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CAN THE CONCEPT OF HUMAN WELLBEING HELP IDENTIFY
REGIONAL POLICY PRIORITIES?

Thesis submitted by
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in May 2010

for the degree of Doctor of Philosophy
in the School of Business
James Cook University

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DECLARATION ON ETHICS

The research presented and reported in this thesis was conducted within the guidelines for research ethics outlined in the National Statement on Ethics Conduct in Research Involving Human (1999), the Joint NHMRC/AVCC Statement and Guidelines on Research Practice (1997), the James Cook University Policy on Experimentation Ethics Standard Practices and Guidelines (2001), and the James Cook University Statement and Guidelines on Research Practice (2001). The proposed research methodology received clearance from the James Cook University Experimentation Ethics Review Committee (approval number H2314).

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STATEMENT ON THE CONTRIBUTION OF OTHERS

The biggest acknowledgment goes to my supervisors, Assoc. Prof. Natalie Stoeckl and Dr Riccardo Welters. They have both done an exceptional job supporting me, advising me, and gently pushing me towards the completion of the Thesis.

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Abstract

The primary aim of this Thesis was to improve our understanding of what people value and find most important to their wellbeing, at the regional scale. To achieve this aim, a series of research questions were proposed and explored:

- What contributes to wellbeing, and by how much?
- What are the current levels of satisfaction with the key contributors?
- Are there commonalities in wellbeing choices and satisfaction levels within and across the regions?
- Are the choices determined by the characteristics of the person?
- Can a better understanding of importance and satisfaction with ‘wellbeing contributors’ assist policy and decision making processes?

A coastal strip adjacent to the Great Barrier Reef was selected as suitable for investigations, since the region is of economic significance and has exceptional environmental value. Two case studies were set within the study region: Cardwell Shire and Whitsunday Shire. Primary data were collected in focus group discussions and via face-to-face and mail-out questionnaires, resulting in a total of more than 350 valid responses. A comprehensive set of sampling techniques was applied which yielded a representative sample.

The perceived contributions of the following 27 wellbeing factors, grouped into three domains, were explored:

- Society, consisting of: Family relations; Community relations; Safety; Cultural identity; Health; Civil and political rights; Education; Council relations; and Sports, travel, entertainment.
- Natural environment, consisting of: Air quality; Water quality; Soil quality; Access to the natural areas; Biodiversity; Swimming, bushwalking and other outdoor activities; Fishing, hunting, collecting produce; Beauty of the landscape and beaches; and Condition of the landscape and beaches.
- Economy and services domain, consisting of: Work; Income; Housing; Health services; Recreational facilities; Roads condition; Public infrastructure and transport; Training and education services; and Support services.

The wellbeing factors were selected using the following process. Firstly, in the preparation stages, focus groups were run with key informants from the region, coming up with a regionally relevant lists of factors. These lists were then further refined during the pilot stage of the project with the actual residents to arriving at a “final list” of factors employed in mailout survey. Then, during the mailout stage, respondents were asked to indicate which (if any) of those factors were important to them; and then asked to indicate just how important they were. Only then was the satisfaction score for “important” wellbeing factors elicited. This novel approach, although not being entirely “bottom-up” did nonetheless provide an opportunity for the respondents to voice their preferences in a time and cost efficient manner. Such an approach is indeed very different to standard list-based elicitations of satisfaction scores, which simply provide respondents with a list of scientist or expert derived factors and ask them to indicate how satisfied they are with each.

Contributors to wellbeing, both at an individual and at an aggregated level, were analysed first. Respondents were found to have selected different factors, and selected them at different increments (levels). At least one factor from all three domains (economy, society and nature) was identified as important to wellbeing by a large majority of respondents. The same ten factors emerged in the analyses as the most important contributors to wellbeing of the majority of the respondents in both Shires. These were: Family relations; Health; Income; Safety; Health services; Water quality; Roads condition; Air quality; Work; and Condition of landscapes and beaches. Thus, it can be concluded that the contributors to wellbeing are indeed shared not only by the individuals within each Shire, but also across the regions. Social factors scored highest, and the scores were remarkably similar across the two shires. Although the same factors emerged as being in the “top-ten”, there were some interesting differences between the two data sets. For example, air quality recorded a higher mean in Whitsunday than in Cardwell Shire; while health services were perceived as being of higher importance in Cardwell than in Whitsunday Shire.

The extent to which respondents were satisfied with their self-nominated “contributors to wellbeing” was explored next. The five factors receiving the highest satisfaction scores in both Shires were family relations, safety, health, education and work. Satisfaction with external factors such as council relations, roads condition and recreational facilities were very low. Variation between the two case studies was also

recorded. For example, satisfaction with water quality and housing was significantly lower in the Whitsunday Shire, while health services and training and education services received significantly lower satisfaction scores in Cardwell Shire. This intra-regional variation of satisfaction scores potentially indicates that the scores are indeed representative of the “objective conditions” specific to the region. In addition, findings of this study were compared to the findings on the Australian Wellbeing Index, an Australia-wide semi-annual survey of wellbeing satisfaction. Satisfaction with family relations, safety and health was on average higher in this study than satisfaction scores reported nationally.

Those points aside, the levels of satisfaction with several contributors from this study were difficult to compare to the national level study as the questions asked, and thus factors explored, were not the same. This is due to the methodological approach where contributors to wellbeing in this study were self-selected by respondents, and not pre-determined by experts. Essential differences emerging from the comparison of two sets of questions (self-selected versus pre-determined) raises interesting questions about the usefulness of pre-determined expert lists for policy making. Furthermore, expert lists record mainly “personal” aspects, which correspond poorly with “objective conditions”. The respondents to this PhD study selected more distant and specific factors, such as roads condition or council relations, than did the experts in the national study. And interestingly, these distant and specific factors are ones that can be influenced by decision makers and are thus more relevant if wellbeing is to be used in decision-support.

A total of 19 socioeconomic, demographic and sense-of-place attributes (characteristics of the respondents) were tested as potential determinants of wellbeing choices and stated satisfactions. Although several attributes emerged as determinants of specific wellbeing contributors and satisfaction levels, they were all of a rather weak predictive power. In other words, no clear conclusive typology – a set of factors that determine people’s responses - emerged from the analysis. It can therefore be argued that objectively measurable attributes of the respondents, such as socio-economic status, are not good predictors of wellbeing, and thus secondary data available on such attributes is of limited use in this context.

Information on the importance of wellbeing contributors was combined with information on levels of satisfaction into a single metric termed the Index of dis-

satisfaction (IDS). The IDS was used to create “action lists” of priorities most pertinent to each study region. Factors receiving the highest scores in IDS are those that were of high importance to a large number of respondents and which also received low satisfaction scores. Health services, the condition of roads and the condition of the landscape and beaches topped the priorities list for the Cardwell Shire; while water quality, health services and the condition of roads were the top three action items in Whitsunday Shire. Thus, the IDS method appeared capable of capturing specific differences between the two Shires. The factors identified on the “action list” came from both the domain of economy and services as well as from the natural environment. The important role of nature as a contributor to wellbeing supports other studies suggesting that the natural environment should be incorporated in wellbeing studies on a more equal footing to other domains.

One of the key conditions for ‘efficient’ investment in regional development requires that one invests resources on items that generate the highest marginal returns. The results of the two case studies presented in this Thesis suggest that the marginal returns on investment in social and environmental factors are at least as high as those associated with investment in economy and services – perhaps higher – and that these factors thus warrant further attention from decision makers in these regions. Whether or not the same holds true in other regions, is a topic worthy of further investigation.

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Chapter 1 Introduction

The concept of sustainable development encourages policy makers to promote development that will sustain natural environments for future generations' welfare, while ensuring that the living standards of those in the present are maintained (WCED, 1987). The concept links ecological protection, economic development and human welfare. Although the concept has been equally hailed and criticised since its origin, sustainable development delivers four key notions:

- It entrenches ecological and societal considerations into economic policy making;
- It explicitly references “needs”, and therefore does not simply argue for the creation of wealth or the conservation of resources, but also for fair distribution;
- In addition to intra-generational equity, it also explicitly refers to intergenerational equity;
- It stresses the concept of “development”, rather than “growth”, acknowledging that economic welfare is about more than just the financial aspects.

The United Nations Rio Declaration (United Nations, 1992) brought further popularisation of the concept of sustainable development. Most relevant here is that Chapter 8 of the Agenda 21 (Quarrie, 1992) calls on governments to modify and strengthen planning and management procedures so as to facilitate the integrated consideration of social, economic and natural environment issues. This goal of “sustainability” sometimes presupposes a new direction for the development of society, which includes consequences for spatial patterns and consumption habits. As the development of society is a highly complex and, to a large extent, unpredictable process, the long-term effects of any policy measure are only partly foreseeable (Abaza et al, 2004). Hence the need for consistent, transparent methods of attempting to predict the impacts of policy measures.

However, before we can assess the impacts or attempt to evaluate the success of the policy, we need to determine the scope of assessment. That is, we need to be able to answer the following question: “Impacts on what?”. The concept of sustainable development explicitly refers to the “needs” and satisfaction of needs of people. Thus, in order to promote sustainability, policy and decision makers need to be able to identify

what “needs” are, and how these needs are distributed in society. In other words, they need to be able to answer questions such as: “What matters to people?” and “How satisfied are they with things that matter to them at the moment?”. Understanding current needs and current levels of satisfactions would benefit policy assessment as it would allow mapping of the envisaged impacts of policy (negative and positive ones) against their importance to people, thus providing information about the potential of different policy options to increase or decrease human welfare.

The concept of “human wellbeing” has emerged in the literature and in practice as a concept with the potential to provide answers to such questions. As a result, human wellbeing is becoming an increasingly important aspect of investigations in planning and management (Hagerty et al, 2001; Hassan et al, 2005; Veenhoven, 2002). Evaluations of the urban quality of life and wellbeing are well documented (for example, see Ge and Hokao, 2006; Giannias, 1998; Grayson and Young, 1994; Pacione, 2003; vanKamp et al, 2003), representing either general approaches or focusing on particular domains of the urban quality of life such as health, social cohesion, safety or leisure (for example, Bell, 2006; Berger-Schmitt, 2002; Lloyd and Auld, 2002). In the rural and semi-rural context, interest in human wellbeing has been largely derived from the natural resource management perspectives, in particular through popularization of the Millennium Ecosystem Assessment methodologies (Hassan et al, 2005; Millennium Ecosystem Assessment, 2003). Consequently improvements in human wellbeing are increasingly viewed as being dependent on improving ecosystem management and ensuring conservation and sustainable use of resources (Hassan et al, 2005). Evidently, human wellbeing approaches that consider the paradigm of sustainable development warrant further research.

Furthermore, natural resource management agencies, regional planners and other decision makers are facing increased pressure to incorporate the social dimensions of resource management into landscape planning. However, studies set in rural regions tend to focus on particular groups, such as landholders (Bohnet and Smith, 2007; Broderick, 2005) or Indigenous populations (Larson et al, 2006; Richmond et al, 2000). Little appears to be known about subjective preferences, individual contributors and the levels of satisfaction with human wellbeing in the general population that resides in rural areas of Australia.

1.1 Aims of the Thesis

The primary aim of this Thesis is to improve our understanding of what people value and find most important to their wellbeing, at the regional scale.

On the one hand, the sustainability literature and the resulting national institutional arrangements explicitly reference “needs” and the satisfaction of “the needs” of the people; while on the other hand, the Australian government is increasingly interested in development and promotion of regional Australia. Yet, we have very little understanding of what the needs and aspirations of the people currently living in the regional Australia are, and hence how these regions can be best developed and the welfare of their residents best enhanced.

Thus, it is important to gain a better understanding of the needs of the residents in regional Australia. The concept of wellbeing was used to explore this aim as it allows for the collection of needs and priorities, that is, important wellbeing contributors, as perceived by people.

However, policy and decision makers do not only need to be familiar with what the needs are, but also with how they are distributed in society. Thus, this research also examined various social, economic and sense of place attributes of residents of regional Australia, with the aim of investigating if such attributes potentially determine stakeholders’ responses.

In addition to the question of “what matters to people?”, this Thesis also explored current levels of satisfaction with important wellbeing contributors. Satisfaction was compared across the case studies, and to national-level studies, with the aim of better understanding regionally-specific issues.

An approach that takes into account both what people value most and how satisfied they are with the current state of affairs would assist decision makers with identifying regional priorities, as perceived by residents. This Thesis proposes one such approach, that of using a quantitative composite value that combines both types of information, and aims to demonstrate, using two Shires in Great Barrier Reef region as examples, how this can be done.

1.2 Overview of the Thesis

This Thesis is organised into eight chapters, and contains three appendices.

Literature that has been reviewed for this Thesis is presented in Chapter 2. The Chapter starts with an overview of key ideas from areas that provide an interdisciplinary integration of economic, social and ecosystem concerns, as well as an integrated concept of human wellbeing. The literature review also presents a summary of current developments in Strategic Environmental Assessment (SEA) processes, legislation and literature and introduces the concept of Corporate Social Responsibility (CSR). An overview of the assessment methods in use is incorporated in the literature review section. Chapter 2 concludes with a list of specific research questions that need to be explored in order to meet the aims of this Thesis.

An overview and a comparison of the two study areas is presented in Chapter 3. Methodological approaches to the primary data collection are also discussed in this chapter. The design of the questionnaire is presented first, followed by the details of pilot testing. The full survey stage of the data collection is presented at the end of the chapter.

Results of this Thesis are presented in three Chapters. Chapter 4 presents investigations into the contributors to wellbeing. The chapter starts with the data analysis methods, and then presents results of the investigation into wellbeing contributors at both individual and regional levels. Explorations of the determinants of the wellbeing choices are also presented. The chapter closes with a discussion of the findings and conclusions. Satisfaction with the state of key contributors to wellbeing is presented and discussed in Chapter 5. Data analysis methods are presented first, followed by results at the regional level. The results are compared to the national satisfaction scores, followed by a discussion and conclusion sections. Chapter 6 explores approaches to better understand both what people value most and how satisfied they are at the moment. A summary of data analysis methods is followed by the explorations of the satisfaction and importance on an individual and regional level. A composite metric of both measures, the Index of dis-satisfaction, is then proposed and discussed.

Key contributions of this Thesis are discussed in Chapter 7. This chapter also presents areas of interest for further research.

Thesis closes with a list of references in Chapter 8 and the appendices.

Chapter 2 Literature review

The structure of this Chapter is organised in line with Figure 1. Sections 2) and 2.2 present a review of the literature focusing on concepts and theories relevant to the integration of societal, ecological and economic concerns, and in particular relevant economic theories. Section 2) concentrates on the literature integrating just two parts of the system: nature and society; nature and economy; and society and economy, and is intended to serve as a preliminary introduction to the subsequent, core, parts of the review. Key concepts and approaches to the integration of all three spheres, that is society, nature and economy (shaded area in Figure 1) are discussed in Section 2.2. Section 2.3 presents a brief overview of two processes based on integrated concepts, that have been developed to inform contemporary government and industry decision making: the Strategic Environmental Assessment process and Corporate Social Responsibility. A summary of the key findings of the literature review is presented in Section 2.4. The chapter concludes with Section 2.5, which identifies a set of research questions for investigation in this Thesis.

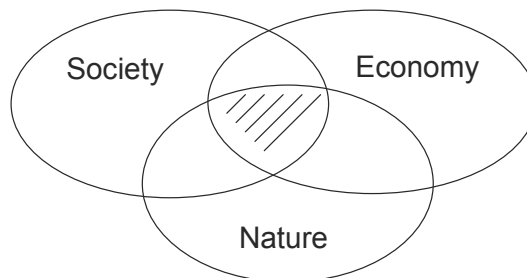


Figure 1. Integrative approaches reviewed in this Thesis: integration of parts of the system (nature and society; nature and economy; and society and economy); and integration of all three spheres, that is society, nature and economy (shaded area)

Preliminaries: definitions

Before continuing, however, it is important to clarify the terminology, particularly given the interdisciplinary nature of the investigation.

- 1) The term “*environment*” tends to be interpreted differently by different researchers and policy makers, depending on their cultural and disciplinary backgrounds, and is often referred to in the context of the natural environment

only. Just how broad the scope is, often depends on the definition given to the term “environment” in national legislation and policies. In some countries and international organisations the definition is broad, incorporating biophysical and socio-cultural dimensions, such as health (Taylor et al, 2004). In other jurisdictions, the definition is more restricted with the emphasis on biophysical aspects.

In this Thesis the term “environment” is used to refer to the social, economic and natural environment, as defined in Part 1 Article 3 (3) of the Queensland Vegetation Management Act (1999), which states that:

“Environment includes

(a) ecosystems and their constituent parts including people and communities; and

(b) all natural and physical resources; and

(c) those qualities and characteristics of locations, places, and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community; and

(d) the social, economic, aesthetic and cultural conditions affecting the matters in paragraphs (a) to (c) or affected by those matters.”

- 2) The term “region” can be defined as an area which is a subset of the nation, that might be, but is not necessarily, an administrative unit (Craig Davies, 1990). Most approaches to defining and determining regions maintain that regions should be contiguous; and homogenous within, in terms of social, economic and bio-geographical factors (Howard 2003). Thus, regions do not always have commonly accepted boundaries. They can be defined by formal boundaries (as in the case of state or local governments) or characterised by similarities in economic and social factors, natural environments and landscapes, or by other connections that distinguish them from neighbouring areas.

Regional geographers and economists identify three different approaches to defining a region: uniform or homogenous regions (areas identified by uniform characteristics), nodal or functional regions (interactions or functional linkages

between different components within a space); and planning regions (coherence and unity of economic decision making, designated by a particular authority) (Coombs 2001).

There is a substantive body of literature discussing the issues related to the definition of a 'region'. But it is not the intention of this thesis to contribute to that literature. Rather it is to improve our understanding of what people value and find most important to their wellbeing at a regional scale. Given this, the most appropriate definition of a "region" for use in this study is that which is most closely aligned with the definition of "planning regions": coherence and unity of economic decision making, designated by a particular authority. As unfortunate – and scientifically questionable – as this definition might be from a sociological perspective, development of policies in Australia, as indeed elsewhere, is bounded by administrative units, not social network catchments or biophysical boundaries (with the notable exception of the natural resources management (NRM) Boards in Australia that are management organisations based, in most cases, on catchment, rather than administrative, boundaries – interestingly, even in this case, the catchments cease at the state borders). Hence the reasons for using planning/administrative boundaries in this thesis. Planning regions in Australia are based on the Australian Bureau of Statistics (ABS) Census Collection Districts, which are agglomerated into Statistical Local Areas (SLAs) that coincide with the Shire or Council boundaries and thus planning management responsibilities. SLAs are further agglomerated into "statistical divisions", formal regions used for management and administration purposes by a large number of state and commonwealth government and non-government agencies, such as health (Department of Health and Ageing), education (Queensland Government Department of Education and Training), or economic development (Regional Development Australia). The "regions" explored in this Thesis thus refer to SLAs (Shire Council boundaries).

2.1 Bi-integrative approaches

2.1.1 Nature and society

The separation of spheres of "nature" and "society" has a long history in mainstream

Western science (Irwin, 2001). Yet it appears that complexity and controversy surrounding some contemporary environmental issues, such as climate change, has provided a renewed stimulus for re-integration in the West. As Goldblatt (1996, p5) argues :

“The classical social theorists were historically late enough to witness not simply the escape of the modern societies from their organic constraints, but also their dynamic capacity to transform natural worlds... Yet they were too early to register fully the implications of those transformations. Far from transcending ecological constraints, modern societies were rapidly acquiring new ones of their own making.”

The strong link between society and nature, however, has not been lost in many traditional societies. Contemporary integrative concepts, fundamentally similar to the emerging Western paradigm of sustainable development, have been described by Indigenous peoples in Hawaii (McGregor et al, 2003), western Africa (Fairhead and Leach, 1996) and Australia (Larson et al, 2006).

Catton and Dunlap (1978) presented one of the first major calls for the new social paradigm in the West, away from “human exemptionalism” towards an “ecological paradigm”. The ecological paradigm presents human beings as part of a larger ecosystem. It acknowledges that not only are human activities causing deterioration of the quality of the natural environment, but also that deterioration of nature has, in turn, a negative impact on people.

Furthermore, Clark (1991) argues that a link between nature and human community should be a central focus of the society. She further proposes that top down management systems might be necessary for global environmental issues and management, with necessary centralised institutions that allow short-term responses to changes. But in the long run, she argues, effective global management can only emerge from universally responsible management of local systems, not from centralised management. She maintains that local people have the most knowledge of the local system and have the most motivation to maintain local sustainability.

The public continues to demands ever greater environmental services, amenities, food safety, and other public goods from rural areas. Increasing range of use and non-use values the public desires from natural and rural areas, requires new evaluative

methodologies. Even if we did know what people want, argues McCarthy (2005), much work is needed to show that particular policies or payments actually produce the desired outcomes.

2.1.2 Nature and economy

The relationship between nature and the economy has significantly changed in the last few centuries and appears to have made a full cycle (Common and Stagl, 2005). Nature played a very strong role in classical economics. Particular attention was paid to the land suitable for agriculture, which was viewed as being of finite supply, and subsequent perceived future shortage of a specific natural resource played an important role in shaping the thinking of influential economists of the late 18th and 19th century. Largely due to Malthus' (1766-1843) predictions of eminent collapse of the system, once population numbers exceed the limits of land, the discipline of economics was labelled "the dismal science". However, one thing which economists of that time, in particular Malthus, did not take into account was the rise and the consequent "conquest" of nature by technology. Technological advances have not only extended the productivity of the land, but have brought about a new phenomenon that allowed for unprecedented economic growth: industrialisation. Industrialisation has brought with it new issues and new challenges for economics, but most importantly for this discussion, shifted the focus of enquiry from the natural environment and natural capital to the "technological" environment and financial, human and industrial capital.

As a result of technological and industrial advancements, not only the collapse of the system as envisaged by Malthus did not occur by the mid-twentieth century, but the standards of living were improving across the globe at an unprecedented rate. The social or natural components of the environment were not given a substantive role in economic theory of that time. The main focus of many economic policies was to promote efficiency and long term growth, and technology was seen as the main driver of that growth.

