USA.
- UN Conference on Environment and Development (UNCED) (1992) *The Global Partnership for Environment and Development: A Guide to Agenda 21*. Geneva.
- United Nations Environment Programme (2001–04) Secretariat of the Convention on Biological Diversity, <<http://www.biodiv.org/programmes/areas/agro/reports.asp>>, (accessed 18 Feb. 2005).

- Unilever Limited. Sustainable Agricultural Reference Manual, (2001)
http://www.unilever.com/Images/2001%20Social%20Review%20of%202000%20Data_tcm13-5331.pdf , <accessed 9th September 2002>.
- Vanclay, F. and Lawrence, G. (1995) *The Environmental Imperative: eco-social concerns for Australian agriculture*. Central Queensland University Press, Rockhampton.
- Walker, K.J. (1992) *Australian Environmental Policy*. New South Wales University Press Ltd, Kensington, NSW.
- Wallerstein, I. (1974) *The Modern World-System II*. Cambridge University Press, New York.
- Wallerstein, I. (1974) *The Modern World-System: Capitalist Agriculture and the Origins of the European Economy in the Sixteenth Century*. Academic Press, New York.
- Wallerstein, I. (1997) States? Sovereignty? The Dilemmas of Capitalists in an Age of Transition. Keynote address at conference on State Sovereignty in the World Economy. University of California, Irvine, 21–23 February 1997. <<http://www.binghamton.edu/fbc/iwsovtv.htm>>, (accessed 12 April 2000).
- Wallerstein, I. (1999) Globalisation or the Age of Transition?: A Long-Term View of the Trajectory of the World-System, Fernand Braudel Center, <<http://www.binghamton.edu/fbc/iwtrajws.htm>>(accessed 12 April 2000).
- Ward, N., Jackson, P., Russell, P. and Wilkinson, K. (2008) Productivism, Post-Productivism and European Agricultural Reform: The Case of Sugar European Society for Rural Sociology. *Sociologia Ruralis* 48(2): 118-132.
- Watts, M. (1996) Development III: The Global Agro-food System and Late Twentieth-Century Development (or Kautsky redux), *Progress in Human Geography* 20(2): 230–245.
- Whatmore, S. and Thorne, L. (1997) Nourishing networks: alternative geographies of food. In Goodman, D. and Watts, M., (eds), *Globalizing food: agrarian questions and global restructuring*. Routledge, London. 287–304.
- Whatmore, S. (1995) From Farming to Agribusiness: the global agrifood system. In Johnston, R.J., Taylor, P. J. and Watts, M.J., (eds) *Geographies of Global Change: Remapping the world in the late twentieth century*. Blackwell, Oxford.
- Wiebe, K. (2003) *Land Quality, Agricultural Productivity and Food Security*. Edward Elgar Publishing Limited, UK.
- Wild, A. (2003) *Soils, Land and Food: Managing the land during the twenty-first century*. Cambridge University Press, UK.
- Wilson, G. A. (2000) From productivism to post-productivism and back again? Exploring the (un)changed natural and mental landscapes of European agriculture, *Transactions of the Institute of British Geographers* 26: 77–102.
- Wilson, G.A., and Rigg, J., (2003) Post-productivist agricultural regimes and the South: discordant concepts? *Progress in Human Geography* 27(6): 681-707.
- Winter, C. and Lockwood., M. (2003/2004) The Natural Area Value Scale: A new Instrument for Measuring Natural Area Values. *Australian Journal of Environmental Management*.11: 411–420.
- Winter, M. (1997) New policies and new skills: Agricultural change and technology transfer. *Sociologia Ruralis* 37(3): 363–381.
- Wood, L. (1994) Pyrethrum and Essential Oils: new cropping ventures in Tasmania, *The Geographical Association* 79: 357.
- World Bank (2001) New Study Reveals That Environmental Damage Threatens Future World Food Production. <<http://www.worldbank.org/html/cgiar/press/news0102.htm>>, (accessed 3 March 2008)

World Commission on Environment and Development (1987) *Our Common Future: Report of the World Commission on Environment and Development*. Oxford University Press, Oxford and New York.

World Wide Fund, Living Planet Report (2008)

<http://www.panda.org/about_our_earth/all_publications/living_planet_report/>, (accessed 4 October 2009)

Wynne, B. (1996) May the Sheep Safely Graze? A Reflexive View of the Expert-Lay Knowledge Divide. In Lash, S., Szerszynski, B. and Wynne, B. (eds) *Risk, Environment, & Modernity: Towards and new ecology*. Sage Publications, London.

Yencken, D. and Wilkinson, D. (2000) *Resetting The Compass: Australia's Journey Towards Sustainability*. CSIRO Publishing, Australia.

Yin, R. K. (2003) *Case study research: design and methods*, Thousand Oaks, Sage, CA.

Young, W.J., Marston, F.M, and Davis, R.J., Nutrient Exports and Land Use in Australian Catchments, *Journal of Environmental Management*, 47 (2): 165–183.

