



# **Meeting the challenges of climate change adaptation in the peri-urban and rural landscapes: Impediments and enablers for integrated landscape management approaches**

**Interim report for the ILM project:**

***Policies and governance to support integrated landscape management in a changing environment***

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## Summary

The landscapes in the south-west of Victoria are the product of the ongoing interactions between local, regional and global biophysical and anthropic processes (what people do). The outcomes of these interactions are the current biophysical landscapes. These can be described in many different ways: landform, natural capital, agricultural, forest, town, infrastructure, habitat, ecology and resources. The distribution of human populations (the human landscape) can also be described in many ways: location, occupation, age, education, health, confidence and so on. Together, the biophysical and human landscapes are sometimes referred to as a social-ecological system.

Human processes that drive changes in a social-ecological system relate to people's objectives, expressed through personal, social, business, and political activities. These objectives vary greatly in form and scale.

Landscape management involves decision-making to develop personal, corporate or community objectives and implementation to organise resources (human, financial, biophysical) to achieve them. Decision-making has three stages: preparation, decision and implementation. Preparation involves gathering and analysing information to inform the decision and may be based on formal research processes or experiential learning or an integration of multiple forms of knowledge (knowledge integration).

In complex systems, such as rural landscapes or the rural urban interface investigated in this project, implementation follows a range of decisions, often made by different people in different organisations that are separated in time and space. Integrated decision making can counter problems that emerge through conflicting values and objectives and help to maintain clarity and social approval.

Integration can be challenged by different perspectives. Objectives prepared by one group are unlikely to be acceptable in the longer term to all of society. For example, biodiversity conservation projects can fail because conservation goals are in conflict with external influences such as national priorities or commercial interests. Perspectives also change over time as biophysical landscapes change due to climate change or other environmental processes and human populations change through migration from rural to urban areas, globalisation and demographic processes such as ageing.

Objectives are critical in driving developments in the biophysical and human landscapes. While it is relatively easy to uncover operational objectives (those that are well down in the hierarchy of decisions) higher level motivations that drive decisions are often determined by less apparent factors such as the aspirations and identity of individuals or organisations. Understanding these deeper motivating factors is essential for effective knowledge integration.

Ideally, the future vision for landscapes among people in south-west Victoria should be understood as part of the decision making process. This study, because of limited resources, has given particular attention to the future vision for landscapes held by the farming community. Although only a small minority of people living in the south-west region are farmers, they are important because they are a part of the human landscape, they control extensive private land resources and their management contributes to the delivery of ecosystem services valuable to all of society.

A series of interviews with landholders in the south-west indicated that they had long-term objectives (aspirations) much wider than would be expected if the farms were run only as commercial enterprises. These include:

- Developmental opportunities for family members (including careers).
- Living conditions they want to create for their family.
- Business aspects of the enterprises they run.
- Productive capacity of the farm.
- Non-income producing physical aspects of the farm.
- Relationships with people and organisations off the farm (social interactions and obligations).
- Influencing people and change in society (a citizen perspective).

The analysis found that effective governance, while difficult to define, may be about facilitating the achievement of these aspirations within the context of the continuing ecological functioning of the biophysical landscape.

Two questions focused on the important possible changes likely in the south-west in relation to this arrangement:

- 1 What activities or events will change the biophysical and human populations most in the next two decades?
- 2 What are the strongest linkages and interactions between changes in the biophysical landscapes and human populations?

The responses revealed that policies that lead to changes in the human situation: better communications, education, equity and health will benefit people but may have adverse impacts on the landscape and, ultimately, the interactions between the landscape and people. Policies that change the relative profitability of different sectors of the local or international economies will see resources flow to more profitable areas and more financially viable ownership configurations, again with consequences for the biophysical landscape.

Integrated management and decision making can provide for human benefits while mitigating impacts on the landscape. The generation and integration of new knowledge will be important for the development of both human and biophysical landscapes. The principal impediment for knowledge integration is reaching agreement on what topics are important and the kinds of knowledge that are relevant to include in the integration process. Crises that destabilise or disrupt the current social or decision making system can often drive greater knowledge integration. These can force new perspectives to emerge and a transformation in the conception of future objectives and landscape management. Rapid climate change, as has been experienced through a strong drying trend in this region over the past 15 years, has been one such crisis.

The report sets out 13 recommendations to overcome the impediments to integration that lead to the unsustainable use of the biophysical landscape.

## The layout of this report

Part 1 is the introduction and outlines the relationship between biophysical and anthropic processes and the human and biophysical landscapes.

Part 2 is a review of three forms of integration and their value in management.

Part 3 is a review of the analysis of the landholder interviews.

Part 4 provides information on the governance arrangement and policies that are relevant to land use in the study area.

Part 5 reviews information about the impediment and enablers for using the three forms of integration.

Part 6 provides an overview of the findings of study and sets out recommendations.

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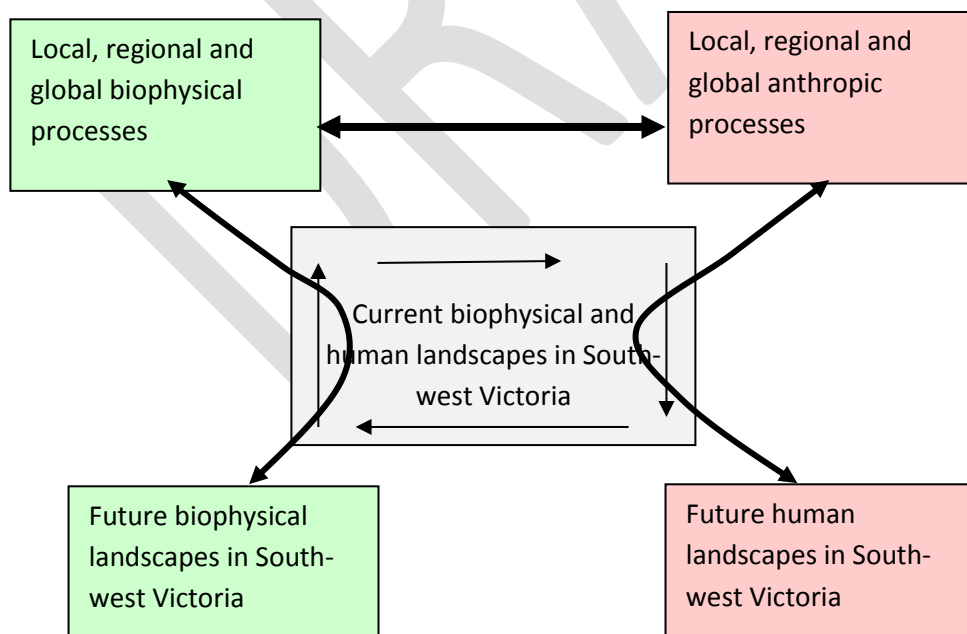
# Part 1. Introduction

## 1.1 Human and biophysical landscapes

The current report is informed by a series of 35 in-depth interviews with land holders and people who have other kinds of involvements with land use in the project’s study area of the South-west region of Victoria.

The biophysical landscape in the South-west region of Victoria has ‘emerged’ and continues to change as a consequence of the interaction between biophysical processes (physical and ecological processes) and anthropic processes. The current physical landscape represents the accumulation of the interactions between these two processes over centuries. The human landscape in the South-west region has emerged since European settlement from the interaction of the same two processes (biophysical and anthropic) as in previous centuries; however, the anthropic processes have been based on European and now increasingly global ideas, values, technologies and economies.

By biophysical landscapes we mean the condition and functioning of land<sup>1</sup> in the region. By human landscape we mean the distribution of people, their quality of life and their activities. The biophysical and human landscapes are functionally related; in absolute terms the total human landscape depends on the total biophysical landscape, and human activities determine many of the attributes in the biophysical landscape. In any one location the human landscape is not totally dependent on the biophysical landscape because any missing elements of the biophysical landscape can be imported (for example; food, water, fuel, machinery etc. can be transported to where there is a demand). The overall relationship is shown diagrammatically in Figure 1.



<sup>1</sup> Land, in this context, includes all associated resources such as water, flora and fauna, air and related marine systems.



## Figure 1: The interactions relevant to the future biophysical and human landscapes

We are interested in the human landscape (social landscape) in terms of current welfare and well being in absolute as well as in relative terms to other people in the state, nation and to some extent globally. The desire of people to improve their welfare and well being today, especially through consumption, has relevance to how the biophysical landscapes in the region will develop and also how national and global biophysical processes will develop. The consequent changes in the biophysical landscapes and people's response to these changes will have impacts on future human landscapes.

We are interested in biophysical landscape that has emerged from land use over recent times and how these two forces (biophysical and anthropic processes) will continue to interact to create future landscapes. Although, many people's interest in land is utilitarian (for example, for the supply of ecosystem services such as food, water, recreation, tourism and aesthetic values; including bequeath valuation of these services) other people may have a bio-centric view in which they value the intrinsic worth of nature (Taylor 1996/2011).

The combination of interests we have in human and biophysical landscapes exists because people and society as a whole have needs, aspirations, long-term objectives and obligations that relate to the land and its use and also relate to themselves and their interaction with other people. The use of land and the relations among people (how people deal with each other) are governed by a range of institutions; these are ways of organising activities. The way these institutions operate is important for the future as they facilitate, but also constrain, people's activities.

In regard to the biophysical landscape, different ways of organising land use (the variety of formal and informal rules governing private and public land use) greatly influence what happens to the land itself and to adjacent lands. The dilemma in land management/governance is that people want to obtain a range of values from land now, but there is a growing awareness that there should be some consideration given to the future so that people living in the decades to come can also obtain this range of values (WCED 1987; ESDSC 1992). Population growth, increasing resource consumption per person and new technologies are increasing the demand for natural resources and environmental services and institutions need to keep pace with these changes. The task is twofold: first, to facilitate current use to enable people to satisfy their aspirations, especially when their needs are not being met; and second, to ensure that current use does not damage the ability to provide for the future needs of the growing population. The latter problems relate to sustainability and what is often being destroyed is sometimes referred to as natural capital, or critical natural capital (Chiesura and De Groot 2003; Ekins et al. 2003).

In regard to the human landscape different ways of organising the interaction among people (the variety of formal and informal rule in dealing with wealth, power, commercial interactions, decision-making, disputes and agreements etc.) greatly influence the way in which people can satisfy their aspirations and their flexibility to adapt to change.

Institutions that relate to the biophysical and human landscapes are a product of people's imaginations; they are socially constructed and although they are often well established in society (sometimes for centuries) and so very resilient to criticism and challenge, they can be modified with

persistence, especially when acute damage has occurred and is recognised by people willing to demand change.

People's interaction with other people and with the land are justified using ethical systems of belief that determine the morality of their actions in regard to land and the relationship between land and people and among people. Not everybody has the same mix of interests and their justifications for actions differ. Some interests are local others are more general. People who hold more general interests (such as nature conservation or the production of commodities) are not necessarily located in the regions but may reside in other parts of the state, nation or even other parts of the world. Also the scale of their interests can differ in terms of time and space and their perspectives of issues. These differences lead to conflicting views and conflicting activities that are played out in a variety of ways, but especially through political action. Major differences relevant in this project include people's perspectives of biophysical and human landscapes, and how they view the future, inter-generational equity and what significance they give to sustainability and improving equity in society and the welfare and well being of people. This diversity means that the future direction that development may take in the longer term is uncertain as are the implications for both the physical and human landscapes. In the short term, new developments tend to follow on from previous developments; thus previous works tends to create a path that new development follows (Abel et al. 2011). But it is possible to rethink development paths to avoid path dependency and create new development that will deliver a different future more in keeping with future conditions. The amount of information and knowledge that has to be prepared and brought together for a change in the development path may be substantial in terms of money but also in terms of the time needed for review and reflection.

The relationship between people operating at the local level and people operating at greater scales, state and federal government levels, as well as people in the private sector working in corporate 'head offices', can be very important in regard to the nature and purpose of local development (or lack of it). Although a much misused term, 'leadership' at various levels can be critical and exists in other countries as noted by Martin (2012) in Canada.

*How much communities ask for outside assistance and how much they do for themselves is a key strategic choice for local leaders. In the attractions we see along our journey it is clear these are very local initiatives. It is the passion of local volunteers who establish and maintain them. Getting this local spirit to work on the bigger issues of employment and community sustainability is one of the key issues of governance of small communities, regardless of where you sit in the political federation tree that is Canada government. How the system cooperates and empowers the local is a real test of political leadership.*

Biophysical and anthropic processes continue to change at national and global levels. These changes and their interactions lead to changes locally in the biophysical landscape visually and in its ecological functioning, which leads to changes in the ecosystem services that landscapes can provide. The human landscapes are also changing in both 'visible ways' (demographically, wealth, education, health, welfare etc.) and in 'less visible ways' such as in regard to delivering people's individual needs including participation, understanding, confidence and security. In combination, biophysical and anthropic processes are important in the delivery of the needs of society more generally such as their role in community stability, sustainability and resilience in times of change.

Biophysical processes change for a host of reasons. Many change in response to previous activities of people including the previous use of the land and activities elsewhere that have changed larger scale physical and ecological processes such as water flows and air pollution (such as acidification, particulates, aerosols and ozone). Of particular interest, in this project, is climate change. However, many local activities have had a dramatic effect on the landscape. These include land clearing, settlements, pollution, soil loss, water diversions, and many new plants and animals which continue to change the ecological processes in the study area. Climate change is acknowledged as presenting unprecedented challenges to biological conservation but: 'We must also remember that most of the things we know we can do to protect biodiversity from climate impacts are the same things currently implemented against other threats' (Sinclair et al. 2010 p8). Climate warming to date has been relatively small with perhaps less than 1 °C warming in the recent decades and this rise has been masked by the variability of weather patterns over seasons and annually. The warming in future, especially once it passes 2 °C, may, apparently, be much more noticeable in terms of plant growth, animal welfare, agricultural production, the provision of ecosystem services and inundation in low lying coastal regions (McInnes et al. 2009).

The south-west of Victoria is impacted by many changes that occur at a global level, much of which come from the operation of technologies that have spread to be used throughout the world. Climate change and the ozone hole are obvious cases but there are many other well known examples such as chlorinated hydrocarbon pesticides and movement of goods that have brought in pests and diseases. We can be sure that there are many activities that are currently thought benign that will prove not to be. Polasky et al. (2011 p.398) note, 'Without reliable information about how current actions are likely to affect the trajectory of global change, and how global change is likely to alter the well-being of future generations, it is hard to provide sensible advice to decision-makers'.

### ***Biophysical landscapes in south-west Victoria***

The biophysical landscape in south-west Victoria can be understood as the outcome of human use of the land. It can be described in many different ways to facilitate particular kinds of understanding. For example miners may describe the biophysical landscape in terms of economic mineable resources, whereas farmers or foresters may be more interested in soils and topography. More generally it can be described in terms of geological features and land form; steep hills, to plains and coastal areas with numerous overlays such as soils, average rainfall, mineral and stone resources, forests, plantations, woodlands, grasslands, habitat and watercourses as well as human features such as access to population centres, land ownership and uses and infrastructure.

The Department of Primary Production classify the state according to 'Primary Production Landscapes of Victoria'<sup>2</sup>. The South-west region includes the western parts of the Southern Plains landscape. There are the Victorian Volcanic Plains, the Dundas and Merino Tablelands, the Otway Plains and the Millicent Coast. It includes some of the southern parts of the Central Victoria landscape, comprising the Southern Slopes, and Grampians Ranges. It also includes the Otway Ranges as part of the Southern Upland landscape.

### ***Human landscape in south-west Victoria***

About eight per cent of the population in a total of approximately 341,000 people in the Barwon South-west region are employed in agriculture, forestry and fisheries. Population is projected to

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<sup>2</sup> Available on line at: [vro.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/primary\\_prod\\_landscapes](http://vro.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/primary_prod_landscapes)

grow to approximately 445,000 by 2026 and about two thirds of this increase (61,000) will come from in migration<sup>3</sup>. Melbourne's population is expected to grow to 6.5 million by 2051 and regional Victoria is projected to grow to 2.3 million. Overseas migration is expected to be the largest driver of population change in Victoria (DPCD 2012). Details of projections to 2031 on a local government areas basis are available in the DPCD publication (DPCD 2012). The projections of annual growth rates range from around 0.5 per cent for Glenelg and Southern Grampians Shires to around two per cent for the Surf Coast Shire. The human landscape, like the biophysical landscape, can be described in a variety of way to facilitate a particular kind of understanding. Some of this data such as socioeconomic status can be mapped (see SEIFA maps<sup>4</sup>) which show that towns tend to have areas in which people are the most disadvantaged.

## 1.2 Management

The biophysical processes automatically respond to human activities because they are governed by the 'laws of nature'. For instance, when the farmer cultivates the land the chemical and biological activity in the soil changes and the air receives engine exhaust and dust. These changes lead to other changes as the natural processes take their normal course. Thus, the biophysical processes are fully integrated with anthropic processes. There is also partial automatic response from human activities and the social aspects of the system. For instance, the farmer's land cultivation would have been preceded by purchases of machinery, chemicals, seed and fuels and the farmer's cultivation may lead to sales in the coming months of the crops produced.

In contrast to the automatic and full response of biophysical processes to anthropic processes, people have to respond automatically and fully (and sometimes instantly) to only some biophysical processes (such as fire, flood or earthquake) but mainly people are able to choose how they respond through management which is based on selective information and specific objectives. Because of this choice, the resulting changes in anthropic processes are not solely determined by the current biophysical situation but for a range of reasons. Information, technology and political disposition may be especially important in influencing choices as well as in- and out-migration of people in the region and urbanisation. Many of these changes have international origins (e.g. the movements of international markets) but local attitudes and activities can be influential in creating change. In the longer term, and from an adaptive capacity point of view, we need to understand the anthropic processes that create the incentives for a variety of land uses and social change that are occurring in the study area. This is because it may be more effective to modify the processes rather than focusing on the outcomes, even though this may seem perverse.

The physical landscape can be viewed as a set of layers constantly interacting through biophysical processes. These layers include air, vegetation, soils, water, the underlying geology and topography, and so on. Each landscape layer can be studied independently but their interactions through biophysical processes need to be known to understand the dynamics of the whole. Similarly, the

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<sup>3</sup> See Barwon South-west's Outlook

[www.rdv.vic.gov.au/victorian-regions/barwon-south-west/barwon-south-wests-outlook](http://www.rdv.vic.gov.au/victorian-regions/barwon-south-west/barwon-south-wests-outlook)

<sup>4</sup> Socio-Economic Indexes for Areas (SEIFA) maps. Available at:

[www.dpcd.vic.gov.au/home/publications-and-research/urban-and-regional-research/census-2011/socio-economic-indices-for-areas-seifa-maps](http://www.dpcd.vic.gov.au/home/publications-and-research/urban-and-regional-research/census-2011/socio-economic-indices-for-areas-seifa-maps)

human landscape can be viewed as a set of layers that are constantly interacting through anthropic processes. These layers include culture, economic activity, connectedness (globalisation), operation of systems (use of infrastructure), technology, ethical views, health, aesthetic opinion, politics, recreation, religion, migration, historical events, administration, government and so on. Each layer can be studied independently but the interactions need to be known to understand the dynamics of the whole. And to understand the entire social-ecological system the dynamics of the interaction between the physical landscape (biophysical processes) and the human landscape (anthropic processes) need to be known. But it is impossible to know all the elements and how they interact, the outcome of people's activities always contain uncertainty and increasingly the situation in which management occurs is becoming more uncertain because of biophysical changes (for example, those coming from climate change) and anthropic changes (for example, coming from globalisation and changes in the availability of resources) hence the best that managers can do is to learn systemically as they go.

Although people talk about managing the system, in reality they are adjusting parts of the system to get particular kinds of outcomes. The outcomes they seek are the objectives of managers, and objectives are critical in determining the actions managers take including the knowledge, technologies and resources the managers seek out and apply in these tasks. This suggests that management processes that can deal with uncertainty, surprise and resilience through systematic learning such as adaptive management are likely to become increasingly important in many, but not all, circumstances (Doremus et al. 2011).

*Adaptive management is not a 'trial and error' process but emphasises learning while doing. Doremus et al. (2011 p.2) suggested that: 'The essence of adaptive management is a commitment to learning and a systematic approach to doing so'.*

*...elements [of adaptive management] that have been identified in theory and in practice are: management objectives that are regularly revisited and accordingly revised, a model(s) of the system being managed, a range of management options, monitoring and evaluating outcomes of management actions, mechanisms for incorporating learning into future decisions, and a collaborative structure for stakeholder participation and learning..... Implementation of adaptive management also provides the potential to respond in a timely manner to changing conditions, social objectives, and new knowledge. It can therefore help avoid costly or irreparable mistakes and unintended consequences (National Research Council 2004 p.2).*

Allan (2007) noted that although the value of adaptive management is considerable, the constraints to using adaptive management in natural resource management are substantial and consequently it is little used (see also Allan and Curtis 2005). The constraints that reduce the effective use of adaptive management according to Allan et al. (2008) include: (1) risk aversion (aversion to learning, fear of failure and being held accountable); (2) inadequate protocols (inadequate guidelines); (3) complexity (requiring an integrative and holistic approach); and (4) inadequate resources (need time for reflection and learning).

### 1.3 Management objectives

One particular layer in the human landscape is a 'future-vision landscape'. This represents people's aspirations or views about where they and their family want to be in the future in terms of the physical and human landscapes. Hogan et al. (2011 p.Xi) noted in a study of 4,000 farmers that 'Emerging trends noted in this paper also point towards farmers' life goals and identity as playing an important part in the ways in which farmers make decisions about their farming practice and, indeed, in the viability of farms and farmers themselves'. Wheeler et al. (2012 p.266) in discussing irrigated farms noted that having a succession plan (a named successor) was important in how the farm was managed: 'There was strong evidence that the identification of a successor is positively associated with the current and future management of farms. Those with no successor in place are more likely to go into a period of stagnation'. Ramos (2010 p.690) noted that planning practices tend to bypass the identification of objectives going from problem identification directly to problem solving; she notes that 'The definition of objectives is still a major task towards guiding future development'.

The future-vision landscape provides an important part of the motivation for action; it is what decision-makers are striving to achieve. For example, the 'future-vision landscape' may be economic — a financially wealthy person or financially wealthy population, or it could be health — an individual being healthy or people in general living longer, or it could be educational — a well educated individual or a job-ready population, or it could be aesthetic — a landscape that is attractive to tourists. Or a 'future-vision landscape' could relate to particular layers in the physical landscape such as biodiversity — the survival of a species or ecosystem more generally, or it could be productivity — the development of more productive soils with less erosion and less water pollution. A 'future-vision landscape' could be a combination of what a person (group, company, community of whole state) wants to achieve in both physical and human landscapes. To achieve future-vision landscapes requires a certain amount of forward thinking to anticipate the future conditions in which the decision-maker will have to operate. Tschakert and Dietrich (2010) noted that forward looking or anticipatory learning is a key element in adaptation to climate change.

Overall, the future-vision landscape that the state or nation seems to be endorsing has a general focus on obtaining economic and population growth as a means of obtaining improved human welfare and well being and other objectives such as wealth and power. This overall future-vision landscape leads on to the intensification of land use (along with increased use of other resources and a general improvement in productivity) to increase the delivery of marketable ecosystem services; a trend that is likely to continue in future. This intensification of land use may create conflict with other objectives that people and governments may include in their future-vision landscape and suggests the need for more integration among objectives that different parts of society may have. For example, a recent Parliamentary Committee inquiry on the food system in the UK noted that 'The Government's [UK Government] approach appears to be focused on the concept of "sustainable intensification". Intensifying production risks damaging the environment and society' (EAC 2012 summary).

Individuals and families have future-vision landscapes that contain elements of both physical and human landscapes. For example, they may want to own a home, increase their consumption levels and educate their children to a higher standard than previous generations and make provision for future generations. Governments also have future-vision landscapes that may be expressed in

national constitutions, policy statements, planning schemes, and political manifestos. Usually government future-vision landscapes are accompanied by research and investigation to establish their relevance to the population and to demonstrate transparency in policy development.

Perhaps, in general, future-vision landscapes may give priority to human landscape (such as economic development, health, education etc.) as physical landscapes are often referred to as 'resources' to be used for the delivery of human landscapes rather than as objectives in their own right.

Concerns about achieving quality landscapes are being addressed in Europe through the European Landscape Convention (ELC 2000, Chapter 1 Article1c) that aims to promote landscape protection, management and planning and organise cooperation on landscape issues, from the perspective of sustainable development. Objectives are important and the Convention indicates that it is the aspirations of the public that are to form the basis for developing objectives. The general provisions provide a definition of quality objectives as: "'Landscape quality objective" means, for a specific landscape, the formulation by the competent public authorities of the aspirations of the public with regard to the landscape features of their surroundings'.

In Victoria since European settlement, until the latter part of the twentieth century, the rationale for organising rural societies and hence landscapes was agriculture, forestry and mining, with gold mining taking priority where this was possible. During the second half of the twentieth century and into this century the rationale for agriculture and forestry has weakened with other uses and values of landscape such as tourism, urban growth, industry and commerce, and more recently conservation, coming to the fore leading to perhaps a more multi-functionality of rural landscapes. While mining in Australia may still have priority (now for coal and gas) the forces driving land use change continue to move away from agriculture and forestry and encompass, in addition to tourism, conservation and urban expansion, a growing range of uses and values such as rural residential, population growth and aging, water, communications, renewable energy, recreation, new industries and technologies, globalised markets and perhaps changing social values concerning health, employment, consumption, food sovereignty and equity. Farming, although relatively less important in the economy of Victoria, has not been static and has responded as part of supply chains to free market and self-help orientated policies (DAFF 2010) by managing risk, increasing production and efficiency involving increasing farm size, adopting new technologies, export orientation and to some extent taking action on natural resource issues on their own or by cooperating with other landholders and gaining some support through Landcare.

Applying the notion of 'quality objectives in landscapes' suggested in the European Landscape Convention would indicate that governance bodies would need to consider a very wide range of stakeholders' aspirations in south-west Victoria (not just those of farmers or conservation groups). In addition, if landscape uses are to be sustainable, they must also maintain (or improve) ecological integrity and also maintain the welfare of people within the landscapes.

Moving to achieve the future-vision landscapes of the public, individual landholders, businesses and governments requires the creation of a management process which leads to the development of an overarching management objective that is inclusive of stakeholders' objectives (a shared vision) followed by a cascading suite of operational objectives (as in project management).

Olsson et al. (2004 p.1) illustrated the importance of an agreed vision and goals among stakeholders in the transformation of a wetland governance system in Sweden. They reported that: 'A comprehensive framework was developed with a shared vision and goals that presented conservation as development, turned problems into possibilities, and contributed to a shift in perception among key actors regarding the values of the wetland landscape'. Pearson and Gorman (2010) discuss the importance of a vision in managing landscapes and the lack of a shared vision for the future development of the Northern Territory. They suggest the use of the *Leitbild* approach to help generate a shared vision. Potschin et al. (2010 p.657) note that a *Leitbild* describes a desired future state of a landscape or region and proposals or guidelines on how that state can be realised; it contains both 'visionary' and 'operational' components. The definition they suggest for a *Leitbild* is: *A Leitbild (pl. Leitbilder) is a summary statement describing a desired and releasable future state for a specific issue or spatial unit, which takes account of the primary objectives and drivers in a holistic and integrated way. All present knowledge is used to balance future constraints and demands from social, economic, cultural, political and environmental perspectives. Therefore, a commonly accepted Leitbild projects a specified trajectory for the future spatial structure, distribution, utilisation, condition and development of the socio-natural system. It provides a set of guidelines that shape actions, and a framework within which the impact of particular developments can be judged and socially negotiated.* Potschin et al. (2010 p.657)

In considering ecological restoration in Western Australia, Abensperg-Traun et al. (2004 p.608) support the notion of discussion and agreement. They noted that 'Any ecological restoration project is bound to fail unless it is socially integrated' and 'What is required is a discussion process at a broad social scale to define what the society wants future landscapes to look like, and what "services" they should provide us with'. And they suggest that 'In the absence of a broadly based discussion process involving representatives from all sectors of society, we will continue with the piecemeal approach that has so far characterised most ecological restoration work and which, to date, has largely failed to halt biodiversity erosion'. Dietz et al. (2003 p.1910) suggested that promising strategies for improving the governance of the commons included developing a dialogue they referred to as 'Analytic deliberation'; 'Well-structured dialogue involving scientists, resource users, and interested publics, and informed by analysis of key information about environmental and human-environment systems, appears critical'.

Large scale and long term objectives or vision provide a framework for individuals and organisations to contribute effectively to the achievement of the overall objective or vision. For example, draft National Wildlife Corridors Plan (NWCPAG 2012 p.1) initiated by the Commonwealth Government established a vision about corridors: 'The Corridors Plan lays the foundation for a new, collaborative, whole-of-landscape approach to biodiversity conservation that is based on voluntary cooperation and the existing efforts of communities, landholders, governments and industry. The role of the Australian Government is to enable and coordinate the efforts of all participants'.