However, by the 1970's, some negative impacts of economic growth on the natural environment started to gain a wider consideration in economic discussions. The sub-disciplines of environmental economics, resource economics and ecological economics emerged to fill distinct niches, partly as a response to limited connections between the natural environment and economics of early to mid- 20th century (Common and Stagl,

2005). Although sub-disciplinary borders blur, resource economists chiefly view the natural environment as a provider of goods and services, while environmental economists are mainly concerned with the use of nature as a sink: that is, they often focus on pollution issues (Tietenberg, 2000). In contrast, ecological economists are concerned with the overall relationship between nature and economy, and thus the ideas of sustainability and sustainable development play a major role in their thinking (Common and Stagl, 2005). Much of the recent literature that integrates nature and economy (and their relations to policy) thus deals with pollution, ecological degradation, and methods of attempting to prevent and/or mitigate those problems.

The difference in paradigms has potentially profound impacts on the way in which the relationship between nature and economy, and thus sustainability, is understood. The “dominant paradigm”, our pre-determined point of viewing certain phenomenon, determines the space within which our future analysis will take place (our “vision”). Daly and Farley (2004), based on the writing of Kuhn and Schumpeter, argue that whatever is omitted from the paradigm, can not be recaptured and thus addressed in subsequent analyses that are based on that paradigm. Correcting of the “vision” therefore requires a new paradigm, not further analysis of the old (Daly and Farley, 2004). This point is very important for the future of sustainability thought, as the foundations and the building blocks of different economic “visions” differ on key aspects. As Daly wrote in the introduction to his book “Beyond Growth” in 1996:

“The power of the concept of sustainable development is that it both reflects and evokes a latent shift in our vision of how economic activities of human beings are related to the natural world – an ecosystem which is finite, non-growing and materially closed. The demands of these activities on the containing ecosystem for regeneration of raw material “inputs” and the absorption of waste “outputs” must, I will argue, be kept at ecologically sustainable levels as a condition of sustainable development. This change in vision involves replacing the economic norm of quantitative expansion (growth) with that of qualitative improvement (development) as the path of future progress.” (p1)

Figure 2 illustrates the relationship between the economy and natural ecosystems as a simplified perception. Some economists acknowledge the limitations to growth imposed by the natural system in which the economy operates; and thus envisage a “steady-state” economy constrained by its external environment (Figure 2, A). For others, there is no

reason for limitations in growth (Figure 2, B); the economy can grow forever, as technology is assumed to be capable of providing substitutes for any limits imposed by the ecosystem (Daly and Farley, 2004; Common and Stagl, 2005).

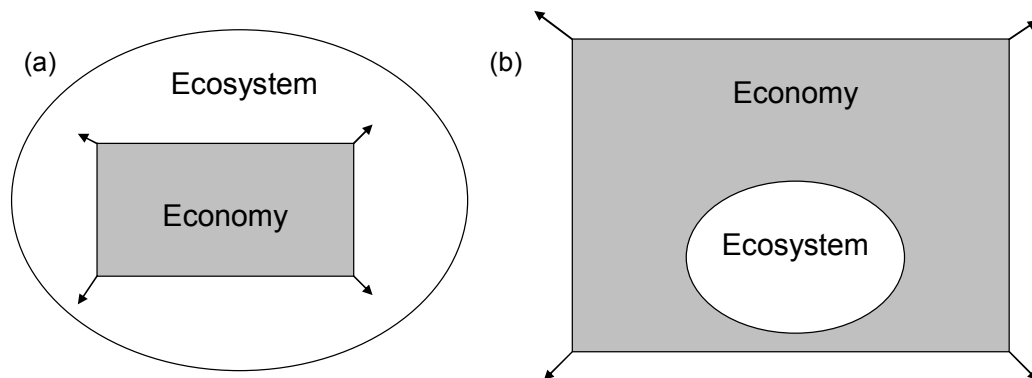


Figure 2. Different views of the relationship between the ecosystems and the economy: (a) economy constrained by its external environment and (b) economy with no limitations in growth

Jacobs (1991) points out that the natural environment is sometimes seen as a set of goods and services, just like any other good or service. Consequently, an explanation for the overuse and abuse of the natural environment (“ecosystem services”) is that environmental goods and services are usually available for free. Therefore, if one starts to charge for the use of environmental goods and services, users will have an incentive to minimise their use or to use other goods in stead. But if natural goods and services are not substitutable for other types of goods and services, then simply placing a price on the environment will not solve the problem of overuse. Model (A) above might therefore be a better representation of our state of affairs.

2.1.3 Economy and society

Like the relationship between nature and the economic system, so too is the relationship between social and economic systems viewed differently by different schools. For the classical economists of the late eighteenth and early nineteenth century, the social environment played a central role. The idea of a “stationary state” of the economy was viewed by some economists of the time as a natural point of maturation of an economic system. Mill (1806-1873) argued that a stationary state of economic development does not imply a stationary state of human improvement. People will have more time for improving the “art of living” once they get beyond the “art of getting on”, he argued.

Daly (1996) notes that such ideas would, in today's world, be labelled as "sustainable development". But what improvements in living conditions would the "art of living" include? Many sets of indicators of such improvement have been proposed over the years, and will be discussed in more detail later. But it suffices to say here, even if we could agree on a single set of factors that positively contribute to "art of living", we would still be faced with the need to make choices between those contributors. People have preferences as to what is important to them, and so societies also have preferences as to what is important to their welfare (Feldman, 1980). Just like individuals are constrained by their budgets, policy makers and administrators also operate within strict budgets, and policy makers are often faced with the difficult choice of trading off between two goods. A key question facing policy makers is therefore often: "If both A and B are good and desirable, is it "better" to have A or B?" (for example, when is it better to build a hospital and when should one build a school?).

Majority voting has been proposed as an optimal way of making these types of social choices, and is the basis of democratic systems, the most accepted political model of our times. Much work on majority voting has concerned itself with identifying different requirements for the creation of efficient and equitable social choices: hence Pareto's need for optimality and Rawls' need for fairness. A comprehensive set of requirements was put forward by Arrow (1950, 1963), who defined a set of elements which would need to be fulfilled for a "social choice rule" to work. Specifically, Arrow proposes that the following conditions must be fulfilled if one wishes to create a "foolproof" set of rules for discovering and defining social preferences:

- completeness and transitivity;
- universality;
- Pareto consistency;
- non-dictatorship; and
- independence of irrelevant alternatives.

After running various theoretical possibilities through those requirements, Arrow concluded that there is actually no foolproof way to derive complete and transitive social preference relations in a society, as no collective choice can be made that satisfies all five requirements. This conclusion is called "Arrow's impossibility theorem". The clear "no" finding of Arrow's theorem effectively negates any assertion that there are

such things as “general will”, “social contract”, “social good” or even “people’s government”; that is, his impossibility theorem casts doubt over much of the 20th century social thought (Feldman, 1980).

Several writers have since challenged the theorem, in particular the requirements for completeness, transitivity, and universality (see LeBreton and Weymark, 2002; or Feldman and Serrano, 2006 for details). However, one of the requirements that has received most criticism is that of independence. The independence rule states that if people’s feelings about a set of irrelevant alternatives change, but do not change about the pair of alternatives x and y , then a collective choice rule must preserve the social ordering of x and y .

Two types of arguments are put forward against this rule. The first is that people evaluate entire sets of social options, not fully independent among themselves. Therefore, there is no pair of alternatives that can be evaluated separately from other options as no option can be fully “irrelevant”. The second criticism of this rule is that political and societal decisions are made at one given point in time, with whatever the given set of preferences are at that time. As Feldman (1980) argues, the real pragmatic question from a policy-maker’s perspective is:

“We have so many people with particular preferences that are given. How might we aggregate these given preferences? What might or might not happen when and if preferences change is not of particular interest to us, because we want to aggregate the fixed preferences of our given population now.” (p193).

Therefore, Feldman argues further, as long as we acknowledge that preferences are inter-linked and will indeed change over time, the questions of aggregating individual preferences into a social preference is what really matters.

Several forms of majority voting exist, from the simple yes/no vote to ranking and weight voting. The majority of the economic valuation exercises, for example, are based on the principles of preference rankings (Feldman, 1980; Johansson, 1991; Page, 1991; Tietenberg, 2000). “Weight voting” however appears particularly useful for a better understanding of the voting preferences: in this method, each person reports his or her preference relation, that is, a certain weight is assigned to each rank. The weights given to a particular alternative by each person are then summed. Social preference relation is then derived from the sums of weights (this type of voting is also referred to as “de

Borda voting” since de Borda was arguably the first to analyse this type of approach in his work published in 1781). The main criticism that de Borda voting receives is that the outcome, that is, the social preference relation, will depend on the actual magnitudes of the weights - a different set of weights will generally generate a different social preference relation. So, Feldman (1980) argues, if weights are assigned in an arbitrary manner, then the resulting social preference relation will also be arbitrary.

2.2 Integration of society, nature and economy

Popularisation of the concept of sustainable development provided a renewed impetus for integration of societal, economic and ecological concerns (WCED, 1987). The United Nations Rio Declaration (United Nations, 1992) furthered the acceptance of sustainable development concepts, by calling on governments to modify and strengthen planning and management procedures so as to facilitate the integrated consideration of social, economic and natural environment issues.

At the individual (personal) level, several related concepts with the potential to encompass human conditions, the economy and the nature have emerged, including the concepts of “standard-of-living”, “quality-of-life”, “happiness” and “wellbeing”. Common and Stagl (2005) argue that:

“to the extent that people’s needs and desires are more or less satisfied, we could expect them to feel more or less happy. Then, a proper and comprehensive indicator of economic performance is human happiness” (p198).

Although concepts of “standard-of-living”, “quality-of-life”, “happiness” and “wellbeing” are very similar, they are not fully interchangeable. However, the delineations between the concepts often blur, and furthermore, they are sometimes defined differently by different researcher schools (Haybron, 2008). For example, “wellbeing” has been recently referred to as a subjective perception of one’s quality of life (Costanza et al 2007). In addition, “happiness” is often referred to as an emotional state of the person and as such is being criticised for being too open to psychological trends of the person (Haybron, 2008).

These concepts will be further discussed in the next two sections, first at the individual and then at an aggregated societal level. Terminology used to refer to the concepts and methods in this literature review is typically that of the original author.

2.2.1 At the individual level

The ethical and philosophical basis for economics, and thus for the relationship between economics and the social and ecological systems, is largely governed by utilitarianism (Common and Stagl, 2005). Utilitarianism is concerned with maximising benefits (pleasures) and minimising costs (pains). An action is thus viewed as “ethical” or “correct” if it increases the pleasure or decreases the pain (Daly and Farley, 2004).

Economists of the nineteenth century were interested in devising a measure for the utility as a cardinal measure, that is, one which could be expressed on an absolute scale. However, with the development of the studies in consumer demands, and the influential writing of Robbins (1898 – 1984) claiming that any interpersonal utility comparison is unscientific, it was deemed that such a cardinal measure was not only unfeasible, but also unnecessary. Instead, ordinal analysis, which measures relative differences between goods or services, was adopted, and it is a change in the utility levels rather than absolute levels of utility that are of interest to modern economists (van Praag, 1991; Layard, 2003).

Another concept relevant to the study of utility is that of the law of diminishing marginal utility, which states that the more one has of something, the less satisfaction an additional unit of it provides. Lane (2000) uses marginal utility theory to discuss happiness at the personal level in the following steps:

1. people have multiple sources of happiness and satisfaction and will seek a variety of goods in their pursuit of happiness;
2. as any one good becomes relatively more abundant, the satisfaction people get from that good usually (but not universally) wanes in relation to the satisfaction they get from other goods;
3. as historical and social circumstances change, the power of various available goods (for example, income, companionship, work satisfaction) to yield satisfaction will change with changes in the supply of each good (as well as with tastes/ “fashion”).

In this context, economic growth is no longer a major source of wellbeing in developed countries, Lane argues (2000). Like other goods, money income and the commodities it buys have declining marginal utility. In contrast, other goods such as companionship for example, may have rising marginal utility in developed countries (Lane, 2000).

Consequently, those striving to increase their total utility might substitute some monetary goods for non-monetary ones.

Furthermore, happiness appears to be correlated with relative, rather than absolute, levels of wealth and consumption. As Daly and Cobb put it, “*having more is less important than having more than the “Joneses”*” (1994, p 415). Therefore, as increased consumption leads to an overall increase in the level of material wealth, it could be expected to do little to increase individual perceptions of wellbeing and happiness.

However, Jacobs (1997) goes further, arguing that it is not only private consumption that makes people better off, but also a range of other goods that individuals enjoy but do not personally buy – “public goods”. He points that most ecological goods, as well as social and cultural goods, are such in nature. Public goods have two things in common: they are shared (i.e. the air we breathe or art galleries); and they must be provided collectively as they are too expensive for the majority of individuals to purchase. Therefore, to pay for such goods, prices and taxes might have to rise and private consumption would thus have to be reduced; but this does not automatically mean that people will be worse off. They might have less money to spend, but their overall quality of life will be higher. In other words, quality of life does not have to be increased through an increase in disposable income; but rather can be increased via improvements in public services or ecological and social conditions (Jacobs, 1991). Moreover, as social and ecological goods and services are contributors to overall wellbeing, the over-emphasis on private consumption at the expense of social and ecological goods may actually lead to a decline in wellbeing, rather than to its increase (Jacobs, 1997).

Jacobs proposes that “standard-of-living” be defined as a sum of disposable income and quality of life. He defines “quality-of-life” as the “*sum of all things which people consume collectively, whether through public expenditure or not purchased at all*” (Jacobs, 1991, p 244), such as public services (education, healthcare, street cleaning); natural environment (clean air); and social conditions (crime levels). In short, Jacobs argues that:

Standard of living = real disposable income + quality of life

Quality of life = public services + condition of natural environment + social conditions

Measuring disposable income, Jacobs further argues, is relatively easy. Measuring quality of life is not; what is important is not the amount spent on services, but the amount of welfare people derive from it. Therefore, standard of living is a subjective notion, which cannot be reduced to objectively measurable indicators. Welfare is an inherently personal concept; each individual will regard a given pattern of consumption – their own and others’ – differently.

Empirical approaches to measuring individual wellbeing will be discussed next. In summary, two types of methodological approaches to the wellbeing and quality of life have been developed, the objective and the subjective approaches.

The objective measures of quality of life and wellbeing consist of data related to material and social circumstances and are typically collected at the national level (Hagerty et al, 2001; Nussbaum and Sen, 1993; Veenhoven, 2002). The objective approach to wellbeing focuses on facts, such as income in dollars or housing in square meters. One criticism of this approach is that it does not provide any insight into individual satisfaction with factors measured – e.g. satisfaction with income or perceived adequacy of housing (Veenhoven, 2002). Another, and perhaps more significant, critique of the measures for the objective approach is the issue of selectivity. Although the objective approach uses objective measures, the process of selection of the measures might not be objective (McAllister, 2005). Two key choices have to be made: a choice of which domains of wellbeing are to be included (and which not); and a choice of how to ascribe weights to these domains. Both selective decisions are often made based on expert judgement, system of norms dominant in a given society, or arbitrarily (McAllister, 2005). Costanza and colleagues (2007) criticise the “objective” indicators of wellbeing as being narrow, opportunity-biased, and unable to incorporate many issues that contribute to quality of life such as identity and psychological security. Furthermore, they argue that

“these so-called “objective” measures are actually proxies for experience identified through “subjective” associations of decision-makers; hence the distinction between objective and subjective indicators is somewhat illusory“
(Costanza et al, 2007, p 268).

Individual satisfactions and perceptions are the main focus of the subjective approaches

to wellbeing (Andrews and Withney, 1976; Cambell et al, 1976; Cummins et al, 2003; Nussbaum and Sen, 1993; Veenhoven, 2002), as they take into account individual experiences and help understand and communicate the interpretations, priorities and needs of the individuals (Diener and Suh, 1997).

Costanza and colleagues (2007) also critique subjective measures of wellbeing, pointing both at the difficulty with delineating preference adaptation and the fact that people judge their wellbeing in comparison with peer groups rather than in absolute terms. Other critiques of the subjective wellbeing measures found in the literature relate to reliability and validity of the subjective measurements; and the roles genetics play in subjective assessment (McAllister, 2005). The argument is that different people might understand the concept of wellbeing differently, and also that some might have a “happier” psychological disposition than others, thus influencing their individual standards of comparison.

If we agree that standard of living depends as much on the people that experience it as it does on policies or market instruments that generate it, we can conclude that, in order to fully understand the impact of policy on the human welfare, we need to understand how each person experiences his or her own welfare.

Irwin (2001) argues that the environment is not “given”, it is also created and interpreted by humans. Therefore, an “objective” study of the environment cannot provide an understanding of the human interpretation of that environment. More subjective approaches that take into account individual experiences and understandings are therefore needed (Diener and Suh, 1997; Costanza et al, 2007).

“Human wellbeing” is a main concept open for investigation through both objective and subjective approaches. In 1992, the United Nations Commission on Sustainable Development published Agenda 21 (United Nations, 1992), which outlined an integrated way of assessing human wellbeing. Since then, it has become a widely-researched concept, with varied (albeit related) approaches (Larson et al, 2006). A comparison of some of the approaches in use is presented in 0, followed by a discussion providing more detail.

Researchers interested in human wellbeing tend to agree that the concept includes: income and basic material needs; the experience of freedom, health and personal security; good social relations; and healthy natural environment (Schwartz, 1994;

Cummins, 1996; Narayan et al, 2000; Alkire, 2002; Millennium Ecosystem Assessment, 2003).

The Australian Bureau of Statistics (ABS) also adds aspects of societal norm to the definition, stating that wellbeing is:

“a set of factors such as natural environment, the human made environment, social arrangements, and human consciousness, that interact within the given culture and can be seen as a state of health or sufficiency in all aspects of life” (ABS, 2001; based on OECD 1976).

Human wellbeing also has a central focus in the conceptual framework of the Millennium Ecosystem Assessment (MEA) (2003). One important contribution of MEA is that it recognises that human wellbeing is also influenced by, for example, the intrinsic values of biodiversity and ecosystems. The MEA explores five core dimensions of wellbeing: material minimum for a good life, health, good social relations, security and freedom and choice. The core dimensions are then related to four categories of ecosystem services: provisioning services, regulating services, cultural services and supporting services (Millennium Ecosystem Assessment, 2003; Table 1).

Another relevant model is Prescott-Allen’s Wellbeing of Nations (2001), which links human wellbeing (presented in the table) with ecosystem wellbeing, both of which are characterised and evaluated through a series of domains. Human wellbeing includes the domains of health, population, wealth, knowledge, culture, community and equity (Table 1). Ecosystem wellbeing is represented in the Stress Index. Domains include land, water, air, species and resource use. The Stress Index shows to what extent human wellbeing in each nation causes ecosystem stress. The Wellbeing Index enables evaluation and comparison of human and ecosystem conditions.

The person-environment model (Mitchell, 2000) examines a combination of measurable spatial, physical and social aspects of the environment and persons’ perception of these. The domains of the model are presented in Table 1. The model records both objective characteristics of the environment as well as subjective understanding of those characteristics.

Table 1. Wellbeing domains in the literature: Comparison of models dealing with human-environment interactions

ABS concept (based on OECD, 1976)	Millennium Ecosystem Assessment (2003)	Wellbeing of Nations (Prescott-Allen, 2001)	Person-environment relationship (Mitchell, 2000)	Concept of liveability (van Kamp et al, 2003)	Com QoL (Cummins et al 2003)
Family and community	Material minimum	Population	Community	Community	<u>Personal level:</u> Relationship
Health	Health	Health	Health	Health	Community connectedness
Education and training	Good social relations	Wealth	Personal development	Personal development	Health
Work	Security	Knowledge	Goods and services	Economy	Achievement
Economic resources	Freedom of choice	Culture	Physical environment	Natural resources	Standard of living
Housing		Community	Security	Built environment	Safety
Crime and justice		Equity		Services accessibility	Future security;
Culture and leisure				Lifestyle	<u>National level:</u> Economic situation
				Safety	State of environment
				Culture	Social conditions
				Natural environment	Wealth/income distribution
					Health services
					Family support

The concept of “liveability” was first described by Veenhoven (1996) who argued that ‘liveability’ is a better word to describe ‘quality-of-life’, ‘wellbeing’ or ‘welfare’ because it refers explicitly to a characteristic of the environment and does not have the limited connotation of material conditions. It refers to the conditions of the environment in which people live, such as air or water pollution or poor housing, and the attributes of people themselves, such as health or educational achievement (Pacione, 2003). The relevant domains are summarised by van Kamp et al (2003) and presented in Table 1.

Methods used in the psychological literature are interested in measuring “quality of life” of each individual per se. Several lists of wellbeing factors, domains, and aggregating algorithms to measure overall quality of life satisfaction have been proposed and are in use, such as the Quality of Life Index (QOL Index, Ferrans and Powers 1985), the Quality of Life Inventory (QOL Inventory, Frisch 1992) or Comprehensive Quality Of Life Scale (ComQol). ComQol is a well established measure of national wellbeing in

Australia, developed in partnership between Australian Unity and Professor Cummins and his colleagues at the Australian Centre on Quality of Life at Deakin University. ComQoL identifies seven domains in total (Cummins et al, 2003): Life as a whole; Personal wellbeing; Australia as a whole; National wellbeing; Social capital; Own life changing; and Australia changing. This model explicitly differentiates wellbeing factors related to “self” from those of the nation. The domain of Personal Life consists of standard of living, health, achievement, relationship, safety, community connectedness and future security (with a Spiritual/religious fulfilment factor also introduced in recent surveys); while the domain related to National Wellbeing comprises of economic situation, state of environment, social conditions, wealth/income distribution, health services and family support (Table 1).