Simplot potato contract

SIMPLOT AUSTRALIA PTY LIMITED
ULVERSTONE-SCOTTSDALE
POTATO CONTRACT 2001 -2002
A.B.N. 92 670 579 609

Contract No

This Agreement is made this..... day of2001.....

BETWEEN.....
Surname Christian Name

Trading as (hereinafter called "the Grower").....
Full Postal Address

Growers ABN.....

AND Simplot Australia Pty Ltd
P.O. Box 138, Ulverstone, Tasmania, 7315
P.O. Box 84, Scottsdale, Tasmania, 7260
(hereinafter called "the Company")

A. PURPOSE:

This agreement is made between Simplot Australia Pty Limited and the Grower for the purpose of the grower supplying to Simplot Australia Pty Limited a specified quantity of potatoes of an agreed quality standard for which Simplot Australia Pty Limited will pay an agreed price.

B. CROWER AGREEMENT – GENERAL TERMS:

The Grower agrees that:

Quantity

1. The Grower will plant, at the agreed time, sufficient seed to provide the following quantity and variety of potatoes from the recommended area.

Hectares	Variety	Gross Tonnes	Planting Time Allocated	Whole Paddock Contract (ha)*

* Whole paddock contracts will only be written for Kinnaber or Shagboby once a surveyed map of the area has been approved by the company.

	Gross Tonnes	Price
Contracted Domestic Tonnage 94.3%		Base Price
Contracted Export Tonnage – 5.7%		Less \$30.00 off Base
Negotiated additional Tonnage		Less \$ off Base

Total Contracted Tonnage	
Average Price off Base for Total Tonnage	\$

2. The Grower will only plant seed that has been purchased from, or authorised by, the Company.
3. The Grower will notify the Company immediately if the agreed seed is not planted for any reason.

Care and Cultivation

4. The Grower will grow the crop of potatoes on land free from weeds or other foreign plants and which has been approved by the Company. The Grower will spray the crop for weed, fungus and pest control as considered necessary by the Company.
5. The Grower will prepare the land on which the potatoes are planted in a thorough manner and take all necessary steps to keep such potatoes in good heart and condition.
6. The Grower will cultivate and husband the crop for manufacturing purposes.
7. The Grower will harvest and load the crop on the transport vehicles and comply with delivery arrangements deemed necessary by the Company for the delivery of the crop to the Company designated delivery point at a time designated by the Company during the seasonal period for such operation.

Paddock Inspection

8. The Grower will permit company representatives to inspect the land and potatoes at any reasonable time.
9. The Grower will comply with all reasonable directions given by the Company as to the time and manner of cultivation, sowing, weeding, spraying, irrigating, harvesting and delivery of the crop.

Sale Contract

10. All potatoes grown under this contract will be sold solely to the Company unless otherwise authorised.
11. The grower will record all required information on the Paddock Record Sheet and forward the completed sheets to the Company prior to delivery of the crop.

Public Liability

12. The Grower shall hold all appropriate insurances for the currency of this contract and shall indemnify the Company accordingly against any claims, loss or damage. This will include:
 - a) public liability insurance policy;
 - b) workers compensation insurance policy.

C. SAMPLING AND GRADING:

Sampling

13. Each load of potatoes shall be inspected, sampled and graded upon receipt at the factory. Any grading decisions of the Company as a result of such sampling shall be final and binding on the Grower.

Grading

14. a. All potatoes supplied to the Company shall be sound, fresh, firm, clean, dry, unwashed, first grade potatoes weighing greater than 75 grams (Russet Burbank - Shepody) or 100 grams (Kennebec) and less than 1000 grams, and shall have a specific gravity of at least 1.070 and shall be free from oil and any other taints and shall be suitable for processing.
- b. For every one (1) per cent soil and foreign matter the Company will make one per cent deduction from the weight of the consignment received.
15. Without limiting the generality of Clause C17 any load of potatoes received by the Company which contains:
 - a. Frosted potatoes;
 - b. More than ten per cent (10%) of potatoes affected by water rot, scab, disease, nematodes, insect damage, discolouration, hollow heart, greening or any combination of these defects; or
 - c. Potatoes with residual effects from chemical pesticides or insecticides,may be deemed by the Company not to meet their requirements and thereby be rejected in accordance with Clause C17 hereof.

Quality Incentives:

16.
 - a. A premium of \$7.00 per tonne will be paid for potatoes which have less than one per cent (1%) defects (AAA Grade)
 - b. A premium of \$4.50 per tonne will be paid for potatoes which have less than two per cent (2%) defects (AA Grade)
 - c. A premium of \$2.00 per tonne will be paid for potatoes which have less than three per cent (3%) defects (A Grade)
 - d. For every one per cent (1%) defects in excess of a one per cent (1%) allowable tolerance the Company will make a one per cent (1%) deduction from the weight of the consignment of potatoes received to less than six per cent (6%). For potatoes delivered after the 30th June, the allowable tolerance will become two per cent (2%).
 - e. For every one per cent (1%) defects in excess of a one per cent (1%) allowable tolerance six per cent (6%) and above the Company will make a one and one half times (1.5x) deduction from the weight of the consignment of potatoes received.