Habitat 141° is a vision about habitat restoration and connection project on a landscape scale in a strip of land on the South Australia/Victoria border from the coast to inland (near Menindee Lakes; about 700 km) involving communities and including the reserve systems (such as the Grampians National Park). It is being driven by Greening Australia. An alliance was formed in 2008 between government agencies and community groups to progress the project (URS 2010). 'Habitat 141°.



provides a unique opportunity for private/public partnerships to respond to the issues facing people and the environment across the Habitat 141° area' (Habitat 141°).

While the human landscape aspects of a future-vision landscape (such as equity, education, a fulfilling life) are difficult to visualise, the biophysical aspects are more easily visualised and visualisation can stimulate people's imaginations very strongly (Firbank et al. 2009) and digital techniques facilitate this and help develop a shared understanding of the future options in the physical landscape (Lange and Hehl-Lange 2010).

The future-vision human landscapes envisaged by families may include a range of aspirations such as having active fulfilling lives with good health and good education. However, in practical terms, much of this is dependent on facilities, programs and the availability of reliable information being within the reach of rural families. Sustainable Farm Families (SFF) and the Sustainable Dairy Farm Families (SDFF) research projects addressed the poor health status of the rural farming family. The course on agricultural health and medicine is offered by the School of Medicine at Deakin University and a number of programs are available through the National Centre for Farmer Health, Western District Health Service in Hamilton<sup>5</sup>. Training of professionals on rural health issues is intended to ameliorate the problem of poor health in farming families. However, Hess et al. (2012 p.176) noted that 'certain distinctly climate-sensitive health threats are very likely to pose challenges outside public health's coping range.... Our findings suggest that management of these threats is likely to require innovative strategies.... Institutional learning at multiple levels is key to increasing adaptive capacity, and adaptive management is a potentially useful framework'.

Alloway and Dalley-Trim (2009 p.58) through interviews with rural students outlined the students' views of the obstacles to fulfilling their aspirations and expectations. They concluded 'At the level of concrete provision and the taking up of opportunities, the pervasive influence of material resources and finance was apparent [lack of money in families]. More specific issues of limited educational opportunity and the occupational models and experiences of small economies were also important. On a different plane were the personal and emotional issues associated with the anxieties of moving to the city, and the powerful sense of loss of family and friends which this implies'. Although there is considerable variation from place to place, the important backdrop for rural students is the rural economy and how it has changed over the decades.

Deregulation of agriculture commenced through policy reforms in the 1980s and in the next decades (such as the National competition policy reforms<sup>6</sup>) transformed agriculture to market-orientation through an emphasis on expanding output and increased productivity and efficiency. Smith and Pritchard (2012) suggested that this was seen as the best mechanism to achieve the well-being of regional Australia, and for Australia more generally, but that the outcomes were experienced differently and the commercial benefits from production and exports by-passed some participants and led to environmental and social issues. Smith and Pritchard (2012 p.43) noted that the literature 'reports the many social disadvantages rural people experience compared to their metropolitan counterparts' and that 'in a somewhat perverse way, then, the preoccupation with an efficient agriculture sector undermines populous, vibrant communities'. Increasing productivity and efficiency has led to increased farm size and a reduction in the number of farms. In addition, services requiring

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<sup>5</sup> National Centre for Farmer Health: [www.farmerhealth.org.au](http://www.farmerhealth.org.au)

<sup>6</sup> National Competition Council web site: [www.ncc.gov.au](http://www.ncc.gov.au)

people living in rural communities have tended to be withdrawn (from local banks to state government agencies). McManus et al. (2012) noted that small towns are important to farmers as the primary place where they connect with other people and build feelings of affiliation and belonging, and that the interaction between farmers and town communities are important in maintaining population and services. The resilience of rural towns is connected to the resilience of farmers and hence has implications for rural policy. Davis et al. (2012 p.8) in a study of older people in Victorian rural towns noted that rural older people play a significant role in rural communities and that productive aging and the sustainability of rural communities goes hand in hand. They conclude that 'This is good news for rural community sustainability in Victoria. Policy-makers at all levels of government will need to carefully consider ways on which to support older people to continue to do what they are already doing, particularly in declining communities'. Most of the towns in the south-west area however, especially on the coast and to the east, have an increasing number of 'sea- tree-change' residents and tourist facilities and their economies have developed accordingly. Such 'immigrants' to the region can provide considerable benefits to rural communities but it requires action on the part of community groups to encourage their integration and contribution (Kilpatrick et al. 2011).

Dibden and Cocklin (2005 p.141) noted that 'The emphasis in government discourse on landholders becoming self-sufficient, competent business managers is at odds with the expectation that farmers and other rural people will undertake voluntarily environmental work for the public good and not primarily for personal private benefit' and that environmental programs put in place to encourage environmental work (such as market based incentives) ...' is to a large extent undermined by policies promoting more competitive production (and therefore often intensive) agriculture, which tends to be associated with detrimental environmental effects'. The economic policy setting for farming aimed at increasing efficiency and production, in addition to having consequences for the maintenance of biodiversity and natural resources, also has sustainability consequences for agriculture, food production and hence landscape change.

Market based policies exposed agriculture to international competition on the domestic market and food imports have been rising at about 6% over the last two decades (PMSEIC 2010 p.34). Local production of vegetables does not meet the current dietary needs of the Australian population and changes such as population growth in Australia (ABS 2010), climate change, the increasing cost of resources and declining availability of some, such as land for market gardens (in the peri-urban areas) and irrigation water, is likely to increase the cost of vegetables and reduce their affordability. Imports have not proved reliable in times of food stress (i.e. during the 2007/8 food crisis export restrictions were used in some food exporting countries (Sharma 2011)). Increasing fuel costs together with climate change and fuel policies are likely to lead to crops being used for biofuels, and policies on carbon sequestration are likely to lead to land being moved from agriculture to permanent tree culture.

Trade liberalisation while opening the domestic market to imports has not led to international trading partners reducing the subsidies on their production of agricultural products, suggesting that farmers in the western district are selling their essentially unsubsidised products into a below cost market. This in the long term is likely to reduce the profitability of Victorian farms and make it harder for agriculture to compete for resources on the domestic real estate market for land and to compete for water with alternative uses such as industry, urban development and environmental

flows. In some way this may lead to ideas of agriculture moving toward 'post-productivism' or 'multi-functionality' as other objectives, especially conservation, increase in importance (Mather et al. 2006; Cocklin et al. 2006). However, Burton and Wilson (2012 p.57) note that 'productivism is re-emerging in different forms..... In Australia, .... productivism is actively promoted by government but, in contrast to post-war productivism, by any means other than direct market interference'. They suggest that the forms of productivism that occur in New Zealand and Australia are accepted 'because of the pioneering mentality of the population, the nations' reliance on export agriculture, a lack of embedded non-agricultural rural communities, and the availability of considerable levels of environmental capital to exploit' (Burton and Wilson 2012 p.67).

Agricultural resources (land and water) are being purchased by foreign sovereign wealth funds enabling the production of foods and biofuels for repatriation to investor nations (Lawrence et al. 2013). Supermarkets have been able to influence the price and conditions of supply which has contributed to the price squeeze experienced by farmers who produce for the domestic market. Lawrence et al. (2013) conclude that 'neoliberalism, as the dominant organising economic philosophy in Australia, appears intractable. Its reliance upon market forces ....does not provide for the necessary public goods such as research and development, ecosystem services, or a safety net for poor and marginalised citizens'. Hamblin (2009) noted that 'Agricultural policies maintain the productivity of the sector, but are ineffective in stemming the associated environmental degradation, biodiversity loss and rural population decline'. Hamblin (2009 p.1195) suggested change is necessary; 'Australia needs to re-define what its agriculture sector represents, environmentally and socially'. Lawrence et al. (2013 p.8) agreed but concluded 'It seems that in the face of the need for Australia to fundamentally redesign its agriculture for the new century, the current productivist trajectory will continue to be pursued with vigor creating major concerns for food security into the future'. Therefore it seems likely that the emphasis on production, exports through globalisation and international markets will continue to be a major management objective for the development of the human landscapes and hence the physical landscapes in the farming areas in the south-west over the coming decades.

## 1.4 Achieving management objectives

People make decisions that relate to land use to further their 'future-vision landscape' with an understanding of only some aspects of the layers in the human and physical landscapes and how these layers interactions. People do not have perfect knowledge. These decisions can be referred to as 'decision-of-the-day'<sup>7</sup>. These decisions lead people into taking action that collectively determine the interaction between the world of nature and the human world. Hogan et al. (2011 p.Xi) suggested that in these layers the social and moral aspects may be especially important '...it may in fact be moral and social identity perspectives which, compared to environmental and economic factors, more strongly influence farmer decision-making with respect to adaptation [adaptation to climate change]'

Decisions-of-the-day can be based on any of the interacting layers of the human landscape, such as generating income, improving health, developing technology or increasing education, and have a

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<sup>7</sup> People take action before full information is available to them. This is a normal part of the decision process although clearly people want to have sufficient relevant information to ensure the action will not fail to deliver the intended results.

direct effect on the human landscape and an indirect effect on the physical landscape through the resources they use and the ideas for further action they may generate. Of course, decisions-of-the-day that are directly about using resources in the landscape, such as mining, farming or conserving ecosystems, will have a primary focus on particular layers in the physical landscape. But invariably the actions will also have an impact on some of the other layers in the physical landscape. For example farming may focus on soils and crops but have an impact on water and biodiversity. The same applies to decisions about the human landscape; they may have outcomes in unexpected areas. Experience of activities and observations of the changes in the layers of both the human and physical landscapes indicate that decisions-of-the-day are often changing more layers than the decision-makers originally took into account. This feedback is very important for improving future decision-making processes and will be an aspect of landscape management stressed in this report. An example of this feedback is people's growing appreciation that information about climate change needs to be included in decisions-of-the-day. This appreciation is leading to many changes including a push toward less polluting technologies (mitigation strategies) and more consideration of storm surge and flood control infrastructure (adaptation strategies).

In summary, we note that particular physical landscape changes are determined by the interactions among layers in the physical landscape and their interaction with anthropic processes — the human activity in the landscape. Purposeful human activity is most likely driven by the desire of decision-makers to realise their future-vision landscapes and how they see or understand the interacting layers in the human and physical landscapes they are working within. Improving people's understanding of these layers and their interaction comes through observation and research. The appreciation of this knowledge by decision-makers might lead to changes in the decision-of-the-day that they make and hence lead to changes in the landscapes. But just knowing the physical landscape consequences may not lead to change if the change compromises the farming objective (the future-vision landscape as it relates to the human landscape). For example, House et al. (2008), using scenarios, modelled the economic impacts and showed that there were substantial opportunity income losses and limited opportunities to offset these with changed farming practices when applying conservation based scenarios in farm management. Just knowing that conservation outcomes would be better will not stimulate changed practices since these would compromise the immediate objective of earning income. House et al. (2008 p.163) concluded that: 'Substantial improvements in regional natural resource management outcomes will only come about when these ecological and economic principles are applied at a regional, or catchment, scale, and the benefits to the community of on-farm conservation as well as the cost to be borne by individual farm enterprises are recognised financially'.

In a study to identify land management strategies to reduce phosphate loads in the Gippsland Lakes, Roberts et al. (2012), noted that voluntary actions of landholders in the catchment at minimum public expense would likely only reach a four per cent reduction in phosphate loads whereas the environmentally set target was 40 per cent. They suggested that the 40 per cent was not feasible because the cost over ten years would not meet the budget objectives of government. The inference is that setting individual objectives is important but achieving them requires a reassessment of the objectives of all stakeholders. They conclude that:

*The major implications of this work .... include the need to be clear about what environmental assets are being protected, and the need for feedback between goal setting and program costs. The*

*research highlights the importance of considering factors such as the impacts of works on environmental condition, the levels of landholder adoption of changed land-management practices required to achieve particular environmental targets and the costs of achieving those levels of adoption (Roberts et al. 2012 p.20).*

Goldman-Benner et al. (2012) also considered the conservation of ecosystem services in catchments in reviewing the theory and practical aspects of paying landholders for ecosystem services. They noted that aspects of the theory of payments (best practice) — conditionality (supplying what is being paid for) and additionality (payments to reward action that would otherwise not occur) — and found that ‘conditionality’ may limit the use of creative funding that provides long term benefits to people and conservation, and ‘additionality’ can exclude benefits from social diffusion and lead to the inefficient targeting of funds. They also noted that although public–private partnerships in ecosystem payment schemes lead to the inclusion of side objectives, these partnerships lower costs and help long-term management.

At a small scale, land use comes about because decision-makers (such as farmers), who control the use of a particular piece of land, put together a range of information, knowledge (including tacit and explicit) and values they have in regard to layers in the physical and human landscapes to decide their ‘future-vision landscape’. They follow through with actions to work toward achieving their ‘future-vision landscape’. The future-vision landscape is likely to have psychological and physical objectives that relate to the human landscape and the physical landscape. For example, they may have objectives of wealth, aesthetics and ethics, and functions (what sort of farmer they want to be) from the layers of the human landscapes and objectives of being in, operating within and using the resources of a particular physical landscapes such as urban, coastal, hills, wooded, sea/water views, agricultural and so on.

Information on the layers of both the physical and human landscapes is not easily available to landholders. The public information that organisations, such as governments and private firms put out on: (1) controls, restrictions, regulations, investment programs, business, markets, incentives, and education, provide some of the information on the human landscape; and (2) information on the layers of the natural landscape such as weather predictions, soil science and native biodiversity, provide some of the information on the physical landscape that decision-makers use in deciding what action to take to fulfil their objectives. This information is interpreted by decision-makers as a cue<sup>8</sup> for the decisions they make. They digest and interpret this information with information they already have and with new information they purposely collect for themselves before making a decision. The objectives decision-makers have influence what decision cues they notice and actively look for. The decision cues that become apparent to the land use decision-makers can change the way they decide to use the land under their control. Information is the key to changing decision-makers beliefs and ultimately to changing their ‘future-view landscapes’ and the ‘decisions-of-the-day’ they make in order to achieve their ‘future-view landscapes’.

The variation in the objectives and circumstances of decision-makers means that they tend to interpret the cues in different ways and this leads to different outcomes for land use and the landscape. Land use decision-makers usually pay strong attention to cues from commercial organisations if they need to use their land to provide their family with income. However, land use

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<sup>8</sup> Cue because it is giving them a guide rather than a clear instruction or picture of the future.

decision-makers are aware that the objectives of commercial organisations are different from their own and arrangements have to be settled before moving from cues to action. Similarly, land use decision-makers are aware that governance agencies at different levels of government have different roles, expertise and objectives in supplying cues. These too need to be interpreted before action is taken.

Landholders, who are making decisions regarding their own families, land and businesses are likely to consider information from both the physical and the human landscapes to decide their 'future-vision landscape'. Taking action to achieve their 'future-vision landscape' involves developing a hierarchy of operational objectives which are likely to relate to a number of layers of both the human and physical landscapes.

Government agencies and businesses follow a similar process in deciding their 'future-vision landscape' and operational objectives, programs and actions that follow in both the physical and human landscapes. However, governments lack the natural integration in regard to objectives, ideas and information between the human and physical landscapes that occurs in a family as there are only a few (typically two) minds involved in family decision-making. But there is compensation, as governments have greater capacity to investigate and develop information about the layers in the human and physical landscapes they decide to include in their decision processes. The information is likely to be more detailed and perhaps more comprehensive than what families can use. For example, since the early 1970s the Victorian state government has an independent body providing advice on the use of public lands, using processes Coffey et al. (2011) refer to as strategic environmental assessment<sup>9</sup>. Their recommendations have gone into considerable detail on the biophysical aspects of public land and integrated objectives across agency stakeholders and specific objectives of the public and business use (such as timber, water, culture, grazing and recreation). But they have not had to delve further into the human landscape (and anthropic processes) and integrate issues across the human and biophysical landscapes as they would have had to do if their advice included private land. Not all objectives can be met because of changing circumstances and opinions. For example the state government in the Western Regions Sustainable Water Strategy (DSE 2011a p.98, Action 3.22) note that by 2019 Catchment Management Authorities (CMAs), Department of Sustainability and Environment, will have reviewed the environmental management objectives for the strategy: 'Should it become apparent with defensible scientific evidence that environmental objectives can no longer be met as a result of long-term changes in water availability, amendment of the objectives will be formally considered as part of the development of regional strategies for healthy rivers and wetlands in consultation with the community. The review of management objectives through the 2013 and 2019 regional strategies for healthy rivers and wetlands will inform the 15-year statutory review of water resources in 2019'.

In some cases issues are not clearly the responsibilities of any particular agency or group. One of the options, once an issue is recognised, is for agencies to work cooperatively. The issue of inland acid sulphate soils is one such issue and is being considered by a multi-agency group: the Corangamite Inland Acid Sulphate Soils Steering Group (CIASSG 2012).

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<sup>9</sup> Land Conservation Council, (1970–1997) Environment Conservation Council, (1997–2001) Victorian Environmental Assessment Council (2001– )

A complication for all stakeholders is including flexibility in the processes used to achieve agreed future-vision landscapes that can deal effectively with three sorts of uncertainties. Two have already been discussed: the uncertainties in the biophysical future, such as from climate change; and uncertainties in the anthropic future, such as those related to globalisation, especially the increasing global demand for resources, from changes in global economic fortunes and price volatility. The third area is uncertainties in the political/business arena associated with the actions of the other stakeholders in the region with whom the 'future-vision landscapes' in both the human and biophysical landscapes depend, at least in part. This area of uncertainty may be most acute for the long term planning that families undertake indicating that family decisions need to be robust (flexible or resilient) to enable their future-vision landscapes to be met over a family life cycle. Darnhofer et al. (2010) in considering the sustainability of farming systems suggested that the wide range of uncertainties about the future meant that 'Change is then no longer seen as a disturbance, but as a trigger for the reorganisation of resources, and for the renewal of the farm organisation and activities. Implementing these strategies comes at a cost, so that farmers need to tackle the inevitable tradeoffs between efficiency and adaptability'. They identified three strategies for improving the adaptive capacity of the farm: (1) learning through experimenting and monitoring; (2) flexibility to increase response options; and (3) diversify to cope with variability.

The high degree of uncertainty about the nature and degree of change stemming from particular events or trends is compounded by the uncertainty of how different kinds of change are going to interact and impact on the social-ecological systems. This uncertainty makes implementing objectives very difficult and greatly reduces the value of many normal tools, such as decision theory and analysing the risk of crossing thresholds if the data required is not going to be reliable. This is important for knowledge integration processes as it indicates the importance of learning from close monitoring and analysis of the operation of social-ecological systems and shows that knowledge integration has to be ongoing and part of achieving the implementation of objectives; achieving management objectives must include preparing for new objectives and a new round of implementation. Polasky et al. (2011 p.398) noted: 'Analysing the impacts of human actions on the trajectory of global change and human well-being requires integrated analysis of the dynamics of social-ecological systems. The rapid rate of change, the lack of a historical analog and the complexity of feedback effects in social-ecological systems shroud the future trajectory in uncertainty and attempts to compare the probable consequences of alternative decisions have large elements of guesswork'.

## **1.5 The integration activity in management**

In this report, we are going to consider the process of management in biophysical and anthropic processes that leads to changes in the physical landscape through the lens of a management activity referred to as 'integration'. In particular we will consider the activity of integration in the management process in regard to adapting to changes, including climate change.

Three sorts of integration are considered in this report. Knowledge integration is a fundamental process preceding decision-making. It involves bringing information together to inform the decision that is about to be made. It is the activity used in developing all decisions; from the most important decisions, such as deciding on their 'future-vision landscapes', through to the smallest decision in the management processes. Knowledge integration is therefore a universal activity that occurs

throughout the management process. Managers have to decide how much information (research) they need to have before they can make a decision that will guide an activity to deliver the desired outcome. For most decisions the knowledge that should be included in integration would take in information from the biophysical and human landscapes. Knowledge integration is not limited and can involve information from various layers in both the biophysical and anthropic processes. For instance the Productivity Commission (2012) indicate the importance of information for decision-makers in adapting to climate change. Information is important for adapting to natural hazards such as flooding and also in regard to the responsibilities of local government. The information content in taxes, support payments, construction codes and emergency management is also important in making decisions. The Productivity Commission also noted that information comes at a cost.

Knowledge integration to decide objectives can be complex as it is likely to involve tradeoffs between and among human and biophysical landscape ideals. Goldstein et al. (2012 p.7568) provided an illustration of integrating information on ecosystem services (water quality and carbon sequestration) and financial return to create objectives for land use decisions. They note:

*Our results highlight that ecosystem-service and economic tradeoffs are a key challenge that decision-makers will need to confront. A notable gap remains between recognition of the economic value of ecosystem services to society (e.g., carbon storage, water-quality improvements, and others) and the financial value to landowners, because the value of ecosystem services remains largely external to existing markets..... Making ecosystem-service tradeoffs explicit in decision making provides a window of opportunity to inform the adoption of strategies in which local and regional-scale land-use planning decisions contribute meaningfully to addressing sustainability challenges.* Goldstein et al. (2012 p.7568)

One option being tried is the 'mainstreaming of conservation assets' into the marketplace. This is based on the assumption that biodiversity can be conserved when conservation becomes a competitive land use (Robinson 2011). This reduces or simplifies, in theory at least, the knowledge integration problem to a comparison of economic values of different options; although in some cases non-monetary metrics might be feasible. Daily et al. (2009 p.27) outline some of the practical problems of incorporating natural capital (what produces ecosystem services) into resource and land use decisions on a large scale. They note that the science of ecosystem services needs to be advanced and the importance of the social-political issue of getting ecosystem services explicitly integrated into all decision-making; 'We must design effective and enduring institutions to manage, monitor, and provide incentives that reflect the social values of ecosystem services'. However, progress is being made; China, for example, is investing about USD102.6 bn in ecosystem payments this decade (2000–2010).

Knowledge integration is about preparing information to inform the decision and this may take years of training and practical experience. However, how people actually make the decision is not covered in this report. It is taken as a 'black box'. Although the idea of knowledge integration implies a rational decision-making process, this may not actually be the reality. Knowledge integration, that is preparing information and understanding to import the decision does not prevent intuition and the use of creativity in the decision-making activity. Decision-making often involves several people and so communication becomes an important part of decision-making in which integration can play a role. Mintzberg and Westley (2001) reviewed three decisions making approaches; 'thinking first',



'seeing first' and 'doing first'. They suggested that seeing first and doing first are best approaches when: many elements have to be combined into a creative solution; when commitment is important; when communication across boundaries is essential; and when the situation is confusing. Farmers tend to use these latter two approaches, they like to see the problem and visualise the solution and they like to experiment a bit and see what works (which could be developed into adaptive management). Although people make decisions in numerous ways, knowledge integration is still important in terms of preparation and in regard to execution of the decision (however made) vertical and horizontal integration are vital.

Vertical and horizontal integration are the other forms of integration and refer to particular kinds of decisions that coordinate and prioritise the delivery of management objectives. Vertical integration is about coordinating decisions through a supply chain so that the outcomes deliver the desired objective. Horizontal integration is also about coordinating decisions but across supply chains so that the outcomes deliver the desired objective. Decisions about vertical or horizontal integration will of course be informed by knowledge integration. The terms vertical and horizontal integrations are also used as general descriptions of the functional arrangements of organisations (including governments). Vertically integrated organisations span a supply chain ('paddock to plate') while horizontally integrated organisations span particular activities in the supply chain (retailing or manufacturing or transportation). Integration is supported by organisations because it can facilitate the flow of information, increase control and can lead to improved profits.

Integration is a key activity in management as it informs decisions and coordinates activities. As such, integration is a 'good thing' in the management process as it facilitates the development and delivery of 'future-vision landscapes' (long-term objectives). Consequently, overcoming barriers and supporting enablers to integration are also 'good things'. However, this only applies if the 'future-vision landscapes' of decision-makers are actually what, in the fullness of time, society wants. Integration is a facilitating activity in the management process; it can facilitate the achievement of objectives, which society might judge in years to come as desirable or undesirable, with equal ease. Integration therefore in both business and government requires the balancing force of public scrutiny to avoid monopoly and collusion in business, and a loss of democracy in government.

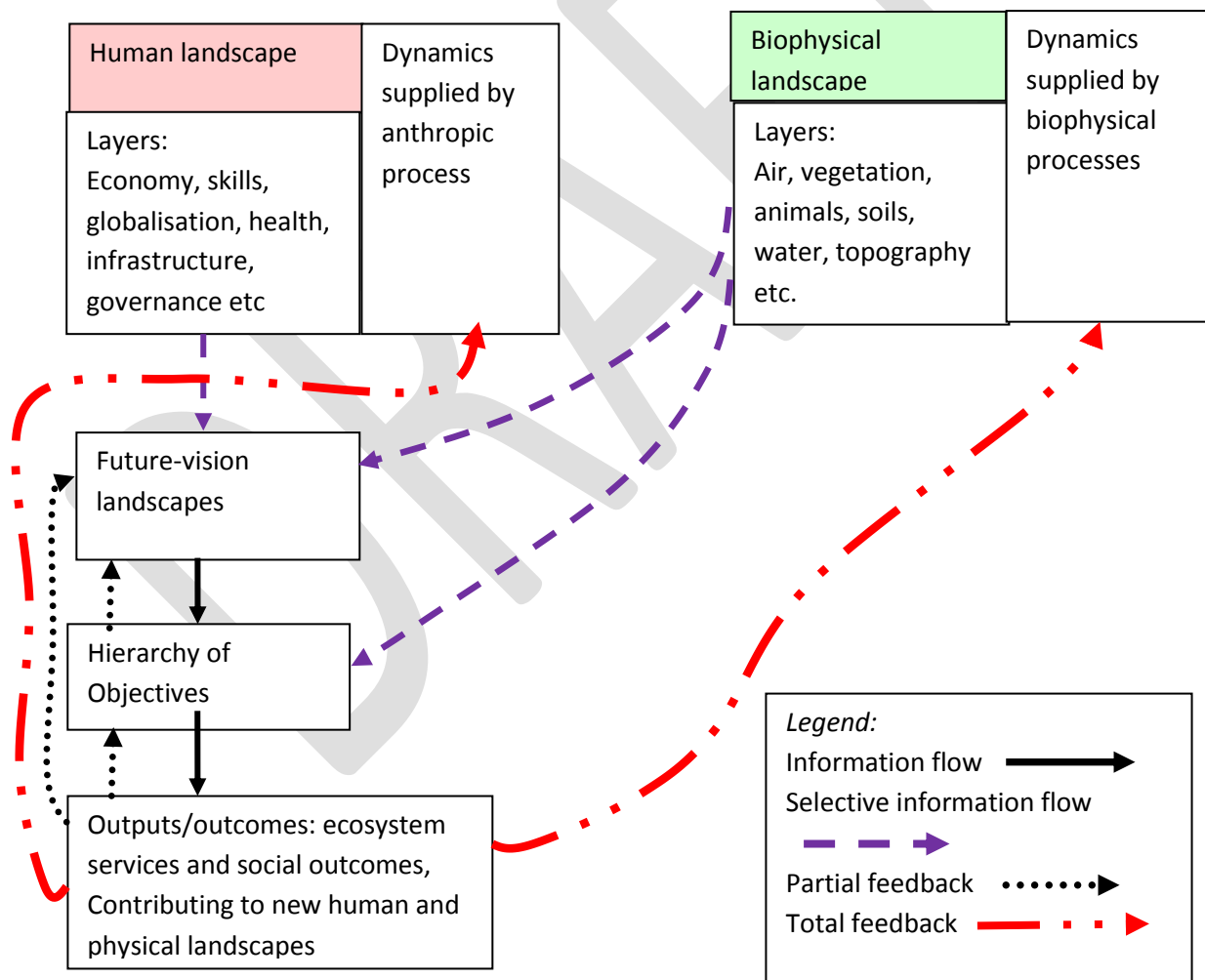
Setting out the project in terms of human and physical landscapes (anthropic and biophysical processes) provides a frame for understanding the context in which the relationships between landholders, businesses and governance agencies exist. Integration is an activity used throughout the management process to decide 'future-vision landscapes', establish the principal and operational objectives and in coordinating the actions that deliver these objectives. Although there can be conflict between the landholders, businesses and governance agencies when their 'future-vision landscape' do not harmonise, they are all actors in the same social-ecological systems and have much to gain through cooperation that aims to deliver long-term benefits to society as a whole. Figure 2 provides a diagram of the information flows and feedback loops in moving from existing new physical and human landscapes.