The Australian Unity Wellbeing Index method, based on a concept of ComQoL, is a subjective measure that investigates how Australians feel about their life in Australia (Cummins, 1996; Cummins et al, 2003). The method is based on national phone surveys of a random, geographically representative sample of 2,000 Australians, conducted at least twice per year. The first Australian Wellbeing Index survey was conducted in April 2001, and 19 additional surveys have been conducted since (Cummins et al, 2008). Surveys are actively managed to ensure an even gender split in each geographic region, but are not managed for age of respondents, cultural background or any other socio-demographic characteristic of respondents. The respondents are asked to rate their satisfaction with life areas on a scale of 0-10 (the life areas of: Standard of living; Health; Achievement; Relationship; Safety; Community connectedness; and Future security). Scores from all items are combined and converted to a 0-100 point range, thus forming the Personal Wellbeing Index. The Index has two main aims. One of them is the identification of longitudinal change in levels of responses, through comparison of index findings over time. The other aim is to identify groups within the Australian population that are “happier” or “less happy” than Australian averages. The Australian Wellbeing Index is based on the theory of homeostasis and thus looks for segments of the population that exhibit low satisfaction with life levels, a sign of homeostasis failure.

In his analyses of 16 studies on life satisfaction in the English-speaking western countries, Cummins (1995) reported that a life satisfaction score of 75 (out of 100, with 2.5% variation) was recorded in all of the studies. He therefore proposed that a

“normal” or homeostatic level of satisfaction with life, in the population of western countries, is between 70-80% (Cummins and Nistico, 2002; Cummins et al, 2002; Cummins, 2003). The homeostatic level is explained as a cognitive mechanism by which most of the people in a population sample actively maintain their life satisfaction by means of internal homeostatic control, under normal conditions. However, homeostatic failure might occur as a result of unfavourable extrinsic conditions (Cummins et al, 2002). Cummins therefore proposes that if satisfaction values in the population sample are lying under the homeostasis level, then the majority of the population are experiencing homeostatic failure. Such failure, he argues, is caused by the external forces and objective changes in life circumstances.

A similar method is used by the Hunter Valley Research Foundation (2008) in their Wellbeing Watch of the Hunter Region in NSW. Residents with a landline telephone connection are selected using random digit dialling method. This annual survey is conducted with 1,500 respondents in the Hunter Region and another 500 respondents in the remainder of NSW, which serve as a comparison sample. This survey uses five point scale and also aims at identifying both longitudinal change and population subgroups.

However, all of the conceptual models and approaches described above have one characteristic in common. They are pre-determined, that is, they provide a pre-set normative list of indicators that have been collated by experts (scientists or administrators). Thus, they provide no opportunity for participation and input from the very people whose levels of wellbeing are being determined. Consequently, they do not allow for the “sovereignty” of the individual that is central to much of economic thought.

Two approaches discussed below, Sen’s capabilities approach (which also served as a basis for the UN Human Development Index) and Max-Neef’s Human Scale Development, do address this shortcoming by specifically acknowledging that individuals are indeed the ones who need to decide what is or is not of importance to them.

Three concepts are central to Amartya Sen’s “capabilities approach”: functioning, capabilities and achievements (Sen, 1993a, 1993b, 1991; Anand and Sen 1993; Nussbaum and Sen, 1993). “Functioning” represents a state of a person, or the things

she manages to do, or be, in life. Functionings vary from the elementary, such as being well nourished, to the more complex, such as being respected. A “capability” of a person reflects the alternative combinations of functionings that a person could achieve, and from which she chooses. A capability can be visualised as a space for functionings, as the extent of freedom a person has to achieve different functionings. Thus, a person’s freedom to live different types of lives is reflected in the person’s capability set. A capability is thus defined as a set of options available to the person to “achieve” things important to her. Therefore, living is viewed as a combination of various “doings” and “beings”, with the quality of life being assessed in terms of the capability to achieve valuable functionings. Sen acknowledges that the capability of a person depends on a variety of factors, including personal characteristics and social arrangements.

Sen also separates the capability to achieve functions from the actuality of achieving functions, as person might choose not to achieve something she is capable of (i.e. difference between a woman staying at home to look after her family because she chooses so rather than because she is not allowed to enter the workforce). Therefore, the object of policy, he argues, is to provide capabilities for functioning, not to ensure that functioning is achieved (Sen, 1993a).

Furthermore, Sen stresses that individuals are likely to differ a great deal from each other in the weights they attach to those different functionings – and that the assessment of individual and social advantages (wellbeing) must be aware of and alert to these variations. He argues that:

“focusing on the space of functioning does not entail that each functioning must be taken to be equally valuable, or valuable at all”. (Sen, 1993a, p32)

Rather, Sen proposes, choices are related to underlying concerns and values of the person, where:

“some definable functionings might be important and others quite trivial and negligible.” (Sen, 1993a, p32).

Thus, Sen concludes, evaluative studies need to distinguish between (a) what is valuable; and (b) how valuable it is. Although Sen acknowledges that the former question is an elementary aspect of the latter question, he argues that identification of objects of value is an essential element which makes the pursuit of the second question possible. The “evaluative space” of a person needs first to be identified, before it can be

weighted and ranked, and such rankings “*can indeed take us some distance – often quite a long distance – in the evaluative exercise*” (Sen, 1993a, p32). Sen further argues that understanding both what is included and what is excluded by a person is equally valuable knowledge.

An alternative approach, based on the elicitation of the welfare concerns in consultation with the citizens, was proposed by Max-Neef and colleagues (Cepaur, 1986; Max-Neef et al, 1989; Max-Neef, 1991, 1995) in the Human Scale Development (HSD) paradigm. Max-Neef and colleagues propose a participatory concept to be used for the purpose of diagnosis, planning, assessment and evaluation, in which participants themselves discuss and determine the domains of interest to their wellbeing.

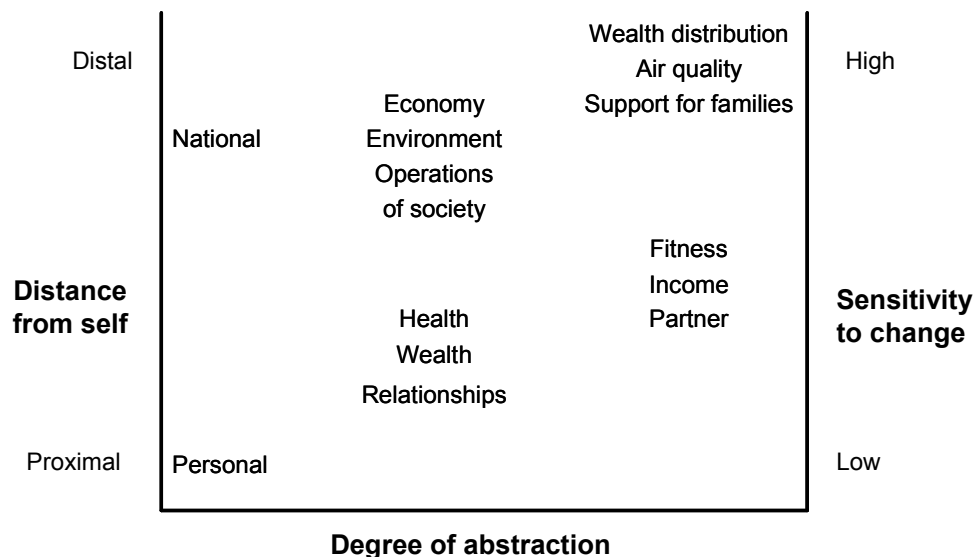
Another way in which this approach distinguishes itself from most other approaches found in the literature is that, similarly to Sen’s capabilities and functions, Max-Neef and colleagues clearly distinguish between “needs” and “satisfiers” of the needs. They argue that fundamental human needs are finite, few, and classifiable; and the same in all cultures and in all historical periods. What changes, both over time and through cultures, is the way or the means by which the needs are satisfied. Thus, what is culturally determined are not the fundamental human needs, but the satisfiers for those needs.

The method proposed by Max-Neef and colleagues is envisaged as series of 2-day workshops, attended by up to 50 people. In a preliminary stage, the participatory exercise is to serve as a “group self-diagnosis”, with process of dialog later acting as a catalyst for further characterisation and rising of the awareness of the group. The Human Scale Development method proposes a matrix of, in rows, the existential needs of Being, Having, Doing, and Interacting; and, in columns, the axiological values of Subsistence, Protection, Affection, Understanding, Participation, Idleness, Creation, Identity and Freedom. Participants in the workshops are presented with the matrix-table with the empty squares, and are advised to fill in the squares with the satisfiers they see as important to them / their communities (for example, “Having” *education* would be a satisfiers of the need for “Understanding”).

Max-Neef and colleagues further argue that human needs must be understood as a system: that is, all human needs are inter-related, interactive, and no hierarchies exist within the system (with the sole exception of the need for subsistence, that is, to remain

alive). Rather, simultaneities, complementarities and trade-offs are characteristics of the process of needs satisfaction. Also, they propose that there are very few satisfiers that contribute to one need only, and conversely, a need might require various satisfiers in order to be met. Furthermore, they set satisfiers within three contexts: (a) with regard to oneself; (b) with regard to the social group; and (c) with regard to the wider environment.

An interesting concept in the context of “self” to “environment”, related to this discussion, has been considered by Cummins (2003), who proposed two dimensions that have an influence on wellbeing satisfaction scores (Figure 3). The first one is an abstract-specific dimension, where it is argued that more specific questions (such as: How satisfied are you with your health?) will generate greater variation in responses than more abstract questions (such as: How satisfied are you with your life overall?). The other dimension seen as relevant is distance from self, or the proximal-distal dimension, which ranges from highly personal issues to more societal and global issues. Again, the fluctuations in satisfaction scores are expected to be greater as we move from factors affecting personal wellbeing (for example, relationship with family and friends) to more distal, societal factors, as more distal factors are more sensitive to actual life conditions (Figure 3).



(based on Cummins et al, 2003)

Figure 3. Bi-dimensional model of subjective wellbeing sensitivity to external forces of change

Abstract and proximal measures are thus likely to evidence little sensitivity to changing (objective) circumstances, while specific and distal factors would reflect well the variation in the object or experience being evaluated (Cummins, 2003). This is a very interesting point for decision makers, as most policy interventions deal with distal and specific issues, and therefore changes in satisfaction with such issues should be readily identifiable in the satisfaction scores.

The phenomenon is explained through “positive bias” of the human brain which leads (under normal circumstances) to a generally positive view of self. The positive bias phenomenon has been recorded in several studies, with findings that the individual tends to find him/herself “superior” to others – luckier, happier, more moral, or otherwise better than average (Andrews and Withey, 1976; Headey and Wearing, 1989; Diener et al, 1999). This hypothesis is also supported by studies from Australia. For example, although 87% of Australians surveyed agreed that their ‘own future will be brighter’, only 30% thought that quality of life in Australia overall will be better in early 21st century than at the time of the survey (Eckersley, 2000).

2.2.2 At the societal level

Concepts of individual utility, quality of life and wellbeing were explored in the previous section. This section looks into aggregation of those individual utilities to a societal level – societal welfare.

As noted earlier, a central idea of utility theory is that individuals choose those things that bring them most utility, or most enhance their wellbeing, within the constraints of the resources they possess (Bell, 2006). An aggregation of all utilities obtained in society, that is all goods and services consumed, thus provides an overview of the welfare of that society. One of the key issues with societal welfare is related to the ways in which individual utilities are aggregated. A few main approaches are briefly presented here (based on Feldman, 1980; Johansson, 1991; Delisle, 2008).

Conceptual aggregation was provided by Bergson-Samuelson, who proposed a general approach where contributing factors are fully interchangeable:

$$SWF(x) = U1(x), U2(x), \dots UN(x)$$

Where

SWF(x) = welfare or social wellbeing in a state x

U = personal utility of persons 1-N, in a state x

The Benthamian social welfare function then proposes simple addition of all individual utilities, thus giving each individual utility an equal weight:

$$SWF(x) = U1(x) + U2(x) + U3(x) \dots UN(x)$$

Nash's approach on the other hand multiplies the utilities of each individual:

$$SWF(x) = [U1(x) * U2(x) * U3(x) \dots UN(x)]$$

Consequently, this welfare function provides an incomplete substitutability between the utilities of different individuals. In contrast to the Benthamian function where only the total sum of utilities matters, under this formulation equity and distribution do affect social welfare. Rawls's approach goes further, equating society's welfare to the welfare level of the least well-off person in that society:

$$SWF_{(x)} = \min [U1(x), \dots UN(x)]$$

Where

min = minimum level of personal utility of persons 1 to N, in a state x

This function thus assumes that there cannot be any substitutability between utilities of different individuals - social welfare of the society is related to the utility of the poorest person.

Some economists view each affected individual as a sole judge of his or her utility, thus the change in an individual's utility is measured solely in terms of preferences of individuals. This approach is also referred to as the "doctrine of consumer sovereignty" (Common and Stagl, 2005). If source of values is in one's own subjective preferences, this implies that one does not really care or need to know about other's preferences (Daly and Farley, 2004). Persons of this view would thus be inclined to use a Benthamian approach to aggregate welfare.

Other economists argue that values and preferences go beyond individuals, and include shared norms and societal views on "goods" and "bads", largely determined by culture. Thus, individual rights and preferences are not taken as the only criteria for evaluation of utility, as issues relating to intra-societal distribution of goods and bads, or equity, become important (Benton, 1997). Persons of this persuasion would thus be more inclined to adhere to Nash's or Rawls' approaches to measuring social welfare.

It is interesting to note that GDP (gross domestic product), a measure of economic

activity, is occasionally used as an indicator of economic welfare. This practice is of concern as, in the first place, GDP is a simple aggregation of incomes and as such is Benthamian in nature and fails to consider equality of distributional issues. Moreover, GDP was not intended to be used as an indicator or a measure of total welfare, as many important contributors to individual utilities (as discussed in Section 2.2.1) and thus total welfare are non-monetary by nature and therefore not captured in GDP. Non-monetary welfare is however not easily measured and thus not necessarily assessed in the welfare analysis. Rather, policy-makers use GDP as an indication of the general direction of change in welfare (Daly and Farley, 2004), based on the assumption that an increase in monetary welfare will result in an increase of total welfare:

$$\uparrow \text{Total welfare} = \uparrow \text{monetary welfare (in GDP)} + \text{non-monetary welfare (not measured)}$$

But increases in the monetary contribution to welfare will only be associated with increases in total welfare if there are no simultaneous reductions in other, non-monetary, contributors, such as public goods (or other bottom lines of the “triple bottom line”). Once the decrease in non-monetary welfare exceeds the increase in monetary welfare, total welfare will start decreasing (Daly and Farley, 2004):

$$\downarrow \text{Total welfare} = \uparrow \text{monetary welfare (in GDP)} + \downarrow \downarrow \text{non-monetary welfare}$$

Therefore, a measure of total welfare needs to go beyond monetary improvements to take into account a change in non-monetary contributors to welfare (condition of nature or society). This idea dates back to the eighteenth century when Bentham and others proposed that the object of public policy should indeed be to maximise the sum of happiness in society. Several recent examples which seek to do this are discussed here.

The Human Development Index (HDI), established by the United Nations Development Programme (UNDP), proposes several non-economic measures of wellbeing, including life expectancy at birth, infant mortality, calories intake and adult literacy (Anand and Sen, 1993). Table 2 (from Common and Stagl, 2005) summarises the HDI data for 2002, and compares it to GDP of the regions selected. It can be observed that all

indicators follow the GDP trend: countries with higher GDP have longer life expectancy, lower rates of infant mortality, higher caloric intakes and higher rates of adult literacy.

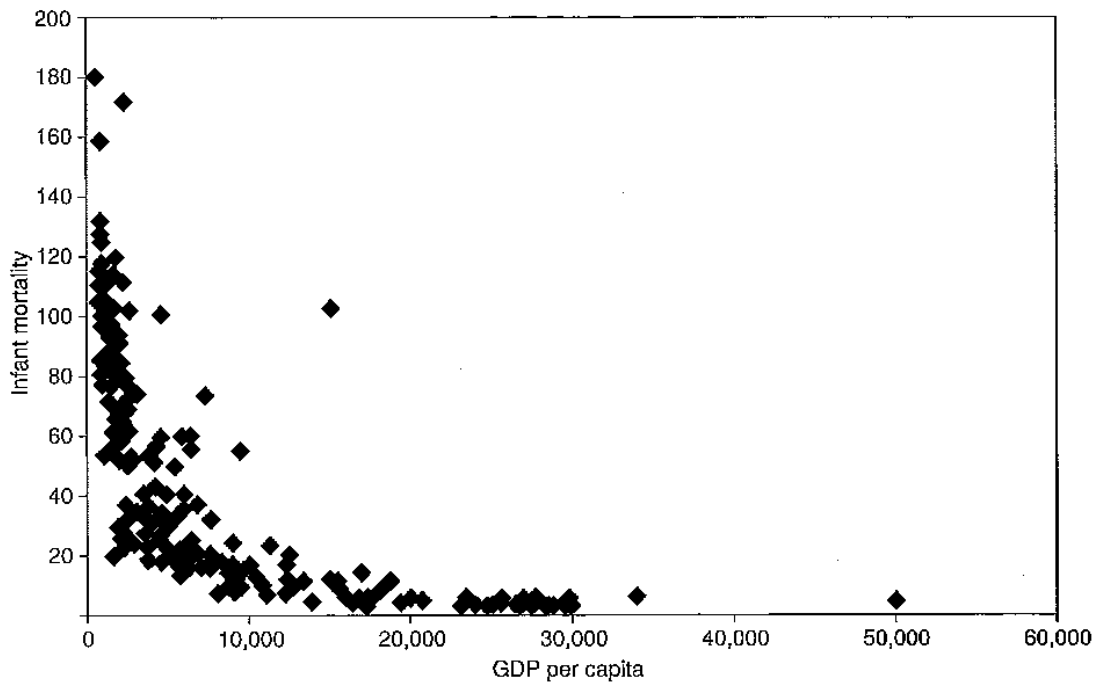
Table 2. Comparison of GDP and human development index indicators, selected countries

Region	GDP per capita (in US\$ 2000 equiv)	Life expectancy (in years)	Infant mortality (per 1,000 births)	Calories intake (per day)	Adult literacy (%)
OECD*	27,848	78.2	6	3,380	~100
FSB**	6,930	68.6	20	2,910	99.3
Developing	3,783	64.7	61	2,660	73.7
Least developed	1,216	51.9	98	2,100	52.8

* High income most developed countries, including Australia

** former Soviet countries and eastern Europe

This appears to justify the importance of income and thus GDP as a measure of utility in countries with relatively low GDP. Indeed, data from individual countries indicates that major improvements in the HDI occur with GDP rising to 5-10,000 US\$; and significant benefits continue to be observable until GDP reaches about 15,000 US\$ (1999 US\$). Beyond that, the increase in GDP is not so strongly correlated with the increases in HDI. Figure 4, a plot showing the relation between the infant mortality rate and GDP in 165 countries in the world, is presented to illustrate this point (from Common and Stagl, 2005, p197). The figure supports the observation that economic growth is very important for improving human wellbeing at income levels typical of the developing world today, but is not very important at income levels typical in developed countries. Therefore, other indicators that better measure individual and social health appear to be needed in richer countries.



Points based on data from 165 countries (Common and Stagl, 2005, p197)

Figure 4. A relationship between infant mortality rates and GDP per capita, cross-analysis of international studies

Goodstein (1999) argues that the key question for developed countries therefore is: “Is more really better?”. He stresses that being “better off” in practice means having more goods. But what is more is not necessarily better, Goodstein argues. According to recent studies in Europe and North America, he argues, money buys little happiness, and it does so at a decreasing rate. According to the “Easterlin paradox” (Easterlin, 1974), rising income correlates with life satisfaction only up to median income. “*Declining hedonic return on national income neatly reflects the law of diminishing returns*”, concludes Veenhoven (1993; p127). And as Wachtel (1983) reports in his study, the percentage of the US population reporting themselves as “very happy” has remained roughly constant since 1957, despite the doubling of per capita personal consumption expenditures over the same period of time.

Over time, there has been a growing recognition of the importance of such issues, with several authors investigating the link between happiness and income. Some of those studies are presented in more detail on the following pages.

Happiness (index)

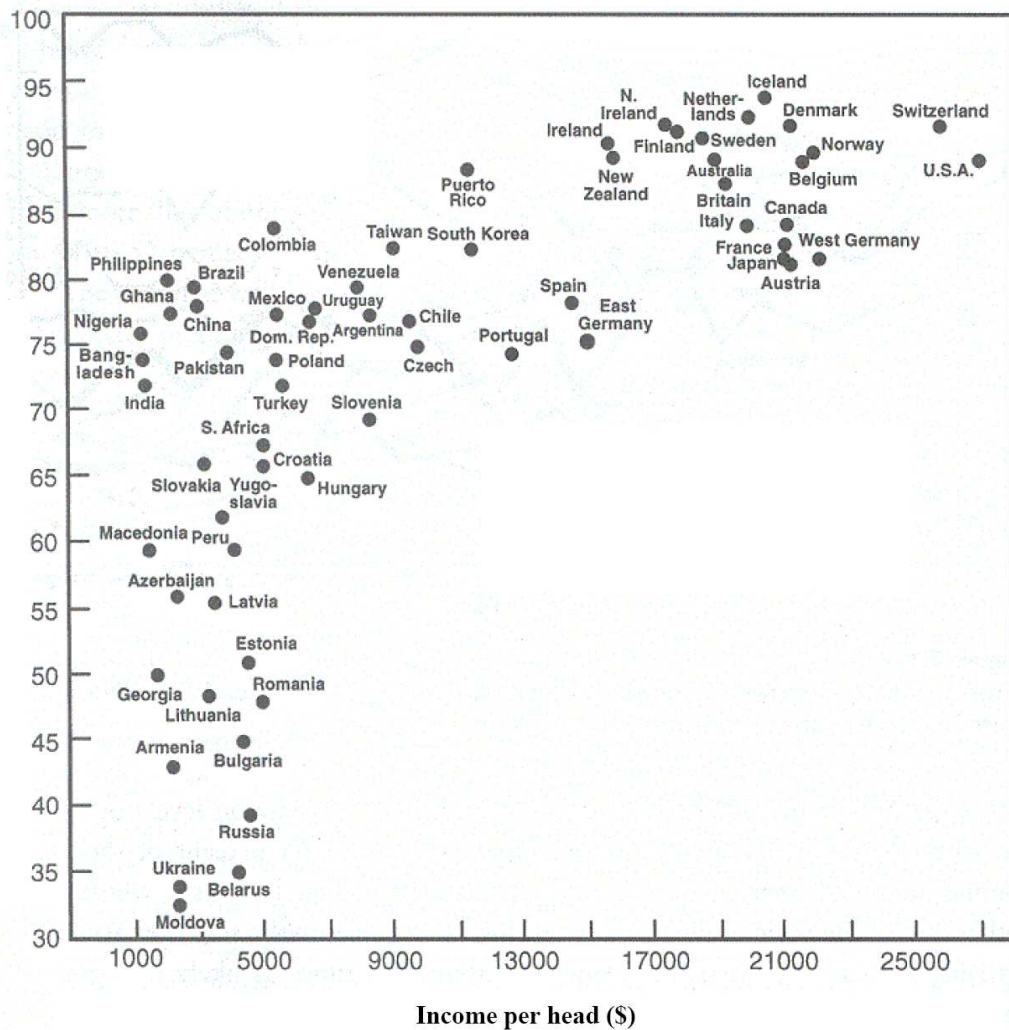


Figure 5. Income and happiness: international comparison

(from Layard 2003, p18. Reproduced by permission of Professor Lord Richard Layard, London School of Economics, UK)

An example of the “happiness index” based on data from the wide section of countries, is presented in Figure 5. Income is presented on the horizontal axis and on the vertical axis is “happiness” measured by the average of two numbers: the percentage of respondents who declared themselves as happy, and the percentage who stated that they were satisfied with their life. The data indicate that once a country has an income per head of over 15,000 US\$ (in 1990 US\$), correlations between happiness and income per head diminish. For poorer countries, however, the impact of income on happiness is clear. This finding is also supported by time-series available for India, Mexico and the Philippines (Layard, 2003).