Rejection in Sample	Payment Deduction
< 1 % (AAA Grade)	+ \$7.00 / tonne
< 2 % (AA Grade)	+ \$4.50 / tonne - percentage deduction > 1%
< 3 % (A Grade)	+ \$2.00 / tonne - percentage deduction > 2%
3%	- 2.0%
4%	- 3.0%
5%	- 4.0%
6%	- 5.0%
7%	- 6.0%
8%	- 10.5%
9%	- 12.0%
10%	- 13.5%
11%	- 15.0%
12%	- 16.5% (Reject Load)

17. If the Company is of the opinion that any load of potatoes does not conform with their requirements they may refuse to accept delivery of the load or any part thereof or may agree to purchase the load or part thereof at such price as may be agreed upon between the Grower and the Company.

PRICE AND PAYMENT:

18. The Company agrees to pay the Grower for potatoes delivered in accordance with this contract the prices according to the scale set out below:

a. Domestic Base Price per Tonne

	Kennecott and Shepody (\$/T)	Russet Burbank Ranger Russet (\$/T)
January	198.70	201.70
February	189.70	199.70
March	184.70	189.70
April	187.70	192.70
May	187.70	192.70
June	193.70	198.70
July	200.70	205.70
August	206.70	211.70
September	209.70	214.70
October	212.70	217.70

b. Export Base Price

Export base price is set at \$30.00 below the above monthly Domestic Base Price

19. Incentives:

a. Bruise Free

This price is set at 60% bruise free tubers.

- i) For each 1% above the 60% base an incentive of \$0.50 cents per tonne will be paid.
- ii) For each 1% below the base a deduction of \$1.00 per tonne will be deducted.
- iii) For tubers assessed at below 45% the entire consignment will be subject to rejection.

%		\$	
100	+	\$20.00	+0.50 per tonne for each 1%
95	+	\$17.50	
90	+	\$15.00	
85	+	\$12.50	
80	+	\$10.00	
75	+	\$7.50	
70	+	\$5.00	
65	+	\$2.50	
60		BASE	
55	-	\$5.00	-\$1.00 per tonne for each 1%
50	-	\$10.00	
45	-	\$15.00	
Less than 45		Subject to rejection	

General Conditions

22. All potatoes are to be delivered to the Company's factory or other specified delivery point at the Grower's expense.
23. If any Goods and Services Tax (GST) is payable for the supply of goods and/or services under this Agreement, payment of those goods and/or services must be increased in accordance with the GST payable. The Grower warrants that it will be registered under the GST law and will advise Simplot Australia Pty Limited if it ceases to be registered.
24. In the event of a total or partial crop failure, non delivery of potatoes or rejection of a crop by the Company the Grower is still liable for all cost of seed supplied by the Company, interest and any other charges due and not paid, and such payment shall be made within thirty days of the Company giving the Grower notification of failure, non delivery or rejection.
25. This contract is not transferable without the consent in writing of the Company and constitutes the entire contract between the parties and no verbal statements or agreements shall alter the contract.
26. No change or alterations of the printed provisions of this contract shall be made or have any legal effect unless made and authorised in writing by the Company's Agricultural Manager.
27. The Company shall not be liable to the Grower for any injury caused to persons or livestock or damage to property in any manner arising from the use of equipment owned by the Company and/or dusts or sprays which are used by the Grower on the advice or reasonable direction of the Company.
28. The Company shall not be liable to the Grower for any loss of yield arising from the use of equipment owned by the Company and/or dusts or sprays which are used by the Grower on advice or reasonable direction of the Company.
29. To the maximum extent permitted by law no conditions or warranties expressed or implied are made here on behalf of the Company as to the quality variety or productiveness of the seed supplied.

Location and Description of Land Covered by the Contract (Attach Map if available)

SEED

30. The Grower shall only plant seed supplied or authorised by the Company on the approved land.
31. That seed supplied by the Company to the Grower is non-returnable. If the Grower does not pay for the seed at the agreed price per tonne within thirty days of the receipt of such seed it is agreed that the Company may deduct the price of such seed and any other charges together with interest at current Company bank overdraft rate from any payment to be made by the Company to the Grower.
32. Any complaint as to the quality of the seed supplied will be lodged in writing with the Company within seven days of the Grower receiving such seed. No complaints will be considered following the culking of the seed.
33. All empty seed bins not owned by the Grower are to be returned at the Grower's expense to the bin owner by the 1st January.
34. All seed supplied to the Grower by the Company will incur GST and will be payable by the Grower.

Phase One survey instrument and processor questions

1) May I ask what age group you belong to?