The position individuals and companies have in these supply chains are very important in terms of the information they receive (e.g. for firms, the information can be in the form of the money-flows from the markets they sell into and buy from) and for their ability to act and make changes to what they do. In addition the size of the landscapes is very important; in some layers both biophysical and

human landscapes are global. Identifying these features (integrating this knowledge) is very important in making effective long-term decisions. For example, the Environmental Audit Committee of the UK House of Commons noted:

*there was a failure in some parts of the food supply chain to pass financial returns fairly to primary food producers, leaving some sectors economically unsustainable. This could have long-term ramifications for the continued ability of suppliers to source produce from UK farmers and also for the well-being of local communities. Ultimately such a state of affairs exports our production base, to countries where food may be produced to lower environmental, health and welfare standards, increasing rather than alleviating the 'unsustainability' of the food system (EAC 2012 p.20).*

The global nature of many aspects of the landscapes is important in Australia because about 60 per cent of physical agricultural production is exported (with the embodied resources from a range of layers in the biophysical e.g. virtual water) and Australia imports about AUD10 bn worth of food products with embodied resources from the exporting countries (see Chapagain et al. 2006 for the case with cotton and Dinesh Kumar and Singh for virtual water in global food trade).



**Figure 2: Diagram of human and physical landscape interaction. Both kinds of landscapes can be thought of as containing layers that interact to form the total landscape. The processes that create the dynamics within the landscapes are biophysical and anthropic. There is considerable**

interaction between the human and physical landscapes and collectively they are sometimes referred to as social-ecological systems. Decision-makers decide on a 'future-vision landscape' as their overarching goal or aspiration. In doing so, they select information from various layers in both the human and physical landscapes. Decision-makers then devise operational objectives and undertake actions to realise their future-vision landscapes (achieve their aspirations). In this process they obtain partial information from both landscapes and use this as feedback to adjust their activities and/or their 'future-vision landscapes' (especially if their aspirations prove to be unrealistic). At the same time the two landscapes obtain total feedback from the outputs/outcomes of the decision-makers' activities and respond accordingly; sometimes leading to shock or surprises in both biophysical landscapes (e.g. biodiversity extinctions) and human landscapes (e.g. financial crises)

DRAFT

## Part 2. Integration activities in the management process

### 2.1 Meaning of integration in integrated landscape management

Three kinds of integrative activities are the most relevant in landscape management.

- *Knowledge integration* is the activity in the management process that involves bringing information together and learning from it in preparation for making decisions.
- *Vertical integration* is the activity in the management process involved in implementing decisions through a supply chain in order to achieve an agreed outcome.
- *Horizontal integration* is the activity in the management process of fitting together the vertical integration activities being used by several independent decision-makers working across a supply chain (or chains) at a particular level in the supply chains in order to achieve an agreed outcome.

These three kinds of integration activities are important in all management process involved in land use.

A failure within any one form of integration lowers success in the outcomes of the management process. Failure in knowledge integration can be catastrophic for outcomes.

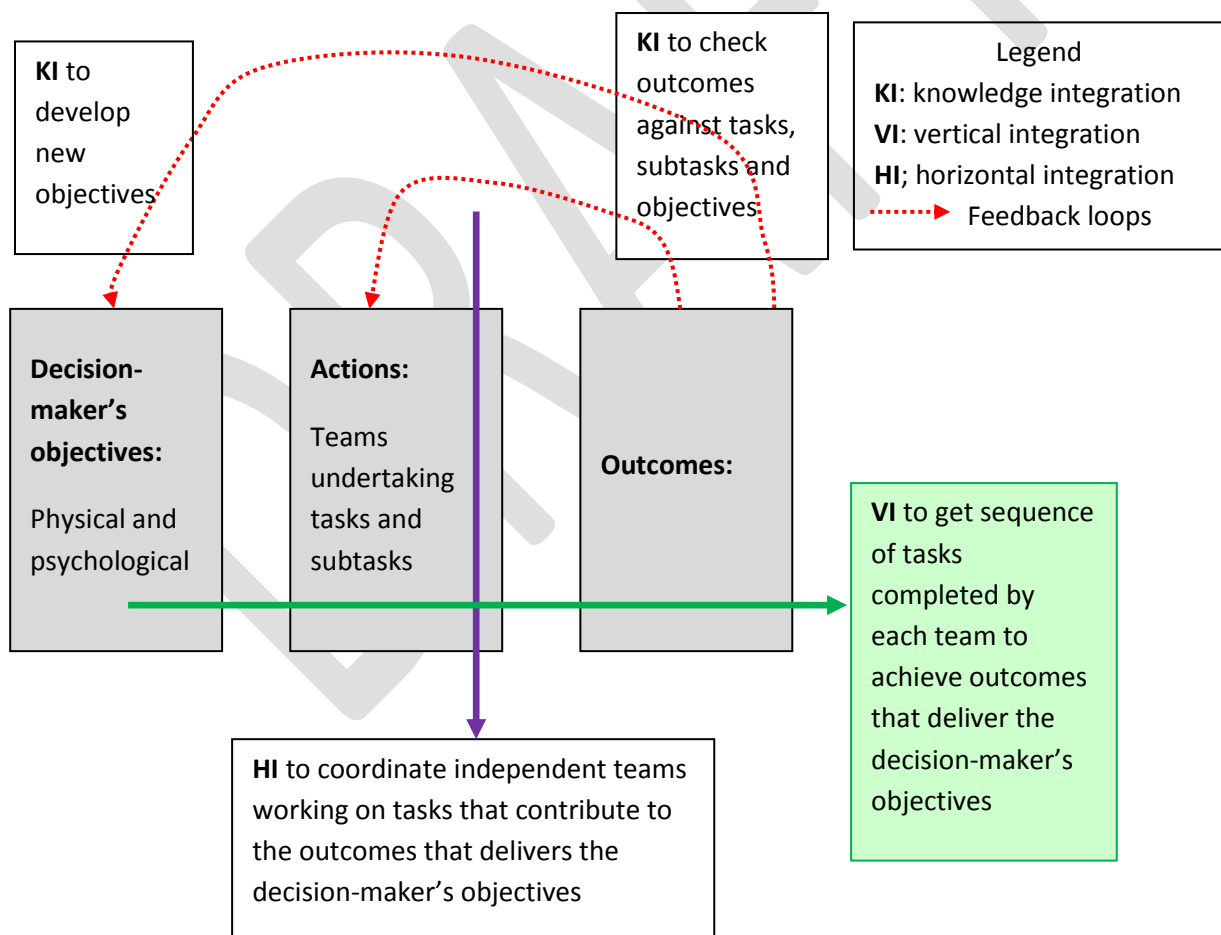
Management is a cybernetic process that involves: (1) deciding long-term visions ('future-vision landscapes'); (2) setting objectives to achieve these visions; (3) taking action to achieve these objectives; (4) identifying actual outcomes and using this information as feedback to; (5) adjust the process to more closely achieve the objectives; or (6) to decide to change objectives. The management process can be applied at any scale, time period, and level of objective; from organising lunches to managing a county or the planet.

Integration is an important activity throughout the management process and substantially determines the objectives and outcomes.

The management process (and parts of it) has been studied for centuries. Most recent work relates to the management of business as this is where the money for management research is greatest. Two related approaches to management are probably most relevant. One is total quality management (TQM) which is a systems approach to management. TQM includes its off shoot, environmental management systems (EMS) (Cary et al. 2007; Higgins et al. 2009; Hillary 2000). TQM uses the *plan/do/check or study/act* cycle of continuous improvement (Edwards Deming 1982). The second approach focuses on learning involving single- and double-loop learning. This also uses a cycle of 'objectives or governing variables/action strategies/consequences' (Argyris and Schön 1974). Both of these approaches are relevant to land use management and describe an integrative approach to management to address the same management dilemma; when long-term (or large scale) and short-term (or small scale) decisions lead to conflicting outcomes. More recently the resilience approach to management has highlighted the importance of forward-looking learning processes (Tschakert and Dietrich 2006).

Knowledge integration is the intelligence activity that occurs throughout the management process. It concerns developing knowledge to decide the overall objectives and improving objectives and performance by learning from the feedback loops (see Figure 2). Rarely would a manager have a 'future-vision landscape' that can be addressed by a single objective; more likely the manager may envisage a landscape that has a degree of inherent conflict, such as financial wealth, and a clear (non-polluted) environment. Developing the knowledge about the outcomes of the manager's individual options in terms of human and biophysical landscapes is a necessary step toward integrating this knowledge to form an overall objective and integrating this into plans for action.

Vertical and horizontal integration are coordinating activities in the management process; the implementation of plans. They concern organising the people and tasks they perform to help them contribute to the delivery of the overall objective. Vertical integration refers to the sequencing of a task from the objective through to the output and review undertaken by a single team (or agency). It can be thought of as organising the work through a supply chain. Horizontal integration refers to the activity of coordinating the work of several teams (or agencies) working in parallel and able to have an impact on the overall objective. It can be thought of as coordinating the work across a supply chain. This is shown diagrammatically in Figure 3.



**Figure 3: Management process showing two feedback loops (the short one represents single loop learning and the longer one represents double loop learning): KI (knowledge integration) is the intelligence activity used to develop and redevelop objectives and decide actions, tasks and**

**subtasks; VI (Vertical integration) is the organising activity for the tasks or subtasks that each team undertakes to generate the outcomes through the supply chain; HI (horizontal integration) is the activity that is used to organise collaboration among teams to achieve the outcomes across the supply chain**

## **2.2 Integration and landholders**

The three aspects of integration explained above are important activities in the landholders' management process and in the activities of government bodies operating in the land use arena. The activities of government bodies will be dealt with in Section 3.

The current physical landscape and the way it is changing is a consequence of the interaction between two forces. One force we can call 'nature' meaning the operation of biophysical systems (biophysical processes) and the other force is people's use of the land (anthropic processes). Indigenous people's use of the land was different and less intense than post settlement land use (Builth 2002; Kenny 2008) but nevertheless involved these two forces.

Management, in the sense of taking action to achieve objectives, is normal practice for people. What actually happens in different parcels of land varies greatly as a consequence of the different aspirations (or 'future-vision landscapes') they have and the different actions landholders take to achieve their objectives/aspirations, ('future-vision landscapes') and the different interactions with nature that occurs.

Integration, as an activity of management, assists decision-makers organise themselves, their interaction with other people and work out how to deal with natural forces with the aim of achieving their objectives.

It is people's objectives and how they seek to achieve these that are critical in determining the future look and functioning of the landscape. Integration, if well done, expedites the delivery of the objectives. However, knowledge integration, as well as having this role in expediting the delivery of objectives also has a role in developing people's objectives. People need to integrate a wide range of knowledge to work out what objectives are appropriate for their lives. The knowledge they integrate comes from various layers in the human and physical landscapes (as outlined in the introduction). For example, for a person to develop the long-term objective or aspiration (perhaps their 'future-vision landscape') of being a dairy farmer, they would have to integrate what they know about the activities of being a dairy farmer such as the economic situation and business conditions, regulatory environment, health and cultural aspects, and recreational opportunities with what they know about their own emotions, likes and dislikes, culture, religion, ethics and perhaps their physical capabilities. Once they have developed this long-term objective then a whole host of sub-objectives fall into place, such as learning how to run a business and learning about animal husbandry, to actually following through to create the opportunities they need to fulfil their aspiration.

Once the landholders start to take action they can obtain feedback which will allow them to adjust their actions to the reality of their situation as indicated in Figure 2.

A more detailed explanation for each of these forms of integration given below uses the perspective of the landholder.

## The landholder's perspective: Knowledge integration

Knowledge integration (KI) is the process decision-makers use to establish their aspirations (or future-vision landscape), clarify their long-term objectives and devise a suite of objectives (sub-objectives, jobs, tasks or projects) that they think will deliver their long-term objectives. Knowledge integration, as part of management, is an iterative process and an active process in which decision-makers bring together their own and family objectives/aspirations and knowledge about their own capabilities, the capacity and capabilities of their land holdings with information from external sources that the landholder deems relevant. This external information may include information about particular anthropic process such as market intelligence, finance available, information about new techniques, machinery, crops and animal husbandry practices, as well as information about biophysical processes for their region such as salinity, soil erosion and fertility, pollution, diseases, weather patterns and climate change. In knowledge integration landholders are bringing together information from various layers of the human landscape (anthropic processes) with information from various layers of the biophysical landscape and applying it in decision-making.

Because decision-makers are human and often make decisions quickly, every aspect of knowledge integration can be unrealistic or incorrect in some way. For instance, although an individual may be quite clear about their long-term objectives/aspirations 'future-vision landscapes', in a family situation, different members may have quite different aspirations and so there can be a level of disagreement about what is to be achieved in the long-term. And of course, many individuals may also be somewhat uncertain about what they would like to achieve. This may be especially so for some of the psychological objectives that people have as they may not be fully aware of them or they may clash with physical objectives. They may also have some unrealistic notions about their own capabilities and the capabilities of their land holdings to perform to expectations. In addition, they may not be accessing the most reliable external information (for example, ASIC 2012 on finance advice) and there is the possibility of misinterpreting the information even when it is quite reliable.

Knowledge integration, however flawed, is the action that the landholder uses in deciding what to do. It is a basic activity in their decision/management process. Management, and therefore the activity of knowledge integration, is an iterative process that landholders restarted or adjusted if any information they think is important changes. Decision-makers often change their minds during the course of a project as a consequence of new information or because they have interpreted existing information in a new way. They might decide to cut their losses if things are not going well or greatly expand the project if the results are favourable.

New information can come from comparing the outcomes of their projects with their original objectives (or hopes) for the project. This may be very confronting if it shows a considerable discrepancy between objectives and reality. A large gap might suggest faulty decision-making, lack of skill or perhaps incompetence. Such a crisis is likely to create an incentive to improve performance. New information may also come from external sources. The landholder may seek new information to improve existing projects and solve the crisis or start new ones. Information about agricultural industries, new opportunities, government incentives or regulation etc. may come from a variety of sources such as friends and neighbours, publications, consultants, industry organisations, tertiary courses, government publications and groups including Landcare (Reference group 2010). Obtaining new information can be considered a learning situation.

Knowledge integration, as an activity in the landholders' decision process, invariably involves learning. When things go well there is little to learn as the outcomes of the land holder's projects (such as cropping or livestock production) deliver their intended objectives. When the landholder's projects have poor outcomes (for a variety of reasons) the decision-makers can learn in two ways; single or double loop learning (Argyris and Schön 1974). Single loop learning is about doing the current job better (the shorter backward loop in Figure 2). In single loop learning the landholders maintain their objectives and are concerned about learning how to implement the projects they have chosen to conduct in the most effective and efficient way possible in order to improve the delivery of their chosen objectives. The knowledge they seek includes information on the science, management and marketing aspects of the work as well as information about the capacity of their land and so on. Double loop learning is about doing better jobs (the longer back loop in Figure 2). In double loop learning (sometimes referred to as 'reflective learning') the landholder reviews the entire process from objective setting to outcome and perhaps changes some of their beliefs and hence objectives as a result of the knowledge they have gained. They can then adjust the implementing activities accordingly.

The experience landholders get in running enterprises gives them considerable single loop learning, becoming experts in that kind of enterprise, be it sheep farming or wheat cropping. Mostly, landholders focus on single loop learning as they have to earn a living from their chosen enterprises and have to make them work effectively. In this situation, knowledge integration is not a random process of information accumulation but rather starts with the decision-makers' operational objectives such as earning a living from dairying or cropping etc. These objectives guide the decision-makers in seeking information (what to learn about). So, the first port of call (as it were) is single loop learning to learn enough to make the project work (i.e. become an expert).

Double loop learning may come about because of an undeniable failure in the ability of the chosen enterprises to deliver their intended objectives. This crisis may come about because of a variety of reasons; perhaps external conditions have changed. Such serious problems lead people to pause in their normal works schedule and so create a space or time for reflection and learning. Rickards (2012 p.17) noted that farmers' active lives made finding time to reflect difficult and suggested: 'it is important that, when people have the energy, they look back and deepen their understanding of their situation, of their own and others' reactions, and of how they could better position themselves for the future challenges that will inevitably and perhaps increasingly emerge'.

Negative feedback from the landholder's operations may stimulate a deeper look at objectives and this may lead to double loop learning with the decision-maker changing some of their longer term objectives or aspirations. These objectives may be physical or psychological in nature. Changing long term objectives/ambitions may lead to the landholder changing their operational objectives; including how they use their land. Double loop learning is important when increasing efficiency in the chosen enterprises no longer delivers their 'future-view landscapes' and changes in land use become inevitable to adapt, in the coming decades, to the raft of changes likely to have an impact on farming, including climate change. Shen and Jones (2005) illustrate the importance of double loop learning for organisational learning on a national scale (rural/agricultural education system in China).

Double loop learning may lead to changes in the physical aspects of the landholder's aspirations or to their psychological objectives such as how they go about dealing with problems. For example,



physically, dairy farmers may appreciate that they have to vertically or horizontally integrate their activities to stay as a dairy farmer. Psychologically, they may appreciate that to stay as a dairy farmer they will have to respond to bad news about milk prices in a more constructive way so they can develop alternative courses of action and so increase the choices they have.

The incentive for learning comes from the appreciation of a developing crisis and the acceptance that something has to be done. The origin of the crisis may be in the biophysical or anthropic parts of the social-ecological system. In regard to conservation, Berkes and Turner (2006a) refer to this as the 'crisis model' but also note that the appreciation of a looming crisis may come from an understanding of ecology; the 'ecological understanding model' (Berkes and Turner 2006b). Ecological knowledge can be considered as part of 'memory'; the knowledge base for decision-making. Berkes and Turner (2006a) suggest these two mechanisms work together; following a crisis people can organise, learn and adapt, such that long-term conservation knowledge can come from a combination of long-term ecological understanding coupled with learning from crises and mistakes. They suggest that this is a survival mechanism as it increases resilience of the social-ecological system.

The same approach seems relevant to crises in the anthropic part of the social-ecological system where the crisis may be economic depression, financial crisis or inequity issues in society. Forward-looking learning is especially important when current activities are not delivering their hoped for outcomes and changes are increasing uncertainty. Tschakert and Dietrich (2010 online) suggested a five point methodological framework for anticipatory learning by local communities in low income countries but it has relevance to developed communities. These points are: (1) learning from past climate related events especially what strategies were most/least effective and for whom; (2) monitoring trends to anticipate future events; (3) planning for surprises using scenarios; (4) measuring people's capacity for anticipation — this is 'the ability to shift from envisaging possible futures (as explored through scenario planning) to the ability to develop a dynamic plan for how to deal with potential uncertainties'; and (5) decision support tools for adaptive planning, which may include games and stories to build awareness of various aspects of climate change. The important aspect of the framework is that it is undertaken by community members and would go some way toward Rickards (2012 p.16–17) observation that discussions among community members would help them in adapting to climate variability, '[I]t is by interacting with diverse others that people are able to gain a sense of what is happening in their community, and by extension, make better sense of what is happening in their own lives. Such interaction is also important for enabling social learning of the sort that is needed for communities to collectively adapt to emerging challenges such as climate change. Conversation is needed about what people have tried and what did and did not work'. Davidson-Hunt and Berkes (2003 online) raise the same point, that 'adaptive learning ...requires maintaining the web of relationships of people and places'. Perhaps the important point here is the 'diverse others' the notion that adaptive learning has to 'look outwards'. Little progress is likely in the long-term from the social learning that only involves neighbours and friends or even regional communities, or communities of practice. This may even be counterproductive if it remains inward looking and re-enforces existing positions and ideas. The point is that sources for adaptive learning have to include expertise well-informed through research and experience across a range of relevant disciplines. This requires detailed planning, time, energy, money and longevity to be effective....that is to help communities come to terms with a future that may require substantial changes to what they do and how they make their living. Adaptation is likely to require hard

decisions once questions about long-term objectives have to be addressed (as in double and triple loop learning – what better things to do) as opposed to questions about how to do things better (single loop learning).

## **The landholder's perspective: Vertical Integration**

Once a program or project is decided in outline, vertical integration becomes important for decision-makers. Vertical integration is the activity of organising the work needed to move from the longer term objective, e.g. developing a dairy business, to implementation the suite of operational objectives needed to create and run a dairy business. It includes the process of reviewing the performance of individual parts of the business as well as the overall operation to see how it compares with the original long term objective. Such reviews are often neglected in management because decision-makers are often overly confident in the suitability of their business model, even when conditions change. For activities that involve using land, the time frame for reviews can be quite long term. For example the Australian Government's *Monitoring, Evaluating, Reporting and Improvement Strategy* for their *Caring for Our Country* program suggest a 20 year time frame to monitor outcomes (Commonwealth of Australia 2011).

In industry, total vertical integration involves the development of a business that undertakes all the work along a supply chain, from raw material procurement, through production to sales and recycling. Partial vertical integration occurs when the organisation (e.g. landholder's business) undertakes two or more steps in the supply chain, indicating that there are degrees of vertical integration. Vertical integration can be rapidly increased through company takeover or merger; the aim is to increase company profits by increasing control of more parts of the supply chain, or by reducing transactions costs of dealing with numerous independent firms (Cadeaux and Ng 2012) or by increasing the flow of information. The incentives for vertical integration vary depending on whether its forward (downstream) or backward (upstream) integration. Changing circumstances can lead to organisations divesting parts of the supply chain, that is, dis-integrating to improve profit levels. Vertical integration does not have to involve ownership as it can be achieved through ongoing contractual arrangements. Vertical integration can increase market power and lead to anti-competitive behaviours (Riordan 2005).

In terms of landscape, vertical integration refers to the process of managing the supply chain from organising production to final consumption and in many cases, to the recycling of wastes. Vertical integration requires that the part of the supply chain the landholder controls is fitted into the parts that occur before (upstream) and after (downstream) in the supply chain (backward and forward vertical integration). Vertical integration is the backbone of organising the management of land use and production since if it goes wrong the landholder may be unable to organise production or unable to sell the products they have produced.

The important element of vertical integration is the cooperation between different levels in the supply chain. Very often, landholders' share in vertical integration is rather limited because although they can participate in a number of steps they may not be able to control the flow of money or information through the system; two important advantages of vertical integration.

Changes are occurring in the degree of vertical integration; some landholders are increasing their vertical integration by moving into retail (cellar door sales<sup>10</sup>, farmers markets<sup>11</sup>, cereal and futures markets, and other schemes such as community supported agriculture) while others are focusing on a smaller part of the chain by outsourcing tasks such as crop growing and land ownership. In addition, some farmers are participating in vertically integrated production processes being organised through contracting arrangements with processing companies and retailers following the American example (Delforce et al. 2005; Schneider 2011).

### **The landholder's perspective: Horizontal integration**

In industry, horizontal integration refers to the expansion of control across the same level of the supply chain. In terms of landholders, horizontal integration refers to the activity of coordinating actions at the same level in the supply chain. Farmers who expand their farms and their businesses by acquiring adjacent farms are participating in a form of horizontal integration. Farmers increase their horizontal integration to spread the cost of their overheads over more production and also to increase the size of their business and incomes.

Horizontal integration is very important in many agricultural industries as it allows agribusinesses to develop the scale necessary to run profitable businesses in particular areas such as milk factories, and cereal storage and sales facilities. Horizontal integration is sometimes associated with vertical integration. For example, farms may grow in size and also develop contractual arrangements with manufacturers to process their products.

The way landholders use horizontal and vertical integration activities can affect how they use their land and eventually how the landscape looks and functions. The incentives for landholders to participate in integration or dis-integration mainly come from the actions of government organisations, such as changes to the taxation laws.

## **2.3 The inter-relationships between landholders, business, research and governance sectors and civil society**

### **The overall picture**

Some of the knowledge that landholders integrate prior to making a decision comes from external organisations as mentioned above. The operations (current and previous) of these external organisations influence what landholders can do. These external organisations are in the government, business and educational/research sectors and there is considerable interaction between them. In Figure 4 we have shown these sectors and indicate that civil society has an overarching role. This role is difficult to identify clearly but it involves establishing a social ethic that provides a broad direction for improvements in governance and social acceptability of the actions with the sectors. In a sense civil society takes all sectors to task in an effort to change society, they are the ethical keepers, making the final decisions, eventually, about tradeoffs, notably between

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<sup>10</sup> For some of the cellar door sales in the study area see: [www.visitvictoria.com/Activities-and-attractions/Food-and-wine/Wineries/Wine-regions-in-western-Victoria.aspx](http://www.visitvictoria.com/Activities-and-attractions/Food-and-wine/Wineries/Wine-regions-in-western-Victoria.aspx)

<sup>11</sup> For a current list of farmers markets see White Hat Tours [www.whitehat.com.au/victoria/markets/Farmers.asp](http://www.whitehat.com.au/victoria/markets/Farmers.asp)

weakly linked development and conservation goals (Salafsky 2011). To some degree the direction in which civil society influences change in different sectors comes from international ideas such as the United Nations' (UN) *Universal Declaration of Human Rights*, the UN's sustainable development conferences and the Brundtland report (WCED 1987). But can also come from issue-based overseas non-government organisations (NGOs) such as PETA and their anti-mulesing campaign<sup>12</sup> (Sneddon & Rollin 2010) and Australian NGOs such as The Australian Conservation Foundation and their campaigns on biodiversity.

Landholders participate in the educational/research sectors, sometimes by active participation in research trials and sometimes by taking educational courses or contributing to research funding through levies. Landholders are partly in the commercial sector in so far as they participate in commercial supply chains (purchasing fuels, machinery fertilisers etc. and selling milk, cattle, sheep, grains and wool). Landholders' control of the land surface means they also participate in asset markets (land and water) and in supply chains that are non-commercial (such as biodiversity conservation) that are of great interest to the government sector and civil society. These two supply chains provide ecosystem services and affect sustainability. The combined concerns of the commercial, government and educational/research sectors are less than the concerns of civil society. We know this is so because of the constant pressure from civil society for reform of both the commercial and government sectors.

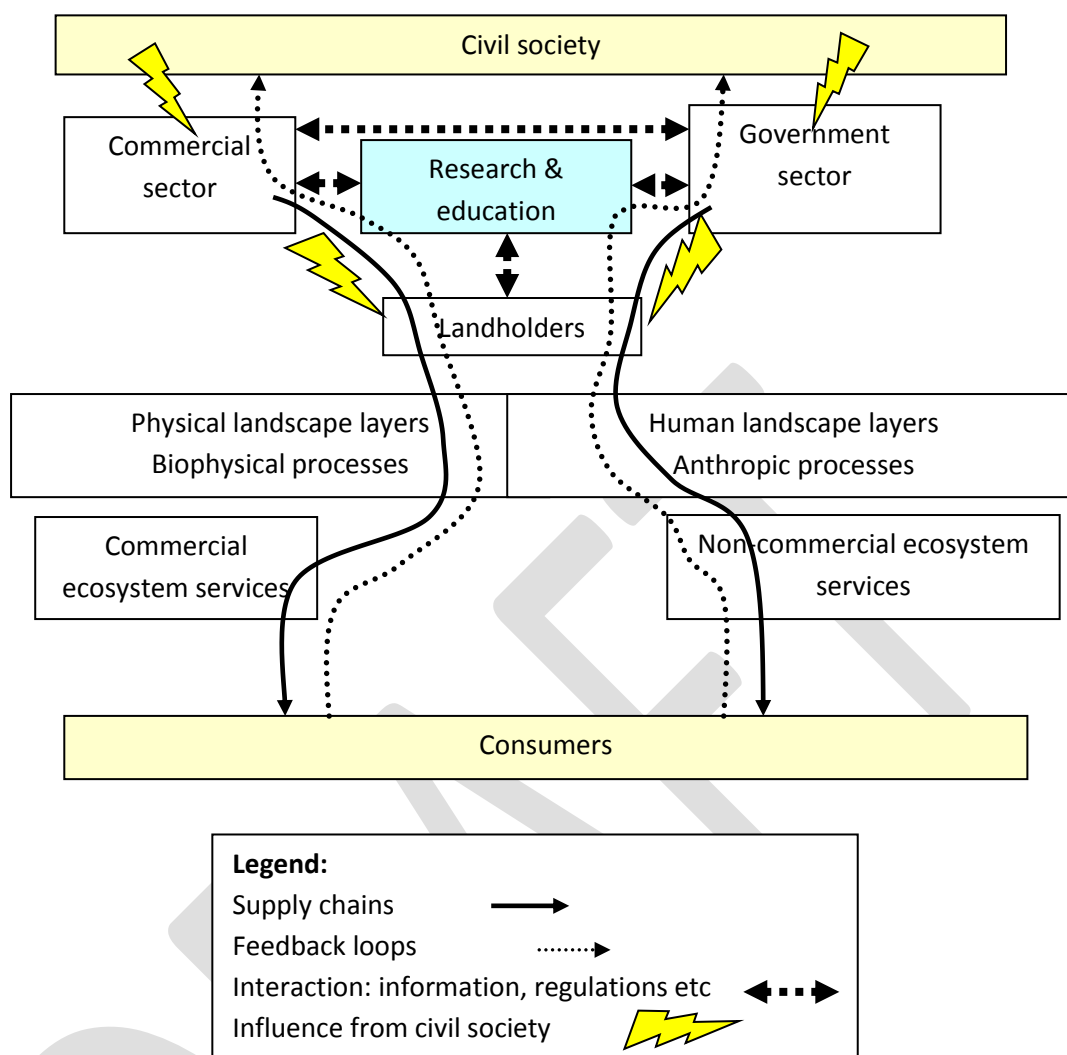
This dynamic between the sectors is essential for progress in a democracy. It may lead to sub-optimal solutions for particular sectors but overall it provides a process with internal checks to power. This dynamic is illustrated in Figure 4. One of the concerns that civil society may have, which might be shared to a degree by government, is the long term future of the ability of the natural resources of the planet to sustain the global population growth and consumption levels. Concerns over global pollution from CFCs and now greenhouse gases provide an example. At a local level the direction is toward encouraging growth in consumption and population, although there is a general appreciation through international work and even through local information on the ecological footprint of Australians that this raises a sustainability dilemma about consumption levels; 'The average Victorian needs 6.8 global hectares of land to sustain his or her lifestyle.....If everyone on the planet lived like Victorians, we would need more than four Earths to support us' (EPA 2008 p.3) (The Victorian EPA provide a calculator<sup>13</sup>). The disconnect between overall consumption levels and the capacity of the planet to provide the material and process the wastes in a way that will not change the operation of the planet's overall ecological processes (i.e. remain sustainable) has been known for decades but may still become an important issue taken up by civil society. A recent statement (in June 2012) by the Global Network of Science Academics makes this clear 'Current patterns of consumption, especially in high-income countries, are eroding natural capital at rates that are severely damaging the interests of future generations' (IAP 2012). It is an issue that will be raised again at the UN's Rio +20 conference<sup>14</sup>.