Even more telling appear to be scores on happiness recorded over time in developed countries. A plot presented in Figure 6 (from Layard 2003, p15) compares income levels and happiness scores in the USA for the 1946 to 1996 period (largely based on data from Wachtel, 1983). It can be observed that income levels, presented as GDP per capita, have continuously increased over this period. On the other hand, happiness levels (as a percentage of people in the society who labelled themselves as “very happy”) have increased in the first decade (1946-1956), but have steadily decreased ever since. This situation is not unique to the USA. Findings in Japan, based on data series starting in the 1950s, show no change in happiness levels despite a 6-fold rise in income per head during the same period (Layard, 2003).

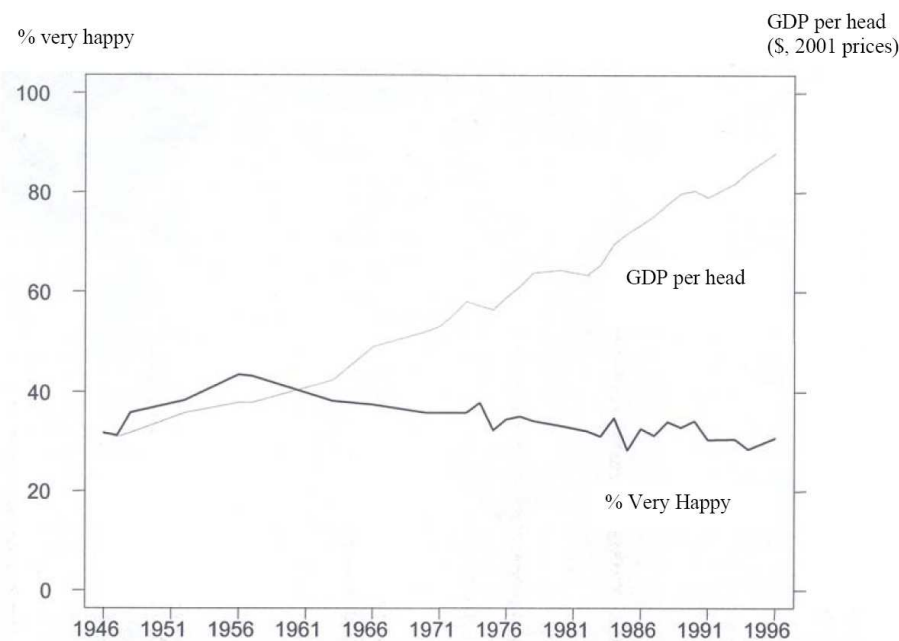


Figure 6. Income and happiness in the USA, 1946-1996 time series

(from Layard 2003, p15.

Reproduced by permission of Professor Lord Richard Layard, London School of Economics, UK)

And in Europe, data collected since the early 1970s, also show no increase in happiness despite a continuous increase in GDP (Frey and Stutzer, 2002). In their study of Switzerland, Frey and Stutzer (2002) demonstrated that micro- and macro-economic conditions in the form of income, unemployment, and inflation affected happiness. However, the largest impact on happiness appears to have come from the degree of

political freedom as perceived by respondents. The more developed the democratic institutions and the degree of local autonomy, the more satisfied people were with their lives. While such factors as rising income increased personal happiness only minimally, institutions that facilitate more individual involvement in politics (such as referendums) had a substantial effect (see also previous discussion on pages 14-15). Analysis of international data sets by Veenhoven (1996, 1999) indicates a large correspondence between the wellbeing of contemporary nations and the average wellbeing of citizens in these nations. She found that the “Happy Life Years” corresponded well to (a) the position of the nation in the world system, (b) the functioning of public institutions in the nation, (c) the productivity of the nation, and (d) the stability of the system (Veenhoven, 2009; “Happy Life Years” are a function of the satisfaction score of the nation and life expectancy of the nation).

Trends recorded in Australia are similar. The Australian Personal Wellbeing Index has fluctuated between 73.4 and 76.4 points (out of 100 points) since recording started in 2001 (Australian Unity, 2008), unrelated to the continuous growth in GDP recorded over this time.

Yet despite the fact that a wide body of research from many different nations repeatedly finds that increased happiness does not directly follow from increased income, western governments nonetheless continue to be primarily concerned with economic growth as an indicator of prosperity. For example, former Australian Prime Minister, John Howard, set the overriding goal of his government as achievement of an average annual economic growth of over 4% for the 2000-2010 decade, clearly setting economic growth as the prime benchmark by which to judge Government performance (Eckersley, 2000; based on Howard, 1998). In contrast to political imperatives, only 38% of respondents to a quality of life survey conducted in Australia during 1999 rated ‘having more money to buy things’ as very important to them. In contrast, ‘being able to spend more time with your family and friends’ was rated as very important by 75% of respondents and 66% chose ‘having less stress and pressure in your life’ as very important (Eckersley, 2000).

Another interesting study reported by Eckersley (1999) examined preferences and expectations of young Australians. When asked to nominate the scenario they *expected* for Australia for 2010, almost two thirds of the young people said they expected *‘a fast-paced, internationally competitive society, with the emphasis on the individual, wealth*

generation and enjoying the “good life”’. However eight in ten said they would prefer ‘a “greener”, more stable society, where the emphasis is on cooperation, community and family, more equal distribution of wealth, and greater economic self-sufficiency’.

This, in his book “Growth Fetish”, Hamilton (2003) argues that, far from being the answer to our problems, growth fetishism and the marketing society lie at the heart of our social ills. He argues that “growth fetishism” has corrupted our social priorities and political structures, and has created a profound sense of alienation among young and old.

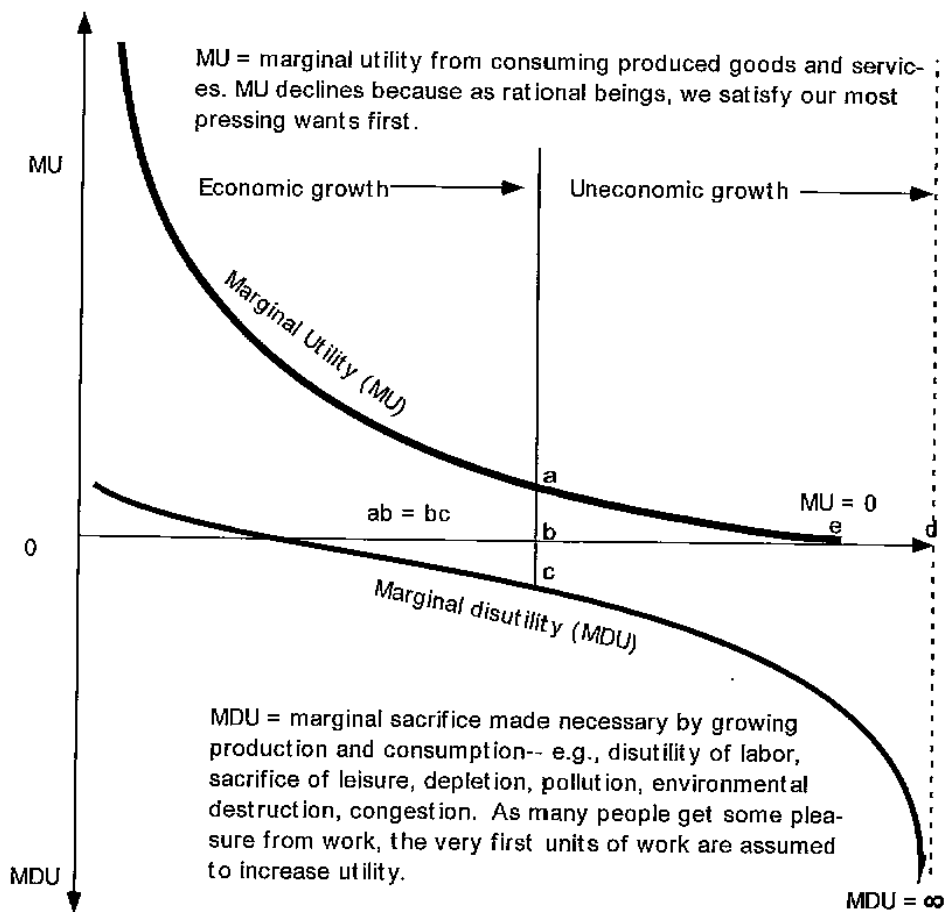
Manfred Max-Neef and his colleagues at the Development Alternatives Centre have reviewed data from 19 developing and developed countries and detected a growing feeling among the people in the developed countries that they belong to an overall deteriorating system that affects them negatively on both personal and collective levels (Max-Neef, 1995). Max-Neef consequently proposed a “Threshold Hypothesis” stating that for every society there is a period in which economic growth, as conventionally measured, brings about an improvement in the quality of life, but only up to a point – the threshold point – beyond which, if there is more economic growth, quality of life might begin to deteriorate (Max-Neef, 1991; 1995).

This notion is also captured in Daly and Farley’s (2004) concept of Marginal Disutility (MDU). The law of diminishing marginal utility states that the more one has of something, the less satisfaction an additional unit of it provides. A classic Marginal Utility (MU) graph was however adjusted by Daly and Farley (Figure 7, from Daly and Farley, 2004; p231) to include the concept of Marginal Disutility (MDU). The MDU is equated with the loss of welfare and thus introduces the concept of “uneconomic growth”. The argument is that growth is economic as long as marginal utility, that is the benefits we accrue through the ability to consume goods and services; exceeds marginal disutility, that is the losses we accrue due to the loss of free time, natural resources, pollution etc. Thus,

Economic growth occurs if: $MU > MDU = +$

The optimal level of growth occurs when: $MU = MDU = 0$

And non-economic growth occurs if: $MU < MDU = -$



b = economic limit of optimal scale, where MU (point a) = MDU (point c);

e = futility limit, where MU = 0

d = catastrophe limit, where MDU = infinity

Figure 7. Limits to growth of macro-economy: linkages between economic growth, uneconomic growth, marginal utility and marginal disutility concepts

(from *Ecological Economics: Principles and Applications*, by Herman E. Daly and Joshua Farley, p231.

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It can, therefore, be argued that in societies at the early stages of economic development (that is “non-developed” or “developing” countries) MU is far greater than MDU. However, as such countries surpass the “optimal” levels of economic development, MDU becomes greater than MU, that is marginal “sacrifices” made exceed the marginal benefit gained. At this stage, the alternatives to economic growth might need to be considered, as sustainable levels for a society lay close to point (b) in Figure 8.

The law of diminishing marginal utility is also evident in estimates developed for Australians by Professor Cummins and colleagues (Australian Unity, 2008). They argue

that money loses the ability to reliably raise wellbeing in Australian households beyond a household income of A\$101,000-150,000, and then present estimates of the amounts required to “purchase” one additional percentage point of wellbeing (Figure 8, from Australian Unity, 2008, p17).



(from Australian Unity, 2008, p17)

Figure 8. The cost of purchasing an additional percentage point of wellbeing in Australia

According to their estimates, A\$7,143 is enough, on average, to raise the happiness level of people with a household income of less than A\$15,000 by 1%. However, persons living in households with an average income above A\$150,000 would require an additional A\$625,000 to purchase just one additional point of happiness (Figure 8, Australian Unity, 2008).

Evidently, measures of wellbeing be they at an individual or at an aggregated level, need to include both financial and non-financial components if they are to truly reflect our “happiness”. Let us now turn to the broader issue of societal welfare, and a brief discussion of two key empirical approaches to measuring societal welfare, economic and social indicators approach.

For the best part, economic approaches to measuring social welfare have been “objective” in nature. One of the first economic science propositions for measuring welfare at the national level was a Measure of Economic Welfare (MEW) compiled by Nordhaus and Tobin in 1972. The MEW is based on the adjustments of GDP to include, for example, welfare-reducing factors such as environmental pollution; to differentiate between consumption that creates positive welfare and consumption that does not increase welfare such as, for example, cost of commuting to work; and to include values

of services provided by government to personal consumption. Their results indicate that MEW in the USA increased by some 42% between 1929 and 1965. This corresponds to about half of the increase in GDP per capita over the same period (87.5%) (Tietenberg, 2000).

Another similar measure is the Index of Sustainable Economic Welfare (ISEW) developed by Daly and Cobb (1994). The ISEW also proposes to incorporate important factors left out by GDP, such as equity and fairness of income distribution, public services, natural resource depletion and pollution; and subtract some of the costs normally included in GDP as “positives”, such as military expenditure, costs of controlling crime, repairing environmental damage etc. In addition, Daly and Cobb (1994) proposed inclusion of the unpaid housework and the inclusion of the services provided by infrastructure (such as roads) to consumers. They completed a study for the USA for the time period of 1951 to 1986. Although GDP continuously increased over that period, ISEW suggested that per capita welfare increased until 1976 and effectively fell thereafter (Cobb and Cobb, 1994; Daly and Cobb, 1994).

Studies for other nations conducted in the 1990s using the ISEW methodology, for example for UK, Germany, the Netherlands, Denmark and Austria (Max-Neef, 1995), all concluded that economic welfare rose in those countries following the second world war but began to decline in the mid to late 1970s despite continued growth of per capita GDP.

A similar trend was observed for Australia in calculations of the Sustainable Net Benefits (SNB) for Australia, using time series from 1966 to 1995 (Lawn, 2001). Lawn noted the increase in SNB for the 1966 to 1974 period, and a steady decline till 1980. There was some fluctuation in the index till 1989, and then a decline. In 1995, the SNB index for Australia was lower than at its peak in 1974, despite continuous growth in GDP.

In summary, economic methods for measuring wellbeing are largely objective and based on available national data, and concentrate on economic components of welfare only. Over the last ten to fifteen years, more emphasis has been put into the inclusion of other types of indicators, mainly demographic ones, into such national measures.

Inclusion of population measures other than basic economic indices has resulted in numerous alternative sets of indicators commonly summarised as “Social Indicators”

(Land, 2000). Social indicators are typically being used to assess the quality of life of nations, regions and cities, and are often used to either compare geographic units or for longitudinal assessment of change within the same geographic unit (Massam, 2002). The majority of the concepts reviewed in 0 rely on social indicators methodologies (for example, OECD, 1976; ABS, 2001; Prescott-Allen, 2001).

SEIFA - Socio-economic Indices for Areas, developed by the Australian Bureau of Statistics from the Census of Population and Housing, could be categorised as one such method. SEIFA provides a range of wider economic measures as well as personal development indicators to rank local areas based on their relative social and economic wellbeing, by combining attributes of the residents such as income, educational attainment, unemployment, dwellings without motor vehicles, occupation, size of dwellings, mortgage repayments etc. The Census provides extensive information on a number of social and economic concepts, such as income, education and occupation. However, these subjects in isolation may not give a full indication of the social and economic conditions in a particular area. SEIFA combines all these items into a series of four indices, each summarising a different aspect of the level of socio-economic wellbeing in an area (ABS, 2003).

Social indicators methods provide the opportunity for inclusion of economic, social and ecological concerns into the same indicators lists. Although neither SEIFAs nor the social indicators list proposed by the International Organisation for Economic Co-operation and Development (OECD, 2005) currently include any ecological nor sustainability measures, such measures could potentially be incorporated into social indicators methods. Such an example is the New Zealand Ministry for Social Development Social Report (2008) which includes two ecological measures under the “physical environment” domain, air quality and quality of drinking water. The “desired outcome” statement for the physical environment domain is defined as: *“The natural and built environment in which people live is clean, healthy and beautiful. Everybody is able to access natural areas and public spaces.”* (p94). The report explicitly acknowledges the role healthy, clean, beautiful and accessible environment plays in the quality of life not only of current, but also future generations of New Zealanders.

At the Great Barrier Reef region scale, Larson and Smajgl (2006) developed a set of indicators integrating all three domains (economic, social and ecological) and allowed for a cross-catchment comparison of performance within the GBR region. Thus, social

indicators methods provide opportunity for integration of various wellbeing domains at varying scales.

Nonetheless, social indicators are an objective measure of wellbeing and provide no insight into personal perceptions of wellbeing. A notable exception is work done by Centre for Bhutan Studies on Gross National Happiness (GNH) index. Probably the most popularised application of the subjective wellbeing in the policy context at the national level, Gross National Happiness (GNH) index of the Kingdom of Bhutan was launched in 2008 (Centre for Bhutan Studies, 2010). The statement that the “Gross National Happiness is more important than Gross Domestic Product” was made by His Majesty the 4th King of Bhutan, who has, since the beginning of His reign in 1972, paved the institutional and political way for implementation of the GNH Index. The GNH index is based on data collected from households, and elicits subjective perceptions on aspects such as “things that you consider to be most important in leading to a happy and contented life?”, followed by perceived satisfaction with various aspects of life and elicitation of the main sources of stress as perceived by respondents. The survey also elicits perception of a number of domains, namely: time use, living standards, good governance, psychological wellbeing, community vitality, culture, health, education and ecology (Centre for Bhutan Studies, 2010).

2.3 Integrated processes

Perhaps partially in response to a growing recognition that money is not “everything”, policy and decision makers at all levels of governance are facing increased pressure to consider wider social and ecological dimensions of their decisions (for example, WCED, 1987; UN Rio Declaration 1992; Australian Environmental Protection and Biodiversity Conservation Act, 1999). As a result, those monitoring and evaluating policy impacts are called upon to include economic, ecological and social data in their assessments (Larson and Williams, 2008).

This section reviews two key processes that facilitate that integration: strategic environmental assessment and corporate social responsibility. Strategic environmental assessment (SEA) is an important legislative requirement in the creation of contemporary policy instruments by governments. The Corporate Social Responsibility (CSR) concept, on the other hand, is intended to govern the actions of the corporate

sector.

2.3.1 Strategic environmental assessment

Environmental Impact Assessment (EIA) became a legislative requirement for the assessment of proposed projects in several countries in the 70's and 80's. Following the introduction of EIA, the need for a mechanism that would allow for the assessment of policies and their long-term effects was recognised (Therival et al, 1992, Glasson et al, 1995, Sadler and Verheem, 1996). The strategic environmental assessment process was subsequently developed, allowing for the identification of environmental issues in stages earlier than the project stage. Strategic Environmental Assessment (SEA) thus refers to the process of evaluating the effects of a policy, plan or program on the natural, social and economic environment, taking sustainability considerations into account (Figure 9). A good example of SEA is integrated catchment management approach.

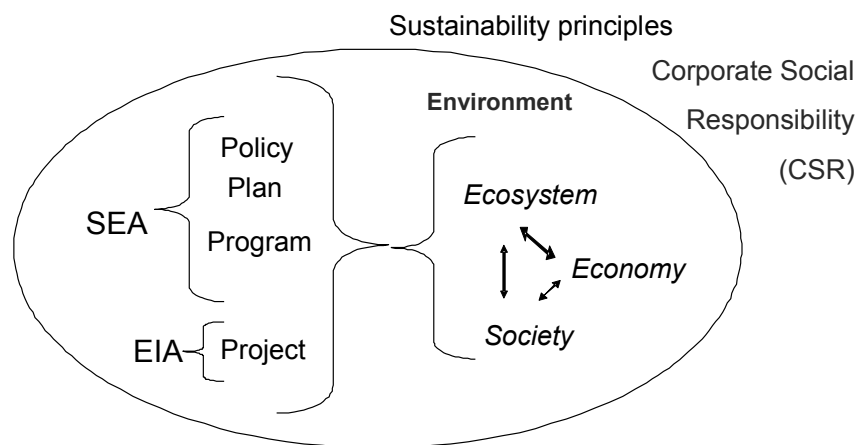


Figure 9. Linkages between concepts discussed in his section: Strategic Impact Assessment, Environmental Impact Assessment, Environment, Sustainability, and Corporate Social Responsibility

The key distinctions between strategic environmental assessments (SEA) and EIA's are:

- (a) Scale: The scale of a SEA has moved from a location-specific project scale typical for EIA, to an a-spatial policy-scale. "Policies" impact wider geographical areas and/or entire sectors of the economy.
- (b) Scope: The scope of investigations has grown from one which was largely concerned with the natural environment to one that is multidisciplinary, taking

into account the social, natural and economic environment.