25—35 years
36—45 years
46—55 years
56—65 years
66—and over

2) What group of vegetable growers do you represent?

--

3) How many vegetable growers are there in this group?

--

4) In what area do you and your growers farm?

North	North West	Other

5) What vegetables do you usually grow on your farm?

6) Do you produce anything other than vegetables, such as poppies, pyrethrum, livestock, forestry, dairy? (this is not an exhaustive list, please list any others).

7) Where is the farm?

--

8) What is the size of your farm?

--

Sustainability

9) How would you define sustainable agriculture in your own words?

.....
.....
.....
.....

Land degradation --Now I'd like to ask a few questions about degradation, such as soil erosion, salinity and acidity

10) Do you consider that you have any soil erosion problems on your own land?

yes
no

11) If yes, how would you describe the erosion problem?

mild
serious
extreme

12) Are you aware of any salinity problems on your own land?

yes
no

13) How would you describe this salinity problem?

mild
serious
extreme

14) Are you aware of any soil acidity on your land?

yes
no

15) If yes, how would you describe it?

mild
serious
extreme

16) What do you consider to be the worst land degradation problems you are facing on your own land at the present time?

soil erosion
soil salinity
soil acidity
other

17) Why in your opinion has this problem arisen on their land?

.....

.....

18) For the farmers you represent, how would you describe the following degradation problems?

	None	Mild	Serious	Extreme
soil salinity				
soil acidity				
soil erosion				

19) Why has/have this/these problem/s arisen?

.....

.....

Green payments

Green Payments is a term used in the UK to describe a form of agricultural subsidy paid to primary producers when they sign up on a five yearly management contract with the Ministry of Agriculture. Under this scheme, some farmers are paid to recreate wildlife habitat, reduce overstocking and input use and, if they have land under an Environmentally Sensitive Areas programme, to open it up to greater public access.

20) Do you think green payments would be something your growers might consider?

yes
no
uncertain

21) What action would you as the grower representative take regarding such a proposal?

support
reject
ignore
other

22) Do you think that a period of five yearly green contracts is:

too short
too long
about correct

23) Do you think that government policy at the moment encourages farmers to manage their land sustainably?

Federal	State
yes	yes
no	no
uncertain	uncertain

24) Is there too much outside interference with the way you farm these days?

yes
no

25) What do you think might be the main objections to a green payments scheme ?

time
cost
interest
other

26) What proportion of growers in your group might be willing to try some environmental projects on their farm if they had enough incentive?

0%
25%
50%
75%
100%

27) What do you think “enough incentive” would be to arouse growers’ interest in such a scheme?

A subsidy of 25% of costs
A subsidy of 50% of costs
Other

28) Would it be better for farmers to get ‘up front payments’ or should they be paid ‘by results’ alone?

up front
by results
some other way

Tasmania’s image: the ‘clean green and organic’ alternatives.

29) Do your growers feel Tasmania’s “clean green image” is important?

yes
no
unsure

30) Is it worth preserving?

yes
no
unsure

31) Would growers be willing to change the way they are farming to maintain and improve this marketing image?

yes
no
unsure

32) Do growers feel there is some value in organic farming?

yes
no
other

33) Would you be willing to try a crop on your land if there was a profitable market for organic products?

yes
no

34) Are you aware of any growers in your group willing to try an organic crop on their land if there was a profitable market for such products?

yes
no
unsure

It is also quite important for this research to look at the relations between growers and other organisations involved in the food chain such as processors, suppliers of farm inputs and government entities.

35) What percentage of your produce would you say is sold by contract?

0%	25%	50%	75%	100%
----	-----	-----	-----	------

36) What percentage of your produce is sold at markets?

0%	25%	50%	75%	100%
----	-----	-----	-----	------

37) What percentage of your produce is sold by other means such as:

38) Directly from the farm gate?

0%	25%	50%	75%	100%
----	-----	-----	-----	------

39) Directly to retailers?

0%	25%	50%	75%	100%
----	-----	-----	-----	------

40) At markets?

0%	25%	50%	75%	100%
----	-----	-----	-----	------

41) What is your preferred method of selling your produce?

.....

.....

43) Why?

.....
.....

44) Are growers generally content with the current arrangements with processors, for example in respect of negotiated prices?

yes
no
uncertain

45) Are you personally content with the current arrangements and relations you have with the following representatives? Please choose from the card to indicate your choice.

	Very Happy	Happy	Unhappy	Very Unhappy
Processor reps	1	2	3	4
Retailer	1	2	3	4
Consumer	1	2	3	4
Supplier reps	1	2	3	4
Financial reps	1	2	3	4
Government reps	1	2	3	4
Other	1	2	3	4

46) What part of the arrangements/relations would you like to change?

.....
.....

What changes would you like to make?

.....
.....

47) Who do you think may be preventing the change?

other growers
processors
retailers
governments
others (please specify)

48) How will growers find themselves in five years' time?

richer
poorer
the same
Other

49) What changes in the grower/processor relationship, would you like to see ?