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<sup>12</sup> People for the Ethical Treatment of Animals web site:  
[www.peta.org/b/thepetafiles/archive/tags/mulesing/default.aspx](http://www.peta.org/b/thepetafiles/archive/tags/mulesing/default.aspx)

<sup>13</sup> See: [www.epa.vic.gov.au/ecologicalfootprint/](http://www.epa.vic.gov.au/ecologicalfootprint/)

<sup>14</sup> See: [www.uncsd2012.org/](http://www.uncsd2012.org/)



**Figure 4: A representation of the two supply chains using landholder resources (commercial and non-commercial ecosystem services). Both supply chains use a combination of biophysical and anthropic process in the relevant layers of the physical and human landscapes. Feedback loops leading to single and double loop learning run back through the supply chains all the way to civil society. Ideas from civil society influence much of the system in the long term, including the consumers (the connection between consumers and civil society is not shown in this figure to maintain simplicity).**

Research and education have a pivotal role in linking the two supply chains and providing decision-makers throughout the system with information and knowledge that help them obtain their objectives ('future-vision landscapes' — biophysical and human). It is also the source of much of the new information for knowledge integration that decision-makers seek out before making decisions. However, information has to be available to enable decision-makers to access it and there has been a tendency in developed nations to reduce investment in agricultural research over the last few decades. In regard to food production in the UK, the recent parliamentary committee inquiry notes that:

*We do not currently have the basic science base to deliver more sustainable food production practices. Relying on markets to identify and to direct where this research is needed, and on sufficient scale, is likely to fail. The Government must be prepared to intervene with universities, colleges and the Research Councils to develop incentives for them to train more agricultural and food scientists. It must also take a more active role in directing the Technology Strategy Board and the Agriculture and Horticulture Development Board to focus research on sustainable food production (EAC 2012 p.14).*

The decline in agricultural research overseas has also occurred in Australia. Mullens (2010 pp.18, 27) noted that 'public investment in R&D in [Australian] agriculture has been stagnant since the 70s and it seems likely that this stagnation is now being reflected in broadacre productivity growth [a decline in productivity].... public investment in agricultural research in Australia has been static (AUD830 M in 2004 dollars) for two decades and research intensity has declined (to 3.0%)'. Hunt et al. (2012) noted the recent shift of research focus from production to natural resource management and also the unravelling of research, development and extension commencing in the mid 1990s to the present. They conclude that 'Unfortunately, ongoing public policy signals [such as the Productivity Commission's report recommending a 50% reduction in funding for Research and Development Corporations] indicate that the agricultural RD&E portfolio is still unravelling in Australia' (Hunt et al. 2012 p.22).

### **Single to multiple decision-makers**

So far we have considered the situation in which there is a single decision-maker. This can become a very complex situation when that decision-maker is a large corporation. However, in terms of landscapes, the outcome (what the landscape will look like and what services it will deliver) will emerge from a combination of the operation of natural processes and the actions that flow from decisions made by hundreds perhaps thousands of individual decision-makers. Some these 'individual' decision-makers are government agencies or corporations. Perhaps, in the long-term, the objectives that landholders have are arguably the most influential on the look and function of the landscape.

Each decision-maker is likely to have a different mix of objectives (physical and psychological) and in addition their actions are likely to be focused at different time scales depending on their priority at the time. The actions taken to satisfy a short term objective may compromise the fulfilment of long term objectives that the decision-maker or other decision-makers may have. The individual does not develop their 'future-vision landscapes' (aspirations) in isolation of family and society more generally. So that as social values change in regard to both what are reasonable objectives and reasonable ways of achieving those objectives, so at least some individual decision-makers will reflect those changing values, thus creating a trend in decisions about the use of land resources. For instance, the move to productionism (desire to produce [and consume] more) after World War II, and the move to market liberalisation in later decades, has led to the notion of the landholder as a business-person and a host of changes in the landscape as business decisions about land use come to the fore.

Different decision-makers have different abilities to use to take action. Landholders are restrained by laws that regulate the use of their land (such as planning schemes, regulation on water diversion and conservation/pollution laws) but they actually have the responsibility and ability to operate on-

site so that their decisions effectively determine how the land is used. Landholders may not always have the scientific and business knowledge to develop effective farming enterprises. They are less served by governments in this regard but advice comes from a range of firms from independent advisors to firms in relevant agricultural supply chains, including fertiliser companies to agribusinesses that buy products from the landholders. Supply chain companies have their own objectives and the operation of these objectives through the firm's activities can influence the objectives and actions of the landholders, often through contractual arrangements.

Mostly natural resource management issues are external to the product market system through which landholders make a living, even though many aspects of natural resource management have long term implications for production. Information on natural resource management is available from many sources (increasingly from the internet). Arrangements such as Landcare, with trained facilitators who can assist groups of landholders with advice, provide a useful information transfer system and a substantial stimulus to take action. However, funding inconsistencies in Landcare makes providing quality advice and continuity in a way that matches the ongoing nature of natural resource management issues a difficult task. One interviewee noted that: 'Landcare attracts the youngsters [as facilitators] but it needs job continuity ....Landcare is a start up job but it need to keep some of them because [moving on]... that kills them [the enthusiasm in the group].....need some old heads in Landcare' (attribution: male mid-career).

Governments and government agencies also have their own objectives that tend to set the scene for some of the activities of business. For example, their decisions have resulted in the development of infrastructure that greatly influences land use, and planning schemes influence how the land is developed for non-farming purposes such as for housing, infrastructure, mining and quarrying. Some agencies are landholders and operate parks, reserves and a range of facilities; their activities and responsibilities have much in common with other landholders although their objectives are different.

Bringing different people together to participate in decision-making can be problematic for a host of reasons, such as power and capacity. Lane (2006 issue 6) in his discussion on regional natural resource management (NRM) noted that 'the challenge for civic regionalism is to bring the various kinds of knowledge together when developing management strategies, rather than allowing these knowledges to compete — one laying claim to rationality, the other to morality or local wisdom. We need to learn how to use both so that our management plans are both effective and just'.

### **Public service's perspective: Knowledge integration**

The public service through the levels of government has an enormous capacity for accumulating and generating information through investigation and research, and employs a very wide range of professionals. An issue in knowledge integration is bringing this diversity of information and knowledge to bear on particular decisions because decision-makers often work in relative isolation from other professionals in other agencies and department and also at different government levels. The transaction costs of bringing information together from professionals located in other agencies and from other levels of government can be high. Regional organisations (Catchment Management Authorities and local government) being on a smaller scale and regionally based, may have a better capacity than central agencies and departments to bring local knowledge into consideration when



local information is important in making decisions. Knowledge integration can be given special emphasis during inquiries to deal with particular issues. State of the environment reporting is an example, as are parliamentary inquiries and royal commissions. In some cases investigation are carried out prior to particular decisions such as creating parks and reserves and allocation of water, such as the diversions from the Murray Darling system<sup>15</sup> and in developing and changing planning schemes. Bauer et al. (2011 pp.7, 8) in a study of climate change adaptation in ten Organisation for Economic Cooperation and Development (OECD) countries noted that governments addressed uncertainties by integrating knowledge in decision-making which required 'managing complex science-policy(-society) relations.... characterised by complex interactions between scientists and policy-makers'. Bauer et al. also noted that adaptive governance required the involvement of non-state stakeholders and the public. 'They often have valuable knowledge on and experience with local or sectoral particularities in the context of climate change adaptation. In addition, they are crucial actors in the implementation of adaptation policies and measures'.

### Public service's perspective: Vertical integration

The process of getting policies and projects implemented is a vertical integration task. Vertical integration is the links across levels of organisation. It involves the usual steps in the management cycle of setting objectives, planning, taking action and reviewing the process before proceeding to improve the process for the next management iteration. Vertical integration can help to improve the control of the implementation process by ensuring that the priority for action is maintained throughout the process. However, effective integration may be achievable through agreement, contacts and consultation when a number of organisations are involved. Mainly the agency involved is responsible for monitoring, evaluation and review of the project they are implementing. The Auditor General's office also reviews some of these projects and makes recommendation for improved management. The role of the Auditor General as an independent officer of the Victorian Parliament is to 'examine, on behalf of Parliament and Victorian taxpayers, the management of resources within the public sector'<sup>16</sup>.

Vertical integration is relatively simple when the project involves activities that are known to deliver outcomes that meet the initial objective. Repairing a machine is a relatively straight forward project as the correct actions and desired outcome are known. Growing crops is harder because of the numerous confounding events that can prevent the realisation of the outcome, such as weather, pests and also markets, despite the 'correct actions' being taken. Bowmer (2011 p.183) noted the difficulties of linking stubble farming systems (no till) and river health and concluded that 'In general water quality and quantity is expected to reflect land use management [such as stubble farming] but the relationship is confounded by natural variation at larger scale. A catchment-based approach to landscape sustainability and resilience in Australia is advocated'. Bowmer (p.183) suggest that the catchment scale (involving regional government and citizen organisations like Landcare groups) is appropriate 'for integration and optimisation of land use that integrates both on-farm profitability and off-farm ecosystem service benefits and impacts'.

This scale may be useful because it is sufficiently large to be able to identify 'confounding factors' in nature and perhaps undertake work to reduce them (such as gully erosion on water quality) and

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<sup>15</sup> The Basin plan provides an example: [download.mdba.gov.au/proposed/proposed\\_basin\\_plan.pdf](http://download.mdba.gov.au/proposed/proposed_basin_plan.pdf)

<sup>16</sup> [www.audit.vic.gov.au/about\\_us/role\\_of\\_the\\_auditor-general.aspx](http://www.audit.vic.gov.au/about_us/role_of_the_auditor-general.aspx)



because it is more likely to get community agreement (perhaps tacit agreement) on landscape objectives at this scale — a process referred to as ‘civic regionalism’ (Lane 2006). Perhaps decision-making at the landscape scale may benefit because people are knowledgeable about the particular issues at that have their causes at that scale (it’s their own region). It also may allows some degree of participation in decision-making, ‘citizens are the best judge of their own interests’ (Fiorino 1990 p.227–228). Also being involved in making the decisions may give people confidence and encourage their cooperation in implementation, ‘in addition, broader participation may contribute to better decision-making, incorporating a broader range of values into decisions, and reduce the probability of error’.

Lane (2006 issue 5) notes that ‘if civic regionalism to be more integrating, the vertical roles of regional bodies relative to local, state and federal governments will need to be clarified and made to coordinate’. He goes on to say ‘it will also require greater structural and procedural reform of federal and state NRM agencies to provide for greater horizontal integration’.

### **Public service’s perspective: Horizontal integration**

Horizontal integration is necessary when coordination is needed between agencies working on issues at the same level of organisation (e.g. local or state government). For environmental governance this tends to imply linkages of governance across geographic space (Reed and Bruyneel 2010). The problems can become acute when one agency in pursuing its interests inhibits the ability of other agencies to achieve their objectives. Discussion and agreement may find a collaborative pathway which suits all the objectives involved. However, in many cases, where there is a clash some of the objectives have to be given a higher priority to ensure the objectives are achieved (LGPMC 2009). Establishing these priorities may be a complex political task of working horizontally ‘requiring skills in mediation, conflict resolution, enabling skills, organisational management, community development, and so on’ (Lane 2006 issue 4). Privatisation of many government services in the 1980s and 90s lead to multiprovider provision of services which exacerbated the coordination/integration problems (Van Gramberg et al. 2005). Among the arrangements to improve coordination across portfolios was the creation of the Council of Australian Governments and whole of government approaches (MAC 2004).

Multilevel governance occurs when governance is linked both vertically, through different levels of organisations, and horizontally, across organisations that operate the same level (and across geographic space in some cases).

## **2.4 Objectives**

We have noted that ‘future-vision landscapes’ represent landholders’ physical/psychological major long term objectives. To realise these future-vision landscapes landholders create a hierarchy of objectives to manage the activities they think are necessary to deliver their ‘future-vision landscape’. Landholders express their ‘future-vision landscapes’ verbally in a number of ways. Such as ‘leaving the farm in a better condition than it was when they started’; ‘being the “boss” in our lives’; ‘providing a good place to raise a family’; ‘being free to pursue one’s own interests and opportunities’; ‘having a job in which you can enjoy the outdoors’. What individuals mean by these statements varies greatly. But whatever they mean they provide the landholders with the incentive

for actions. How intense that incentive is and what they mean in these statements is fairly clear when one sees the product of their pursuits after they have been in operation for a few years or decades. For instance, 'pursuing personal interests' may mean developing a productive profitable farm but it can also mean restoring wetlands or planting trees or spending a lot of time overseas or indeed all of these things and more. However, landholders' 'future-vision landscapes' (and long-term objectives) are complex and some aspects may not get sufficient priority for action until some particular event occurs such as the availability of financial help. Moon and Cocklin's (2011) work indicates that landholders do have long term objectives that only get expressed when supported by a government policy (such as financial incentives). Farmar-Bowers (2010) discussed the same issue from the policy perspective, noting that policies that were viewed by landholders (policy recipients) as being in tune with aspects of their long-term objectives were more likely to be effective than those that appear unsupportive. Brodt et al. (2006 p.104) in considering biologically based farming support this idea noting that 'we also cannot expect farmers to adopt management strategies whose values are inconsistent with their personal values....[although] ...we can expect that shifts in overall social values will also be reflected in the values of the farming community'. Greiner and Gregg (2011 p.257), in considering conservation policies, suggested that governments should take note of the characteristics of the target audience (the farmers) and 'governments would be well advised to harness the diverse set of aspirations and motivations of farmers when designing conservation programs'. Bowles's (2008 p.1605) suggestions reinforce this as he noted that 'incentives [such as money payments] that appeal to self-interest may fail when they undermine the moral values that lead people to act altruistically or in other public-spirited ways'. People act to acquire economic good but also to establish themselves as autonomous, moral individuals and, as Greiner and Gregg (2011) note, farmers tend to be driven by a very strong stewardship ethic. An example of industry concern with improving their resource management is the Target 100 AUS program developed by the cattle and sheep industry. The programs consists of 100 research and development projects that the cattle and sheep industry commissions Australian universities and research organisations to undertake to find more efficient and environmentally beneficial practices through the supply chains<sup>17</sup>. At the farm level many farmers have put in place programs to improve their farming practices, an example for the south-west concerns manure handling: 'We've developed our own environmental assurance program which we have called our "Carbon Hoofprint". The foundations of this involve re-using cattle manure from the feedlot, recycling it into a nutrient dense humus soil conditioner, which is biologically activated, and then applying the final product to our soils. This process along with rotational grazing practices allows us to build soil carbon levels'<sup>18</sup>.

Landholders rarely change their 'future-vision landscapes' but what they actually do (try to accomplish) can change according to their beliefs which can change over time. The change in their beliefs may lead on to a change in how they go about achieving their long term objectives. If their incentives to achieve their objectives are strong then they may be very willing to change what they believe in order to be successful. So landholders are open to information and will change what they believe and do in order to achieve their goals. Attempts to encourage landholders to change their long term objectives (future-vision landscapes) are likely to be extremely difficult.

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<sup>17</sup> See [www.target100.com.au/industry-initiatives/all-initiatives/](http://www.target100.com.au/industry-initiatives/all-initiatives/)

<sup>18</sup> From the website: [www.hopkinsriverbeef.com](http://www.hopkinsriverbeef.com) and [hopkinsriverbeef.com/carbon-hoofprint/](http://hopkinsriverbeef.com/carbon-hoofprint/)

Landholders who use their land for a substantial part of their income usually have complex 'future-vision landscapes' often blending question of 'making a living' with 'spending their income'. They may require a profitable farm but also one that supports some native biodiversity. They may select areas for biodiversity conservation that have a negative impact on the operation of the farm business and in addition spend some of the farm income on conservation. They may justify this in many different ways including in economic terms as increasing the capital worth of the farm based on the notion that other people will appreciate the conservation values of the farm in cash terms (as worth having and so worth paying a premium for). Over half of farmers in Australia with natural environments on their property protected these areas for conservation purposes (ABS 2011). Some farmers' 'future-vision landscapes' govern how they farm for profit; taking into consideration the impact of their production methods on both the environment and consumer. This can lead farmers into 'ethical farming' (Barbour 2012), organic and biodynamic farming and permaculture. Some are concerned with the raising of animals and the conservation of older animal breeds that are generally no longer used commercially (see AFACT; Fernleigh Free Range). The blending of environmental protection concerns and business needs can lead to new businesses based on vertical integration and improving the ecological integrity of the property. Examples in the study area include utilising waste streams from pigs, permaculture and improving the sustainability of the farm (Museum Victoria, n d).

While the 'future-value landscape' may not change over their life time (they always need a profitable farm, or always act to maintain their integrity) their operational objectives may change as the owners pass through their life cycle, moving from raising a family to semi-retirement. Their changing personal needs may influence this change. Farmers (55 is the average age) are older than the average workers in Victoria and many are close to retirement age and looking for ways of doing less.

The objectives of businesses associated with agriculture are in tune with normal business practices of growth and profit maintenance. Mostly these businesses are managed by younger people as employees rather than owners of the companies.

## **2.5 Bringing things together**

Peri-urban and rural landscapes (both biophysical and human landscapes) are changing because of people's and organisations' activities as they pursue their long-term goals. These activities lead to a host of events occurring (and continuing to occur) in both biophysical and anthropic processes, and there is also the possibility of new events occurring in the future, that together are likely to bring considerable but largely unknown changes to both biophysical and human landscapes and to the ability of people and organisations to effectively pursue their existing goals.

One group of events in the biophysical processes is climate change. This may lead to numerous events such as increasing temperatures, variability of weather and increasing sea levels.

The ability to adapt to these changes depends in part on the ability of people and organisations to change how they pursue their goals and in part on their ability to change their goals. There may be numerous management and governance strategies that might facilitate increasing flexibility in how people and organisations establish and pursue their long term goals but they all depend on

developing, disseminating and accepting new knowledge. Perhaps the knowledge required relates to two questions: Are the goals best for everyone in the long term? Are the ways in which the goals are being pursued going to lead to their achievement in perpetuity?

These are not questions that can be answered through research but require the cooperation of all peoples, all stakeholders. The mechanisms currently available for this level of involvement are management and governance, as these are the existing processes in which both goals are established and implementation processes are agreed. The process within management that may assist or hinder adaptation is 'integration'. Integration may be beneficial if it involves discussion and debate (including a conflict resolution process) and some level of understanding and agreement. It may be negative if it leads to the expression of power and the reduction of review. Debate and discussion leads to review and contemplation and hence the development of knowledge across a spectrum of decision-makers. This knowledge may help them adapt both their implementation activities and their goals to the changing circumstances (including adaptation to climate change).

Although 'integration' is just a stepping stone in the management and governance processes it is important because how it is used can turn society toward effective climate change adaptation or away into some other direction. What then are the barriers and enablers to integration that can assist in adaptation? Tentatively, we can list the requirements that are important to integration: (1) identifying stakeholders and their long-term goals (aspirations); (2) knowledge about how the current systems work and what trends are occurring; and (3) ideas about the likely future events and their relevance to stakeholders' long-term goals and the operation of the current system.

To acquire this information and have it continually updated, suggests the institutional arrangement for governance for human and biophysical landscapes should be adaptive; that is they should be able to develop relevant knowledge about biophysical and anthropic processes through management/governance practices and be able to monitor changes. To bring people into sufficient agreement to develop management programs that stakeholders will support, suggests that institutional arrangements should include stakeholder interests, have effective conflict resolution processes and be able to share information so it can be understood and trusted. To maintain, but also adjust management programs as conditions change, suggests that institutional arrangements should be able to define user groups and their responsibilities and apply sanctions to encourage ongoing support.

Dietz et al. (2003) suggested three governance principles in particular are relevant to the governance of regional and probably global resources; these are 'analytic deliberation' (dialogue among stakeholders), 'nesting' (adaptive governance from local to global) and 'institutional variety' (mix of institutional types, hierarchies, markets and community self-governance). Bauer et al. (2011) noted that 'nesting' different levels of governance was not always joined up and coordinated, and that 'cross-scale interdependence' is not matched with 'cross-scale linkages'. In regard to 'institutional mix' they note that hierarchies mainly relied on 'command and control', markets on 'financial incentives' and networks on 'collaboration'.

## Part 3. A review of the analysis of the interviews

A range of landholders with properties in the south-west study area were asked to talk about their long term objectives or aspirations for their family, farm and/or landscape and also what programs or activities they had in place to achieve these objectives. The interviewer had a list of questions and checked these off as the conversations with the interviewees proceeded. If some of the questions were not addressed in the interview the interviewer would ask about that topic. The list of questions is set out in Figure 5.

A number of people were also interviewed who do not have land based businesses but have a professional involvement in land use (resource use) in the study area. They were asked to talk about the objectives of what they were involved in and strategies and programs that were being used to achieve these objectives.

### 3.1 Landholders long term objectives and aspirations (summary)

Each interviewee had a unique story to tell and a unique set of aspirations or long term objectives. The common ground in these stories can be divided into seven groups of objectives. These objectives are independent in that the interviewee may focus on making decisions in these groupings one at a time, although often in a hierarchical order, and overall they are related and substantially integrated.

- 1 Objectives about developmental opportunities for family members. These included education, moral development (being 'good people' for a want of a better term) and happiness or being able to pursue 'full lives' that bring satisfaction.
- 2 Objectives about the living conditions they want to create or have for their family. These mainly related to outdoor lives in a rural setting with scope for a range of activities including being in touch with nature.
- 3 Objectives about the businesses aspects of the enterprises they were running. While profitability in the longer term was an essential element they had other objectives such as ability to grow the business given their financial/physical/industry situation and the personal acceptability of the activities needed to run the business (did they enjoy the work).
- 4 Objectives about the physical aspects of the farm in regard to production and income and related to the productive capacity of the farm. The objectives ranged from soil conservation to water supply.
- 5 Objectives about the non income producing physical aspects of the farm. These objectives are not related directly to production and income in the foreseeable future although they may be related to the value of the estate. The issues in these objectives included the residences and their grounds, the extent and quality of the permanent vegetation on the property (trees, woodlands, forest, grasslands and waterways).
- 6 Objectives concerning their relationships with people and organisations off the farm. These relationships can be connected to any of the other five objective areas or some different area (or topic). Objectives about their community, making a contribution and being involved in a number of ways. This community may be a community of practice developed through activities (such as business or church) but tended to relate to the local town (village) or regional centre. The effect of this interaction is to maintain contact with ideas and social development and to bring this

information into the decision-making systems of landholders and to influence external decision-makers.

7 Objectives about influencing people and change in society (a citizen perspective).

<b>Questions for Interviews Commencing November 2011</b>	
<b>Objectives of the interview</b>	
(1)	What aspirations/objectives they have for the future:
a.	For their family and themselves
b.	For their farm
c.	For the region and the landscape in the region
(2)	What strategies they have to ensure they get their objectives/aspirations
a.	For family
b.	For farm
c.	For regional landscape
<b>Questions</b>	
Subsistence,	
1	How do you make your living?
2	Tell me about your farming operations
3	What other income producing ventures are relevant
Protection,	
1	Tell me about your aspirations or long term objectives for your family/ farm/business
2	How do you protect your family in terms of maintaining a living, health and security?
3	What strategies or general approach do you have to dealing with changes that might become problems or provide opportunities (Climate fuel prices sequestration, methane etc)
Affection,	
1	tell me about decisions that are influenced by any special needs of family members
Understanding,	
1	where do you get reliable information to help you make decisions about the farm
2	tell me about education, getting skills and knowledge that is important for your/family
Participation,	
1	are you involved in regional affairs and local groups
a.	social, political, welfare, landscape, conservation, recreation, business, agricultural, educational.
2	What is attractive in this involvement (what do you do and what do you get out of it)
3	Involvement in Landcare or landscape action in some way
Leisure,	
1	value of farm for recreation leisure hobby
2	values of region or landscape for tourism, recreation, leisure aesthetics
Creation,	
1	ability to express creative talents through the farm and external activities
Identity,	
1	How do you/family relate or identify to the region/farm
Freedom.	
1	do you feel tied to your industry (e.g. dairying)/farm/region

**Figure 5: The objectives of the interviews (explained to the interviewees) and the question set that was only addressed if the conversation with the interviewee missed mentioning the topic**

### **3.2 Why landholder objectives are relevant to integrated landscape management**

Most of the land in the South-west region is privately owned and used for private purposes that are directed by the long term objectives that landholders have. This makes landholders (farmers) an

important stakeholder group in society in their own right and also managers of important assets that deliver both economic and valuable but non-economic ecosystems services to the Victorian community that governments have to deal with in achieving the governments' long term objectives for both human and biophysical landscapes within the south-west region. The governments' policies and programs that seem most relevant to the biophysical and human landscapes in the south-west are outlined in Part 4 of this report.

Currently farmers are excluded from paying for the carbon pollution their farming activities create but they have assets that can be used to sequester carbon, at least temporarily, in soils and vegetation (CC 2011). Because of agriculture's substantial contribution to Australia's carbon pollution (DCC 2008; DCCEE 2010) it seems inevitable that eventually mitigation will become an important aspect of agriculture; this will increase the importance of the assets and management practices of farmers and other land holders in the south-west.

To a substantial degree, the long-term objectives of landholders and the strategies they have employed to reach their objectives have had ongoing approval of the community and governments, period by period as have the activities of non-farm industries and commercial ventures in the south-west region. The current human and biophysical landscapes have come about because of the ongoing demand for goods and services by the public and ongoing acceptance of the appropriateness of landholders (farmers and non-farm businesses) meeting consumer demand for goods and services, and production and distribution methods that producers have employed year by year, over the decades, by both public and government authorities. This applies to the whole range of products and services destined for the home market, such as water supply, transport infrastructure, manufactured goods, energy production, education and medical services as well as agricultural products, and also a substantial volume of exports. All of these 'approved' activities have had and continue to have a very significant impact on the development of both the human and biophysical landscapes that exist in the south-west region.

The methods of land management used by landholders, the demand for goods and services and the acceptability of the methods employed have evolved over the decades and this has led to the substantial change in the current condition of the land, what the land can produce, how the land is used and what the biophysical landscape looks like.

Always the current practices in land management as well as governments' control practices are likely to fall short of the most advanced ideas about what goods and services and what methods are most likely to maintain the productivity of the land (in regard to a range of ecosystem services). Thus a time slippage between the 'ideal' and reality is normal. It is also normal to have the dilemma of what to do to ensure a future landscape (goods and services produced and methods used) that Victorians (and all Australians) will approve of in decades to come. This 'normal dilemma' is ongoing; the content or focus of the dilemma changes from period to period.

The landholders in deciding what to do and how to manage their land are integrating their objectives (seven are summarised above) with external information such as market conditions, new technologies, government regulations and incentives. As asset owners, as opposed to asset users, they are also deciding how to manage the assets (land and water) and integrating their long-term objectives with external information in a process usually referred to as 'succession planning'. Options for disposal of their assets are limited by land use planning regulations and by external



demand which tends to be light from other local farmers wanting to expand their farm size and variable from other external sources (previously, some had an opportunity to sell to blue gum companies and perhaps some have opportunities to sell to foreign sovereign funds, to amenity tree-changers or to energy companies wanting carbon credits). By taking on external information landholders can integrate their activities and succession planning so that the outcomes are likely to be positive for achieving their long-term family objectives. Similarly governments and businesses with a stake in the south-west region are integrating their objectives and programs so that the outputs are likely to be positive for achieving their objectives. Government policy to move further toward market based governance may see the freeing up of assets enabling them to be more readily transferred to more profitable and financially secure ownership and uses.