Although the scope of SEA is different to that of EIA, most SEAs rely on the procedures and methods of assessment previously used in EIA (Therivel, 1996). Even though this approach has worked well on several occasions, over time it has become clear that there is a need for SEA specific assessment procedures and an accompanying set of tools. As a result, new SEA procedures have been separated from the EIA practice through several national and international pieces of legislation (for example, through the Australian Environmental Protection Act; the Council Directives in Europe; World Bank Group requirements; United Nations initiatives). In a document developed for the UNDP, Abaza et al (2004) note that, in global terms, EIA and SEA are the only tools whose use is required by law, in many countries, and whose results are publicly acknowledged and available. No other tool has this status, nor is any likely to achieve it in the near future. However, there has been no parallel development of SEA-specific tools and there is little guidance available on the appropriate methods for future studies in SEA (Bertrand et al, 1999).

In Australia, the SEA process is regulated through the *Environment Protection and Biodiversity Conservation Act 1999* (the Act). Section 146 of the Act contains provisions for the development of the “Regulatory Impact Statement” for the policies, plans and programs proposed at the Commonwealth of Australia level. Significant aspects of the SEA section of the Act are discussed in Marsden (1999).

Although SEA has been legislated in Australia for a number of years, there are relatively few examples of the process actually being applied (Marsden and Dovers, 2002; Brinsmead, 2005). Most of the scientific debate in Australia still revolves around clarification of definitions, legislative requirements and approaches to the process (Marsden and Dovers 2002; Pope et al, 2004; Brinsmead, 2005; Pope, 2005; Dovers, 2005).

In addition to or parallel with the strategic environmental assessment, governments and agencies are undertaking a series of other similar processes, such as sustainability appraisals, vulnerability assessments, integrated catchment management planning and regional social impact assessments (George, 2001).

Assessment processes have a potential to act as social communication processes through which scientists, decision makers, advocates, media and public interact to define

relevant questions, mobilize relevant experts and expertise, and interpret findings (Cash and Clarke, 2001). Cash and Clarke (2001) list three characteristics that distinguish more from less effective assessments: saliency (perceived relevance of the assessment), credibility (perceived authoritativeness or believability of the technical dimensions of the process) and legitimacy (perceived fairness of the assessment process to particular constituencies).

From a user perspective, three more key factors of effectiveness can be identified:

- Interest: For an assessment to constitute an effective channel of communication between public, scientists and decision makers, the decision makers need to be interested in listening to what the scientists and public are saying, and scientists should be investigating questions of interest to the public.
- Capacity: The effectiveness of an assessment process might be reduced due to basic logistical or technical capacity constraints.
- Openness: Openness is determined by the degree to which decision makers are exposed, and potentially receptive, to communication of assessment findings.

A good critique of openness of policy making to “citizen participation” is presented by Irwin (2001). He argues that, although recent scientific and legislative developments accord significant importance to public groups and their role in environmental and planning matters, they stop short of considering the actual public understanding of issues; assume that environmental issues exist separate from the human interpretation and construction of those issues; and fail to recognise significant social differences in the reconstruction of environmental matters by the “public”. He therefore suggests that public response to environmental issues should not be treated as a matter of environmental cause producing public effect. Rather, we need to explore the relationship between environmental matters and public groups in a more thorough fashion, looking at the link between environmental and non-environmental concerns in everyday life. Furthermore, he suggests, we do not only need to comprehend a sociological understanding of the environment but also the mechanism people use to select which – if any – environmental issue(s) they are to be concerned with (Irwin, 2001).

Understanding what those mechanisms are would allow us to anticipate what questions and concerns are likely to emerge. Such an understanding would be highly relevant for

successful decision-making.

2.3.2 Corporate social responsibility and the triple bottom line

Another emerging process of interest to this discussion is that of Corporate Social Responsibility and reporting. The World Bank and the International Finance Corporation (IFC) define Corporate Social Responsibility (CSR) as:

“the commitment of businesses to contribute to sustainable economic development by working with employees, their families, the local community and society at large to improve their lives in ways that are good for business and for development” (IFC, 2008).

The concept of a “triple bottom line”, developed by Elkington (1998), set a similar agenda, providing an integrative model for businesses. It is generally accepted that the triple bottom line refers to the three components as the delivery of environmental quality, social equity and economic prosperity by business. However, the performance of these three factors should not be viewed in isolation from each other, but as an integrated suite for sustainability (Christen et al, 2006). Further, Vanclay (2003) warns, the broad nature of the three components should not be lost in a narrow indicator definition process that loses sight of the integrated and all encompassing nature of sustainability.

As such, the thinking underlying CSR is similar to that of “triple bottom line”, however, the actual “responsibility” of the businesses to provide more sustainable outcomes to the regions they operate in is more prominent. Although CSR is lightly addressed in the *Australian Corporations Act 2001* through directors’ duty to “*disclose the extent to which they take account of environmental, social, labour and ethical standards in their investment decisions*” (Section 1013D(1) of the Act), there is little other reference to social duties of the companies operating in Australia.

Over 70% of Australia’s top 100 companies (determined by revenue) surveyed in 2001 reported that they had CSR policies in place (Cronin and Zappalà, 2002). However, some authors argue that the practice of CSR in Australia has progressed little beyond “corporate philanthropy” (Glazebrook, 2001). In their review of Australia’s legislative requirements for CSR, Anderson and Landau (2006) conclude that there is very little mandatory CSR or mandatory reporting of CSR activities in Australia. They further conclude that, although a growing number of Australian companies are adopting CSR,

“they continue to adopt practices that are short-term and philanthropic in nature rather than integrating CSR into their business strategies and organisational practices” (Anderson and Landau, 2006, p3).

Even though a large number of Australian companies appear to have relevant policies in place, only 24 percent of the top 500 Australian companies actually reported on their sustainability performance in 2005, a very low proportion in comparison to other developed countries (KPMG, 2005).

Therefore, although Corporate Social Responsibility has been a significant driver of improved ecological and social performance and stakeholders communication of the companies internationally in the last 20 years, it appears that its potential for assistance with regional development in Australia has largely remained an unexplored territory.

2.3.3 Empirical methods for assessment

Dovers (2005) argues that no single or superior assessment methodology exists: the policy assessments should draw on a diverse toolkit and the precise mix should be determined depending on context, issues and information. The following sub-section thus discusses some of the more widely used assessment methods, firstly looking at policy-level tools, then at tools used to assess programs, and finally considering methods that are frequently used to assess the impact of specific projects.

Policy level SEA is at the top of the decision-making hierarchy. This level of decision-making provides an opportunity to assess the impacts of an “unlimited” policy option. Importantly, it also provides an opportunity to assess the impacts of alternative instruments of policy application, such as fiscal, market or regulatory instruments. Typical methods and techniques for policy level assessment include scenario construction, simulation analysis and stakeholder consultation, including expert panels. Scenarios, in particular, have received growing interest as a systematic method that catalyses thinking about uncertain, complex futures. They reveal dynamic processes and causal chains leading to different potential outcomes of the future (Alcamo, 2001). The UK Environmental Agency (2005) defines scenarios as “a method of forecasting possible states of the environment under a range of plausible future conditions”. One of the main strengths of the scenarios method is that it allows for – even requires - participation of a wide range of stakeholders. Furthermore, assumptions used to forecast the effects of a policy are made explicit. Scenarios also help us to understand key

drivers and how they might interact and affect the future. Scenarios go beyond a single best estimate, or a 'high' and 'low' projection, and encourage exploration of a number of different, logically-consistent pathways as a way of framing questions about the future (Bertrand et al, 1999). The UK Environmental Agency (2005) approach to scenarios is based on four assumptions:

- The future is unlike the past, and is shaped by human choice and action;
- The future cannot be foreseen, but exploring the future can inform present decisions;
- There are many possible futures, scenarios map a 'possibility space';
- Our societies, technologies, values and traditions are changing rapidly.

The scenarios are entirely qualitative in nature, and are often presented in the narrative style. They are not projections of future, nor predictions of likelihood of a certain outcome. Through development of scenarios, participants are encouraged to learn more about policy areas other than their own, and develop a more integrated and forward-looking approach to policy making.

Public policies and the way they are conducted are becoming increasingly complex. This postulates that efficient formulation and application of policies is dependent on the ability to take in a multitude of facts, to interpret these facts from a variety of angles, and to continuously update policies in order to reflect the changes in the context for which they were initially aimed. In the context of uncertainty, a better and more versatile understanding of the future and the deep trends influencing its evolution can assist policy-makers in identifying future needs and developing appropriate policy initiatives to meet them.

The main shortcoming of the scenario method appears to be its heavy reliance on expert opinion for definition of trends and existing interactions, exposing the method to potential bias (Alcamo, 2001). Further, scenarios are open to extensive political and power influence. In order to minimise the bias and gain wide representation of the views and beliefs, a whole range of stakeholders, including the general public, should be involved in the scenarios development. However, intensive public consultation processes render scenarios as very costly and time consuming exercises (Bertrand et al, 1999).

Additionally, although some good examples of the use of the scenario method on the regional scale exist, scenarios tend to be used on a very large geographic scale (national, international, or global). This large scale allows for a good overview of the issues and key determinants and drivers, however, brings little relevant information to stakeholders at a local or regional scale.

Program level SEA addresses issues most likely to emerge as policy decisions are assessed for their implementation. Methods used at this level are somewhat poorly developed, and tend to be more presentation tools rather than assessment tools (for example, overlay mapping (GIS), constraints and opportunities mapping, impact matrices). Multi-criteria analysis (MCA) has been used effectively at this level.

MCA involves a variety of decision-making techniques that incorporate different criteria on which to base a decision. MCA techniques can be used to identify a single preferred plan, to rank options, as short-listing tools to select options for more detailed assessment, or to differentiate acceptable and unacceptable plans.

The main strength of the MCA is probably the ability to conduct sensitivity analyses and test the extent to which altering basic assumptions will change the overall result. Furthermore, if a simplified form of MCA with extensive stakeholder involvement is used, MCA can become a useful method for the evaluation of options.

The main weaknesses of the MCA technique have been identified by Sadler (2002) as:

- high data dependency, as the technique requires the establishment of measurable criteria;
- high expert judgment dependency, in regards to creation of scores and weights; and
- technical complexity.

Nonetheless, MCA remains arguably the most widely used method for the evaluation of implementation options as well as likely impacts, and has been used in Australia for a range of assessments from water policy impacts in the Murray-Darling River Basin (Qureshi et al, 2007) to the conservation impacts in the Great Barrier Reef region (Hajkowicz, 2006).

Project-level impact assessment identifies project priorities, and is typically conducted as a part of the project alternatives assessment. Typical project level methods and

techniques that are also applied at a policy level include multi-criteria analyses (MCA), cost-benefit analyses (CBA), environmental models and indicator sets. Time and money might also be available to permit in-depth qualitative studies at this level of resolution.

CBA was first institutionalised in conjunction with the United States Flood Control Act of 1936. The Act specified that federal participation in project controlling flood would be justifiable “...if the benefits to whomever they accrue are in excess of estimated costs...” (from Field and Field, 2002, page 119). This hypothetical distribution does not however need to translate into the actual distribution, implying that under any circumstances there will likely be losers and gainers (Johansson, 1991). Nonetheless, the Act opened the door for the development of the methodologies that would allow these costs and benefits to be accurately estimated.

Although historically accused of short-circuiting the processes of the political discussion and decision that should take place around the prospective public programs (Field and Field, 2002), CBA has gained renewed weight in recent years in the USA through legislation of the Regulatory Impact Analysis and Economic Analysis, which requires benefit-cost analysis of all government regulations. Therefore, despite the critique, cost-benefit analysis is a primary analytical method for evaluating public programs in the USA (Pearce and Nash, 1981).

CBA is usually conducted for policies and projects that include both market and non-market types of outputs, both ecological and social. One factor that complicates this type of analysis is that costs and benefits associated with natural environment and social change tend to be of a non-market nature. To compensate for this, economists have developed a series of non-market valuation techniques that are used to estimate these types of outcomes. The valuation techniques will not be discussed here in detail (for a comprehensive review and critique see Costanza et al, 2001 or Spash, 2007). It suffices for the purpose of this review to say that despite great methodological achievements made in this area, large gaps still remain in CBA’s ability to deal with non-market values, and in particular cultural and intrinsic values.

CBA has been increasingly used to assess costs and benefits at the levels higher than a project. Pearce and Nash (1981) discuss some of the key issues related to the ability of CBA to produce relevant analysis at the policy level as:

- Time scale: Policies and programs are developed and enacted for a number of

years (i.e. Water Management Plans under Water Act in Australia are enacted for the initial period of 10 years). In order to be able to correctly predict all costs and benefits arising from a long term policy, inputs and outputs for the analysis must be specified. To do this satisfactorily, we need a good understanding and ability to predict future events such as future growth patterns, technological change, or change in norms and beliefs of the society.

- **Discounting:** Although generally a very useful tool allowing for the comparison of costs and benefits that occur at different time points, the practice of discounting opens several questions when evaluating economic and social benefits likely to occur far into the future. High discount rates, typically applied in developing countries, make it particularly hard to make benefits to the future generations count in CBA. Equally, future ecological and social damages that result from today's economic activity, are significantly downgraded. Due to the positive time preference, market actors tend to discount the future at a much higher rate than is dynamically efficient (Goodstein, 1999). This reduces investment in projects with long-term benefits and lowers welfare of future generations below that which could be achieved.
- **Spatial scale and distribution:** For CBA to be effective, it needs to be specific in terms of spatial scale. However, this might be a problem when evaluating policies and plans that tend to be either non-spatial or difficult to delineate. In the case of regional evaluations, spatial scope comes into play in the issue of equity as well. This is because national level policies have the potential to create significantly different outcomes (costs and benefits) in regions with different economic mixes. For example, a policy promoting an increase in water quality might be beneficial to tourism orientated region but very costly to a region that is strongly dependent on agriculture. Likewise, policies or projects that produce, for example, increased air pollution in a small region from a new energy generation plant, might have significant national benefit (economic growth opportunity that added energy generates). Similar problems occur when national interests outweigh interests of outer (neighbouring or distant) nations.
- **Valuation:** In the case of smaller scale localised changes, ecological and social aspects of change are easily understandable by consumers, and there is usually a strong sense of "what is consumed" individually. On a larger scale, however,

valuation becomes more difficult, as the nature of the ecological and social features changes and becomes more abstract, collective, unknown or unethical (Jacobs, 1991).

- **Equity:** Distribution of costs and benefits of the program should be a matter of equity, or fairness of such a program, and not related to its economic efficiency. The issue of equity, horizontal and vertical, has recently received increased attention, particularly internationally (for example, Common and Stagl, 2005; Daly and Farley, 2004; Jacobs, 1991). This is particularly problematic in CBA since prices are often used as an indicator of ‘value’, and since the price that people are willing to pay, is necessarily a function of the amount they are able to pay. In other words, CBA will indicate whether a project is ‘valued’ by the community – given the current income distribution. If one were to change the current distribution, then the outcome of the CBA could also change. Consequently, those who deem the current income distribution to be ‘unfair’ or ‘unequitable’ would also be likely to find the result of a CBA conducted with that current distribution to be ‘unfair’ or ‘unequitable’. Furthermore, the tests applied in CBA – that benefits exceed costs – do not account for the change which might occur in income distribution as a result of the project. They thus implicitly “accept” the Benthamian social welfare function as optimal without verifying if this indeed is so.
- **Forced decisions and human rights:** In economics, the liberal school of thought argues that any action which forces individuals to make decisions they would not have made voluntarily, is invalid (for example, willingness to accept compensation approach) (Field and Field, 2002). This argument is similar to the human rights argument (for example, right to clean water versus willingness to pay for clean water).

If we could identify not only costs and benefits but also on whom they fall, and keep the effects on different groups separate, judgments of equity would be much easier. This approach appears feasible at the project scale, where there is a limited set of stakeholders and costs and benefits. However, on the program scale, and more prominently, on the policy scale, advantages and disadvantages for each individual cannot be determined in a reasonable period of time, incurring reasonable costs. This is where judgment tends to move from the individual scale to the “national benefit” scale

and ignore personal voting and preferences.

Further, Osborn (1997) argues, although the rationalist approach and reduction of decision-making process to a complex cost-benefit analysis should not be entirely rejected, it needs to be put into a decision - making process context acknowledging the limitations of that process in a complex world. He argues that attempts to reduce everything to quantified analysis, in particular one where input from real people and real communities is minimised, can be very misleading. What people believe and what they care about needs to be factored into an assessment of what is important. Osborn finds the problem of attaching the appropriate values to the environmental benefits particularly worrying, and argues that:

“it is vital not to let the decision-making process become a prisoner of what economists can quantify, and the conclusions of what such calculations appear to point to.” (Osborn, 1997, p133)

Indeed, quantified analysis is unlikely to provide sufficient information to allow for a full understanding of the system under study. A balance between qualitative information and quantitative assessment needs to be achieved. “Quantitative methods provide a skeleton of information and qualitative studies put the flesh on the bones”, argue Emtage and colleagues (2006). But how much flesh can be added is in practice often determined by non-scientific realities of budgetary and time constraints.

2.4 Summary of the literature review

The literature review identified an interesting concept that appears to open itself to further investigation: that of human wellbeing. The wellbeing concept is emerging as a concept potentially suitable for development of a tool for identification and quantification of regional priorities. The wellbeing concept is both an integrative concept that takes into account social, ecological, economic, institutional, cultural and other domains (Prescott-Allan, 2001; Alkire, 2002; Millennium Ecosystem Assessment, 2003; Veenhoven, 2009); and a subjective concept, that allows for confirmation of stakeholders perceptions (Cummins et al, 2003; McAllister, 2005). Measures of wellbeing are different to traditional economic valuation as they are not based on monetary units and thus circumvent issues of income levels and income distribution (Spash, 2007).

The sustainable development paradigm makes a specific reference to human needs and satisfaction of those needs. The concept of “needs” is relatively well defined at the national or global level (Anand and Sen, 1993; Common and Stagl, 2005) and at the individual level (Jacobs, 1997; Cummins et al, 2003). The needs of the regions, and in particular less developed and more remote regions, are not necessarily well understood (Larson, 2006; Stafford Smith, 2008). Thus, there is a methodological gap at the regional policy scale (Cash and Clarke, 2001) and there appears to be a need for a tool that could help existing methodologies become more relevant at the regional level. Such a tool would need to provide information on key characteristics of the region under investigation, as perceived by stakeholders living in the region. Information thus collected could provide valuable insights for traditional assessment methodologies, such as scenarios, MCA or CBA.

Policy and decision makers at all levels of governance are facing increased pressure to consider wider social and ecological dimensions of their decisions. As a result, assessment, monitoring and evaluations of policy impacts are increasingly including economic and ecological, as well as social data. However, few methods and tools have been developed to specifically suit scope and scale of policy assessment (Bertrand et al, 1999). Instead, the process often ‘adopts’ methods designed for other purposes.

Policy affects wellbeing, so it would be useful to assess policy in terms of its impact on wellbeing. If one could determine contributors to individual wellbeing and rank them, then one could understand the perceived importance assigned by that individual to each contributor. One could then look into domains likely to be affected by the policy and make predictions about the likely reaction to and adoption of the policy.

Methods coming from psychological research are relevant to this study as they are subjective methods that allow for the collection of perceptions of the people residing in the regions of interest (Cummins et al, 2003; Hunter Valley Research Foundation, 2008). Further, similar to social indicators, surveys can be developed as to include questions from any domain (New Zealand Ministry for Social Development, 2008). However, in both cases, questions asked from the respondents tend to be pre-set, that is selected and pre-determined by experts developing the survey. Literature from both social science and economics discusses the importance of allowing the respondents to select the wellbeing factors they are going to be surveyed on (CEPAUR 1986; Max-Neef et al, 1989; Sen, 1993a; Irwin, 2001; Costanza et al, 2007). Literature suggests a

two-step method of (a) determining wellbeing factors relevant to the respondent and (b) eliciting their view about the factors selected (Osborn, 1997; Sen, 1993a; Costanza et al, 2007). The understanding of current levels of satisfaction of the regional population with the various wellbeing aspects would also need to be recorded in order to elicit areas of concern. Ideally, such a method would be viewed as a social communication process (Cash and Clark, 2001), as on-the-ground stakeholders sometimes find the goal of “environmental sustainability” difficult to operationalise. The understanding and acceptance of the principles of sustainability by the local stakeholders on the ground could be improved if sustainability goals were “translated” into issues relevant to them (Larson, 2006). Furthermore, the relevance of the national or other higher level goals to the on-the-ground stakeholders could be improved through communication of concerns of stakeholders to policy makers.

Also, it would be of interest to find out if there are sub-sets of individuals within a region that share similar perceptions on what contributes towards their wellbeing. If wellbeing patterns can be identified and grouped in that manner, then it would be interesting to see if one could use secondary data to objectively identify those groups with similar wellbeing patterns. Is there, for example, a specific life cycle stage, occupation, and/or educational level, that is a common determinant of individual wellbeing concerns?

People’s preferences and choices change over time (Lane, 2000), and therefore the method would need to be approached as a longitudinal study that would accommodate the changes in preferences and thus take into account Arrow’s recommendations (Arrow, 1950, 1963; Feldman, 1980).

Social choice theory indicates that the most “foolproof” method for generating understanding of social preferences might be “de Borda voting” or “weight voting”, where weights are assigned to different choices or alternatives (by individuals) and thus allow for ranking of those alternatives at an aggregated level (group or society level). De Borda or weight voting could be used as a method of establishing respondents’ preferences by respondents themselves rather than arbitrarily, thus avoiding potential error attached to weighting issues (Feldman, 1980; McAllister, 2005). If we assume, in line with utility theory, that every individual is the best judge of his or her utility and preferences, then the most suitable way in which the weights should be assigned to different choices is by those individuals themselves.

However, for a tool to be usable at the regional scale it would need to be sufficiently sensitive to recognise potential differences in wellbeing satisfaction and concerns that might exist between regions. Therefore, such a tool would need to be tested in at least two case studies, to determine both its transferability as well as its sensitivity. Are wellbeing factors of importance specific to the region – do regions differ in what is important to them? Is there different satisfaction with wellbeing in different regions? Those would be some of the questions that warrant further investigation as they might better inform some of the questions arising in policy development. Better understanding of the regional wellbeing would allow for better communication of priorities between the stakeholders and the policy makers during policy development stages. This type of information would also allow for development of more specific and appropriate mitigation and management options for the policy implementation stage.