.....
.....

50) Are profits fairly distributed in the current arrangements?

Yes
No

51) If not, who gains most?

growers
processors
retailers
Others (please specify)

52) If growers were to try and improve their situation, to whom could they turn for help?

Other growers
Processors
Retailers
Consumers
Others (please specify)

53) What do you feel you stand to lose in the current economic climate as you see it?

The farm
Livelihood
Lifestyle
Money
Tradition
Other (please specify)

53) How does your current cash flow from the farm these days match up with your expectations?

25%
50%
75%
100%
Over

54) Do you find that you are relying more on family labour to manage the work of the farm?

Yes
Sometimes
Never

56) Do you find it necessary to get work outside your farm to supplement your income?

yes
no

57) How many hours per week do you work away from your own farm?

1-8 hours per week
9-16 hours per week
17-24 hours per week
25-32 hours per week
33 and over hours per week

58) Do you feel pressure to devote more time and interest to the business side of farming than you did say, five years ago?

yes
no
sometimes

59) Do you see increased production as a way of increasing profits?

yes
no
unsure

60) Do you see increased production as a solution to surviving in farming?

yes
no
possibly

61) Do you feel that you are increasingly depending on outside expertise?

yes
no
occasionally

62) What do you think might be the advantages to be gained by vegetable growers from new technologies?

a great deal
none
a little
uncertain

63) Do you feel that most growers will become better off as a result of the development of new 'biotechnologies'?

yes
no
uncertain

64) Genetic engineering may be one way of developing biotechnology. Do you approve of genetic engineering?

yes
no
unsure

65) Are you aware of any ways that genetic engineering might improve your present system of production?

yes
no
unsure

66) How? Please specify.

.....
.....

67) Are you aware of any possible danger involved in the use of biotechnological products in agriculture?

yes
no
unsure

68) Would it be a source of concern for you to find that the cultivation of genetically-modified plants may lead to an increased use of herbicides?

yes
no
unsure

69) If increasing the amount of herbicides in farm production meant an increased herbicide residue in food, should farmers continue to use high amounts?

yes
no

70) Do growers in your group have choice in deciding whether to grow genetically modified crops?

yes
no

71) Are there pressures on farmers to adopt all new technology quickly?

yes
no

72) Are the farmers free to decide when to adopt new technology?

yes
no

73) If increased use of herbicides (*such as Glyphosate*) on genetically-modified crops also meant certain undesirable environmental effects (*on endangered plants and animals and fish*) would you continue to use them?

yes
no

74) Glyphosate was identified in a Californian study as the third most common cause of poisoning among farm workers. Knowing that information, would you still be able to recommend its use to growers?

yes
no

75) Is a ban on all genetically modified farm products reasonable?

yes
no
unsure

It would be useful to explore your views on a number of matters related to farming. This will allow us to draw a more accurate picture of the values of growers like your members. Farmers, opinions on a range of matters might help us to better understand possible directions for Australia's agriculture. Please say whether you agree or disagree with the following statements by indicating the letter on the card.

- a) strongly agree
- b) agree
- c) disagree
- d) strongly disagree
- e) unsure

76) Most land management practices are well worth considering.

--

77) The environmental problems of growers are exaggerated by people who are not farming.

--

78) Increased subsidies to farmers would solve farm environmental problems.

--

79) Growers should not be held responsible for environmental problems resulting from farming because the production of food is an essential activity required by the rest of society.

--

80) Managing the land sustainably ought to be a big consideration in this area.

--

81) Even when eroded soil material has left the farm, it is still the responsibility of that farm.

☐

82) Protecting the environment is not an important part of being a successful farmer.

☐

83) The control of farm environmental problems is an issue for everyone in the community.

☐

84) The activities of farming around here have a significant effect on the environment in other areas.

☐

85) In my case, increasing farm sales is a far more important consideration than reducing environmental degradation.

☐

86) The farmer should be held liable for environmental damage caused by farming activity.

☐

87) Growers need more information on land management practices.

☐

88) Environment problems on the farm are only quite minor in comparison with damage to the environment caused by the city.

☐

89) Sustainable land management should just be considered another cost of running the farm.

☐

90) Most farmers around here are in favour of using environmentally sound practices.

☐

91) The cost of environmental land management practices is a major obstacle to farmers using them.

☐

92) Growers should be allowed to produce all they can even if some environmental degradation results from their farming activities.

☐

93) Growers would be willing to take further measures to control environmental damage if they could be sure that land management practices would do the job.

94) It is in the best interest of growers to ensure the long-term health of their land.

95) Farmers in general do not give enough consideration to undertaking environmentally sound land management practices.

96) I would not try a new chemical until it was well proven in the district.

97) There is not much point than planning more than a few months ahead.

98) I regard myself as a fairly conservative and traditional farmer.

Processor representatives interviews

Introduction

Can I ask how long you have worked for the company?