Knowing the current situation in the systems they are working within is essential for both landholders and government agencies as this allow them to discern what constitutes a change and allow the measurement of that change.

Ideally, landholders in developing their long term and operational objectives are able to integrate information about their aspirations with knowledge of the current situation and good information about possible futures. Landholders of course have objectives, other than producing agricultural commodities for sale, that have an impact on their land use. For instance, they may have private family uses of land for recreation or pursuing a social obligation they feel strongly about – for example, restoring native vegetation. In addition they may have obligations in society (such as being a local government councillor or hospital board member) so that they have to spread their efforts across business as well as non-business objectives and this reduces the time available for any one objective. Land management and allocation of time to various pursuits are decisions that can be reviewed and changed although some decisions lock the landholder into a course of action for a time (such as buying a farm) and others are irreversible and are permanent ‘locks’. Ideally governments are integrating information to develop their long term objectives (white papers, policy statements) then integrate their objectives (different policies) with each other (which are likely to cross agency boundaries) with knowledge of the current situation and with external information about the possible future. The process is iterative and also a function of scale and time, as small scale objectives (activities or events) can change the effectiveness of large scale objectives (activities or events) and also short term objectives can influence long term objectives by facilitating or preventing their achievement<sup>19</sup>.

Part of the information landholders need to include in their decision-making concerns the activities (including rules, regulations and incentives) of governments, and governments need to include in their decision-making the information about landholders, especially when the objectives governments want involve the cooperation of landholders (at least to some degree). In a democratic situation, governments are restricted in the long term as to how much change they can impose that is contrary to the objectives of landholders in case they lose electoral support. The same notion applies to land holders; they are restricted to changes that are within boundaries of public acceptability and are currently legal. Bending the rules, of course is part of the process of change but maintaining public acceptance is important for being politically successful.

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<sup>19</sup> See panarchy [www.resalliance.org/index.php/panarchy](http://www.resalliance.org/index.php/panarchy)



Although landholders (people with rural properties as opposed to home in urban suburban areas) are a minority in the region, the issue of fairness is important in policies that can change the lives of people. Understanding landholders' objectives in developing policy is thus important for governments. As one farmer put it: 'What worries farmers are that decisions are made about the country by people who don't know much about the country' (attribution: male, late career). Indeed Potschin and Klug (2010 p.654) suggested that 'It seems that no successful planning process can be implemented without considering, recognising and accommodating different values of local people'.

### 3.3 Landholder's long-term objectives

#### Objectives about developmental opportunities for family members.

*Landholders often maintain that growing up on a farm provides a great opportunity for children to develop physically and mentally. 'Farm life is very good for them [children] wholesome it's a good learning environment'* (attribution: male, mid-career).

A number of reasons are given such as being exposed to farming and the reality of how their parents make a living, having open spaces to play and undertake physical exercises such as riding horses or bike riding, and having the opportunity to experience nature close up. Other comments include the advantage of rural community and supportive neighbours. Many landholders see negatives especially in regard to children's education and the flow on into job opportunities. The outcome is that a number send their children to boarding school in Ballarat or Geelong.

Landholders have to think ahead about education since it can be financially expensive. 'we have got to think about whether our local education is the biggest issue for us and whether it will provide to a level that is appropriate I suppose ....whether we have to move closer to a bigger city or town ....something we have to consider some time ....give them a bit more exposure' (attribution: male, mid-career).

A number of landholders mentioned the travel they had done and how it helped to give a comparison with their home and business life. Some of their adult children also travelled and their experiences added to the family understanding. Others knew what they wanted to do from an early age.

Self development is also important with landholders seeking out learning programs and courses (such as leadership programs, director's courses and Nuffield scholarships) and taking up positions on company boards, organisations and being on committees and advisory groups. These activities are personally fulfilling and also provide information that can be applied in their businesses and land management decisions. One interviewee put it this way: 'I don't want to do lots of academic stuff but ....'Never stop learning'.... if there is an opportunity ...You never know what door it may open for you ... it's getting quite volatile in farming ....the markets and the weather and you never know when your luck might run out in farming and you have to get another income from somewhere....its building up new skill sets' (attribution: male, mid-career).

The farm can provide a career opportunity for children. One interviewee whose family had been farming the area for some generations said his son was now managing the farm: 'My son is working

on the farm for the foreseeable future ...committed to it, he can after secondary school, he come home on the farm, that is all he particularly wanted to do, that suited me I guess, but it was really up to him' (attribution: male, late career).

### **Objectives about the living conditions they want to create or have for their family.**

Although lifestyle is sometimes used as a pejorative term, landholders often mention this as an important benefit of farming or living in a rural setting. This is sometimes mentioned together with the problems and hard physical work of farming as a form of compensation.

An example of the kind of statement is: 'I have always enjoyed even from a little youngster, farming, or farm business, I enjoy the lifestyle, it's wholesome, and I enjoy producing something from the ground up and I like rural communities I think it's an honest trustworthy community to live in' (attribution: male, mid-career).

Deciding early in life to work in farming is not unusual and usually comes from some early experience of being on a farm or visiting a farm probably on a regular basis. For example one interviewee noted 'Ever since I was a little kid I always loved this property because its undulating hills and the big old trees are still there and everything' (attribution: male, late career). For many farmers the proximity to nature (natural environment) and growing things are very important. There is also an element of wanting to produce agricultural commodities rather than other goods such as timber, even though they can earn and income from alternatives. Not all farmers start out farming, some work in the city or in other rural jobs before buying into farming.

Another aspect of this lifestyle (but not unique to farming) is the ability to run one's own business and generate work topics (enterprises) and schedules that suit their family. This arrangement allows the participation and employment of family members.

Many farmers do not have an easy time of farming. Often the combination of lack of capital (small business size) low and fluctuating incomes due to variable seasons and market conditions and the hard physical work and long hours make it a difficult life. Consequently some do not encourage or actively discourage their children from a farming career. However, many would like to have a non-farming career and use the farm (or parts of it) for recreation. For example, one interviewee noted that: 'I am not really encouraging him [my son] to be a farmer.... [We might] leave him with a core of the farm and the same with my daughter....she thinks she would like to have a piece of the farm and work at the same time, which I think is a much better option than the way I have lived all my life which is hard work' (attribution: male, late career).

For many people the real benefit in living in a rural setting is close access to nature even though they may not earn a living from farming. One interviewee noted: 'When the opportunity came up for us to look at this property and take it on, certainly from my background in natural resource management, I felt that this is a better environment for our son to grow up in .... we could sit on the front veranda at night and watch the swamp wallabies coming down the road and koalas wandering up the drive' (attribution: female, mid-career) .

There tends to be an ethical aspect to how landholders want to live. An important aspect is concern for the family which can be thought of as the application of care ethics but this for many people expands to include concern for the community more generally and people and their environment more generally. For example one interviewee noted that 'we worry about our carbon foot print' (attribution: male, mid-career) and are taking steps to reduce it. For many the ethical considerations include caring for particular aspects of the natural and or human landscapes.

One aspect of the farming life is the health risks involved. These come from a variety of sources such as injury from physical activity and accidents and from poisoning from farm chemicals and also asthma from pollens and dust. There is also the possibility of diseases from animals (zoonoses<sup>20</sup>). One interviewee notes that: '[health problems come from a] Combination of things ....been a farmer all my life so the experts seem to think that a reasonable thing to have crook hips and crook back and all the rest of it ...had problems with my back for donkey's years' (attribution: male, late career).

### **Objectives about the businesses or enterprises they were running.**

An important aspect is being able to run one's own business; be the boss. Landholders' views and approach to business are variable. Often the enterprises they are running are determined by their inclinations and personal preferences rather than selecting the enterprise that will make the most money given the resources available. However, resources are critical in determining the long term success of the businesses and therefore the maintenance or success of the business from the family point of view.

The business aspects can be divided into three time periods; getting into farming, running a successful business (with sufficient profit) and finding ways to stop work and 'retire'.

#### ***Getting into farming***

Getting a farming enterprise to sufficient size in order to support the family's growing needs is a major hurdle. Some of the interviewees came from non-farming backgrounds and developed expertise and capital resources in stages, using both agricultural and off farm incomes to 'grow the business' which may involve buying a bigger farm. Dairy farming offers a way to get into farming incrementally.

*If there was an opportunity to buy a bigger farm than I would do that ....there are a few limitations here...the cow shed needs a lot of money spent on it.....There is not enough security in farming to go and spend three or four hundred thousand on a new shed .....but moving to a bigger farm that has a better shed means we have to part with AUD140,000 stamp duty...single biggest limitation on changing farms.....we should move on but we have hit the bottle neck ...need more equity to take the next jump [to a bigger farm] (attribution: male, mid-career).*

Developing equity to expand the farm business is partly dependent on the market maintaining the value of farms. But as one interviewee noted: '[there is] no one out there to buy farms. ...there is so much potential in the region to grow .... But it's underused .....Perhaps 90% of farmers would sell tomorrow if somebody would come along ...worst I have seen in 25 years of farming' (attribution: male, mid-career).

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<sup>20</sup> For a list see: AG1032 Bronwyn Murdoch, [www.dpi.vic.gov.au/agriculture/pests-diseases-and-weeds/animal-diseases/zoonoses/zoonoses-animal-diseases-that-may-also-affect-humans](http://www.dpi.vic.gov.au/agriculture/pests-diseases-and-weeds/animal-diseases/zoonoses/zoonoses-animal-diseases-that-may-also-affect-humans)

Another interviewee noted the potential value of exposing young people to farming, suggesting that students starting at regional universities could be told 'we can train you up as relief milkers and you can help your way through studying ...a small number might go farming...not rocket science to milk cows' (attribution: male, mid-career). It would also help create a labour pool as the lack of labour is a problem in growing farming businesses. Also lack of housing on the farm is a problem in attracting and keeping labour.

Some people move into farming not to create a business that will support them fully but as a preferable alternative to city living and a city job. For instance one interviewee explained their decision to go farming as: 'Pretty much a decision based on not wanting to be stuck in a job in the city for the rest of our lives I guess and we had friends out here who had done a similar thing ...sounded like a great idea at the time ....figured we could set up my wife's business here ....after a few years of saving up we bought the place ... and continued working for a few years to pay for things we were getting done....we got the house built ...then we move here....it was a bit of a learning curve.....I had no real manual skills to be honest...we have done it ....we will be here for a while yet..it's very satisfying' (attribution: male, mid-career).

Inheriting a farm is an option for many but they often have to buy out siblings unless the succession plan had provided alternatives. There is much less of an expectation that children will follow on with the family farm than there used to be. Perhaps for two reasons: they may want another career; or the farm may not be able to provide a sufficient income in years to come. In regards to grandchildren, one interviewee notes: 'grandchildren ...opportunity to farm may be there but really don't think you can expect them to necessarily follow on. Sure the farm or some of the land has been in the family for 100 years or better but better let the children make up their own minds about careers' (attribution: male, late career).

## ***Running a successful business***

### ***Position in the supply chain***

Running a successful business within a supply chain requires that the operation obtained enough income from operation to not only live but develop and invest in new technologies and business development. Farmers are well aware that generally they are 'price takers' and have little control over the prices they pay for the inputs and money they get for their products. Marketing and the ability to obtain a return on money invested is a major issue for farmers now and into the foreseeable future. For example, one interviewee noted about the ability of farmers to get an adequate share of the marketing margin:

*[Supermarkets] are taking more of that marketing margin from milk factories and where are they investing to make the industry more profitable or efficient? Which they are not. They don't have the ability or capacity to invest back into agriculture like our own companies or farms do [probably not interested] so for a short term gain to get that marketing margin the long term view ...I don't like that long term view because we [farmers] are going to get pushed up against the wall again and won't be able to produce food ...it will be too costly to produce. Price of food will go up if we [farmers] cannot capture some of that margin on the way than ....there is not much point in buying cabbage for a dollar and selling it for 90 cents. Marketing is the main issue in the future (attribution: male, mid-career).*

There is some flexibility on farmers' use of the supply chain. Some, notably dairy farmers, have specialised on one step in the supply chain (milking cows) and contracted out the raising of dairy replacements (young cows) and the production of grain for supplementary feed. Feed lots also specialise at one point of the supply chain. There are a number of possible reasons for increasing specialisation. Partly it may be to capitalise on scale and hence throughput focusing on that part of their traditional supply chain that gives them the most return. Specialisation also allows the business to grow as they are using other people's resources by buying in their products rather than using their own resources to produce the inputs.

Some farmers are going the other way by extending their business into the wholesale and retail areas of the supply chain. For example, they may be selling their products through a cellar door/market stall or delivering to retail outlets directly.

### Expanding the farm business

Many farm businesses are too small to successfully support a family through a generation. They have to be expanded. One of the commonest ways is to increase the resource base by buying more land or other farms businesses. However, land prices and the lack of capital make this very difficult. 'I would have loved that opportunity [buy a nearby farm] but limited in how we can expand by lack of capital [bank borrowing]. Buying is a good investment for capital gain but need an income to live on' (attribution: male, mid-career). In addition to buying a farm or land to 'grow' the farm business purchasers have to pay stamp duty on the value of the property. One interviewee noted that: 'stamp duty on buying a farm or moving farms [upgrading to a bigger business] is a major hurdle. [there is] no point in upgrading a farm that is too small to make a return on capital investment' (attribution: male, mid-career). Family farms often have income difficulties when generations change as the farm has to support two families for a time. One farmer in this situation noted that the farm business was too small to adequately support two families and his son was moving the enterprise mix to more profitable ventures (cropping replacing wool) doing some crop contracting and share farming for extra income. He said that they would 'Like to buy more land but you have to have the assets behind you before you can do that' (attribution: male, late career).

Over the decades farms have been amalgamated as a way of increasing the size of the business and income and also to take advantage of scale. The counter movement is to break farms up into smaller units to take advantage of the demand for rural living (hobby farms) and the higher price per hectare of smaller holdings. One interviewee noted that: 'When I was growing up there were a lot of soldier settlers in the area so there were a lot of farmers on fairly small areas when I was a kid, but of course all of those have gone now, all been bought up and amalgamated into bigger areas or else broken up into smaller hobby farms. So the landscape does change and most people who live in the district are not farmers they work in town and just live out here' (attribution: male, late career).

### Thinking about climate change

Farmers have to react to the situation and their prognosis of the coming season. They know that seasons and years vary; some will be bumper years, others average and some poor. One farmer noted that financially farmers 'can survive one bad year in five but not one good year in five' (attribution: male, mid-career).

Generally farmers are optimistic in regard to climate change. For example: 'I am not too worried about climate and those sorts of things, I understand what is happening. But I do think farming is

adaptable, we can adapt and we have adapted, so there are tools there so we can keep adapting. So in terms of climate change and in that space we are well versed to challenge that - if it's a worry - so it's something we have to continue to work at and develop things but I think the farming/agriculture is very resilient and keeps reinventing itself anyway, so I think it will always adapt and humans are good at that' (attribution: male, mid-career). Others note that it is something farmers will have to deal with: 'Climate change ...yes we are concerned, it's making it harder, we had all this rain last summer which made cropping really difficult, just something that never used to happen, we have been through 14 years of very dry seasons, an extended drought you could say ...yes I think climate change is happening and we have to deal with it, it's going to make it harder for farmers to grow food' (attribution: male, late career).

Some expressed concern that government policy may not drive real change; they would be paying a general tax but not being given directives or incentives to get products that reduced carbon pollution such as bio-digesters. 'I am not opposed to a carbon tax providing it drives change...that what worries me, it is not going to drive change ....need to offer a subsidy or try to get these products that are going to reduce energy ....and have access to them....need incentives to invest in new technologies.... Need to work out key areas to invest seriously in, invest properly. [key areas for investment could be] effluent management, solar energy and new technologies such as efficient pumps' (attribution: male, mid-career).

Perhaps the change in the landscape due to changes in agriculture because of climate change might be small if the industry makes internal adjustments as suggested above (more efficient pumps, solar power, diets for cows that reduce methane production etc.). However, farming may be impacted by changes in other industries such as the energy industry seeking to offset its carbon emissions. This may lead to destocking of rural areas and an increase in permanent tree plantations. One interviewee noted:

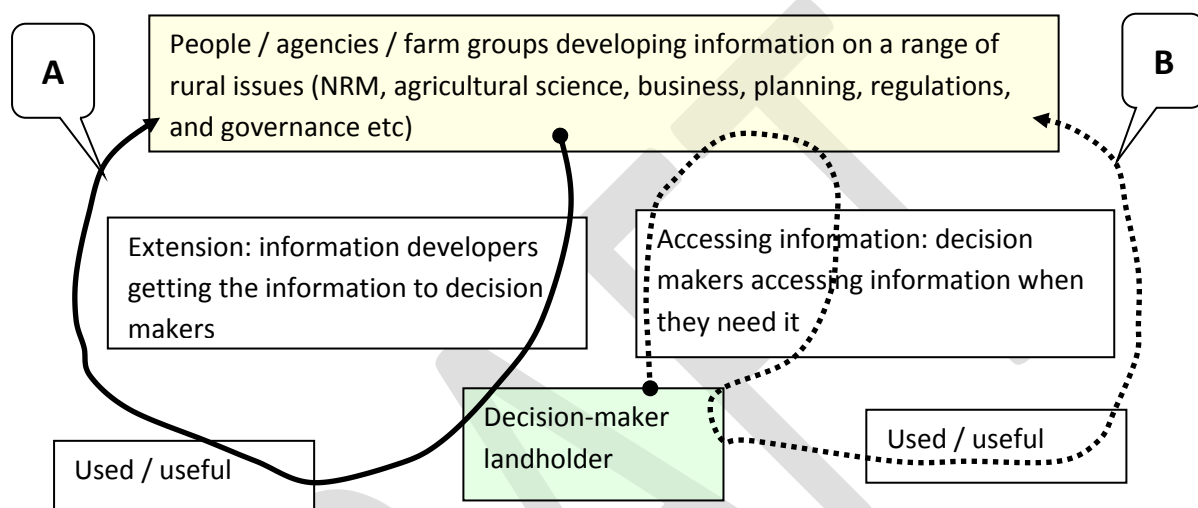
*While agriculture is not on the books as a carbon industry as yet [involved in the carbon tax], it does not take much of an imagination to know that they will be because they are one of the biggest producers of carbon. And one of the biggest producers of carbon.... are dairy farms of which the south-west has a great number and that there will be this alliance start forming between industries [such as power companies] that produce a lot of carbon and areas of Australia ....that can be purchased ....to defray that carbon (attribution: female, mid-career).*

Carbon farming is of considerable interest as farmers see that it might help their farm soils, region and conservation objective and also provide some income. One interviewee discussed actions taken to find out more:

*Attended a carbon farming conference in Dubbo [September 2012] and formed a working alliance with other Landcare groups in the Corangamite catchment area with a view of trying to understand what can be done and what cannot be done about the carbon cycle and whether this carbon trading particularly for soil carbon is a viable thing or whether it is just a bit difficult to measure because I don't think even the Commonwealth Government department had really got a good handle on it...(attribution: male, late career).*

## Information

One of the problems in farming is getting useful information in time for making good decisions. This is a rolling situation requiring ongoing research and up-to-date information. Perhaps there are two aspects: first, developing the information; and second, decision-makers having the information. The problem for the people developing the information is getting the information to the decision-makers (landholders) (A in Figure 6) ; this could be via an extension program. From the decision-maker's perspective having the information is about being able to seek and find the information when they need it (B in Figure 6).



**Figure 6: Information transfer: from information developers to decision-makers, from decision-maker to information developers. An issue is feedback on how the process went and the value of the information. Improvements require feedback (i.e. adaptive management) A, extension activities to decision-makers; B, decision-makers seeking information**

Developing the information requires knowledgeable and experienced people and there is a problem in regards of getting clever people to study agriculture at university level and undertake higher degrees. One interviewee noted for agricultural graduates that 'the money is not there ...but the demand for good people in agriculture is still high' (attribution: male, mid-career).

One of the areas of concern to interviewees and so perhaps requiring research is the ability to continue to produce with lower inputs because of climate change and increasing costs and perhaps lower availability of resources such as diesel and fertilisers. One interviewee noted a problem with some agricultural research as: 'Not understanding that the environment is the underpinning for the whole business [agriculture]' (attribution: male, mid-career). Understanding the functioning of the environment is very important and this requires ongoing research and monitoring of various aspects of the environment such as water quality, biodiversity and soils.

Farmers are looking for higher value crop of commodities to produce on high value land to meet the growing costs of farming and this may require considerable research. 'Perhaps looking for a good mix of products to meet risk profile' (attribution: male, mid-career). Landholders appreciate that the



government and universities are moving out of agricultural research for a range of reasons, but there is still research being conducted.

Previously governments were much more involved in extension services than they are now. One interviewee noted: 'we have lost a lot of extension services ....what is the opportunity cost of not having it in the long-term...may be better to beef up the extension services and get those farms walks and extension services going again ...they don't have the funding to do it.....it would be good to have the farm [research farm], research and extension driven from a resource [university], or the research done on farms....I don't think we are looking far enough ahead in our policy' (attribution: male, mid-career).

One interviewee was concerned about how departments/consultants approach farmers and suggested that farmers understand that they work in complex systems that they cannot really understand and learn what works by trying things out. So it is important to: 'Try and excite farmers to try things.... it's not until the farmers change something on their own land that they understand....its learning by doing not trying to think it through...the complexity does not allow us to think it through' (attribution: male, mid-career). Perhaps one of the ways of exciting farmers is to approach them in the way they normally operate:

*I have worked with groups [of farmers] for a while...I load up a whole heap of stuff and it will range from profit to food to landscapes and stuff and they just want a talk and a roam. And the farmers love it and we will go from how high should I be putting the bottom electric wire? to what do you think the future is of human health?...from strategic to the lowest operational stuff and the farmers love it and score it high....[however] extension people will give it a [low score] because it jumped around everywhere. That is how people live ....farmers walk in they are trying to design the future....next minute they are going out and feeding the sheep....they run all these simultaneously in this complexity (attribution: male, mid-career).*

Landholders access information from wherever they can and not necessarily from specialists in government or from specialist private practitioners. Other landholders are an important source of information. For instance one interviewee noted that:

*Information comes from friends and the stock agent, he has been really helpful ...he knows I am inexperienced and will pop in to see what is going on ...lot of people have been really good knowing that we are new to it ... some reading ...[and] done some courses years ago short course, but I don't think it's that hard really ...we have fenced the paddocks into smaller paddocks of about 5 hectares each just a small amount of reading told me that, just moving them to paddocks more regularly encourages better grass growth (attribution: male, mid-career).*

Landholders learn from each other and this is especially important locally to see what local farmers have achieved. Farm walks and site visit are an effective way of learning and many farmers like showing people around their farms and explaining what they are doing. For instance one interviewee in discussing learning from others farmers about tree establishment noted:

*Landscape and catchment groups come and have a walk through to see what we are doing and we sometimes go a field trip and see what other people are doing....it's a good way to share information.....there used to be a good tree expert from DSE who used to come out here and talk to*



*us occasionally. We had a discharge site that was salting up and we wanted to deep rip it and plant it to trees, he said they would not grow but they did [local eucalyptus species], so then he used to bring people out to show them how to do it (attribution: male, late career).*

Although the need for information is general, specific information needs are time and location dependent. For example one interviewee said: 'I am involved in a discussion group near Geelong...mixed farming and cropping farmers, 2 years ago [2009/10] they were moving back out of livestock into cropping, now because of high land prices and wetter seasons they are suggesting they should move back to have a really good mix to reduce risk' (attribution: male, mid-career).

One of the trends in land tenure is the purchase of smaller holdings by people who do not have a farming background and so lack some of the practical management skills. One farmer's view of hobby farmers suggests that information is the key to improved management and having that information available through a media that hobby farmers can access on demand is very helpful: 'Some of the hobby farmers were hopeless ...but some have developed quite nice little farms now. I think probably the internet and so forth has given them more information nowadays ...they are starting to look after their properties...some are interested in doing the best they can [in regards to weeds and pests]' (attribution: male, late career).

One interviewee noted that there is 'Never a problem finding information in natural resource management; You build up a network of contacts in different organisations and if you are willing to ring up government agencies and ask dumb questions its quite surprising what people will actually tell you or direct you to, ...sometimes it requires some persistence....have to be a little bit persistent...' (attribution: female, mid-career).

Although there seems to be a general understanding that the climate is changing there is less appreciation of what the implications may be both in physical and political terms. One interviewee suggests that: 'That impression of what changing climate is all about and how it relates to carbon and the carbon tax is a very poorly understood connection, a connection that needs to be made more available from trusted sources to the general community' (attribution: female, mid-career). To develop a community more resilient to climate change, a greater appreciation of the impact of weather extremes (heatwaves, droughts, floods, fires and storms) and how to respond to them is needed. There is also some appreciation that practices on land that generate greenhouse gases will have to change eventually but these may have to be supported by research based information; such as how to apply nitrogen fertiliser to improve its effectiveness and reduce greenhouse gas production.

### Labour

Getting labour can be a problem especially getting skilled labour for part-time casual work. One interviewee mentioned that they have been able to train up people to help out on the farm, 'we have found the best are the older people nearing retirement age who don't have family commitments ...these people can come whenever you need them' (attribution: male, mid-career). Some jobs have traditionally been done through contract, such as shearing, but one interviewee notes that 'We have a real problem getting shearers, nobody wants to do that hard work anymore ...it's a significant factor in lowering the number of sheep on the property' (attribution: male, late

career). 'We don't have any permanent staff but use external people for shearing and other jobs with the sheep and sometimes for the header.....personal contacts' (attribution: male, late career).

### **Alternative income**

Alternative sources of income can be very important to keeping the farm running (especially during lean years) and also providing a source of income to help expand the farming businesses.

Traditionally farmers have obtained extra income by working off-farm in occupations such as teaching and nursing, and in running other enterprises such as shearing, general contracting and trucking. For example one interviewee mentioned that 'I do a bit of wool classing for neighbours' (attribution: male, later career).

One potential income stream is royalties from wind farms. The future for wind farms in Victoria may not be very promising. For example one interviewee notes that 'We also have planning permission for wind turbines on this property which should make us a lot more economically viable if they ever get built but the state government is very anti wind turbines and because they have already been given approval we are pretty hopeful that they will get built' (attribution: male, late career).

Although there is a perception that farmers are business people making a living and that their decisions are economically rational, many use external sources of income to subsidise their farming activities. One interviewee notes in talking about the reasons people buy farms noted: 'It's not economics, the farm that comes up for sale [and they buy it] then they find that they started working off farm to subsidise it; that is telling you it's not economics. They [farmers] don't make decisions [about going or staying farming] based on those things [economics]' (attribution: male, mid-career). Another interviewee suggested that 'If you look at the return on investments in farming, it's pretty miserable' (attribution: male, late career).

### **Using technology**

Modern agriculture is dependent on a wide range of technologies and successfully farms often use many of these technologies. Mostly technologies allow farmers to do more, replacing labour with machinery or chemicals (capital replacing labour). For example, dairy sheds are designed to reduce labour allowing more cows to be milked. Pesticides and herbicides allow larger crop yields although not all farmers are happy with the technologies they use. For example one farmer noted that: 'What I don't like about cropping is all the spraying you have to do all the time there is that much chemical use and I really don't like all that. We are spraying all the time that is the only way you can get yields out of crops that is the only way to make money is spraying every weed out' (attribution: male, late career).

### **Finding a way out and retiring**

One way out is to lease the farm so that they retain income from the property and retain the capital value. One idea was: 'We wanted to set up our farm so that an average person could get good results ...so we can step back [lease the property]' (attribution: male, mid-career).

'[The dairy industry] is top heavy with older people ...a lot are looking to get out when they cannot milk the cows anymore...they sell the cows ....they have no debt ....and run a few stock ....so the farm goes out of dairying' (attribution: male, mid-career). There is a problem if the dairy factories are relying on a maintaining or increasing flow of milk from the region. If too many farmers retire

from the dairy industry the entire industry in the region may be vulnerable if there is not enough milk to run the factories at a profitable level.

The blue gum industry provided a ready buyer for some farms although it is not an ongoing opportunity. One interviewee noted that: 'A lot of this area went into blue gums...really just a bit of a con ....poor investors they thought they were getting a good deal but probably all of them lost their money in the end I don't know who owns them anymore ...the people who used to live here well they sold up, so less people in the area so its affected CFA, Landcare groups ...I am sure it had a big effect on the place' (attribution: male, mid-career).

Other options include selling to local farmers who want to expand their farm businesses by increasing their land holdings. Many farmers commented on the low demand. There may be many reasons for the low demand such as the age of farmers (more looking at retiring and doing less than expanding), the relatively poor returns to farming, and the costs of money and the cost of purchasing (stamp duty).