The research questions emerging from the literature reviewed are presented and discussed in the next Section.

2.5 Emerging research questions

The primary aim of this Thesis is to improve our understanding of stakeholders' priorities at the regional scale. A number of research questions emerged based on the Thesis aims and the review of the literature.

A better understanding of what contributes to wellbeing, and by how much, is needed first (Figure 10, question A). In addition to the question of “what matters to people?”, this Thesis also proposes to explore current levels of satisfaction with important wellbeing contributors (Figure 10, question B). The Thesis also acknowledges that policy and decision makers are not only interested in what the needs are, but also how they are shared and distributed in society. Thus, two cross-cutting investigations are proposed: an exploration of the commonalities in the results within and across the case studies; and an exploration of the potential determinants of stated choices.

This Thesis also proposes that a more complex evaluation and analysis is needed in order to improve our understanding of both what people value most and how satisfied they are at the moment. Thus, approaches that would create a better understanding of wellbeing contributors and the satisfaction, to assist decisions and policy making, are explored in the last research question (Figure 10, question C).

A conceptual framework of the research questions, as presented in Figure 10, is further discussed below.

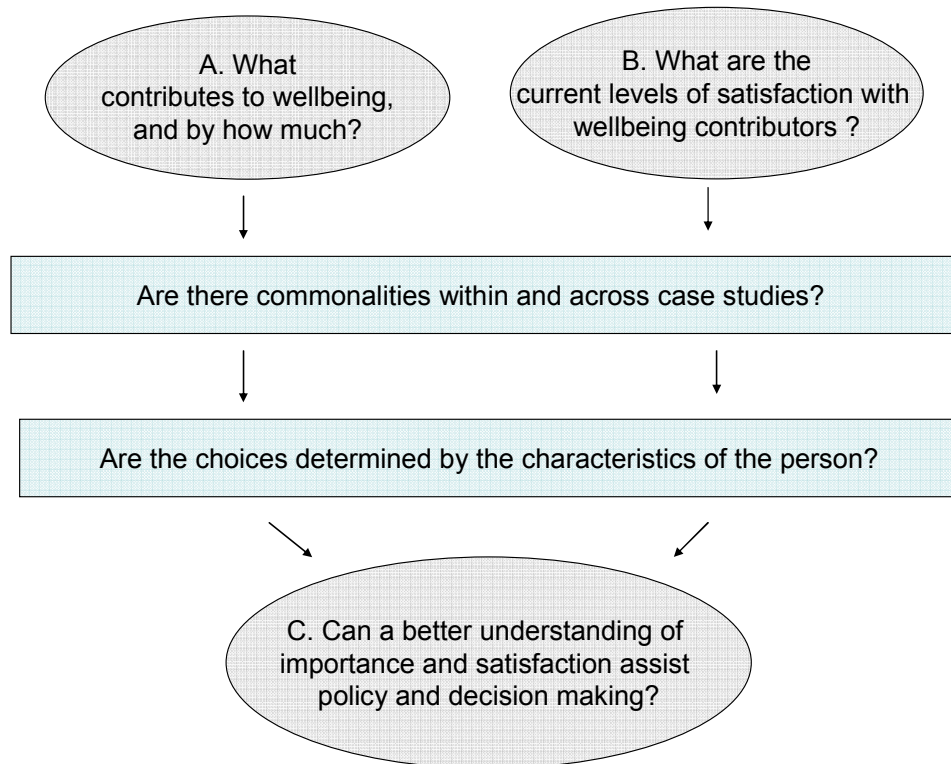


Figure 10. Conceptualisation of the research questions explored in this Thesis

A. What contributes to wellbeing, and by how much?

The first aim of this Thesis is to better understand the needs of the residents in regional Australia. This first part of the enquiry thus aims to define and measure the most important contributors to individual and regional wellbeing.

Three main sub-questions to be explored are:

- What factors (*contributors to wellbeing*) are perceived as being the most/least important to individual wellbeing?
- Are the contributors to wellbeing *shared* by individuals within and across different regions?
- Is choice of contributors to wellbeing *determined* by the characteristics of the person? Can wellbeing choices be explained by socioeconomic, demographic or sense of place characteristics of the person?

Results of these investigations are presented in Chapter 4 of the Thesis.

B. What are the current levels of satisfaction with wellbeing contributors?

This Thesis also aims to explore current levels of satisfaction with the wellbeing contributors. The following research sub-questions were therefore addressed:

- How *satisfied* are people with the various wellbeing contributors at the time?
- How *similar* is the satisfaction of residents in regions *to the national scores*?
- Are the satisfaction levels *shared* by individuals within and across regions?
- Is the choice of satisfaction levels *determined* by the characteristics of a person?
Can satisfaction scores be explained by socioeconomic, demographic or sense of place characteristics of the person?

The result are presented in Chapter 5 of the Thesis.

C. Can a better understanding of importance and satisfaction with ‘wellbeing contributors’ assist policy and decision making processes?

There is a clear need for an approach that would assist decision makers with identifying regional priorities, as perceived by residents. Levels of satisfaction with wellbeing factors provide useful insights in their own right, but they do not provide an understanding of how important each of these factors is to the respondents overall. For example, at the policy-making level, a factor recorded as being of concern to a large majority of residents is likely to receive more attention than a factor that concerns only a few residents. Therefore, relevance of satisfaction levels to policy making could be improved by taking into account the recorded importance of each factor. This part of the research therefore investigates the relationship between satisfaction scores and the relative importance (weights) assigned to wellbeing factors. Specifically, it sets out to answer the following research sub-questions:

- Can we integrate satisfaction and importance into one metric?
- Can this metric help identify wellbeing factors that might warrant attention from decision and policy makers – i.e. can it identify regional priorities or help develop an “action list”?

Chapter 6 of the Thesis seeks to answer these research questions.

2.6 Proposed contributions

This Thesis sets out to provide contributions to academia through both methodological as well as theoretical investigations. Methodological contribution targets learning to support well established assessment methods, such as scenarios, MCA and CBA, as follows:

- **Methodological considerations for data collection:** An important critique of existing methods is their “expert dependency” (Sadler, 2002), as they typically rely on experts to both provide lists of indicators to be followed, as well as to provide relative weights of importance for each indicator included. Sen (1993a) however argues that selection of what is important needs to be done by people themselves, and he stresses that understanding of both what is included and what is excluded by a person is equally valuable knowledge. Feldman (1980) further argues that as long as weights are assigned in an arbitrary manner, the resulting social preference relations will also be arbitrary. Thus, avenues for the collection of data where both selection and weighing of factors is performed by respondents, not experts, were investigated. Development of a quantitative method that does not use dollar-based metric was also explored. Addressing both the “right” scope and the “right” scale of assessment was also identified in the literature as an important consideration. Thus, application of an integrated approach that incorporates domains of society, nature and economy was investigated; the approach deals with the regional scale, as a significant gap was identified at the regional policy assessment scale (Cash and Clark, 2001). As discussed earlier in this Thesis (pages 6-7), the definition of the “regions” in this study is closely aligned with the definition of “planning regions” used by various government agencies, that is, Statistical Local Areas (SLAs) or Shire boundaries and “statistical divisions”.
- **Methodological considerations for data analyses:** Proponents of the subjective wellbeing approaches suggest that such approaches elicit perceptions of the respondents, and therefore provide data different to that obtained via collection of objective secondary data. This consideration, and thus the potential additional utility of the subjective wellbeing approach, is tested. In addition, this thesis also explored the utility of the “typologies” approach, which suggests that preferences of residents can be predicted based on the readily available

socioeconomic characteristics (“types”). In addition, the usefulness of bivariate and multivariate analysis in the assessment of typologies is explored.

- Interpretation of results: An approach that combines satisfaction and importance values into a single metric was explored. The approach was assessed for the sensitivity to capture specificities of the regions under investigation.

These methodological explorations were conducted within the boundaries set by both economic and psychological theories. Threshold hypothesis (Max-Neef, 1995), and the consequent expected substitution of monetary with non-monetary goods as the main sources of wellbeing in developed countries (Lane, 2000), the concept of Marginal Disutility (Daly and Farley, 2004) and the Capabilities Approach (Sen, 1993a, 1993b, 1991; Anand and Sen 1993; Nussbaum and Sen, 1993), were the main theoretical contributions from the economic literature. Psychological theories of Homeostasis Failure and Positive Cognitive Bias theory (Cummins and Nistico, 2002, Cummins et al, 2003), also provided interesting contributions.

Methodological contributions and the theoretical investigations are discussed in the last chapter of the Thesis, Chapter 7.

Chapter 3 Methodological approaches to data collection

The previous chapter identified a set of research questions and sub-questions. To answer these questions, both primary and secondary data were used in this study.

Secondary data were used primarily for the collection of background information, and to provide a comparative discussion of the potential “objective” explanations for trends observed in the primary data collected. In order to test cross-regional differences and similarities, more than one region needed to be included in the study. An overview of data available for the Great Barrier Reef and two Shires selected for the study is thus presented first, in Section 3.1 of this Chapter.

However, not all data required to answer research questions was available, and thus additional primary data were collected. Primary data collection was initiated using semi-structured interviews (Morgan and Krueger, 1993), and progressed into a mail survey data collection method (Dillman, 1978, 2000). The main objective of the primary data was to collect information on wellbeing contributors and satisfaction. Socioeconomic, demographic and sense of place information about respondents was also collected.

Several broad steps were taken in the development of the methodological approach to the primary data collection. Section 3.2 describes the first steps in the design of the questionnaire, that is, conceptualisation of the questionnaire content and development of the initial pool of questions. Section 3.3 presents the pilot testing method and consequent amendments to the draft questionnaire, with methods used for the full survey stage including survey errors and validation described in Section 3.4. The Chapter closes with an overview of the community engagement activities in Section 3.5.

The application for the research project was submitted to the James Cook University Human Ethics Sub-Committee for consideration and approved at the March 26, 2006 meeting (Approval number H2314). The approval letter is presented in Appendix 1. The research was based solely on the non-intrusive questionnaire, and was therefore classified as Category 1 (least potential impact on participants).

The full mail-out package used for the data collection for this Thesis is presented in Appendix 2.

3.1 Overview of the study locations

The aim of this Thesis was to further our understanding of what people feel is important to them, at the regional scale. Given the scale of the research, data could not be collected from the entire population, and hence a representative sample of the region was sought. The main social unit of study in this Thesis is an administrative unit or a Shire.

One of the research questions proposed in this Thesis was to investigate if the wellbeing perceptions are shared by individuals across the regions, implying a multiple location approach. Also, a minimum of two study locations were needed to test the validity and replicability of the methodological approach proposed. The methodological approach proposed in this Thesis integrates concerns related to the biophysical environment (nature) and the socio-economic environment (society, economy and services). Hence, boundaries of the study locations were tested both in terms of biophysical units for management (i.e. catchment areas) and socio-economic units (i.e. Shires). The first selection criterion for the Shire, thus, was a similarity between catchment and the Shire area. Second, the shires of the GBR were studied for their similarities and differences in socio-economic terms. Both similarities and differences between the case studies were required to allow for testing of the research questions and also for testing of the approach itself.

Following preliminary scoping, two Shires were selected for further investigations. These were:

- Cardwell Shire, largely corresponding to Tully and Murray Rivers catchment areas and associated coastal areas (**Error! Reference source not found.**, A), a more “traditional” Shire characterised by high employment in agriculture and older, settled populations; and
- Whitsunday Shire, corresponding to Whitsunday Rivers (primarily Proserpine River) catchment areas and associated coastal areas (**Error! Reference source not found.**, B), a more “dynamic” Shire characterised by a mix of industries, including tourism, and a younger more mobile population.

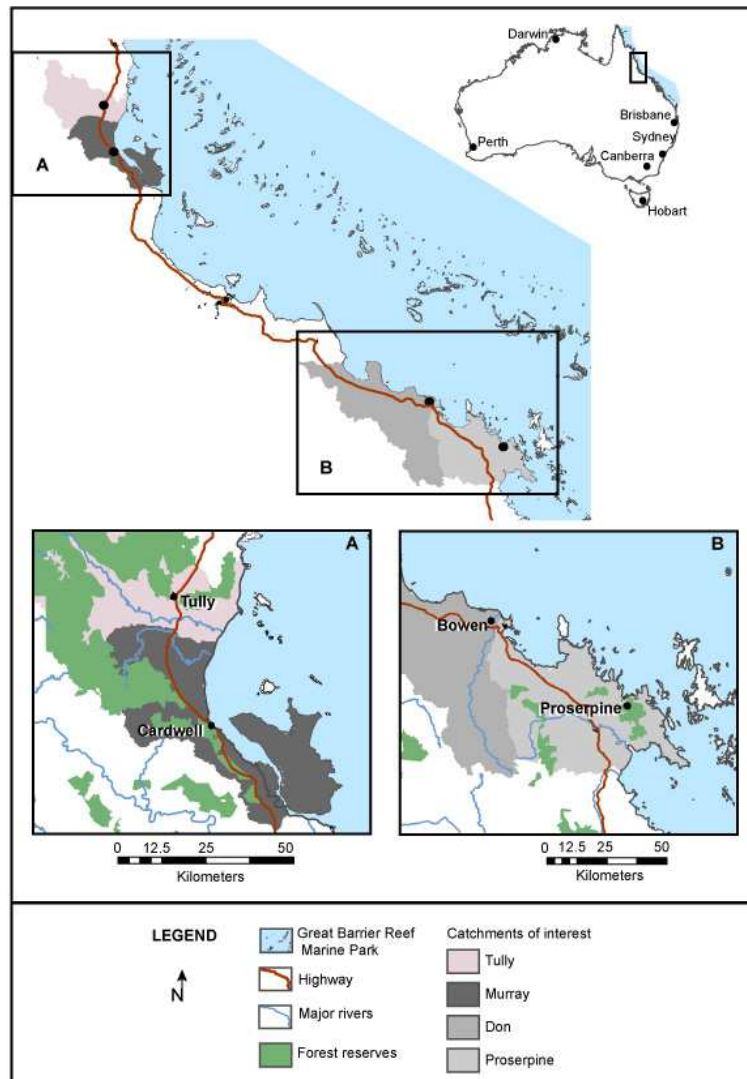


Figure 11. Location of study areas, with (A) Cardwell Shire and (B) Whitsunday Shire

Characteristics of both Shires are presented in more detail below. The Queensland's Office of Economic and Statistical Research (OESR) and the Australian Bureau of Statistics (ABS) Census of population and housing (ABS, 2006b) were key sources of demographic and economic data. Strategic plans and other relevant data collated by the regional natural resources management bodies were used as background information on the natural resources management issues. To provide context, a brief introductory overview of the wider Great Barrier Reef region, in which both case studies are located, is presented first.

3.1.1 Overview of the Great Barrier Reef region

The Great Barrier Reef (GBR) World Heritage Area in Australia is of significant natural, social and economic importance. The GBR extends over 2,300 km, parallel to the east coast of Australia in Queensland, and covers an area of approximately 350,000 km². The GBR consists of an archipelagic complex of over 2,900 reefs and was proclaimed a Marine Park in 1975 and a World Heritage site in 1981. Forty catchments, covering a total area of almost 426,000 km², drain into the GBR lagoon. Administratively, the GBR region is organised into local government areas, represented by either City or Shire Councils.

The estimated population of the GBR region in 2005 was 781,200 people, representing close to 20 per cent of Queensland's population. The annual population growth rate for the GBR region as estimated in 2006 was 1.3%, with the age category of 65 years or more growing the fastest. However, the age group of 65 plus years of age in the GBR region is proportionally smaller than the average for Queensland. The Indigenous population, as a percentage of the total population in the GBR region, is 5 per cent. ABS SEIFA (Socio-Economic Indices for Areas) data indicate that the GBR region is disadvantaged in socio-economic terms when compared with the rest of Australia.

The majority of the land in the GBR region is used for grazing, and mainly grazing of natural vegetation. However, the gross revenue of grazing per kilometre square (km²) of land is considerably lower than for land under other economic uses, such as irrigation or dryland cropping (Hug and Larson, 2006).

The Productivity Commission estimated in 2003 that the gross value of production (GVP) for mining, tourism and agricultural industries in the GBR region was over \$14 billion, with about \$7 billion from mining, \$4.2 billion from tourism and \$3.2 billion from agriculture. In addition, ports within the GBR region exported 62 per cent of Queensland's ports exports. Future projections estimate that mineral processing and tourism will experience the largest growth in terms of GVP.

Several community-based natural resources management groups are active in the GBR region. The main natural-resources related issues requiring attention were identified as: issues related to loss of vegetation and fragmentation of habitats, including riparian and in-stream vegetation; issues related to poor water quality, including sedimentation and diffuse-source pollution; and a range of issues related to poor land and water

management practices. The most significant impact was deemed to be diffuse pollution from broad-scale agricultural land use (Haynes et al, 2001; Furnas, 2003), in particular, pesticide and nutrient applications (Haynes et al, 2000; McDonald and Weston, 2004; Mitchell et al, 2005).

3.1.2 Comparison of study areas

A comparison of key demographic and economic characteristics of the two selected shires, Cardwell and Whitsunday Shire, is presented in this section. A summary of the data discussed on the forthcoming pages is presented in Table 3, with data sources for various types of statistics presented available in the text.

The following similarities and differences can be noted between the Cardwell and Whitsunday shires:

- **Landscapes of both shires are similar, but Cardwell belongs to the wet tropics while Whitsunday Shire is in the dry tropics:**

Landscapes in both shires are dominated by lush forests at the higher elevation, cleared cultivated land on the alluvial plains, and wetlands and estuaries near the sandy coast. Climate is characterised by a wet season from December to March, and a dry season from April to November. The average daily maximum temperature is around 29°C, with a minimum daily average of 19°C.

The average annual rainfall for Cardwell (Eden Street) weather station is 2,100mm, however, rainfall varies within Cardwell Shire, with significantly higher rainfalls recorded in the ranges than in the plains. The average annual rainfall is lower in Whitsunday Shire, with Proserpine Airport station recording an annual average of 1,360mm (OESR, 2005c).

- **The size of the shires is similar, but Whitsunday has higher population density:**

The total area of Cardwell Shire is 3,062 square kilometres, with an estimated resident population for 2005 of 11,230. Population density in the Shire is therefore estimated at 3.7 persons per km². The major townships of the Shire include Cardwell (resident populations of 1,100), Wongaling Beach (1,220), and Tully (2,560), the administrative centre of the Shire (OESR, 2005a).

Table 3. Comparison of key demographic and economic characteristics of the two selected shires, Cardwell and Whitsunday Shire

Topic	Cardwell	Whitsunday
Bio-climatic conditions	Wet tropics	Dry tropics
Shire area	3,062 km ²	2,679 km ²
Demographic		
Population (estimate for 2005)	11,230	17,512
Annual population growth rate	1.7%	3%
Fastest growing segment of population	Age 65+	Age 65+
% population over 50	50.4%	38.2%
Indigenous population % of total	6.3%	1.2%
Born overseas (excluding visitors) % of total	18%	22%
SEIFA levels (2006)	921 - 972	957 - 1,018
Deciles (10=best)	3 – 5	6 - 8
Crime rate per 100,000 persons:		
Against person (QLD Av= 1,085)	1,355	1,441
Against property (QLD Av= 8,094)	5,755	7,614
Other offences (QLD AV= 2,866)	8,335	4,912
Housing and Education		
Median monthly mortgage repayment by family	\$850–\$949	\$1,600–\$1,999
% of families owning / renting their home	45% / 28%	22% / 41%
% population that has finished Year 10 or less	43.13%	37.04%
Economy		
Unemployment rate (2001; QLD Av = 8.2%)	4.6%	6.6%
Median weekly income (2001)		
Individual (QLD Av=\$360)	\$361	\$426
Household (QLD Av=\$735)	\$639	\$717
Gross value agricultural production (2000)	\$ 128 million	\$53 million
Accommodation takings (2004)	\$16 million	\$105 million
Employment (2001)		
Agriculture, forestry and fishing	30.3%	6.4%
Accommodation and restaurants	9.4%	19.5%
Land use		
% protected land	67%	29%
% land under sugar	13%	15%
% grazing	6.5%	44%

QLD Av = Queensland average

Although the two shires are similar in size, population of Whitsunday was larger than that in Cardwell Shire (17,510 persons in 2005), resulting in average density of 6.5 people per km². The major townships of the shire include Airlie Beach (with an estimated population of 2,375 residents), Cannonvale (3,430) and Proserpine (3,350), the administrative centre of the Shire (OESR, 2005c).

- **The fastest growing segment of population is 65 years and older, but Whitsunday Shire population is growing faster:**

Table 4 presents estimated age distribution for both Shires in 2026, as well as estimated annual growth rates for each age group. The fastest growing age group in both shires is expected to be people age 65 years or more. However, older people will comprise a higher percentage of total population in Cardwell. In addition, population projections indicate that Cardwell Shire is expected to experience the annual average growth rate of 1.7 %, compared to 2.3% projected for Whitsunday (OESR, 2005b).

Table 4. Estimated age distributions in 2026 and predicted annual population growth rates, both shires

Age group	Age distribution in 2026		Annual growth rate %	
	Cardwell Shire	Whitsunday Shire	Cardwell Shire	Whitsunday Shire
0 to 14 years	2,539	3,985	0.3	1.1
15 to 39 years	4,750	8,915	1.1	1.5
40 to 64 years	5,822	9,400	2.1	2.5
65+ years	3,160	5,045	4.0	5.8
All years	16,270	27,345	1.7	2.3

- **About 1/5 of the population in both shires was born overseas, but the percentage of Indigenous population was higher for Cardwell Shire:**

Seventy five per cent of persons in Cardwell and 65% of persons enumerated during census in Whitsunday Shire were born in Australia (ABS, 2006b). The majority of those born overseas were overseas visitors (7 and 13%, respectively), followed by residents born in North-western Europe (5.5 and 7.3%, respectively) and Oceania (2.6 and 3.2%, respectively).