Can you tell me about your role in the company?

Sustainability

How would your company interpret the concept of sustainable agriculture?

What is the company's view/s on the sustainability of vegetable production in the state of Tasmania?

Is your company aware of the level, if any, of soil and water degradation as a result of vegetable farming in this state?

Where does the company see its responsibility in relation to such a situation?

What steps does your company take to avoid or minimise the occurrence of degradation as a result of vegetable production and processing?

Does the company see any value in supplying growers with information on the subject of sustainable land management?

Relations with growers

How would you describe relations between your company and contracted vegetable growers in general?

What in your opinion are the main points of contention between processors and vegetable farmers?

Would you comment on the view that vegetable growers are the weakest link in the food production chain and have little power in price negotiations?

Are farmers price takers and not price makers?

On prices

Some vegetable farmers claim that low contract prices reduce their capacity to manage their land sustainably. What is your view?

Can you give an indication of the way price returns are distributed among stakeholders in the vegetable industry in Tasmania?

What are the main pressures on processing companies?

Are there pressures on your company (if any) in relation to:

- (a) price returns;
- (b) innovation
- (c) retail demands
- (d) fast food outlets
- (e) growers

- (f) consumers
- (g) competition and imports
- (h) pressure to export
- (i) other

On change

Are you able to see a time when processor and grower interests will become more closely aligned in managing price returns?

What is the company's position on change in use of land from vegetable growing to plantation forestry?

What might be some likely outcomes of this trend?

On "Clean and Green" marketing

Some consider the possession of a 'clean and green' image a valuable asset for Tasmania. What is your company's view on the subject?

Would a "Product of Tasmania" label be a useful device for the vegetable industry? What is the company's policy on the research and development of biotechnology in relation to vegetable production? and

What is the company's view of organic vegetable production?

Phase Two survey instrument

Introduction

Thank you for agreeing to take part in this survey. It is part of a larger project to identify the level of sustainability in which to place Tasmania’s vegetable industry. The aim of this survey is to establish a better understanding of current management practices on Tasmania’s vegetable farms, farmers’ perceptions of soil erosion and structure decline and the steps being taken to prevent and minimize soil resource degradation in general. Specifically, the research looks at the use of rotations, deep ripping, green manuring and conservation earthworks. The research also seeks farmer perceptions of and responses to the possibility of climate change and its effects on individual operations and the industry.

This survey is expected to take between 40 to 45 minutes. Although it is essentially a telephone survey, you are requested to read the questions on this copy sent to you with the information sheet. This will help to minimize communication problems. There is no need to complete any document or return it. The copy of the questions sent to you is intended merely as a visual aid to the questionnaire.

Section 1: Preliminary background information

Q1. I farm in an area known as:

Q2. The size in hectares of the land I farm is:

Q3. Please indicate your response to the appropriate statement

I own my own farm outright	
I own my farm with a partner	
I manage someone else’s land	
My equity in the farm is (%)	
Size of leased land (if any)	
Other	

Q4. In the last five years the size of the land I farm has:

Increased	
Decreased	
Remained the same	

Q5. The area in hectares cropped on my farm in the last year was:

Q6. In the last five years the land I have cropped has:

Increased	
Decreased	
Remained the same	

Q7. Over the last five years I have been farming, the following changes have occurred to crops on my land.

CROP	Production UP	Production DOWN	UNCHANGED
1			
2			
3			
4			
5			
6			
7			
CROP	Price return UP	Price return DOWN	UNCHANGED
1			
2			
3			
4			
5			
6			
7			

Sections 2&3: Soils, crops and rotations)

Q8. What soil types do you normally crop?

Krasnozem	
Cressy soils	
Black cracking soils	
Duplex soils	
Deep sands	

Q9. What crops have you stopped growing in the last two years and why?

Q10. Do you have a regular crop rotation?

Q18. What rotation do you follow?

Q19. What crops would you definitely not grow after certain others?

Q20. What are your reasons for not doing this?

**Q21.*(If you grow pasture in your rotation – otherwise go to Q23.)*
What is your pasture phase ?**

Q22. What are your reasons for growing pasture?

Section 4: Onion growing

Q23. (If you do not grow onions - please go to Q29.)

Do you always grow a cover crop for onions?

Q24. What are your expectations of a cover crop for onions?

Q25. What problems (If any) have you encountered growing a cover crop with Onions?

Q26. Do you use technical information on the use of cover crops?

Q27. Please indicate the time of year you normally sow onions.

Between March 1 and May 31	
Between June 1 and August 3	
After September 1	

Q28. What implements did you use to cultivate your soil for onions this year (step by step)?

Section 5: Potato growing

Q29. Do you grow potatoes?

Q30 . Is potatoes your main crop?

Q31. Do you also grow potatoes on leased land?

Q32. How often do you grow potatoes?