One interviewee noted that a relative of theirs was acting as a stock agent and buying farms for a foreign sovereign fund. This option may be available in the future if farms in the south-west region meet the requirements of foreign investors. Another interviewee noted the possibility of energy companies buying farms and growing plantations to gain carbon credits from both the trees and reduced carbon pollution from the previous farming activities. Perhaps more traditionally some farm holdings have sold off portions of land on separate tiles that have been used as hobby farms, rural living or for their amenity and conservation value. One interviewee noted the problems with trying to farm in the peri-urban area as there were ongoing issues with utility companies wanting to develop infrastructure on their land but no ability yet to sell into the residential market because of the zoning and use the proceeds to buy elsewhere. An issue for some landholders was the pressure to sell when land they own is rezoned for residential development and the rateable value increased accordingly.

### **Objectives about the physical aspects of the farm in regard to production and income and related to the productive capacity of the farm.**

There are two aspects of objectives about the physical aspect of the farm. One concerns the psychological feeling of doing a good job over a period of time and avoiding the stigma of 'mining the land' or of being known as a 'poor' farmer with degrading land and a heavy weed presence. Perhaps the usual refrain of 'leaving the farm in a better condition' refers to this sentiment.

The second aspect concerns the reality that the physical aspects of the farms, such as productive soils and shelter for stock, actually can lead to improved production and income (other things being equal). Productive farms are also worth more in terms of sales and even if the farmer has no intention of selling, high farm values mean increased equity and hence increased borrowing ability. A step toward improving the physical aspects of the farm is the development of a whole farm plan. This brings important physical aspects (distributed spatially) together to facilitate improved land management.

Many of the ideas about soil productivity focus on erosion, acidity and salinity.

Adapting to prepare for the future is also an objective of some. There is concern about climate change but also about higher energy prices especially oil and gas which are very important inputs for modern agriculture. One interviewee noted the importance of developing grazing management practices that would continue to produce with very low inputs: 'We need to be incredibly diverse [in number of pasture species] if you want the land to be stable or to not erode, infiltrate water, to cycle nutrients, to store carbon, to regenerate our ecosystem and to supply our life support system, then we need to head in this direction ....I believe once we cannot afford fossil fuels ....we are going to need someone who can actually say "how would I do that" ' (attribution: male, mid-career).

Although mining is not a feature of concern for farmers there was mention of coal seam gas as a potential hazard for some farmers and some small scale mining was still being conducted. For example one interviewee noted that: 'We will see what happens as we have just got a mining lease been approved and the chap is going to dig down with an excavator 20 or 30 feet and find what is left [in the deep lead] and make his fortune, or so he tell me' (attribution: male, late career).

Many of the longer term physical improvement to the farm that will sustain production in the long term (such as soil conservation and weed reduction) merge into the non-income physical aspects of the farm as many of the longer term improvements also have a public benefit.

### **Objectives about the non-income producing physical aspects of the farm and nearby landscape.**

Most landholders are very aware of the changing social attitudes that focus on the value of conserving native plants and animals in the landscape and the importance of maintaining and perhaps expanding native habitat on private land. Most have participated in Landcare programs and taken up some of the incentives related to conservation. The justification for conservation is complex. It may be related to the appreciation of the social/scientific value of native ecosystem but for some it comes from a personal interest in an aspect of nature which is often commenced at an early age and is developed throughout their lives.

Many landholders are, or have been active members of Landcare and have planted (or allowed regeneration of) native vegetation on parts of their properties especially on creek frontages. One interviewee noted that: 'the river bank has plenty of trees, we have fenced the river and all our creeks off so we don't allow stock into any of the waterways ....The banks were fairly eroded from people letting the stock in everywhere ...grass has grown back and holding the banks in place ...most of the people in the area have done that [fenced off creeks]' (attribution: male, mid-career).

Some landholders are restoring habitat because they appreciate a connection between the long-term aspects of NRM that helps maintain a well functioning landscape for the long term viability of farming in this landscape. 'I am no tree hugger but it's just that when we came here we fenced off the waterways and did all these things and won awards ...there is going to be more and more focus on exports which there is going to be ...so pick up your game [to improve NRM] as the whip will be cranked really hard...if farmers don't do these things soon the cost of doing it was be [substantial] – well they just won't be able to do it' (attribution: male, mid-career).

Landcare has been important but one interviewee noted that 'We have been involved in Landcare since it started, Landcare grants have not added up to a very big percentage of the work we did.

Would not do the work because you thought you were going to get a grant. You only do the work because you want to' (attribution: male, late career). The interest in working in Landcare groups has reduced in recent years. One landholder who was involved in Landcare of over a decade noted that 'Landcare group ... but they are not very active ...lost its sparkle a little bit ...last 5 years it has dropped off a bit... and most of the involvement is using the equipment we have got' (attribution: male, mid-career).

Many farmers have been working on revegetation for decades for example one interviewee noted that: 'we have been replanting trees [over 30 years] by getting the seed from the trees that are already here, fencing out areas and revegetating and about 10 year ago we fenced out the entire creek line [2 Km] on both sides and revegetated the creek line to make it more attractive and prevent the cattle from eroding the banks.... We have been planting gum trees and native before it was even popular to do so' (attribution: male, late career). Another landholder had also been active in creating habitat for some decades: 'Over that period of time [several decades] I have created wetlands and planted heaps of trees and ... been rewarded [by the birdlife] ...well over 90% of the plantings are largely indigenous stuff so the birdlife has really started to come back here, it's taken a huge amount of time and a huge amount of effort.... The ultimate reward [for conservation work] would be seeing brolga there' (attribution: male, late career).

Although farmers can only work on their own properties some make arrangements with neighbours to work together on conservation issues and have aspirations for their region too. For example one landholder suggested: 'What I would like to see ... having connections [of native vegetation] along the lakes and up the creeks and would actually have a connection into the Otways, would be fantastic' (attribution: male, late career).

Landscapes have been changing because of the actions of individuals. For instance one interviewee noted that: 'I was coming on the back road from Birregurra to Colac and I was thinking – gees – if you look at that landscape 15/20 years ago it's very very much changed so there has been a heap of plantings [native trees] that are going on there. [although] We still have bastards who plant Cyprus.....I hate [Cyprus trees] with a vengeance' (attribution: male, late career).

An interviewee noted that many landholders have selfish motivations for land care but that there are public benefits. He suggested that the targeted investment approach is counterproductive:

*All farmers would like to think they look after their farms ...there is a private benefit but also a community benefit ...some look at it in totally selfish terms but others who think of it in terms of [the community]...if there is a spread of knowledge on how to do thing better then the whole community benefits ... there is a huge amount of goodwill amongst farmers generally to try and do the right thing by the land and do a better job of looking after the land ...targeted investments...I don't think it achieves what they set out to achieve because it excludes a lot of people who would otherwise do works and be involved in improving the environment generally...pity the government does not catch on to the fact that the majority of Landcare work [money and time] is put in by landholders and not by government. ... The government's money is a sort of catalyst to get things moving along - often it is knowledge as much as money that is wanted to initiate action...a lot of landholders who are keen and happy to do things as long as they are along the lines that they want to do and not imposed by rules and regulations ...although the rationale behind this targeted investment is sound ...but the end result is I think a negative thing not a positive thing. [Targeted investment is a] smack in the face for*

*their goodwill... [There] Should be some thought on how you catch hold of that goodwill and use it to get a better result and more wide spread because Landcare need to be spread over all the land ...there is a bit of thought that we should concentrate on the watercourses but they are only the result of activities that go on in the catchment and if you don't treat the catchment you won't solve the problem of the watercourses ...the thinking is not forward enough (attribution: male, late career).*

Landcare groups provide a forum for information exchange between members and provide an opportunity to learn about what the group have done; the results of trials and a range of activities and a chance tell the committee what they see as important and what issues they would like help with. This provides a direction for the kinds of grants the committee should pursue in the coming year.

A long term conservation option for some is to put a Trust for Nature covenant on part of their property to protect the conservation values legally in perpetuity. One interviewee noted that: 'we got the covenant through eventually [8 years] so half our property is under a conservation covenant there is a big huge section we do not graze at all, [it is a] couple of hundred acres just native bushland, just all left to regrow ...looks fantastic in there' (attribution: male, mid-career).

The incentives for covenants are personal although councils tend to have a unwritten polices to give a rate reduction on covenanted land.

### **Objectives concerning their relationships with people and organisations off the farm.**

The long working hours coupled with substantial distances to travel to participate in events tends to make farming an isolating activity. However, many farmers and their families are active in seeking interaction with others for a range of reasons including business, rural affairs and social interaction. Landcare, for instance provided an opportunity to meet and work with other landholders on projects of mutual interest and provide a learning opportunity. Interviewees were office bearers and active in a range of organisations associated with rural affairs such as Landcare, Waterwatch, Catchment Management Authorities, Demo Dairy and a range of conservation groups.

One interviewee noted: 'I do enjoy farming day-to-day but I also enjoy being off farm and being in industry and private industry it helps to develop me and keeps me pretty sane...getting stimulation from outside which I think is pretty important' (attribution: male, mid-career).

Many farmers travel overseas for a range of social and business reason and some are involved in student exchange hosting overseas students which gives a two way process of learning and understanding. One interviewee noted that overseas travel was an eye opener for what is going on in regard to how other people treat their environment 'on our first visit to Hong Kong the harbour was full of floating rubbish, years later when we returned it was clear and there were notices on the ferries warning of AUD10,000 fines for dropping water into the harbour....The creeks in Italy were full of junk and rubbish...in Casablanca ... the whole dam beach was rubbish, every time the waves washed in there were tins and plastic bags and god knows what — just shocking' (attribution: male, late career).

Neighbours are important for farmers socially and for the spread of weeds etc. One interviewee who has lived in the same area all his life noted:

*When I was growing up there were a lot of soldier settlers in the area so there were a lot of farmers on fairly small areas ... but of course all of those have gone now, all been bought up and amalgamated into bigger areas or else broken up into smaller hobby farms. So the landscape does change and most people who live in the district [now] are not farmers, they work in town and just live out here. Some of the hobby farmers were hopeless ...but some have developed quite nice little farms now. I think probably the internet and so forth has given them more information nowadays ...they are starting to look after their properties...some are interested in doing the best they can [in regards to weeds and pests]* (attribution: male, late career).

Landcare also provides an outlet for getting off farm. One interviewee noted that:

*The Landcare process that happened is probably one of the greatest environmental political [actions] that ever been done I reckon...it's always good when you are joining organisations...everybody likes to listen and read ...to material that backs up their own opinions I suppose and to a certain extent it's nice to meet and talk with people who share part of your ideals and long term wishes and aspirations. It helps for those people to know that they are not on their own* (attribution: male, late career).

One interviewee in discussing their relations with the community said: 'Always been involved in community committees and what have you, at the moment I am a committee member for the [local] land care group and on a rural health services board — that is my public service activities at the moment, but I have been on various boards over the years so it the way in the country [to be involved]' (attribution: male, late career)

One aspect that seems necessary for the future is to identify and develop the common ground between different parts of the community to encourage people to work together on climate change as everybody will be subject to the same changes.

## **Objectives about influencing people and change in society**

People are not always passive about their beliefs and many have objectives that concern 'making a mark on society by changing people beliefs and attitudes' about particular issues or viewpoints. Even when a person is not especially actively seeking change they still find it is gratifying when society moves toward ideas or views that they had held for a long time. The issues that have been raised include developing aspects of the agricultural industry, and improving the conservation of the landscape. It would seem desirable to incorporate the concerns and ideas of local people in policy development and regional decision-making. This would be a two-way street as recognising the legitimate concerns of local people and hence showing them respect would be reciprocated in local people paying more attention to the objectives of government, especially in conservation matters.

In regard to conservation one interviewee noted that:

*All of these issues [conservation issues] are changing and change is a very slow process, when you change people, I think people are becoming more green, you can tell people — I am quite careful about how I talk to people about green issues its about winning the issue and moving people — but*



*when you do it you can say things like ‘well everybody is a greenie really, just that some people are more green than others’, if you use that phrase very few people will actually disagree with you but if you used that phrase 30 years ago you would have had a lot of people would not be happy with that. I do think it is moving forward but it’s far too slow (attribution: male, late career).*

Another interviewee having noted the poor condition of some kinds of public land and in order to maintain and improve native habitat suggested: ‘Try and encourage them [government agency with disused land] in a direction which is new to them which is where they have leases on parcels of land which have remnant vegetation to encourage them to vest that lease in a Landcare group... [in order to] protect some of those flora and fauna communities which because of their nature — they are grasslands — they are very attractive to pastoral lease and becoming rarer and rarer for that reason’ (attribution: female, mid-career). Conservation and community development work is often time-consuming and hard work. The rail trail between Port Fairy and Warrnambool provides an example:

*it will become a fantastic asset for the community and for Victoria, in managing these sites and managing the rail trail the committee takes on an awful lot of work and like most voluntary organisations its quite difficult to attract people to come along and help, sometimes it’s quite difficult to attract money to maintain and actually develop something over time ... the nitty gritty of a rail trail management, the capacity to achieve that ambition, over time, often falls on the shoulders of people who are retired (attribution: female, mid-career).*

There are issues concerning pollution and one interviewee suggested the use of the precautionary principle. ‘One of the strategies I would really like to come to the fore...would be an understanding that just because an impact is not 3000% proven does not mean that there aren’t any...that the limits of our science should not override the [view] that something is not right. That the lack of proof should not replace what we feel that something that is not right to happen’ (attribution: female, mid-career). It would seem that issues on discharge of waste water from geothermal developments in the region are not resolved.

Some landholders are active in pushing for conservation policies for public assets in their immediate region and appreciate that they have to be eternally vigilant as companies and agencies are constantly seeking development. One interviewee said his aspiration was ‘to leave the land to the next generation better than what we started off with because we have done a lot of damage so the aspiration is to try and put it back in a bit better shape for the next generations before we pass on’ (attribution: male, late career). He included public land in this aspiration and noted that ‘The biggest asset in the Otway Ranges is the water and if water is abused then the whole place will be in trouble just like it is over in the Barwon river catchment...that has been brought about not so much the surface water impoundments but by the groundwater extracts that has dried stream left right and centre’ (attribution: male, late career). It seems that some landholders have been actively involved with groups looking after their local and regional environmental assets especially forests (from logging) and rivers (from surface and groundwater extraction). An issue a number mentioned was the possibility of coal seam gas extraction because they appreciated that coal and oil existed in the region.

A number of interviewees saw two roles for government agencies (including CMAs) especially important in encouraging farmers in the conservation activities. One role was providing information on what would be the most effective conservation activities; this would include identifying



conservation 'hot spots' where the 'pay off' for conservation would be greatest, and providing ongoing information and advice to farmers on conservation. This advice is best delivered face-to-face as farmers respond well to personal interaction where they can develop respect and a bond. The second role for government would be to improve incentives for conservation. 'Basically more money than is currently being offered, because the bush tender stuff is this market based stuff and I think it is more philosophical than targeted to land management objectives' (attribution: female, mid-career). However, she also noted that incentives on their own may not always be enough and other options should be developed to provide flexibility in arrangement for conservation between farmers and government. 'There are some people who will do the right and proper regardless of what you give them and some people who will never do the right and proper regardless of what you give them' (attribution: female, mid-career).

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## Part 4. Governance arrangement

### 4.1 Introduction

Virtually all governments' actions within Australia and some actions by overseas governments have some kind and degree of impact on the biophysical and human landscapes in Australia and hence in the south-west of Victoria, either directly by providing services such as education, health, transportation and security, or indirectly by changing the circumstances in which people and businesses operate such as through taxation, monetary policy, laws and international agreements and trade arrangements.

Australian governments' collaborative action on climate change (via Council of Australian Governments, COAG) has a history going back to at least 1992 with the endorsement of the *National Greenhouse Response Strategy* and a new broader *National Greenhouse Strategy* in 1998. In 2006 COAG adopted a *Plan for Collaborative Action on Climate Change*<sup>21</sup> and in 2007 a *National Climate Change Adaptation Framework*<sup>22</sup> with a 5–7 year time frame. The key focus of the *Framework* is to help decision-makers understand and incorporate climate change into policy and operational decisions at all scales and across vulnerable sectors. Its suggested areas of action included building adaptive capacity, and action in water resources, coasts, biodiversity, agriculture, fisheries, forests, human health, tourism, settlements and natural disasters. The notion of progress through collaboration has a long history and the notion of sustainable development developed in the 1980s brought to the fore the idea that the maintenance of the natural environment was important information that should be integrated into decisions about society and economic development. The *National Strategy on Ecologically Sustainable Development* (ESD) which was adopted by all levels of Australian government in 1992 defined ESD 'as using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'<sup>23</sup>. The strategy has led to a number of legislative changes and agreements such as COAG's 1992 Intergovernmental Agreement on the Environment which contains a section on climate change. The importance of these documents for this project is that they set the scope for the required integration of knowledge for long term decision-making as matters relating to human (social and economic) and biophysical landscapes.

One issue is the notion of what is a 'vulnerable' sector to climate change. This is a complex area as there is a difference between an action that is vulnerable to being damaged through climate change events, such as building in a flood- or fire-prone area which may be considered as a vulnerable action, and a sector such as the building industry. The vulnerability of the building sector lies in it having to adjust to changes in the planning and building codes in order to continue building; adaptation thus reduces vulnerability. The vulnerability of governments depends on them developing and implementing effective codes to avoid being sued or also perhaps put out of office. The governance arrangements are pivotal as their codes and planning arrangements guide the building industry sector. In agriculture, individual enterprises such as crops or livestock production

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<sup>21</sup> [www.coag.gov.au/coag\\_meeting\\_outcomes/2006-02-10/docs/attachment\\_c\\_climate\\_change.pdf](http://www.coag.gov.au/coag_meeting_outcomes/2006-02-10/docs/attachment_c_climate_change.pdf)

<sup>22</sup> [www.coag.gov.au/coag\\_meeting\\_outcomes/2007-04-13/docs/national\\_climate\\_change\\_adaption\\_framework.pdf](http://www.coag.gov.au/coag_meeting_outcomes/2007-04-13/docs/national_climate_change_adaption_framework.pdf)

<sup>23</sup> [www.environment.gov.au/about/esd/index.html#nseid](http://www.environment.gov.au/about/esd/index.html#nseid)

are vulnerable to weather events (heatwaves, storms, droughts, floods, cold outbreaks, pests and diseases) and this is normal although climate change may make these events more frequent, intense and persistent (see Goodness 2012 ). Nelson et al. (2010 p.9) noted that 'In policy development since the early 1990s, drought has been considered a natural characteristic of Australia's variable and changing climate. This means that successful management of climate risk is recognised as a definitive characteristic of farming excellence.' However, achieving that excellence requires excellent capability to deal with vulnerability to climate change. The outcome vulnerability models used in Australia address the question 'what is the vulnerability of present agricultural systems if current management and policy continues?' (Pearson et al. 2011 p.118). In terms of the agriculture sector as a whole very many other issues are likely to have an impact of farming and farmers will respond to these as well as to direct weather events on production. Pearson et al. (2011 p.118) suggest that models that address contextual vulnerability address the question 'how can Australian rural communities dependent on agriculture reorganise their farming and livelihood opportunities to manage the impacts of climate change'. They conclude that 'there is a need for contextual vulnerability assessments of the Australian agricultural sector' and suggest that priorities for a new research agenda (which is a governance task) include; rebalancing investment away from context-free (outcome) vulnerability assessments, creating a contextual vulnerability research agenda, and building multidisciplinary and cross-institutional teams. In regard to their last suggestion (multidisciplinary teams) the work of Page (2007) on teamwork would seem to be very relevant.

Many of the governments' actions have very long-term ramifications and can continue to have an impact on the biophysical and human landscapes for decades. Not all consequences are foreseen; some turn out to be welcome surprises whereas others are less welcome. It is very difficult to get things right in the long-term for a number of reasons. One reason relates to the development of improved knowledge in the intervening years which can lead to changes in public opinion and tolerance and the eventual integration of this knowledge into public policy. Another is the balance between the need to specialise to pursue individual topics versus the need to integrate topics to devise programs that deliver multiple-objectives. Another relates to the application of the philosophy of governments at the time; such as neoliberalism reliance on individual responsibility, markets and increasing economic efficiency. Another is the relative power of different sections of the community leading to preferencing of one industry, group or section in the short term to meet medium term purposes. These reasons are related so that it may take decades (in the absence of a crisis) for major changes in policy direction to occur. However, major changes are initiated from time-to-time for moral reasons are often characterised by frequent setbacks and many new starts. Major changes include emphasis on human rights, advanced by the Universal Declaration of Human Rights in 1948 but still controversial; environmental issues, advanced by pollution science in the early 1960s and still being debated; and public health issues related to the outbreaks of contagious disease, advanced by medical science in the nineteenth century and which continue to be advanced. For instance, in May 2012 in Victoria through a Parliamentary Committee that recommended the integration of public health consideration into the Victorian planning system (EPRC 2012).

While integration is a management process, its use is stimulated by the notion that decisions would be improved by applying the integration process (knowledge integration) in developing and reviewing objectives and in implementing these objectives (vertical and horizontal integration). In regard to the future landscape in the south-west, it is not possible to say if there will be any major change in the direction of policy, but climate change, increasing fuel prices, population growth and

changing wealth within the population will invariably create change as people adjust to new conditions. This flux may also stimulate more interest in advancing the major moral changes as noted above (human rights, environmental conservation and health). The recommendation of the Victorian Parliamentary Committee to integrate health into the planning system is partly a reinvigoration of public health issues stimulated this time through concerns about chronic diseases related to unhealthy lifestyles and factors such as the built environment, demographic changes and climate change. Perhaps the most directly relevant recommendation for the rural biophysical landscape is:

**Recommendation 3:** *That the Melbourne Metropolitan Strategy includes measures to identify and protect valuable agricultural land in peri - urban Melbourne.* (EPRC 2012 p.29).

Of the many governance policies, programs and projects that have an impact on the biophysical and human landscapes the ones most likely to meet moral imperatives in the long term are those that enable people to satisfy their fundamental needs in a way that can be sustained. Tables 1 and 2 below set out nine fundamental needs people have in terms of the biophysical and human landscapes for rural and town residents and for society as a whole. The statements within these boxes can be thought of as 'principles' of sorts that can be used to assess governance policies, programs and projects. For example, 'Recommendation 3' from the Parliamentary Inquiry fits within the 'protection boxes' as it concerns food sovereignty (control of food source) (Patel 2009; Glipo and Pascual 2005; Gathii 2012) and moving toward a healthy national diet (NHMRC 2011).

More generally, and especially in regards to 'Earning a living', policies that increase producer incomes from agricultural production would be a positive in terms of rural people (farmers and rural people earning a living from the agricultural product supply chain). Garnett (2012 p.5) for example, in reviewing market governance mechanisms for climate change and agriculture, suggested that 'Measures [policies] that alter farm practices need to be acceptable to farmers and they must have the capacity to implement them. Importantly, they need to be seen by farmers as beneficial, either because they raise incomes or improve yields or both'. In addition, such measures/policies also need to tick the boxes for town people and society as indicated in Table 1. The measures that increase farm incomes may not tick the box for town people if they increase the cost of resources town people (and industry) require (such as water or land<sup>24</sup>), or if the increased economic activity on farms bypasses the town and fails to provide local employment (for example, by failing to develop town based businesses that add value to farm outputs). Also they may not tick the box for society if they fail to maintain the landscape's ecological function, and represent effective natural resource management and improve regional welfare. If these policies fail to tick all the boxes then a debate and negotiation is required to find a solution.

The 'principles' set out in the tables below are not absolute, of course, but can be used to establish a set of questions to encourage debate on policies. Such a debate, by bringing in other issues and information before decisions are made, represents a form of knowledge integration.

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<sup>24</sup> Food might also be included but the majority of production in the South-west is exported and increased farm profitability is unlikely to have much impact on local food prices.

**Table 1: People's (rural, town and society) fundamental needs in regard to biophysical landscapes (what the biophysical landscape should contain and or produce e.g. natural capital and ecosystem services to be able to deliver people's needs: listed under nine headings)**

Fundamental needs	Biophysical landscapes		
	Rural	Town	Society
Earning a living	Agricultural, forest and fish production.	Outdoor tourist attractions. Available raw materials and waste disposal.	Maintain options by retaining ecological function and effective natural resource management.
Protection	Safe water and food, clean air. Less injury, chemical poisoning, zoonoses, damaging weather extremes.	Safe water and food, clean air. Less damaging weather extremes. Resources available for living (e.g. housing, roads).	Secure food and water supplies, food sovereignty. Less environmental disease, exposure to environmental hazards. Industries and society more resilient to climate change.
Recognition of personal worth	Valued contribution to biophysical landscape management through activities such as biodiversity maintenance.	Valued contribution to biophysical landscape management through activities such as sustainable consumption.	Outdoor sites that cater for a diversity of interests and programs that encourage sustainable biophysical landscapes.
Understanding	Experimental farms and field research facilities.	Available natural systems for science and culture education.	Available natural systems for environmental, science and culture education.
Participation	Sites for cooperative activities in land use, nature and natural resource management.	Sites for cooperative activities in land use, nature and natural resource management.	Large number of diverse nature based issues and sites to encourage public participation.
Leisure	Sites that cater for regional outdoor leisure interests.	Urban parks and gardens Sports grounds National parks, reserves and natural areas.	Arrangements to develop and maintain a range of diverse recreation sites throughout nation.
Creation	Sites that allow experimentation and trial of ideas.	Sites that allow experimentation and trial of ideas.	Inspiring land areas, natural areas/features and biophysical landscapes.
Identity	Local landscapes that engender a positive emotion of familiarity and belonging.	Urban and regional landscapes that people are happy to be identified with and can create positive emotions.	Landscapes that people can identify with in a positive manner.
Freedom	Landscapes that help people achieve their aspirations.	Landscapes that help people satisfy their aspirations.	People are able to raise issues and take action to protect biophysical landscape features and improve human landscapes.

**Table 2: People's (rural, town and society) fundamental needs in regard to human landscapes (how the human landscape should perform to be able to deliver people's needs: listed under nine headings)**

Fundamental needs	Human landscapes		
	Rural	Town	Society
Earning a living	Markets for rural products. Profits to invest in new	Jobs available in new and growing regional industries.	Industries with strong futures, providing regional employment and societal

	developments. Ability to respond positively to climate policy and market changes.	Local people qualify for jobs.	contributions. Resilient in terms of anthropic process such as climate change policies, changing technologies and markets, and fuel and global finance shocks.
Protection	Safe farm equipment, chemicals and working conditions. Secure position in supply chains. Effective health services. Well regulated industry. Secure retirement.	Reliable security. Effective health services. Safe working and living conditions. Well regulated industry. Secure retirement.	Healthy national diet. National security. Lower crime rates and exploitation. High level of occupational health and safety. Fewer accidents. Effective health services. Healthy population. Industries becoming more sustainable and resilient to market shock. Human rights are protected.
Recognition of personal worth	Appreciation of social/economic role.	Appreciation of social/economic role.	Social harmony.
Understanding	Rural health and safety training. High levels of research, and extension in agricultural science and business. Lifelong ecological and NRM training.	High levels of food literacy. Understanding of food sources and health consideration. Entrepreneurship to make used of regional value adding industry for rural commodities. Educational and ongoing training opportunities in regional locations.	High levels of: entrepreneurship, job skills, lifelong learning & education. Similar educational opportunities for all Australians. Effective research and extension.
Participation	Opportunities to participate in social and political organisations. Participation in decision-making relevant to region and industries.	Opportunities to participate in social and political organisations. Participation in decision-making relevant to region and industries.	High rates of effective public participation. Democratic decision-making. Subsidiarity principle used.
Leisure	Ability to participate in leisure activities.	Ability to participate in leisure activities.	High levels of leisure activities to maintain a healthy society (mental and physical).
Creation	Opportunities to be creative in work and society.	Opportunities to be creative in work and society.	High level of creativity in population.
Identity	Happy to be identified as rural landholders, farmers etc.	Happy to be identified with rural area, occupation and town.	Population happy to be identified as Australians.
Freedom	Confidence to develop opportunities to satisfy aspirations.	Confidence to develop opportunities to satisfy aspirations.	Population able to raise issues and take action to protect biophysical landscape features and improve aspects of the human landscape.

The answers to two questions may provide some guidance about what governance arrangements ought to be considered in this section, as dealing with all aspects of governance would be impossible. The questions are:

- 1 What activity or event will change the biophysical and human landscapes most in the next two decades?

The answers may include: (1) demography – population growth; (2) changes in the profitability of industries – including agriculture; (3) transport – communications; (4) education and training; (5) health; (6) water consumption; and (7) climate change.