People of Aboriginal or Torres Strait Islander origin comprised 6.3% of Cardwell Shire residents, a percentage significantly higher than Queensland's Indigenous population

average of 3.1%. The percentage of people of Aboriginal or Torres Strait Islander origin was much lower in Whitsunday Shire, 1.2%.

- **Cardwell Shire has lower SEIFA levels:**

Developed by the Australian Bureau of Statistics (ABS) and using data derived from the Census of Population and Housing, SEIFA (Socio Economic Index for Areas) provides a range of measures to rank areas based on their relative social and economic wellbeing. Four indices are compiled by the ABS: Index of Relative Socio-economic Advantage and Disadvantage; Index of Relative Socio-economic Disadvantage; Index of Economic Resources; and Index of Education and Occupation. For all indices, low scores indicate that shire is disadvantaged, and high scores indicate shires with advantage. An “average” shire in Australia has an index score of 1000 (i.e. any score under 1000 indicates that the shire is below the Australian “norm” of 1000). In addition, all shires are grouped into deciles, where the lowest 10% of all shires in Australia are grouped in decile 1 while the highest 10% of Australia’s shires form decile 10.

The SEIFA Indices for Cardwell Shire, based on 2006 Census data (ABS, 2006a), were between 921 for education and occupation (placing Cardwell Shire in the lowest 30% of government areas in Australia based on education and occupations indicators) to score of 972 (50% of Australia – decile 5) for economic resources (Table 5, based on ABS, 2006a). Indices for Whitsunday Shire were much higher (Table 5). Again, Index of Education and Occupation was the lowest (at 957, decile 6). However, both Index of Relative Socio-economic Disadvantage and Index of Economic Resources received scores above Australian average of 1000, thus placing Whitsunday Shire in the highest 30% of Australian shires for both indices (decile 8), (ABS, 2006a).

Table 5. Socio Economic Index for Areas (SEIFA) levels for 2006, both shires

2006 Local Government Area	Index of Relative Socio-economic Advantage and Disadvantage		Index of Relative Socio-economic Disadvantage		Index of Economic Resources		Index of Education and Occupation	
	Score	Decile	Score	Decile	Score	Decile	Score	Decile
Cardwell Shire	924	4	955	4	972	5	921	3
Whitsunday Shire	996	8	1013	8	1018	8	957	6

- **Crime rates against property were lower than Queensland averages, while crime against person and other offences were higher:**

In terms of crime profiles, the rate of offences against the person in both shires was higher than average crime rates for Queensland (Figure 12, data from OESR 2003 and OESR, 2002b, rate per 100,000 residents).

The rate of property offences was slightly lower than Queensland averages in Whitsunday shire; however, in Cardwell Shire it was significantly lower than state average. On the other hand, rates of “other offences” (such as drug offence, liquor offence and good order offences) were in both shires significantly higher than for Queensland overall, and particularly high in Cardwell Shire (Figure 12).

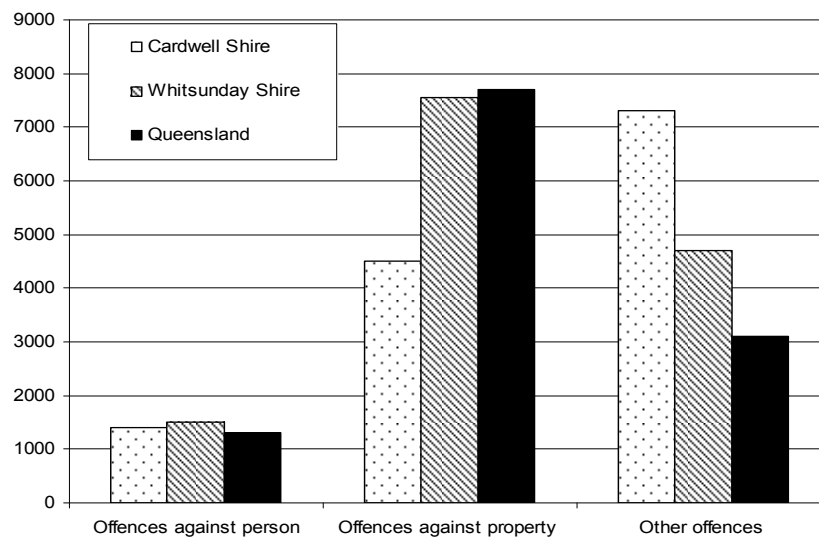


Figure 12. Crime rates per category (offences against person, offences against property, and other offences), both shires and comparison to Queensland rates

- **The median monthly mortgage repayment by family is higher in Whitsunday Shire; while home ownership is much higher in Cardwell Shire:**

The median monthly housing loan repayment in Cardwell Shire was in the range of \$850–\$950 in 2006, while monthly mortgage repayments in Whitsunday Shire were double that, in the range of \$1,600–\$2,000 (ABS, 2008).

A very high percentage of families in Cardwell Shire own their home outright (45%), while an additional 14% were purchasing the home (Table 6). Forty five percent outright ownership recorded in Cardwell Shire is higher than Queensland average of 39%,

and much higher than home ownership in Whitsunday Shire (ABS, 2008). A total of 28% of families in Cardwell were renting, a figure similar to Queensland average. Annual median growth in house prices was strong in some parts of the region (for example, Tully), but rather flat in other parts (for example, Mission Beach) (Suburb Profiles, 2009). Nonetheless, even with such strong growth in recent years, the average house price in Tully at \$240,000 was still lower than the GBR regional average of \$300,000.

On the other hand, the highest percentage of families in Whitsunday Shire live in rented properties (41%). Only 22% of families own their home outright and 15% are purchasing (Table 6, based on ABS, 2008). This is likely due to the high median housing prices, and very sharp growth in property prices in recent years. For example, annual median growth in house prices in the Whitsunday region was higher than 15% a year for all years between 2002 and 2006. According to real estate data (Suburb Profiles, 2009), larger settlements of Cannonvale and Airlie Beach recorded median houses prices of \$480,000 and \$328,500, much higher than regional average of \$300,000.

Table 6. Housing statistics, both shires and comparison to Queensland

Housing statistics	Cardwell Shire	Whitsunday Shire	Queensland
Median weekly housing loan repayment	\$850-\$950	\$1600-\$2000	
Families owning home outright	45%	22%	39%
Families purchasing home	14%	15%	24%
Families renting	28%	41%	30%

However, an important reason for these differences is age difference between the populations of two regions. Older age groups have much higher percentage of outright ownership than younger people (ABS, 2008), and hence Cardwell Shire, where more than 50% of population is over 50 years of age, would be expected to have higher outright ownership rates.

- **The unemployment rate in both shires was lower than for Queensland; but the household median weekly income was also lower than the Queensland average:**

The unemployment rate was low in both shires compared to the Queensland average (OESR, 2005b; based on 2001 data).

Median weekly incomes for both individuals and for households were lower in the study regions than in Queensland on average. Australian Taxation Office data show that the mean taxable income of taxpayers in both Cardwell Shire (\$33,440 a year per person) and the Whitsunday Shire (\$35,610), were lower than the Queensland average of \$40,037 (OESR, 2006, for 2003-04 financial year).

- **Gross value of and employment in agriculture were much higher in Cardwell Shire; while takings from accommodation and employment in tourism-related industries were much higher in Whitsunday Shire:**

In 2000, Cardwell Shire had a total value of agricultural production of \$128 million, of which \$125.5 million were in agricultural crop production and \$2.5 million in livestock (OESR, 2002a). The total gross value of agricultural production in the Whitsunday Shire for the same period was less than half of that in Cardwell Shire (\$52.5 million).

On the other hand, takings from tourism and accommodation in Whitsunday were more than 6 times larger than in Cardwell Shire (\$104.5 and \$16 million, respectively; OESR, 2005c). Tourism capacity of Whitsunday Shire in June 2004 was 2,475 rooms, while the total capacity in Cardwell Shire at the same time was only 420 guest rooms (OESR 2005a). Nonetheless, tourism takings in Cardwell Shire have almost doubled in 5 years between 1999 and 2004, from \$8.8 to \$16 million.

In terms of employment, the largest industry sector in Cardwell was agriculture (30%), followed by retail and trade (12%). In the 5-year period between 1996 and 2001, the biggest decrease in sectoral employment, as a percentage of the total employment, was observed for government administration and defence; followed by agriculture, forestry and fishing; while the biggest increases were recorded in the construction industry; and accommodation, cafes and restaurants.

Accommodation, cafes and restaurants was the largest employer in the Whitsunday Shire employing 19.5 per cent of the region's employed labour force. Other industries with relatively large numbers of employed persons included retail trade (13.3%), transport and storage (10%) and manufacturing (8.4%).

- **The majority of the land in Cardwell Shire is under some kind of protection, while dominant land-use in Whitsunday Shire is grazing:**

Almost 50% of the Cardwell Shire belongs to the Wet Tropics World Heritage Area, with a total of 71% of Tully River and 64% of Murray River catchment under some

form of protection (McDonald and Weston, 2004). The highest percentage of land used in economic production is sugar cane (13% of total land area). Grazing accounts for only 6-7% of land in the shire.

Much smaller percentage of land (29%) is under protection in Whitsunday Shire. The dominant land use in this shire is grazing (44% of land); while 15% of land is under sugar cane and other crops (MWNRMG, 2007).

Both Shires are also adjacent to the Great Barrier Reef World Heritage Area, with islands of Whitsunday coast also forming Whitsunday National Park. Whitsunday Islands draw more than 700,000 tourists to the region annually (WDC, 2008).

The major pollutant in both regions was defined as the water pollution from diffuse sources. Pesticide and fertiliser use were of major concern for the Cardwell Shire NRM (McDonald and Weston, 2004), while suspended sediment and nutrients were identified as a major concern in Mackay-Whitsunday NRM region (Brodie, 2004).

This Section has presented a brief overview of the Great Barrier Reef region and the Shires under study in particular. Demographic and economic characteristics of the social groups, communities or regions, such as those presented in this section, are often used as “objective” indicators of their overall wellbeing. One of the endeavours of this Thesis is to discuss emerging similarities and differences between such “objective” indicators of wellbeing readily available in secondary data and the “subjective” perception of wellbeing factors or satisfaction with those factors, as collected in this research study. This comparison will thus be used later in the Thesis to discuss potential policy implications of using “objective” versus “subjective” approaches to identification of regional priorities.

Details of the primary data collection will now be presented in the remaining sections of this Chapter.

3.2 Design of the questionnaire

3.2.1 Conceptualisation of the questionnaire content

In order to answer the research questions presented in section 2.5 (as per Figure 10), the proposed questionnaire had two general types of questions:

- Questions about respondents' perceptions:

Respondents' perceptions about their own wellbeing, that is, towards what they feel determines their wellbeing, were the principal concern of this research. Questions related to perceptions of wellbeing aimed at answering research questions A, B and C (Figure 10).

- Questions about respondents' characteristics:

Characteristics – or attributes – of the respondents, such as age, marital status, assets etc., were recorded here. This set of questions also included a few questions that aimed at gauging the responder's "sense of place". Information on attributes of the respondents was elicited in order to explore a relationship between wellbeing and "given" characteristics of the person. Questions on attributes aimed at providing answers to the two cross-cutting research questions (Figure 10).

3.2.2 Perceptions of wellbeing

An overview of the literature related to the wellbeing concept, presented earlier, discussed current approaches to wellbeing research and identified typically measured factors of wellbeing, such as safety, health, income levels, environmental quality etc.

Based on the literature review and similar lists and concepts available (OECD, 1976; Schwartz, 1994; Cummins, 1996; Mitchell, 2000; Narayan et al, 2000; Prescott-Allen, 2001; Alkire, 2002; Cummins et al, 2003; Millennium Ecosystem Assessment, 2003; van Kamp et al, 2003), a preliminary list of wellbeing factors was compiled. The factors were grouped into the domains of Society (family and community), Nature (natural environment), and Economy and services. The society domain included six factors from the literature: family relations, community relations, safety, health, educational levels and civil and political rights. A proposed list of factors from the natural environment included: air quality, water quality, biodiversity, swimming and bushwalking, fishing and hunting and beauty of the landscape; while the economy and services domain comprised five factors: income, housing, health services, training and education services and public infrastructure.

The proposed list of wellbeing factors, based on the findings from the literature, was discussed in the contexts of local conditions both in focus groups discussions and during

face-to-face interviews. Focus group discussions were held with the key informants from the region, comprising seven representatives of local commercial, government and non-government groups. The focus group discussed both factors of wellbeing to be included in the mail-out stage and the questionnaire in general. As a result, several additional factors were included in the list of potential wellbeing contributors, while some others (for example, “public infrastructure”) were excluded.

In the next step, this updated list of contributors was discussed with 27 residents of the region during the pilot stage of the project. Using face-to-face interviews, residents were asked to comment on the existing list: both on its content, as well as ways in which they understand the concept behind each factor presented. Respondents were also asked to indicate factors they do not think will be of relevance to their region, and propose additional relevant factors. For example, the factor “biodiversity” was regarded as unimportant by residents of Cardwell Shire, as they pointed that this is only one of the results of landscapes and beaches being in a good condition. The factor “biodiversity” was however deemed important by residents of Whitsunday Shire, and thus was kept on the final list for survey consistency. Interestingly, results of the survey indeed indicate that none of the respondents in Cardwell Shire selected the “biodiversity” factor, although listed, in their wellbeing functions. On the other hand, “condition of the landscape and beaches” was selected as the 9th most important contributor to wellbeing by respondents in this shire.

3.2.3 Characteristics of the respondents

The main reason for including this type of questions was to collect information that would allow one to explore the relationship between wellbeing perceptions and characteristics of the person. Selection of the questions was informed by two main parameters. In order to allow for the comparison of the responses to the Australian Bureau of Statistics (ABS) data for the areas under study, the questions followed typical ABS census-questions classification. Previously published work on the typology of landholders further informed the selection of the attributes to be collected (Kostrowicki 1977; Howeden et al 1998; Landais 1998; Rogers 2003; Emtage et al 2006). The work in the area of development programs and best practice adoption acknowledges the need to understand landholders behaviour, decision-making and actioning by investigating characteristics beyond their average age, number of children, education and income.

There is in agreement in the mainstream socio-economic literature that the attributes, values and choices of a person are not singularly linked to personal characteristics (Myers and Diener, 1996; Whelan et al, 2003; Porter et al, 2007; European Commission for Socio-economic Science and Humanities, 2009). Various classification schemes were developed (see for example Kostrowicki 1977; Howeden et al 1998; Landais 1998; Rogers 2003; Emtage et al 2006) that allow for an understanding of socio-cultural, psychological, environmental and financial factors interrelating to produce differences in behaviour.

Literature suggests that individuals develop and maintain sense of place through an array of social and cultural mechanisms that ascribe meanings or values to them (Cheung et al 2003; Sampson & Goodrich 2009). The concept of “sense of place” has been proposed as way of potentially incorporating peoples’ values and ecological considerations, as place attachment has been found to strongly influence residents’ willingness to engage in conservation and land use planning strategies (Walker and Ryan 2008). Therefore, several “sense of place” questions were also included in this section.

This Thesis did not aspire to contribute to the theoretical discussion of the sense of place concept, but rather to test some of the theoretical assumptions in practice. To this effect, demographic variables readily available in secondary data, that might be considered as “proxies” for sense of place, such as people declaring themselves as Indigenous versus Non-Indigenous; those born overseas versus those born in Australia; and length of time person lived in Shire, were tested. In addition, several other characteristics of the respondents, reported in the literature as contributing to sense of place, were also tested. For example, an individual’s involvement in community activities, or membership in professional associations, were reported in literature as related to how attached individuals are to a place (Stedman 2003, Brown 2005). Similarly, an individual’s perception of whether they are considered a local, or respected, was also found to be related to both their identity and attachment to place (Kalterborn 1998, Williams 2002, Stedman 2002, Brown and Raymond 2007). The connections individuals develop with a place can be assessed through length of time lived in a place and place of birth (Stedman 2003, Brown and Raymond 2007). Therefore, these indicators of sense of place were tested in this Thesis as potential determinants of wellbeing choices.

As a result, the questionnaire provided the following information on the respondents:

- Information comparable to ABS data: Gender; Marital and children status; Age; Cultural background; Qualifications; Sector of employment; Assets; and Income level.
- Sense of place data additional to Census information included: Location of the residence; Length of time person lived in the area; Involvement in community activities and volunteering; and sense of being Local and Respected.

3.2.4 Development of the pool of questions, types and styles

A vitally important aspect of the questionnaire design is the actual wording of the questions. The important thing to consider when deciding on the wording of the questions is the nature of the groups targeted as respondents. In this case, the survey was targeting the general population, where entire population is expected to have a good understanding of their personal wellbeing. Thus, no specific knowledge was required on the issues investigated.

The following checklist of general principles was used to guide the design of the questionnaire on wording issues (based on Dillman, 1978; Salant and Dillman 1994; DeVellis, 2003):

- Will the words be uniformly understood?
- Are the questions too vague? too precise? too demanding?
- Is the question biased? Is the question technically accurate?
- Can the responses be compared with existing information?

Two initial pools of questions were developed. One pool were general questions, dealing with the respondent's attributes; and the other pool of questions was related to the respondent's beliefs about their personal wellbeing. The initial pool of questions was subsequently checked against the above guiding principles.

3.3 Pilot testing

Two test audiences were selected for the pilot stage. One test group comprised peers with expertise in the conduct of surveys and/or wellbeing and livelihoods related work expertise, while the other test group comprised of a sub-sample of selected participants

(Dillman, 1978; Salant and Dillman 1994).

In addition, a focus group discussion was held with the key informants from the region, comprising seven representatives of local commercial, government and non-government groups. The focus group discussed both factors of wellbeing to be included in the mail-out stage and the questionnaire in general.

3.3.1 Expert testing

The “expert” group typically comprises researchers’ peers, that is professionals (colleagues) with the training and background that allows them to understand the study purpose, hypothesis and the research questions the survey is aiming at answering. The key inputs requested from this group were on issues of appropriateness, scientific merit, relevance of the data collected and analytical issues. Clarity of the questions was improved as a result of expert testing. Additionally, the testing aided in the clarification of the future coding of answers for the analysis purposes.

3.3.2 Sub-sample testing

The pilot phase aimed at addressing a diverse section of the actual population to be tested in a full scale survey. The pilot study was conducted ensuring representativeness of the sample in terms of geographic distribution, as well as key demographic parameters relevant to the study: gender; point in life cycle; age; qualification and sector of employment. A total of 27 face-to-face surveys were performed during the pilot stage of the project. The researcher was both collecting the verbal feedback as well as observing the respondents for signs of discomfort or hesitation while filling in the questionnaire. The questionnaire was tested for general impressions; as well as for wording, understanding and order of questions. The following checklist, based on Dillman (1978) and Salant and Dillman (1994), was used to guide the pilot stage:

- Is each of the questions measuring what it is intended to measure?
- Are all the words understood?
- Are questions interpreted similarly by all respondents?
- Does each close-ended question have an answer that applies to each respondent?
- Are questions answered correctly (are some missed or elicit uninterpretable answers?)?
- Does any aspect of the questionnaire suggest bias on the part of the

researcher?

- Does the questionnaire create a positive impression, one that motivates people to answer it?

The key input this group provided was the relevance of the factors of wellbeing proposed to their region. Respondents were engaged in a discussion about the proposed list of wellbeing factors. Background of the wellbeing concept was explained, and respondents were encouraged to discuss their personal perceptions, interests, and areas of importance to wellbeing of themselves and their families. Participants were asked to select key factors influencing their wellbeing in two steps:

(1) First, participants were asked to select all the factors that they considered as contributing to their wellbeing – their ‘Contributors to Wellbeing’.

(2) Second, participants were asked to choose a sub-set of the factors identified in step one that they considered the most important. They were then asked to assign those factors relative levels of importance by allocating points between 1 (least important) and 100 (most important) to each factor selected.

During the pilot study, respondents were not instructed on numbers of factors to select as the most important, however, the majority of respondents settled for 5 to 7 factors. It appears that this subset was large enough to capture the most important contributors, but not too large to become unmanageable for respondents to proceed with the weighing step. Therefore, in the mail-out survey, this number of factors was suggested.

The participants were presented with the picture listing the factors typically identified by people as contributing to their personal wellbeing. Also, they were encouraged to add other factors that they considered important to them that were not listed in the picture, under the title “other”.

Satisfaction with the factors selected as the most important contributors to wellbeing was also recorded. For each factor selected in step 2, participants were asked to assign their current levels of satisfaction with that factor. A scale from 0 (lowest satisfaction) to 100 (highest satisfaction) was used.

3.3.3 Amendments on the draft questionnaire

As a result of the pilot testing, several amendments were made to the initial draft questionnaire. Some of the questions were clarified, and background information provided in the survey form was modified. The layout and presentation of the

questionnaire were also improved in line with the respondents' comments.

The list of factors of wellbeing specified in the questionnaire was amended as to include suggestions from the respondents. All suggestions voiced by more than one respondent were included in the list. The list was collapsed, in discussion with the respondents, to avoid duplications. Some factors, for example condition and the beauty of the beaches, were left separate, as respondents insisted that they represent very different attributes of the landscape. The final list of 27 wellbeing factors agreed upon is presented in Table 7.

Table 7. List of factors potentially contributing to individual wellbeing, developed during focus groups discussions and interviews with key informers in the regions

Society – Family and community	Nature – Natural environment	Economy and services
Family relations	Air quality	Work
Community relations	Water quality	Income
Personal/family safety	Soil quality	Housing
Cultural identity	Access to the natural areas	Health services
Personal/family health	Biodiversity	Recreational facilities
Civil and political rights	Swimming, bushwalking and other activities in the nature	Roads condition
Personal/family education levels	Fishing, hunting, collecting produce	Public infrastructure and transport
Council relations	Beauty of the landscape/beaches	Training and education services
Sports, travel, entertainment	Condition of the landscape/beaches	Support services
Other, to specify	Other, to specify	Other, to specify

3.4 Full-survey stage

This section presents details of the main mail-out part of the survey including the survey method and details of the mail-out phase. Actions taken to mitigate typical survey errors and the validation of the survey are also presented.