Q33. Over the past five years, the demands of processing companies to harvest my potatoes in winter have:

Increased	
Decreased	
Not changed	

Q34. Winter harvesting of potatoes has had:

No effects on my soil	
Some effects on my soil	
Other	

Q35. What are some of the effects (if any) of winter harvesting of potatoes on your land?

Q36. Will you continue to grow potatoes for processing in the future?

Q37. Your profits from potatoes for processing are now:

Very low	
Low	
Adequate	
Good	
Very good	
Other	

Section 6: Adoption – crops, chemicals, machinery and management)

For the next three sets of statements below, please indicate your choices in order of importance, most important being '1' then '2' etc.

Q32. Trying out new crops can be risky.

(Please indicate which statement most closely typifies your approach)

Wait until they are tried and tested in the field	
Test them out for myself	
Rely on what farmers you respect tell me	
Wait until most farmers are using them	
Read the literature from the manufacturers	
Ask the salespeople	
Ask the processors	
Ask an agronomist	
Ask DPIWE	
Other	

Q33. Trying out new chemicals can be risky. I prefer to:

(Please indicate which statement most closely typifies your approach)

Wait until they are tried and tested in the field	
Test them out for myself	
Rely on what farmers I respect tell me	
Wait until most farmers are using them	
Read the literature from the manufacturers	
Ask the salespeople	
Ask the processors	
Ask an agronomist	
Ask DPIWE	
Other	

Q34. Trying out new machinery can be risky. I prefer to:
(Please indicate which statement most closely typifies your approach)

Wait until they are tried and tested in the field	
Test them out for myself	
Rely on what farmers I respect tell me	
Wait until most farmers are using them	
Read the literature from the manufacturers	
Ask the salespeople	
Ask the processors	
Ask DPIWE	
Other	

Q35. Trying out new ways of soil management can be risky. I prefer to:
(Please indicate which statement most closely typifies your approach)

Wait until they are tried and tested in the field	
Test them out for myself	
Rely on what farmers I respect tell me	
Wait until most farmers are using them	
Read the literature from the manufacturers	
Ask the salespeople	
Ask the processors	
Ask DPIWE	
Other	

Please indicate your response to the following two statements:

- Q36. Are farmers always the best source of farming information?**
- Q37. Some experts who are not farmers themselves, have a lot to teach farmers.**
- Q38. Some farmers can have a lot to teach the experts.**

Section 7: Soil erosion and conservation

- Q39. Have you thought about soil erosion in the past year in relation to the land you farm?**
- Q40. In which ways do you recognize soil erosion on your land?**
(Please indicate which statement most closely typifies your approach)

Turbid (muddy) creeks	
Dams buildup	
Coloured run-off	
Loss of soil around fences	
Other	
Other	

Q41. In your opinion, growing which crops contributes to soil erosion?

(Please choose from the following alternatives)

Onions	
Potatoes	
All vegetables	
Other	

Q42. Is the extent of soil erosion in your district

Q43. Over the last five years, has the amount of soil erosion in your district

Q44. What do you see as the major causes of soil erosion in your district?

Q45. Are some farmers in your district trying to reduce soil erosion?

Q46. To what extent is soil erosion affecting your farming business?

Q47. If soil erosion on your property is a problem, is it serious?

Q48. Are you presently taking some action to reduce soil erosion on the land you crop?

Q49. (If yes) what are the actions you are taking to reduce soil erosion on the land you crop?

Q50. Have you encountered any problems with these erosion control methods?

Q51. What are some of the problems you have encountered with these methods?

Section 8: Sustainable management

Q52. Please indicate the statements you consider important for sustainable management practices – ‘5’ for most important and ‘0’ for least.

To use the land as a resource for maintaining family, traditions and society.	
Land to be left in a better condition than when I began farming it.	
To increase yield from the land as much as possible while there is a market.	
To ensure that land will continue to provide an income in the long term future.	
To see land as a shared resource with other species (non-commercial fauna and flora).	
Other	

Q53. In your view, who should take more responsibility for sustainable soil management on agricultural farm land? (Please number '5' for most important to '0' for least important.

Farmers	
Governments	
Processors	
Retailers	
Community (consumers)	
Others	

Q54. Please grade the level of assistance for conserving soil on your land from the following sources from '5' for most important to '0' for least important.

Governments	
Processors	
Retailers	
Community (consumers)	
Others	

Q55. What are some positive things that processing companies could do to reduce soil erosion on your farm?

Q56. What are the positive things that contractors are doing to reduce soil erosion on your land?

Q57. What are the positive things that contractors could do to reduce soil erosion on your farm?

Section 9: Soil structure

Q58. Have you thought about soil structure on your land within the past year or so?

Q59. Have you thought about soil structure decline in terms of the following:

The level of organic matter in the soil?	
The level of organic carbon in the soil?	
Other?	