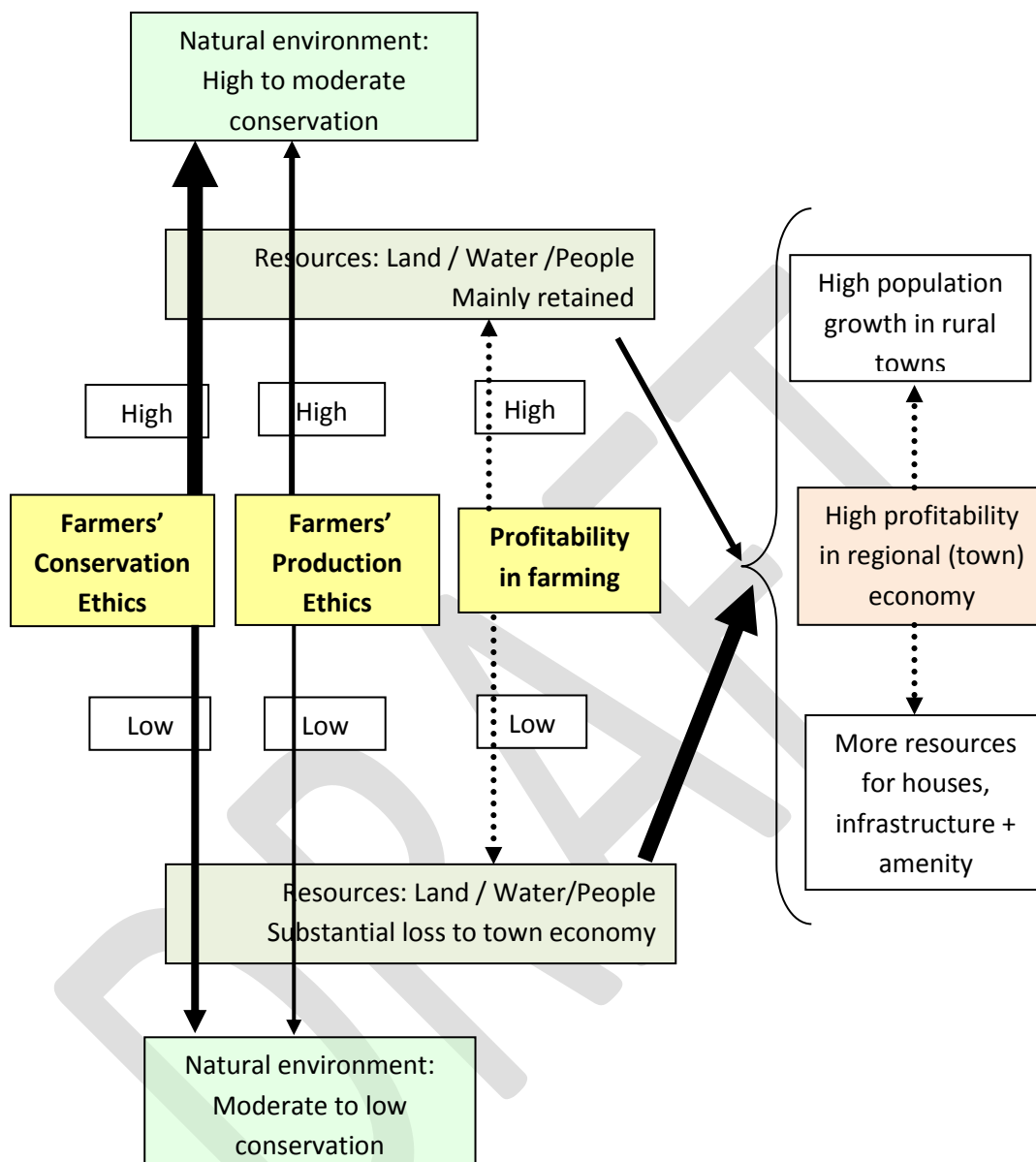
- 2 What are the strongest links between changes (dynamic interaction) in the biophysical and human landscapes?

The answers to the second question may include: (1) the relative profitability of agriculture to other parts of the regional economy; and (2) the relative strengths of production and conservation ethics.

Figure 7 provides an indication of the allocation of land and water resources to: (1) 'the natural environment'; and to (2) 'consumption by town based regional economic growth' as a consequence of the relative profitability of farming and town based industries and strength of farmers' conservation ethic.

Perhaps a less profitable farming is more likely to lead to resources moving out of farming. Water resources, agricultural land and people will move out of farming into the non-farm regional economy; water for urban and industrial use; land for housing and amenity living; both land and water for carbon sequestration; and human resources especially young people for town jobs as they are likely to see reduced career prospects in farming.

Perhaps a more profitable farming sector will lead to more resources (land and water) being retained for farming and more young farmers staying in farming. If farming is relatively profitable compared to town industry, farmers will control more resources, and if they also have a high conservation ethic they are likely to put more resources into the conservation of the natural environment. This is indicated in Figure 7 below.



**Figure 7: An indication of the strongest links between the biophysical and human landscapes: high profitability in the regional/town economy (not agriculture) may lead to population growth in town and attract biophysical resources (land and water) and people from agriculture especially if agricultural profitability is low. High profitability in agriculture coupled with high conservation ethic will lead to more conservation of the natural environment than would occur with other ethical positions (low conservation ethic or high production ethic) and lower levels of profitability**

The activities that lead to change in both the biophysical and human landscapes are suggested as being: (1) population growth; (2) regional industry development (for agriculture and town based industries); (3) infrastructure development (transport – communications and education); (4) water allocation; (5) responses to climate change (as well as climate change itself); and (6) conservation of



the natural environment. While the drivers of these activities are peoples' 'future-vision landscapes' (biophysical and human landscapes) and ethics related to land<sup>25</sup> and to people, especially inter-generational ethics. The argument put forward is that governance of both biophysical and human landscapes ought to have objectives relevant to these drivers (that is, to the nine fundamental needs that relate to the drivers), and also objectives relevant to the six activities identified as being the outcomes of the drivers of change. The other part of the argument is that there must be integration across the drivers (the nine areas of people needs) and across the six activities. The purpose of this integration is twofold; one, to look for synergistic solutions in which one activity can deliver a number of human needs without compromising or preventing the delivery of other needs, including the needs of future generations. The other purpose of integration is to reduce the risk of counterproductive policies and programs that aim to advance one area of needs but inadvertently damage the prospects of achieving other needs or the ability of people to achieve needs in the future. The needs of future generations are assumed to be the same as those listed in Tables 1 and 2 as it seems unlikely that people in future will suddenly no longer need to earn a living or no longer need protection.

The six activities are outlined in the sections below but first there is the issue of how the institutions of government can deal with change stemming from biophysical and anthropic processes. The suggestion is using adaptive management or a similar process involving learning and integrating new knowledge into the decision process. Adaptive management is relatively new and there is a question about the capacity of governance institutions to be able to use this approach. Dixit et al. (2012) developed a tool (National Adaptive Capacity Framework 'NAC') to help governments include institutional capacity building into their climate change adaptation process. The tool can be used to assess institutional strengths and weaknesses in regard to adaptation so that adaptation plans can make good use of the strengths or correct the weaknesses. They identified five key functions that national institutions perform that are critical to adaptation. These are:

- Assessment (assessment of available information to determine national vulnerability, climate change impacts, adaptation practices, climate sensitivity of development);
- Prioritisation (issues, areas, sectors, populations of special importance);
- Coordination (coordination of the activities of disparate actors at multiple levels inside and outside government);
- Information management (collecting, analysing and disseminating information in support of adaptation);
- Climate risk management (identifying risks to priorities, evaluation of option to address these risks, select and implement risk reduction measures).

These functions are inter-related. For example an assessment of vulnerability will help identify priority issues or populations, and knowing the priorities will help identify the necessary coordination and the information to be managed and eventually to identify the greatest risks to these priorities and what measures are most desirable to use to reduce the risk. Although the NAC framework relates to the national level it would seem to be relevant at regional level also. The relevant questions for the South-west region of Victoria might be:

- 1 Have assessments, including vulnerability assessment, been completed?

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<sup>25</sup>'Land' includes water and flora and fauna.

- 2 Has prioritisation been undertaken? (that might relate to the fundamental needs outlined in Tables 1 and 2 and which particular section or population group should be given a priority).
- 3 Is there a coordinating body established? (their role may include organising the collaboration among the various agencies and groups who have a stake in some relevant aspect of the region).
- 4 Is information management organised?
- 5 Is climate risk management in place?

The NAC framework seems to imply a systematic approach in which there is a centralisation coordinating function to undertake assessments and identify priority issues/areas for attention through to implementing risk reduction measures. An alternative would be to incorporate climate change information into the functioning of government agencies at all levels of government so that they can adjust their policies and activities.

The effectiveness of government in delivering the fundamental needs across the all parts of society taking account to ethical issues (including inter-generational issues) is substantially related to the capacity of the institutions to identify appropriate objectives and prepare effectively for likely future changes. While governments' focus would be on the issues identified under the 'Society' columns in Tables 1 and 2 they will have to consider the needs of individuals in both rural areas and regional towns to get many of the policies accepted and implemented.

## 4.2 Population

Projections for population growth in regional Victoria indicate that growth will be strongest in regional centres (Geelong and Warrnambool), in areas on the borders of Melbourne and in areas with significant amenity such as coastal areas (Surf Coast Shire). Migration from overseas is expected to be the largest driver of population growth in Victoria and migration from Melbourne is expected to be the main contributor to the growth in regional population (see also Fletcher 2011 and the 'good move' website<sup>26</sup>). The population in the state is aging but the older age profile of the regions is accentuated by people in their 20s migrating out of the regions, notably to Melbourne, which is attracting younger migrants including overseas migrants (DPCD 2012). The population growth will not include more farmers as the trend for fewer farmers is likely to continue (Barr 2008).

The Commonwealth Government released a population strategy in 2011 (DSEWPC 2011).

*A sustainable Australia is a nation of sustainable communities which have the right mix of services, jobs and education opportunities, affordable housing, amenity and natural environment that make them places where people want to live, work and build a future..... Effort and coordination is required across governments, portfolios and sectors to secure our economic prosperity, improve the liveability of our cities, suburbs and regions, and protect our environment (Minister's foreword p.6- 7).*

The strategy identifies five key elements to be considered (integrated) in managing change, these are: health, water, communication (national broadband), skills (education and training including skilled migration system), and infrastructure. The strategy highlights the need for integration across these areas in order to achieve economic prosperity, liveable communities and environmental

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<sup>26</sup> [goodmove.vic.gov.au/home](http://goodmove.vic.gov.au/home)

sustainability. The Commonwealth Government identified three initiatives to for a 'sustainable Australia' and these are the population strategy, the Ministerial statement on investing in regional Australia (considered in the next section) and the National Urban Policy.

## **National Urban Policy**

The Australian Government's national urban policy *Our Cities, Our Future - A National Urban Policy for a productive, sustainable and liveable future* outlines overarching goals for cities (and regional centres) and the role the Australian Government will play. It follows on from the COAG national objective to 'ensure Australian cities are globally competitive, productive, sustainable, liveable, socially inclusive and well placed to meet future challenges and growth' (DOIT 2011 p.3).

The strategy recognises the critical roles that State, Territory and Local Governments, the private sector and individuals play in planning, managing and investing in cities, and that the Australian Government makes decisions that impact on urban Australia.

## **The environment in accommodating population and industry growth**

Although much growth in industry and population occurs as 'infill' through redevelopment and increasing densities, the rest is accommodated on 'greenfield' sites identified through the planning system. Long term plans in the regions are being developed through regional growth plans and for Melbourne through the metropolitan planning scheme. The Commonwealth's Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) allows for Strategic Assessment to evaluate the impacts of the growth areas on matters of national environmental significance listed under the EPBC Act.

### **4.3 Industrial development in agriculture and rural industries**

The Australian Government invests in regional Australia in collaboration with state and territory governments. The Government's aim outlined in the 2011–12 Budget is to enable regions to broaden their economic base to enable communities to become more resilient, viable and sustainable in the long term (Ministerial Statement 2011–12). The Government revitalised the 55 Regional Development Australia Committees (RDA) with increased funding to help them work across all government levels and the private sector to identify initiatives that will connect communities and boost growth and development. The Government established the Regional Development Fund to support regional projects. Money is also available to upgrade regional health services, regional education and skill development and regional infrastructure. The commitment is about AUD10 bn in 10 years (Ministerial Statement 2011–12).

The RDA for the region is the Barwon–South-west Regional Development Australia Committee. This committee and the Victorian Regional Development Committee submitted a regional development plan to the Victorian and Australian Governments in September 2010 (RDA 2010). The Committee has ten members from business, industry, government, education and training. Committee members come from various locations throughout the region and some are members of other regional organisations such as G21 Geelong Region Alliance, Committee for Geelong, the Committee for Portland and the Great South Coast leadership group.

The Victorian Government is developing eight regional growth plans for Victoria to manage growth and land use pressures to 2050. The plans utilise the strategic land use and growth planning and set out where future residential and employment growth will occur and the critical infrastructure required to support it. Implementation is via the Minister for Planning who will consider and endorse the regional growth plans which will obtain legal status through the planning system. In the Barwon–South-west there are two; the G21 draft Regional Growth Plan, scheduled for submission in July 2012 (City of Greater Geelong 2012), and the Great South Coast. The G21 are developing a Regional Economic Development Strategy (AEC Group 2012).

Victorian Government’s agency, Regional Development Victoria (RDV), administers the Regional Growth Fund (DPCD 2011) that will provide AUD1 bn over eight years to support major strategic infrastructure and community-led local initiatives in regional and rural Victoria, creating more jobs and better career opportunities. Sixty per cent of the funds will be for major infrastructure projects and the remainder will fund local initiatives prioritised by regional and rural communities and local councils with the assistance and support of the five non-metropolitan Victorian Regional Development Australia Committees.

A state-wide Regional Policy Advisory Committee<sup>27</sup> (RPAC) has been established to bring input from regional and rural Victoria in providing economic infrastructure projects and priorities and receiving advice on these projects from Regional Development Victoria. The RPAC will also advise the Minister on matters relating to the economic and community development of regional and rural Victoria. This will include advice on the regional and rural implications of relevant legislation and on other matters referred to the committee by the Minister<sup>28</sup>.

#### **4.4 Climate change**

All three tiers of the government system are relevant to climate change adaptation and landscape management in the south-west of Victoria.

The federal government has been considering controlling carbon pollution since 2004 and released a task force report in 2007 that recommended a cap and trade system. ‘After careful consideration, the Task Group has concluded that Australia should not wait until a genuinely global agreement has been negotiated. It believes that there are benefits, which outweigh the costs, in early adoption by Australia of an appropriate emissions constraint’ and ‘The Task Group is firmly of the view that the most efficient and effective way to manage risk is through market mechanisms’ (PMTGET 2007 p.6).

The commonwealth, state and territory governments commissioned a review of climate change impacts on the economy and an update in 2011 that confirmed the need for action on carbon (Garnaut 2008, 2011). In November the Clean Energy Future legislation passed parliament and is scheduled for implementation in July 2012. The legislation has four sections: (1) introducing a carbon price; (2) promoting innovation and investment in renewable energy; (3) encouraging energy efficiency; and (4) creating opportunities in the land sector to cut pollution (CEF 2012). The legislation will start the process of reducing carbon pollution and has the potential to lead to new opportunities for business and development in the South-west Region. To complement the Carbon

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<sup>27</sup> Regional Policy Advisory Committee [www.rdv.vic.gov.au/regional-growth-fund/advisory-committee](http://www.rdv.vic.gov.au/regional-growth-fund/advisory-committee)

<sup>28</sup> [www.rdv.vic.gov.au/\\_\\_data/assets/pdf\\_file/0005/67973/RGF-6295\\_12pp-BOOKLET\\_web.pdf](http://www.rdv.vic.gov.au/__data/assets/pdf_file/0005/67973/RGF-6295_12pp-BOOKLET_web.pdf)

Farming Initiative which commenced in December 2011 (DAFF 2012) the legislation includes incentives for landholders of around AUD1 bn over four years to pursue climate change action on land and promote biodiversity conservation (biodiverse carbon stores).

The Australian Government is increasing its focus on adaptation as part of a comprehensive climate change strategy. The COAG agreed to the National Adaptation Climate Change Adaptation Framework in April 2007<sup>29</sup>. The Framework covers a range of cooperative actions between all Australian governments to begin to address key demands from business and the community for targeted information on climate change impacts and adaptation options<sup>30</sup>. Climate change science plays an essential role in supporting the three pillars of the Australian Government's climate change policy: action to reduce greenhouse gas emissions, action to adapt to climate change that we cannot avoid, and action to help shape a global solution.

National Climate Change Adaptation Framework (2007–2012/14) sets a non-binding framework for the governance and policy-making of adaptation. It focuses on horizontal coordination by defining cross-sectoral goals and priorities. The Department of Climate Change and Energy Efficiency is responsible for coordinating activities for the framework.

In 2009 the Australian Government released a framework of climate change science (DCC 2009 p.1); its purpose is to guide research on climate science: 'The scientific research proposed under the auspices of the Framework is designed to interact closely with the adaptation response agenda, with mitigation science and technology, and with efforts to develop more effective policy to deal with the climate change challenge'.

The carbon price does not apply to emissions from agriculture although agriculture is an important contributor to emissions. The Australian Government has a AUD1.7 bn land sector package that includes: (1) the carbon farming initiative (CFI), an offset scheme for reducing pollution of storing carbon in the landscape; (2) a biodiversity fund for biodiverse carbon storage and to enhance environmental outcomes from carbon farming (AUD946 M over six years [starting in 2011]) for biodiversity planting, protecting existing native vegetation, and managing threats to biodiversity (invasive species for example); (3) the ongoing carbon farming future program of research development and extension; (4) the carbon farming skills program to provide advice for the CFI; (5) the Indigenous carbon farming fund to support Indigenous Australians with the CFI; (6) the government will buy non-Kyoto compliant CFI credits; (7) The government will help NRM organisations revise their plans to reflect the impacts of climate change and carbon farming. The government has established a Land Sector Carbon and Biodiversity Board to provide government with advice on the land sector package.

## 4.5 Water resources

Water resources are the responsibility of the state government which has been developing water strategies. The central region sustainable water strategy was released in 2006 and includes the

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<sup>29</sup> National Climate Change Adaptation Framework

<sup>30</sup> Site [www.climatechange.gov.au/government/initiatives/national-climate-change-adaptation-framework.aspx](http://www.climatechange.gov.au/government/initiatives/national-climate-change-adaptation-framework.aspx)

Geelong region (Victorian Government 2006). The strategy for the western district was released in 2011. The western region is and managed by five water corporations: (1) Grampians Wimmera Mallee Water; (2) Wannon Water; (3) Southern Rural Water; (4) Central Highlands Water; and (5) Barwon Water. The Department of Sustainability and Environment released a water strategy in 2011 (DSE 2011a) which identifies potential challenges and opportunities to secure the water supplies of the next 50 years. The strategy is to provide increased certainty for water users and the environment. It does this through 22 policies and in 69 actions. These include recognising existing rights, developing local management plans for all systems, monitoring water use outside the entitlement framework to assess potential risks to supplies and manage adverse impact on water supply from land use. Integration in terms of planning is proposed: 'They [water strategies] guide the development, integration and implementation of management plans prepared by water corporations and catchment management authorities operating within each region' (DSE p.19).

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# Part 5. Impediments and enablers for using the integration processes

## 5.1 Integration impediments

### Knowledge integration

The principal impediment for knowledge integration in regard to establishing long-term objectives for society lies with the problems of reaching agreement on what kinds of information ought to be included in the integration process. Without an agreement, the dominant information will come from the more powerful members of society so that the long-term objectives of society tend to favour the aspirations of its more powerful members.

The main reasons for the existence of this impediment seem to concern the inertia established by the institutions that form the framework of our society, that there are strong interests in maintaining the current direction of development and an emphasis of ideology over clarity of long-term objectives. The information needed in the knowledge integration for long term objectives in societies is not highly technical or complex in terms of science or economics. Rather it is about the ability of people to access all their needs in terms of social matters (the human landscape) and also access the ecosystem services from the biophysical landscape that people require to fulfil their need in perpetuity. That is, people's use of the biophysical landscape must allow the maintenance of ecological integrity; it must be sustainable.

The indicators of poor knowledge integration in the existing the long-term objectives for society in regard to the human landscape lie in how different parts of society fair in regard to their human needs. For example, a chronically high unemployment rate in one part of society indicates that part of their 'subsistence need' is not being met. Further investigation is likely to uncover a range of related reasons for this situation. If the long-term objectives for society include the notion of equality and equal treatment, then having an employment deficit in one part of the community is indicative that their needs (or at least this part) have not been effectively integrated in developing the long-term objectives for society.

Other indicators of poor knowledge integration in the existing long-term objectives of society in regard to the biophysical landscape lie in how parts of society or different activities are associated with declining quality of the biophysical landscape. This decline may be associated with land degradation, pathogens, biodiversity loss or pollution. Declining quality in the biophysical landscape is already an impediment for the provision of ecosystem services in many areas and very likely to become a major impediment to the prosperity of future generations. This is especially so for the people living in the region who are likely to relocate to better environments, but also for others in the state and nations as they have to either pay for restoration if this is possible or tolerate declining ecosystem services.

Knowledge integration is not only important for helping to establish and develop long term objectives for society; it is also an essential aspect of decision-making throughout the management process. It is the preliminary stage in making any kind of decision. Making a decision (which includes



deciding to do nothing) is preceded by an analysis of information and the formulation of alternative courses of action (options). This occurs even when the decision-makers decided that 'there is no alternative' (TINA) as this, like doing nothing, is a decision about options. Failure of decisions may come about because of the poor quality or incomplete knowledge used in the knowledge integration process or because the integration (analysis of the knowledge and conclusions) were not carried out adequately. A TINA situation would seem to be a strong indicator that knowledge integration has been inadequate as in most situations there will be options available but they need to be looked for. Monitoring and reviewing the outcomes of projects should be able to identify problems related to poor knowledge and/or poor integration of the information (poor analysis).

### **Horizontal integration**

Although horizontal integration is more about the implementation of objectives (including policies) the reasons for poor horizontal integration may be similar to the reasons for poor knowledge integration in developing long-term objectives for society (inertia in institutions, vested interests and lack of clarity in overall social objectives). Horizontal integration of policy across different sectors in society (different government agencies) concerns a level of objectives that normally would be down the hierarchy of objectives; more operational than overarching objectives. However, integration does imply a loss of autonomy as some sectors would have to change to accommodate the implementation of an overall long-term objective. To work out which (operational) objectives in the sectors should be given priority requires a referral to higher objectives; something that is referred to as 'whole of government response'. This may not be easy as it opens again the problems of developing long-term objectives for society and the power of different sectors.

### **Vertical integration**

Vertical integration is also one of the management techniques to help the delivery of objectives on the ground. It concerns the control of activities from establishing or agreeing the objective (or policy) through to its final implementation. Vertical integration it is about controlling the steps between agreeing an objective and achieving it on the ground. As a management issue, the impediments to integrating effectively relate to the management process in place and how well it is used. In particular, the impediments may be associated with the quality of the monitoring and review processes in place (how speedily a divergence from activities that will achieve the objectives is noticed and corrected). An area of weakness is often around the issues of knowing that the outcomes being achieved are in line with the original objective or policy. This is especially so when the objectives are not clearly stated and implementation relates principally to the use of rules and is part of an ongoing program in which new information is used to modify the rules. Vertical integration can also be problematic when implementation relies on a diversity of organisations, each with slightly different problems to address, and some discretion in interpreting the program.

Monitoring, assessing and reviewing the outcomes of projects are often not well funded nor fully incorporated into the project itself from the beginning. The reasons for this are complex but they may relate to overconfidence that the project, and the way it is being implemented, is the best and cannot be improved on. But poor quality results from vertical integration may also be related to the content of the objective being pursued. If the objective is not accepted by the recipients of the policy there is likely to be opposition and resistance to its deployment. A good review system would



identify this and provide information on how the policy outcomes relate to the objectives of the recipients. This information could be fed into a knowledge integration process to come up with new objectives and from these, new policies and programs.

## 5.2 Integration enablers

### Knowledge integration

Reliable and accurate knowledge is vital in managing social-ecological systems. Perhaps the most important enabler for knowledge integration is the desire of decision-makers to use reliable evidence (information from all people affected by the proposed decisions and relevant biophysical information) in an analytical process that informs decisions.

Perhaps the most important kind of knowledge integration is the one that precedes the establishment of long-term objectives for society. The process used in identifying what information is needed and from what sources is likely to be an ongoing process requiring the establishment of institutions such as constitutions, parliaments, free speech, equity and organisations that can handle debate at the local level.

Although social objectives may be established or changed quite infrequently, many decisions touch on aspects of the long term objectives and via small degrees can change the direction of social development. Incremental changes would seem to be the process in which the long term objectives of society are developed, and they are likely to progress in this way for decades unless there is an event or situation that destabilises or disrupts the social system (a crisis of some form) sufficiently to stimulate a review and reassessment of the situation. In terms of the adaptive cycle the disruption would be the kind that leads (or could lead) the release phase in an adaptive cycle.

On a more controlled basis, the process of adaptive management may be an enabler as it encourages reflection, learning and the development of information required for changing management practices and perhaps also of changing some of the short to middle term objectives. Enablers for horizontal integration may flow from the recognition of a failure because of sector independence.

Knowledge integration requires the development of knowledge and the ability of people to understand how to gather information within society, its meaning and how it can be used in the knowledge integration process. It also requires that members of the community know how to provide information in a way that will be effective in decisions that will have an impact on their needs. Research and investigation are thus important enablers for knowledge integration, as is improving the level and breadth of education within the community, particularly education about rights and needs and how to be effectively involved in community affairs.

### Horizontal integration

Horizontal integration involves breaking down the barriers between organisations and people working in different sectors (with differing objectives and styles of work) that prevent them from cooperation on the achievement of 'whole of government objectives'. In government this has been attempted by machinery of government changes such as amalgamating government departments,

by closing down statutory authorities and moving their functions into government departments, by having a single minister for more than one sector and by establishing coordinating committees, councils, interdepartmental committees and so on. In essence, the overriding of existing authority and power requires a higher power or perhaps a 'shock' or 'crisis' to encourage cooperation. At the same time as wanting agencies to work together on different parts of the same issues, the agencies have to maintain their own expertise and discipline knowledge. Perhaps the most effective crisis to ensuring cross sector integration is one that can be repeated should horizontal integration fail to occur and where the consequences of the crisis have an impact on members of society who have the ability (and also the motivation) to ensure permanent pressure for horizontal integration.

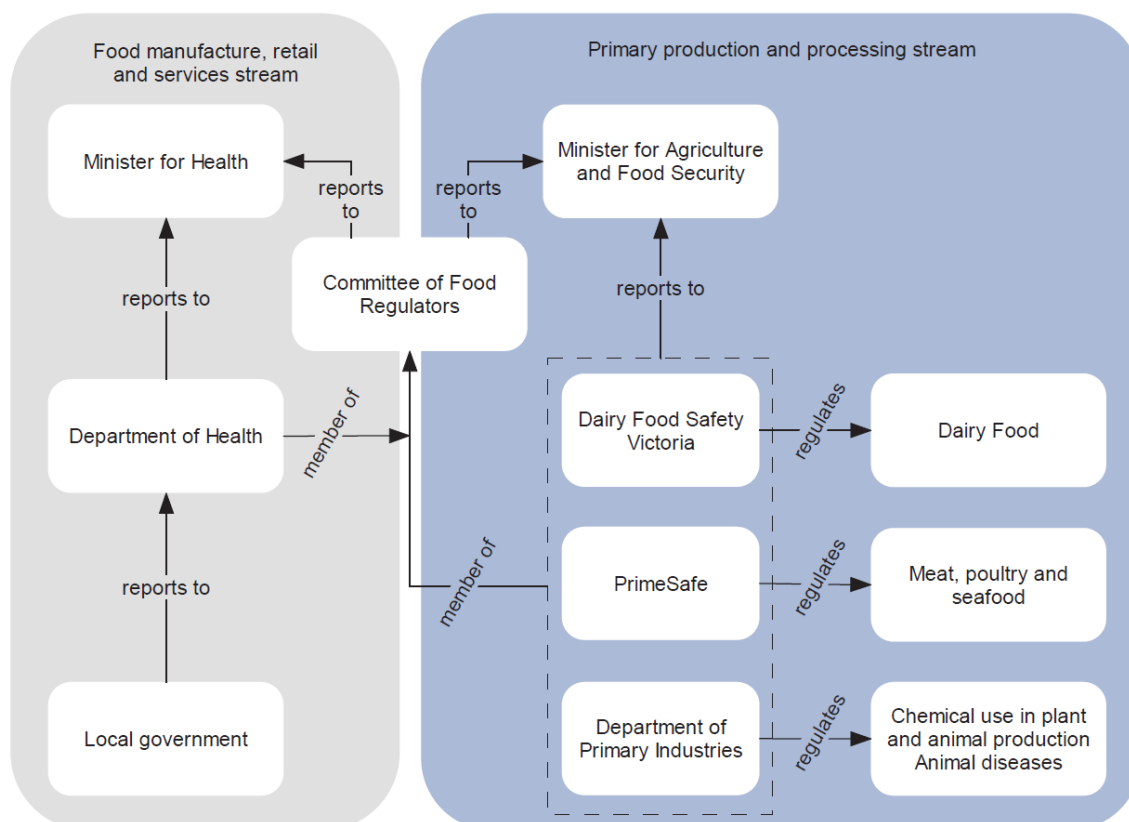
As with knowledge integration institutions can be both inhibitors and enablers. Cross sector organisations can play an important enabling function. Perhaps COAG provides a useful example of a cross sector integrating arrangement at the highest level of Australian governments.

Vertical integration is usually associated with the execution of particular policies or programs and so is closely related to vertical integration which is the activity needed to organise the implementation of a strategy, plan or program.

### **Vertical integration**

Enablers for vertical integration are good management practices such as clear objectives relevant to stakeholders, adequate funding and timing for implementation, well trained staff with the authority and responsibility to undertake the work and an effective dispute resolution process. Good management practices also require effective monitoring and review processes to ensure work stays on target and managers learn from the mistakes that inevitably occur. In addition to internal monitoring and review processes external reviews can provide independent assessment and advice to managers on the situation. External reviews can vary in nature. The reports of the auditors, including the Auditor General's office in Victoria, provide useful information on how well individual policies and programs are being implemented. They generally represent single loop learning that can be used by management to improve their management systems and implementation approach. They can also highlight issues related to horizontal integration where the programs being reviewed (audited) require cross sector working. For example, the Victorian Auditor General report on food safety in Victoria concerns the integrating activities of the four agencies involved (Department of Health (DOH) as the lead agency with support from the Department of Primary Industries (DPI), Dairy Food Safety Victoria (DFSV) and PrimeSafe use regulation to enforce the food safety standards) and the coordination activity of the Victorian Committee of Food Regulators, and makes eight recommendations to improve operations (VAGO 2012 p.4). The report sets out the basic relationships diagrammatically as shown in Figure 8.

**Figure 1A**  
**Victoria's food safety system**



Source: Victorian Auditor-General's Office.

**Figure 8: An overview of the regulatory framework in Victoria. Source: VAGO (2012)<sup>31</sup>**

Another kind of review considers the state of some aspect of the social-ecological system independently of a management program. These may be considered a 'reality check' that can alert people to a current situation and allow them to compare the current situation to some ideal or objective they may have. In theory, these 'state of reviews' can lead to double loop learning when they indicate that the initial objectives and the programs being used to achieve them are not creating the outcomes that the managers or perhaps society wants. The 'state of the environment reports' are one of these kinds of reports but it is up to the managers to use this information to decide if the outcomes are what society wants. Thus the external review provides information to be included in knowledge integration process to review existing objectives and processes and develop new options for future objectives.

<sup>31</sup> VAGO (2012). Agricultural Food Safety, Victorian Auditor General's Report, Victorian Government Printer, Melbourne, page 4. Available from: [www.audit.vic.gov.au/reports\\_and\\_publications/latest\\_reports/2011-12/20120314-food-safety.aspx](http://www.audit.vic.gov.au/reports_and_publications/latest_reports/2011-12/20120314-food-safety.aspx)

# Part 6. Management of human and biophysical landscapes, an overview of findings and recommendations

## 6.1 Overview

The human and biophysical landscapes in the south-west region are related and interact with forces that are within and also external to the region; some of these forces are national and others global. Understanding these forces and their possible consequences for the human and biophysical landscapes, and then integrating this knowledge to make decisions that will ensure an ongoing improvement in people's welfare and well being in a way that is compatible with the sustainability of the biophysical landscape is the challenge facing us now.

The main focus of this study is the landscapes in the south-west of Victoria, particularly the rural biophysical landscape and the relevant human landscape.

Although this has been a small study, no evidence was gathered to suggest that people's aspirations in the south-west region vary according to where they live; between the peri-urban areas and the more distinctly farming areas further west and in the more hilly country. However, some of the opportunities for making a living change because of the proximity to Melbourne. For agriculture, these opportunities are represented by the established land and water assets and current enterprises such as irrigated vegetable production. The economic expansion of Melbourne brings increasing demand for the land and water assets from local, regional, national and to some degree global interests. This demand and the consequent higher land values have a range of consequences for agriculture and provide potential opportunities for new land uses; utility infrastructure, industry and urban development. All new uses crowd out previous uses and can create dissension and conflict.

There are no accepted ideal biophysical or human landscapes that people ought to aim to achieve. However, the people who live and work in the region, like the rest of society, have aspirations. Aspirations are forward looking and are referred to in this report as 'future-vision landscapes'. They include elements related to both human and biophysical landscapes. People manage their progress toward achieving their aspirations by deciding long-term objectives and following through with numerous operational objectives and actions. Their actions are facilitated but also directed and constrained by the institutions (rules and customs) that have been developed over time within society.

As part of achieving their individual aspirations, people have a range of fundamental needs to satisfy. These needs include: earning a living (subsistence), protection, recognition of personal worth (affection), understanding, participation, leisure, creativity, identity and freedom. People in the future will also have these needs. In modern societies, individuals are not generally able to satisfy all these needs without the assistance of other people and arrangements within society. Many of these arrangements are developed by private industry and commercial enterprises, but government arrangements are necessary to provide a facilitating framework for commerce and to protect individuals. Collectively the governance arrangements in society have a vital role in the ability of

people to satisfy their needs. Providing these governance arrangements is an ongoing activity requiring frequent adjustment to ensure that the ability to satisfy personal needs is available to people in perpetuity. This is often referred to as inter-generational equity and is a major obligation for the governance system.

Each of these needs have human and biophysical components; subsistence, for example, includes a healthy diet which requires productive land; understanding includes ecology which requires the maintenance of ecological integrity. Needs are also cross linked as understanding (knowledge) is the basis for determining what is a healthy diet and how to produce it for people in perpetuity.

While governance may not facilitate individual people achieving their specific aspirations, the ability of governance arrangements to help people achieve their fundamental needs now and into the future is a measure of the value or effectiveness of governance. The ultimate report card for governance is successfully negotiating this obligation to provide the basis for stability and prosperity in the decades to come.

In addition to the agricultural materials and products distributed to the community via the economic system, many other essentials produced by farmers/farms, are distributed outside the economic system. The ones that come from the biophysical landscape are termed ecosystem services. While many ecosystem services are tangible, such as food, water, clean air and so on, others are intangible, such as beauty and sense of place. Many of the items required for subsistence (such as food, clothing, energy and water) have strong and obvious people/biophysical landscapes connections. The remaining human needs, such as participation, affection and freedom, protection (policing and health care) come principally from the interactions among people.

The governance arrangements in society ought to ensure people's ability to access the entire spectrum of needs now and also into the future. Ideally one action may be able to satisfy a number of needs synergistically but frequently there will be conflict between the delivery of needs and this conflict has to be resolved. Although political and economic power tend to be the resolving force across the entire social-ecological system, governance arrangements for dispute resolution ought to be based on wider considerations; perhaps equity, care and rights-based ethical considerations are especially important in regard to the human landscape and scientific evidence (plus the precautionary principle), care and land ethics are especially important in regard to the biophysical landscape.

Management is an organising mechanism that provides a way of delivering needs and aspirations and is also a mechanism that involves frequent conflict resolution. Management is driven by decision-making processes that establish overall and then operational objectives and implementation programs. The three steps in the decisions process are preparation, decision and implementation. While all three steps are important in determining the eventual outcomes, the outcomes achieved are substantially reliant on the first step; preparation. The preparation process is characterised by knowledge integration; the process of identifying and developing information to inform the decision process. Knowledge integration, by bringing reliable information together (including information from stakeholders – people potentially impacted by the forthcoming decisions) can act as a conflict resolution process when it ensures information about people's needs is brought into the decision process. Knowledge integration is the step prior to making long-term objectives but it is a processes that is repeated prior to every decision throughout the management

process. Knowledge integration provides the guiding information to help decision-makers ensure that the implementation processes, as well as the overall outcomes, meet intra- and inter-generational equity criteria (i.e. are equitable and sustainable).

The implementation phases of management are almost as important in terms of the outcomes as the decision-making process that establishes the overall objectives. This is because the intentions of the overall objectives can be subverted during implementation when operational objectives come to dominate governance. For example, when economic development become more important than people's welfare and well being (more important than meeting people's needs). Vertical and horizontal integration are important in implementation. They concern the organisation of participants' actions in the delivery of appropriate outcomes within and across the sectors of social organisation (such as industry sectors, government agencies or government levels).

Management is an ongoing process that requires constant adjustment and redirecting to stay on target to deliver intended outcomes. In times of change, information to enable management to adjust their activities in order to remain effective is important. A new kind of management called adaptive management may provide a useful framework for helping managers use their management system to conduct much of its own research to inform change. Single loop learning from adaptive management allows manager to improve how they achieve existing objectives while double loop learning allows managers to go further and question and change the very objectives they are aiming to achieve.

Major review processes, such as state of the environment reporting, catchment condition reports, biodiversity reports, and land degradation reports, and on a global basis the Global Environmental Outlook (UNEP 2012) tend to indicate that many aspects of the biophysical landscape are changing as a consequent of people's activities. Some aspects, such as land degradation and loss of biodiversity, are factors that reduce ecosystem services and hence reduce inter-generational equity. There seems to be no equivalent studies on human landscapes across the range of human needs on a local or regional basis, although there are reports on issues such as poverty (economic status) and health<sup>32</sup>. Generally, it seems that relative to people living in large urban areas, farmers (farming/rural families) are less able to satisfy some of their needs, such as protection (health services, work safety), understanding (education and internet access) and subsistence (return on business investments and level of business profitability). While these are unfortunate for rural families on a personal basis they are also a problem for society because rural families are important in their own right as citizens of Australia and because these issues can reflect on their land management and production which have long-term implications for the rest of society. Changes that may intensify in the coming decades (such as, climate change, globalisation, price increases for energy and fertilisers, and technological change) are likely to exacerbate rather than alleviate these equity problems.

The overall trend for governance is to increase reliance on markets and also on individual action and responsibility; a trend that commenced in the 1980s and is likely to continue. Nevertheless, the ability to reverse declines in ecosystem services (especially non-market services) and improve the

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<sup>32</sup> See for example UK country economic assessments: e.g. [www.cambridgeshire.gov.uk/business/economicandcommunitydev/ecodevelopment/economicassessment.htm](http://www.cambridgeshire.gov.uk/business/economicandcommunitydev/ecodevelopment/economicassessment.htm)

human landscape of rural/farm families in the next decades would seem to be beyond the ability of the rural/farm sector to achieve on their own given the markets in which they operate and governance arrangements.

There are no easy answers for changing governances in ways that will improve people's welfare now and ensure people in future (and there will be many more people in future) will also be able to live in more supportive and functional human and biophysical landscapes. Perhaps the way forward lies in the initiation of processes that bring depth and clarity to the current issues in the human and biophysical landscapes in a way that encourages local people to take more responsibility and provides a way for other people and organisations to make constructive inputs even though they may not be located in the south-west region.

## 6.2 Recommendations

### The approach

Confidence, about being able to handle crises associated with climate change in a way that either maintains the current functions of the social-ecological system through incremental changes or that allows the system to transform rapidly into a new state that is considered to be better able to deliver what the people in the system need in the long-term, ought to be based on real capability.

Climate change, as a global phenomenon, embodies a substantial degree of uncertainty for the south-west region. Also there are considerable uncertainties about what changes might occur as a consequence of people (governments and industries) responding to climate change locally and globally and how these changes and the flow on effects might impact on the social-ecological system in the south-west. The significance of this uncertainty is large given the close connection between climate change and energy consumption, and the dependence of much of the operation of the social-ecological system in the south-west of Victoria on carbon based energy.

The ILM Project is about integration, which is an important part of the management and decision-making processes. Knowledge integration is the process of collecting and analysing information to inform decisions. Vertical and horizontal integration are coordinating processes in the implementation of decisions. The recommendations in this report relate to the use of integration processes in the realisation of collective capability within the social-ecological system in the south-west of Victoria to deal with slow changes as well as crises associated with climate change.

Integration is not new and indeed it is used all the time in preparing for making and implementing decisions. Integration can be used to improve the capability of people, organisations and the institutional framework of governance to collectively deal with the likely changes flowing from climate changes and related issues as well as the surprises. Integration can also be used to improve the understanding of what an 'improved state' in the social-ecological system might be compared to that which currently exists in the south-west region. The details of what an 'improved state' is represent the long-term objectives of society; what people collectively want to live in. Not everybody will agree on what the long-term objectives of society ought to be but the task for knowledge integration is to gather, analyse and set out the information to inform people to help them make well informed and evidence based decisions.

Knowledge integration emphasises the importance of gathering a wide range of reliable information to inform decision-making. This information includes scientific, technical, economic as well as cultural and ethical information. Increasing the understanding of decision-makers in regard to the issues and level of knowledge about these issues will improve their collective capacity to make informed decisions. Page (2007) notes that diversity within a group of skills and perspectives trumps individual ability when dealing with complex problems. Increasing the emphasis on knowledge integration leads to the idea that getting the breadth and depth of knowledge to inform decision-makers requires arrangements that bring together people with a wide range of knowledge and perspectives; it requires arrangement to improve collaboration among stakeholders. Working together will increase the collective capacity to deal with complex problems and generate new ideas to use climate change as a catalyst to advance people's welfare and move toward greater sustainability within the operation of social-ecological systems.

There are three considerations embodied in the recommendations set out in this report. The first is that climate change is already in progress and decision-makers in pursuit of their own objectives use the integration processes routinely to deal with issues that have a bearing on climate change. This existing capability which comes from practical actions, while providing a platform to build on, may nevertheless, become a hindrance to developing the collective capabilities needed to prepare for the combination of social reorientation and the physical changes that flow from climate change and from people's responses.

The second consideration is that the direction of current development is not leading to improving welfare throughout society on an equitable basis and is not using the planet's environment in a way that will be able to be sustained in perpetuity. A successful response to climate change from a social-ecological perspective is therefore not starting from a neutral or zero point but rather from a position that is already negative for many people and for the sustainability of the ecological base on which we depend. While many people appreciate this, the momentum flowing from people's confidence in being able to deal with every situation as they arise reduces the incentive to question and change the nature of the interactions we have with other people and with the environment of the planet. This confidence is partly real and partly a consequence of the existing social acceptance and ecological resilience<sup>33</sup>. Thus the 'business plan' of people and society is not seen to be broken and perhaps seen as only requiring some adjustment to enable people to deal with the unknowns of climate change. The unknowns of climate change would be best dealt with from a more neutral point of improved equity and ecological integrity.

The third consideration is that developing the capacity with a social-ecological system to deal with climate change and deliver people's needs is an endeavour of society; a collective responsibility and perhaps a collective obligation to future generation and to the environment in the south-west of Victoria.

These three considerations; existing capabilities, confidence to deal with change and the notion that adaptation is an endeavour of all of society, strongly suggest that recommendations in this report

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<sup>33</sup> Some people have come to accept being poor that it is in the nature of the economic system and ecological systems adjust to species loss, resource extraction and pollution and still provide ecosystem services (although there may be tipping points that once passed lead to a system transformation and loss of desirable ecosystem services).



ought to encourage people and organisations to collaborate on developing ideas about what capabilities would be needed in future and what kind of social-ecological system would be able to have such capabilities. Developing capabilities can only be achieved by actually undertaking the work (the experience of establishing the institutions and undertaking the work are major enablers for integration). The capabilities needed to deal with unknown future events cannot be taught because they are unknown; they have to be developed through practice in the real world.

There are many choices available and it is unlikely that people will opt for only one; rather it is likely that different groups will champion different choices. One choice is to delay developing the capability until there is no alternative other than to respond to climate change. The Climate Commission (CC 2011) suggested that this was the critical decade for action. In the following decades presumably people will muddle through individually by developing sufficient abilities and arrangements (governance institutions) to hopefully maintain a functional society. The time needed to muddle through and develop sufficient capability is not predictable but the muddling through period may be a time of human and biophysical loss. Another choice would be to prepare for developing this capability by taking action now to address the equity and sustainability issues that already exist in the social-ecological system. This choice works on the assumption that this would provide a better starting point to develop the special capabilities needed to deal with climate change crises than an unequal society that uses parts of the biophysical landscape unsustainably. And this is the choice adopted in this report.

The recommendations in this report set out a stepped approach that aims to facilitate collaboration among residents in the south-west of Victoria, with governments, organisations, social and business interests to build a collaborative capability to deal with climate change. The steps and recommendations that follow provide a way of overcoming the barriers to integration and taking advantage of the enablers of integration.

The steps are:

- 1 Collecting information on the human and biophysical landscape to identify the current issues in the human and biophysical landscapes and how they interact in the south-west region.
- 2 Developing ideas about how to generate meaningful long-term objectives that are acceptable to the people in the south-west region and to other stakeholders that will improve intra- and inter-generational equity.
- 3 Developing ideas about what collaborative governance arrangements would be required to develop, maintain, implement and review these long-term objectives.
- 4 Establishing (formalising) these collaborative governance arrangements and have them develop and publish the long-term objectives.
- 5 Empowering the collaborative arrangements to assist existing organisations, groups and arrangements (that incorporate individuals) in the implementation of the long-term objectives.
- 6 Continuing to collect information on the performance of human and biophysical landscape in regard to people's needs to improve implementation and to review and re-evaluate the relevance of the long-term objectives to changing conditions.

## Recommendation 1

*The step is: Collecting information on the human and biophysical landscape to identify the current issues in the human and biophysical landscapes and how they interact.*

The task of collecting information on how well people are actually meeting their needs (the suggested list of nine needs in Tables 1 and 2) in terms of the human and biophysical landscapes has two purposes. One is to start to develop collaboration to bring a wide range of people and organisations into the process. The other purpose is to have collaborating people and organisations identify issues and problems as they see them in regard to meeting people's needs in terms of human and biophysical landscapes (human needs and ecosystem services etc). Having collaborating people develop this information is a way of making sure the information is relevant, real and accepted by local people and by government agencies and businesses.

The information collection process is iterative so that the first round need not be considered final but rather a platform for more work. In view of the future value of this information, it ought to include material on the needs, in human and biophysical landscape terms, that the collaborators consider to be the most important for the future and most likely to be impacted by climate change and people's responses to climate change. The information should also identify which institutions, arrangements and public policies have the most influence on, or the strongest association with, the needs that are impacted by climate change.

The framework of nine human needs in terms of the biophysical and human landscapes set out in Tables 1 and 2 provide a preliminary indication of the intellectual scope of this work. The practical scope of this work has to be wider than the rural biophysical and rural human landscapes as these landscapes are both modified by activities undertaken elsewhere (in other landscapes).

1. A Establish a group or committee to organise and encourage groups, organisations and individuals to collaborate on developing information on the needs of people in their regions in terms of human and biophysical landscapes (Tables 1 and 2 may be a useful guide for identifying the kinds of information required).
1. B The collaboration should gather information widely among stakeholders and be able to identify which institutions, arrangements, policies and situations are most relevant to both positive and poor delivery of needs in both human and biophysical landscapes.
1. C The information gathered should be analysable according to future vulnerabilities in the delivery of needs (a tipping point approach). This would include assessing vulnerability to ongoing slow changing variables including climate change and likely climate change responses. It is suggested that resilience assessment may be useful when there is too little reliable data to use a risk approach.
1. D Report on needs and issues related to the current human and biophysical landscape that stakeholders have identified.

## Recommendation 2

*The step is: Developing ideas about how to generate meaningful long-term objectives that will improve intra- and inter-generational equity.*

Recommendation 1 involves integrating information about anthropic and biophysical processes. This second recommendation is about developing ideas on how to go about turning this information into visions for the future; how to create long-term objectives. This involves developing ideas about how to integrate the information from Recommendation 1 (current social-ecological information) with notions about the future and people's future-vision landscapes to come up with ideas about what to do (what long-term objectives are appropriate).

Perhaps the most important thing to achieve in this recommendation is how to integrate the knowledge generated in Recommendation 1 to develop a set of long-term objectives that will facilitate the delivery of people's ongoing needs in terms of human and biophysical landscapes. The process should capture wide support for these objectives which have to ensure that the outcomes will be sustainable in both human and biophysical landscape terms.

Although logically it would appear that the long-term objectives should flow easily from the information and analysis done for Recommendation 1 because execution of that recommendation would identify issues and the relevant public policies and activities. However, this is unlikely to be the case as this work would not have resolved conflicting views about solutions nor incorporated national views and political perspectives. As a result, developing long-term objectives to deal with the issues in human and the biophysical landscapes has to be a step process requiring at least: (1) An agreed way of developing the long-term objectives; (2) the development of tentative long-term objectives; (3) a drafting process that allows the input of many state and national considerations into these tentative long-term objectives; (4) a conflict resolution process that looks for synergistic solutions; and (5) followed by a review process that determined the relative value of the objectives in terms of promoting a social-ecological system that is more likely to deliver human needs in perpetuity compared to the existing system.

This work requires a degree of independence from government, communities and businesses. However, it should ensure that these groups operate closely and collaboratively together. This independence should help ensure the work can use the knowledge of specialists but without being captured by the existing culture and philosophies that may exist in different groups. It is essential, if these long-term objectives are to guide development for some years or decades to come, that they are and are also seen to be unbiased by power and pressure groups and are justifiable in terms of care and rights-based ethics.

2. A Establish an independent group to develop, within a time frame, a set of ideas about how long-term objectives could be developed collaboratively that would deliver people's fundamental needs in terms of the biophysical and human landscapes.

2. B Develop a re-drafting process for the preliminary long-term objectives that encourages the incorporation of a national perspective.

### **Recommendation 3**

*The step is: Developing ideas about what collaborative governance arrangements would be required to develop, maintain, implement and review these long-term objectives.*

The recommendations on the long-term objectives for the future development of the social-ecological system have to be well supported through the development and implementation processes.

Implementation requires the work of private sector business and individual people but they need the facilitation that can be created by government actions through policies and programs.

It is extremely unlikely that the process of developing long-term objectives can be achieved quickly because it is cutting new ground on collaboration and gathering information from stakeholders, which is likely to be time-consuming. During this process, ideas about the collaborative governance arrangements for implementation processes can be started. Thus Recommendation 3 need not wait until Recommendation 2 on how to develop long term objectives is completed, nor wait until the long-term objectives are drafted (Recommendation 4). Recommendation 3 is about the machinery of government needed to integrate the efforts of all levels of government in a collaborative way and in a way that works well with private people and organisations. Although the implementation of Recommendation 3 can be started early it may take some time to complete.

Establishing new machinery of government can be very expensive and time-consuming as it requires staff, legislation, budgets and a reorganisation of existing arrangements. Very often new arrangements build on or adapt existing arrangements. For example, catchment management authorities are regionally based but do not deal with many aspects of the human landscape. Expanding their role may be impossible from a practical point of view. Local government is also regionally based and does deal with some aspects of both the human and the biophysical landscape and being elected may be better able to reflect community aspirations. However, building their staff capability may be very difficult. A problem of using any existing arrangement may be the tendency of perpetuating existing thinking and direction when the future might be better served by working from first principles.

3. A During the course of developing ideas on how to create long-term objectives and through that, actual development processes (Recommendations 2 and 4), the independent group should set out areas or topics within these processes where governance arrangements are thought to be necessary.

3. B The independent group should collaborate with all levels of government and with industry, civil society organisations and the public to identify appropriate governance arrangements.

3. C The independent group should find ways of testing the more effective governance arrangements given the long-term objectives they may be working toward achieving.

## **Recommendation 4**

*The step is: Establishing (formalising) these collaborative governance arrangements and having them develop and publish the long-term objectives.*

Recommendation 4 is about moving away from the preliminary work of gathering information, (Recommendation 1) identifying ideas on how to develop sound long-term objectives (Recommendation 2) and considering the governance implications (Recommendation 3) to setting up the collaborative governance process and developing the long term objectives.

There seem to be at least four major alternatives:

- The independent group suggested for undertaking the first three recommendations could continue and collaboratively develop the long-term objectives then pass them on to governments for implementation. Implementation could be driven by existing government agencies or through the collaborative governance arrangements identified in Recommendation 3.
- The collaborative governance arrangements identified in Recommendation 3 could be constituted into an operating body which could develop the long-term objectives and then follow through with the implementation (see Recommendation 5).
- Establish a new group to assess the material developed by the independent group (Recommendations 1, 2, 3) to develop the long-term objectives and make recommendations on how they might be implemented.
- Establish the collaborative governance arrangements identified in recommendation 3 into an operating body and have this body jointly develop the long-term objectives in conjunction with the independent group (Recommendations 1, 2, 3).

Developing the long-term objectives requires both the ability to interpret people's 'future-vision landscapes' in terms of people's needs relative to both human and biophysical landscapes, and the ability to turn this information on people's need into practical objectives that will be accepted by the people in the south-west and other stakeholders as a significant advance and worth working toward.

Including people who are going to implement these objectives in the process used for developing the long-term objectives may provide a reality check and may also ensure that the people involved in the implementation processes are well versed in the objectives they are aiming to achieve. The problems with developing the Basin Plan for the Murray Darling system gives an indication of the complexity and problems that can occur with developing long-term objectives and implementation programs. Because of the desire to both address people's aspirations and reality of governance, the last option above may be the best approach for developing the long-term objectives collaboratively; it involves collaboration among the people who are well aware of people's aspirations with the people who will be charged with developing the governance arrangements.

As the ideas about the long-term objectives are agreed, the differences between them and the outcomes that are being achieved currently should be established to ensure there is a difference and to ensure that the ideas about the long-term objectives are not purely 'aspirational' but actually represent practical actions. These comparisons will facilitate the development, at a later date, of a cascade of operational objectives and implementation programs to move from current development trajectories toward achieving a development trajectory that will more easily deliver the ideas in the long-term objectives.

4. A Develop long-term objectives for the sustainable delivery of people's needs in regional Victoria by integrating the knowledge developed about the management of human and biophysical landscapes using the 'how to' ideas developed in Recommendation 2.

4. B Report on how the possible implementation of these long-term objectives will create a social-ecological system that not only differs from the outcomes being achieved by current

objectives, policies and programs but also addresses the issues highlighted through Recommendation 1.

## **Recommendation 5**

*The step is: Empowering the collaborative arrangements to assist existing organisations, groups and arrangements (that incorporate individuals) in the implementation of the long-term objectives.*

Moving from the long-term objectives to implementation may be relatively easy for individuals and firms who have collaborated in the development of the objectives because they will appreciate that their long-term interests are embedded in achieving the long-term objectives. However, it may be much harder for government as they often have a much shorter time focus and the processes outlined in these recommendations rely on local collaboration in setting a future direction in which no particular government has control. In addition, implementation may require the review and revision of existing government arrangements and a re-allocation of budgets.

However, the long-term objectives can provide a framework for community and business activities that will improve welfare and its sustainability in the coming decades. Individual aspects of these objectives that will benefit from government policy may be lobbied for incrementally. Despite this fallback position, it would seem that an effective approach would be to create an operating body able to expedite the collaborative governance arrangements identified in Recommendation 3.

This operating body would be the same operating body as the one identified in Recommendation 4 that would work cooperatively with the independent group (identified in Recommendations 1, 2 and 3) to develop the long-term objectives.

The role of this body would not be to undertake the work involved in delivering people's needs in the biophysical and human landscapes but rather play a coordinating role in regard to vertical and horizontal integration. It would have an evaluation and monitoring role to ensure that the work being carried out across the region is actually delivering the agreed long-term objectives. It would also have the role of reviewing the long term objectives to ensure that they are still appropriate as circumstances change in the coming years. This operating body would have a degree of independence from all stakeholder and function through public recommendations. Its main purpose would be to facilitate cooperation and collaboration across the public and private sectors in the region.

5. A Create an operating body (group or organisation) to facilitate the achievement of the long-term objectives of society as agreed through the collaborative processes outlined in Recommendation 4.

## **Recommendation 6**

*The step is: Continuing to collect information on the performance of human and biophysical landscapes in regard to people's needs to improve implementation and to review and re-evaluate the relevance of the long-term objectives to changing conditions.*

Climate change and the many associated changes are likely to be ongoing and may increase in importance as greenhouse gases accumulate and mitigation strategies are put in place in Australia

and also globally. In addition to climate there are likely to be many other changes that will have an impact on the human and biophysical landscapes of regional Victoria. These are likely to include further globalisation which will have an impact on markets for commodities and assets (land and water resources) in the region. Energy prices are likely to increase, especially for carbon based energy such as electricity and liquid fuels due to increasing demand, limited supply and mitigation strategies to favour renewables. Population increases will alter the markets for assets and may also have some impact on domestic prices for agricultural products. There are of course always 'surprises' that might occur in the biophysical landscape such as storms or prolonged dry periods, or in the human landscapes such as financial collapse or pandemic disease outbreaks. As a consequence there should be a way of updating and refining the long-term objectives and also the governance of their implementation. The sixth recommendation deals with this ongoing requirement for monitoring and updating to keep abreast of improved knowledge and to respond to significant changes and surprises.

6. A Make provisions for ongoing monitoring and review of the social-ecological systems in regard to their ability to meet the ongoing needs of people on an equitable and sustainable basis.

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