Q60. If it is known, is the level of organic matter in your cropping soil

Less than 5%	
Less than 12%	
Over 12%	
Unsure	

Q61. If it is known, is the level of organic carbon in your cropping soil is

Less than 3%	
Less than 7%	
Over 7%	
Unsure	

Q62. Is soil structure decline on your land

Q63. Is soil structure decline affecting the viability of your farming business?

Q64. Over the past five years, has soil structure on your property

Q65. Can good soil structure with high organic matter help to prevent soil erosion?

Q66. What do you think are the main causes of soil structure decline on your farm?

Q67. What action will you be taking in the next twelve months to improve soil structure on the land you crop?

Section 10: Compaction

Q68. In general, is the degree of soil compaction on your property

Q69. Why do you think soil compaction exists on your property?

Q70. Are you taking action to prevent or overcome soil compaction?

Q71. How do you try to prevent or overcome soil compaction?

Q 72. Do you intend to take some action to deal with soil compaction in the next twelve months?

Section 11: Deep ripping

Q73. Do you use deep ripping on land you crop?

Q74. Please name the reasons you deep rip.

Q75. Have you been to a demonstration farm in your region?

Q76. Would you like to have a demonstration farm in your area?

Section 12: Soil conservation methods

Q77. Does some of your cropping land have a slope of

Q78. In your opinion, is it sustainable to crop land with slopes over 15%?

Q79. It is acceptable to crop land with slopes over 15% as long as soil erosion controls are used.

Q80. Land with slope over 15% is better suited for which of the following?

Q81. Which of the following erosion controls do you use on your cropping land?

Cut-off drains	
Grassed irrigator runs	
Contour drains	
Grassed waterways	
Diversion banks	
Minimum tillage	
Retain over 30% of residue	

Q82. Have you used a whole farm plan for your farm?

Q83. Have you seen any information on officially recommended soil management practices?

Q84. Have you made use of information on officially recommended soil management practices?

Q85. Please indicate if you intend to use information on officially recommended soil management practices in the next twelve months?

Q86. Do you use permanent grassed irrigator lanes?

Q87. Do you have grassed headlands on your paddocks?

Q88. Do you incorporate crop residues back into your soil?

Q89. Do you use minimum tillage to improve soil structure and reduce soil erosion?

Section 13: Farmer priorities

Q90. If vegetable crop returns and profits were higher, I would spend them in the following way: (Please indicate your choice with a number)

TOP PRIORITY	5
HIGH PRIORITY	4
MEDIUM PRIORITY	3
LOW PRIORITY	2
LEAST PRIORITY	1
Buying a new tractor	
Buying a new car	
Reducing debt	
Doing some soil erosion prevention	
Going on a holiday	
Improving farm management practices	
Working on the house	
Buying more farm machinery	
Doing some environmental projects	
Buying more land	
Leasing more land	
Fixing up soil degradation problems	

Q91. As your information source on soil management practices,
(Please indicate your choice with the number in the box from the table)

MOST USED	4	
OFTEN USED	3	
SOMETIMES USED	2	
NEVER USED	1	
The DPIWE		
The processing companies		
The internet		
Journals		
Newspapers		
Other farmers		
Other sources (please specify)		

Section 14: Climate change

Q92. In the past twelve months have you given some thought to the effects of climate change on farming on your own land? (If no, go to Q111.)

Q93. What is your level of concern regarding the future impact of climate change on your business?

Q94. In your opinion, will climate change

Make farming easier?	
Make farming more difficult?	
Make farming impossible?	
Have no effect on farming?	
Other?	

Q95. Adapting to climate change for farmers will be:

Easy	
Difficulty	
Extremely difficult	
Impossible	
Other	

Q96. If farmers are going to help reduce greenhouse emissions as a result of their operations: (Please grade the following options from '5' for most important to '0' for least important).

They need adequate information	
The general public needs to be concerned	
Governments need to show strong leadership	
They will need better prices for their products	
Scientists must be more confident about their predictions	
Other	

Q97. If environmental management practices were shown to help reduce the effects of climate change, would you consider using them? *(Please grade the following options from '5' for most important to '0' for least important).*

Yes, unquestionably	
No, absolutely	
If they were affordable	
If they were subsidized by the community	
If they were mandatory (legally enforceable)	
Other	

Q98. Some of the ways in which farmers can reduce greenhouse gas emissions on their farms are:

.....
.....

Section15: Follow-up studies

According to the design of this research, a number of follow-up case studies are required shortly after the completion of the telephone survey. A small number of participants will be chosen from those respondents who indicated their willingness to take part. The random selection will be made on the understanding that the researcher may accompany the farmer on a working day asking questions, audio-recording and possibly photographing – all from the point of view of adding to the store of information on farm practices. During this time it is hoped that the researcher will come to have a better appreciation of the conditions and problems associated with on-farm resource conservation. The research will of course preserve all respondents’ anonymity and privacy.

Q99. Participation in a follow-up study on farm practices.

Yes, I would be happy to participate.	
No, unfortunately I am unable to spare the time.	
Unsure	
Other	

Thank you ... End of Questionnaire