3.4.1 Survey method

The method chosen for the full-scale survey mail-out was a “Total Design Method”

developed by Dillman (Dillman, 1978; Salant and Dillman, 1994; Dillman, 2000). This method recommends four separate mailings. The mailings commence with the introductory letter, a personalised, advance notice letter that informs people that they were selected to participate in the survey and explains the nature and the goals of the survey and human ethics considerations. The second mailing is suggested to occur up to one week later, and consists of a personalised letter that explains the survey in slightly more detail; a questionnaire; and a stamped addressed return mail envelope. A follow-up note is sent to all participants one to two weeks later, thanking those who have responded and reminding those who have not. The fourth and last mailing is a survey replacement. A new personalised letter and replacement questionnaire with envelope are sent to those who have not yet responded.

In addition, the conduct of the survey was publicised via interviews in the local media and local newspaper's articles.

The mail-out survey documentation package, including the final questionnaire, is presented in Appendix 2.

3.4.2 Potential survey errors and survey validation

The key challenge faced when planning a survey is to think how, if at all, the various types of likely survey errors might be reduced through use of different modes of surveying and sampling and data collection, given the resources to carry out the project. The following types of error were considered during the development of this research.

3.4.2.1 Sampling error

Sampling error is a function of the size of the population, the size of the sample and the heterogeneity of what is being measured. Krejcie and Morgan (1970) provided estimates of the sizes of the samples required for various population sizes at 5% confidence interval. The estimates and their relation to the research populations and sample for this study are presented in 0.

It can be observed from the Table that sizes of the final samples for the individual shires obtained in this study were below the recommended size that would ensure 5% confidence intervals. However, a combined sample size of 374 valid responses was in excess of the recommended size of 367 samples. In addition to the sample size related to the total population size, it is important that the sample is sufficiently large to enable

the statistical procedures planned for the research (Gorsuch, 1983; Coakes and Steed, 2007). Therefore, the final number of subjects required also depends on the total number of variables used for the specific analysis. To accommodate the above concerns, more complex statistical analysis such as multiple regression analysis were performed on combined data sets only.

Table 8. Estimates of the sizes of the samples required - based on total population size, both shires

	Population size*	Recommended sample size**	Selected sample size	Final sample size
Cardwell Shire	2628	322 - 341	410	(180)
Whitsunday Shire	5230	357 +	416	(194)
Total	7858	364-367	824	(374)

* Eligible respondents

**Based on Krejcie and Morgan 1970

3.4.2.2 Coverage error

Coverage error deals with the likelihood that all elements of the population had at least some chance (probability) of being sampled. Stratified random probability sampling, using systematic random sampling methods (Bernard, 1995), was selected for this research in order to minimise the coverage error. Geographic clustering based on localities was first used to ensure an equal geographic distribution of the sample; followed by systematic randomisation.

3.4.2.3 Non-response error

Even in the cases where the initial sample was carefully selected, a non-response error might occur due to the fact that some segments of the population have systematically not returned the surveys. Typically, this might be people with lower levels of schooling or younger people. Therefore, the final mail sample received was compared with the secondary socio-demographic data available from the Australian Bureau of Statistics (ABS), as summarised in Chapter 3. Samples were compared to the shires overall in terms of locality, gender, age, marital status, cultural background, educational levels, sectors of employment and income levels. Gaps between the secondary data statistics and sample characteristics (such as under-representation of the young people, in

particular young males in the survey sample) were filled by additional targeted face-to-face interviews. As a result of these interviews, additional 19 responses from Cardwell Shire and 57 responses from Whitsunday Shire were added to total survey numbers. Face-to-face interviews were conducted using the same survey instrument used during mailout phase of the data collection. As a result, the survey sample created a good representation of the shires overall.

3.4.2.4 Measurement error

Measurement error relates to the error occurring as a result of inaccurate measures of the phenomenon of interest. The inaccuracies might be due to questions, interviewers, respondents, and/or mode of data gathering. Survey questions might be worded poorly or questions might be ordered in a way that biases answers; or respondent might be unable to accurately answer the questions. Three types of validity are typically discussed, content, criterion, and construct validity (DeVellis, 2003).

Content validity concerns adequacy of the specific set of items included to represent a certain content domain. The initial pilot testing conducted for the purpose of this research has specifically targeted the reduction in this type of measurement error. The final questionnaire has been modified prior to the mail-out in order to incorporate the suggestions received. In addition, a total of six version of the key question, Question B.1 (Appendix 2), were produced. To minimise potential bias due to the placing of the factors in the Question B.1, each of the six versions had a different placing of the three main domains and a different placing of individual factors within each domain. Equal numbers of all six versions were mailed out with an intent to prevent measurement error.

Criterion-related validity requires that questions are relevant to the proposed hypothesis. This type of error was specifically tested with peers at the pilot stage of the survey.

Construct validity is directly concerned with the theoretical relationship of a variable to other variables in the questionnaire. Construct validity was tested during the statistical analysis of the data set using the factor analysis method. The results of this analysis are presented in section 3.4.4.

3.4.2.5 Survey costs

In most cases, the extent to which the above mentioned errors can be addressed and

minimised depends on the total funds available for the survey conduct. The main determinant of the numbers of the questionnaires mailed-out was cost of both mail-outs as well as time required for data entry.

3.4.3 Mail-out and follow up

The survey sample was determined based on the postcodes for the relevant Shires. A database of all telephone numbers registered at the relevant postcodes (4852 and 4854 for Cardwell Shire and 4800 and 4802 for Whitsunday Shire) was obtained from a commercial marketing company (Media M Group, Melbourne, Victoria). The potential 'population' of respondents was deemed to be all those listed in a database of residential addresses within postcodes located either partially or wholly within the study area. The list was first stratified by locality, and then alphabetically organised, in order to ensure geographic representation in the sample. The original data base was deemed unbiased as (1) it was not compiled by a researcher but rather by an independent commercial organization; (2) it was listed in order of locality only; and (3) did not provide any information that could cause the bias during the selection, i.e. demographic status or gender of the potential interviewee. The next two sections present details of the mail-out phase for each Shire.

3.4.3.1 Cardwell Shire

As per Dillman's Total Design Method (1978, 2000), the mailing commenced with the introductory letter, sent out to all selected participants. The introductory letter was followed by the questionnaire mailing on August 10, 2006 (Figure 13). The reminder letter was sent 2 weeks later, and a replacement survey was mailed after another two weeks. The number of replies received at each survey step are summarised in Figure 13. It can be observed from the figure that a large number of the responses were received within the first ten days after questionnaire mailing. The arrival of the responses continued throughout the survey period, with the reminder letter having limited success in accelerating the rate of response. However, the mailing of the replacement survey did result in an observable peak in the responses.

Locations included in the Cardwell Shire survey and total numbers of the households registered at each location are presented in Table 9. Out of 410 surveys initially mailed, 173 responses (144 of them deemed as valid) were received. There was no response from 165 selected participants, while 107 letters were returned, due to incomplete or

incorrect address or person moving away. Forty of the returned letters were replaced by newly selected participants from the same geographic location. At the end, the mail-out phase of the survey resulted in 144 valid responses.

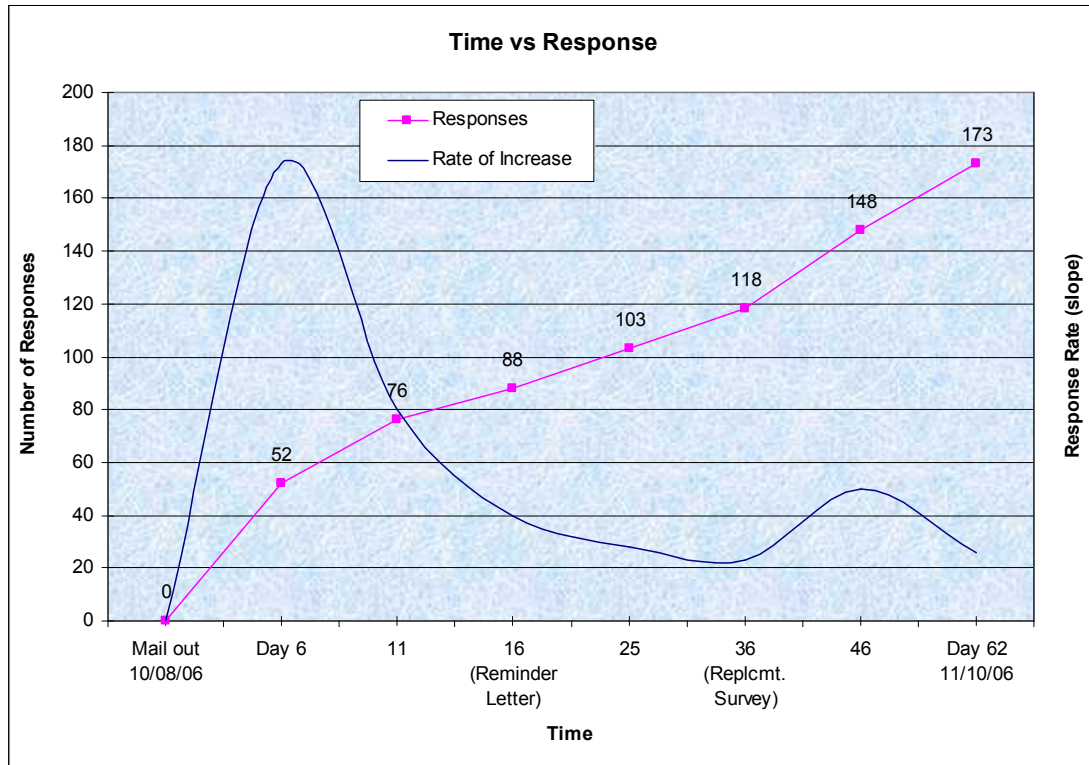


Figure 13. Mail-out survey steps and numbers of replies received during 62 days survey period, Cardwell Shire

Data from the survey sample were compared to the ABS statistics for the Shire and gaps between the ABS statistics and survey sample composition were identified. The analysis found that young persons; persons with lower levels of education; and persons employed in tourism; were underrepresented in the survey sample. In attempt to redress that imbalance, additional face-to-face interviews were conducted in the Cardwell Shire, specifically targeting persons with those characteristics. Face to face interviews were conducted using the same survey instrument that was used in the mail-out phase. The total of valid responses raised to 180, representing 6.85% of registered households and a survey response rate of 43.9% (Table 9).

Table 9. Survey sample and response rates, Cardwell Shire

Location	Total HH*	Total surveyed	Valid responses	Response rate as % of surveyed**	Response rate as % of total
Bilyana	51	9	2	22.22	3.92
Euramo	132	21	12	57.14	9.09
Feluga	127	19	6	31.58	4.72
Jarra Creek	16	3	2	66.67	12.50
Lower Tully	102	16	3	18.75	2.94
Mission Beach South	258	39	12	30.77	4.65
Murray Upper	101	16	8	50.00	7.92
Narragon Beach	4	2	2	100.00	50.00
Silky Oak	19	3	1	33.33	5.26
Tully	1301	202	84	41.58	6.46
Tully Heads	158	25	10	40.00	6.33
Wongaling Beach	359	55	38	69.09	10.58
Total	2628	410	180	43.90	6.85

*HH=households

** This % also includes persons contacted for face to face interviews

3.4.3.2 Whitsunday Shire

An overview of the Whitsunday Shire survey sample and responses is presented in Table 10. The table also presents locations covered by the selected postcodes and the total number of the households registered at each location. The survey was mailed to 416 (8%) of the Shire's households. A total of 194 valid responses, including responses from the face-to-face follow-up interviews, were obtained, representing 3.7% of registered households and a total response rate of 47% (Table 10).

Table 10. Survey sample and response rates, Whitsunday Shire

Location	Total HH*	Total surveyed	% of total surveyed	Valid responses	Response rate (%) of surveyed**	Response rate (%) of total
Airlie Beach	576	46	8.0	21	45.7	3.6
Cannon Valley	294	15	5.1	6	40.0	2.0
Cannonvale	1292	73	5.7	39	53.4	3.0
Conway	95	14	14.7	3	21.4	3.2
Conway Beach	59	11	18.6	9	81.8	15.3
Crystal Brook	26	3	11.5	1	33.3	3.8
Dingo Beach	148	16	10.8	8	50.0	5.4
Dittmer	16	1	6.3	0	0.0	0.0
Foxdale	10	0	0.0	0	0.0	0.0
Gregory River	6	1	16.7	0	0.0	0.0
Hideaway By	47	9	19.1	7	77.8	14.9
Jubilee Pocket	355	30	8.5	14	46.7	3.9
Kelsey Creek	55	4	7.3	2	50.0	3.6
Letherbrook	67	6	9.0	2	33.3	3.0
Mount Julian	131	16	12.2	8	50.0	6.1
North Gregory	138	9	6.5	5	55.6	3.6
Preston	18	1	5.6	1	100.0	5.6
Proserpine	1550	131	8.5	53	40.5	3.4
Riordan Vale	22	2	9.1	1	50.0	4.5
Shute Harbour	67	7	10.4	5	71.4	7.5
Strathdickie	147	12	8.2	7	58.3	4.8
Waterson	35	3	8.6	1	33.3	2.9
Whitsundays	5	1	20.0	0	0.0	0.0
Wilson Beach	40	3	7.5	0	0.0	0.0
Woodwark	25	2	8.0	1	50.0	4.0
Total	5230	416	8.0	194	47%	3.7%

*HH=households

** This % also includes persons contacted for face to face interviews

The mailing commenced on the first of November 2006 (Figure 14), with reminder letters sent one week later and a replacement survey mailed after another two weeks. The majority of the responses were received within the first three weeks after mailing. The mailing of the replacement survey again resulted in an observable peak in responses (Figure 14).

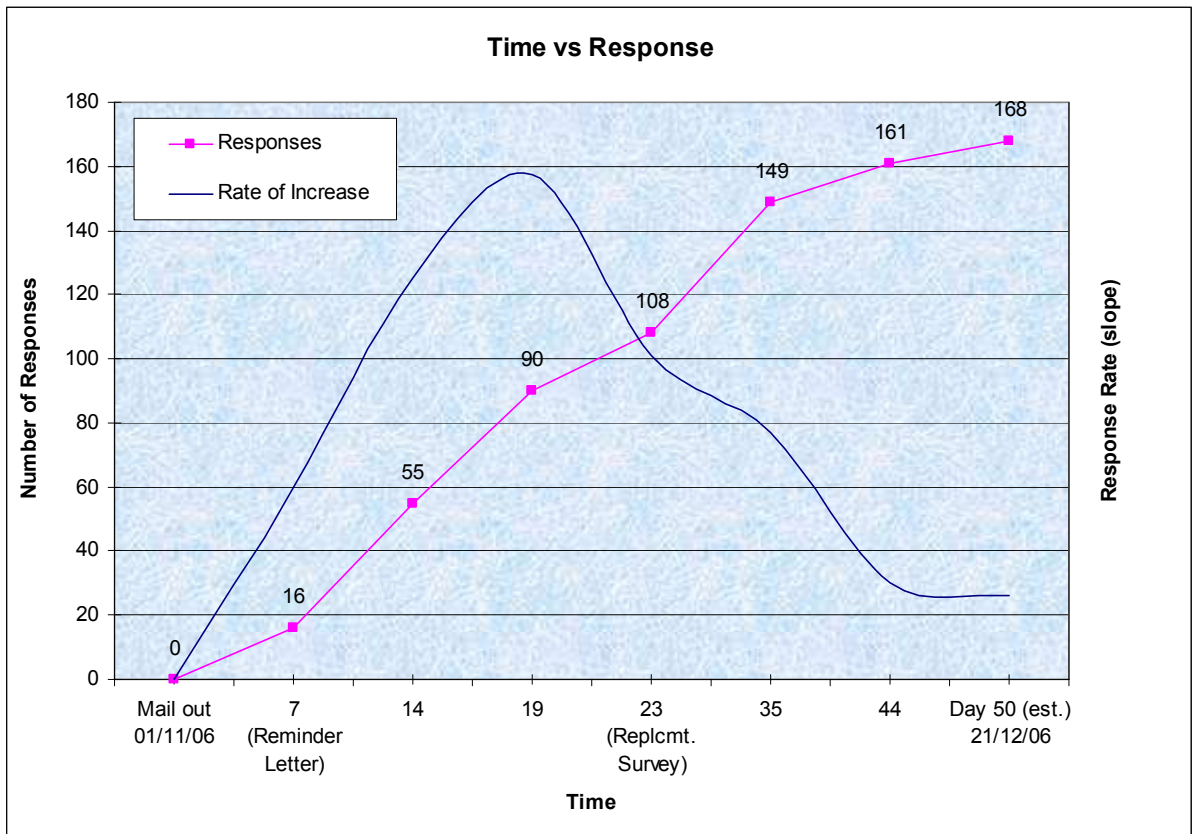


Figure 14. Mail-out survey steps and numbers of replies received over 50 days survey period, Whitsunday Shire

Out of 416 surveys initially mailed, 168 responses were received (137 of them deemed valid). There was no response from 187 selected participants, while 114 letters were returned, due to incomplete or incorrect address or person moving away. 73 of the returned letters were replaced by newly selected participants from the same geographic location. In the end, the mail-out phase of the survey resulted in 137 valid responses. As in the Cardwell Shire, additional face-to-face interviews were conducted after the survey, since the analysis of the demographic and socio-economic characteristics of the respondents showed that young persons, in particular young males; singles persons; persons with lower levels of education; and persons employed in tourism and trade; were underrepresented in the survey sample. Some of the locations were also underrepresented. In addition, the response rate was lower than the desired target of 5% of households. Therefore, an intensive face-to-face interviewing campaign was conducted in the Whitsunday Shire and resulted in 57 valid additional questionnaires. Face to face interviews were conducted using the same survey instrument that was used in the mail-out phase.

3.4.4 Validation of wellbeing variables

Factor analysis was performed as a validation tool for the validity of the construct and internal consistency of the wellbeing factors used in the data collection survey. All 27 contributors to wellbeing were analysed in order to identify variables that are correlated.

Factor analysis is typically used in social sciences for both information packaging and data reduction, by reducing the original list of variables to a shorter list that is easier to manipulate and use for additional analysing (Bernard, 1995). Factors thus created represent a new variable that is based on several original variables combined. Therefore, according to DeVellis's (2003), factor analysis is principally a reorganisation of the information contained in original variables. In the case where the original variables are very dispersed, that is, consist of poorly correlated or unrelated variables, the factor analysis will result in a large number of factors. Such finding indicates that the original variables collected were unrelated; that is, that the questions asked were investigating different aspects and not being repetitive and thus potentially redundant. If the original variables are well correlated (dense), they will produce very few factors. This means that only a few factors will be needed to account for a lot of variance (Bernard, 1995). Results from the analysis are presented in Table 11.

A total of 11 new factors were identified as having initial Eigenvalues higher than 1 in the Cardwell Shire data set. However, even such a large number of factors explained only 39.6% of the total variance (Table 11.A). Factor analysis of the data set from Whitsunday Shire identified a total of 12 new factors with initial Eigenvalues higher than 1. The 12 factors identified explained 64% of variability in the sample (Table 11.B).

These results indicate that the original factors of wellbeing proposed were very dispersed, that is, poorly correlated. This result can be used in validation of the questionnaire as it indicates that the original questions asked were investigating different aspects of wellbeing and were not repetitive and thus potentially redundant. Table 12 further presents a break-down of factors obtained from the factor analysis, for both data sets, into the original variables. It is interesting to note here that the originally proposed factor "beauty and condition of the landscape and beaches" was split into two factors during the pilot stage, "condition of the landscape and beaches" and the "beauty of the landscape and beaches". This was due to respondents insisting that "beauty" and

“condition” represent rather different concepts. Indeed, the two factors were placed into different groups during survey validation process (Table 12).

Table 11. Testing for the internal consistency of the survey instrument: Factor analysis of wellbeing contributors included in questionnaire

(a) Cardwell Shire

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.239	8.292	8.292	1.670	6.185	6.185	1.301	4.819	4.819
2	1.983	7.346	15.638	1.492	5.527	11.712	1.219	4.516	9.334
3	1.798	6.659	22.297	1.333	4.935	16.648	1.123	4.160	13.495
4	1.596	5.911	28.208	1.083	4.011	20.658	1.069	3.958	17.453
5	1.577	5.841	34.049	1.073	3.975	24.633	1.030	3.814	21.267
6	1.426	5.283	39.331	.926	3.430	28.063	.939	3.477	24.744
7	1.339	4.960	44.291	.801	2.967	31.029	.884	3.274	28.018
8	1.295	4.796	49.087	.716	2.652	33.681	.883	3.269	31.287
9	1.226	4.539	53.627	.668	2.473	36.155	.829	3.070	34.357
10	1.158	4.289	57.915	.528	1.955	38.109	.777	2.876	37.233
11	1.090	4.038	61.953	.416	1.541	39.650	.653	2.417	39.650

(b) Whitsunday Shire

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.101	7.782	7.782	2.101	7.782	7.782	1.738	6.438	6.438
2	1.957	7.249	15.031	1.957	7.249	15.031	1.643	6.085	12.523
3	1.696	6.281	21.312	1.696	6.281	21.312	1.559	5.774	18.297
4	1.601	5.928	27.239	1.601	5.928	27.239	1.501	5.560	23.856
5	1.505	5.575	32.814	1.505	5.575	32.814	1.493	5.530	29.386
6	1.358	5.028	37.843	1.358	5.028	37.843	1.405	5.205	34.591
7	1.281	4.746	42.589	1.281	4.746	42.589	1.375	5.092	39.683
8	1.223	4.529	47.118	1.223	4.529	47.118	1.371	5.078	44.761
9	1.207	4.469	51.587	1.207	4.469	51.587	1.340	4.963	49.724
10	1.184	4.387	55.974	1.184	4.387	55.974	1.327	4.914	54.639
11	1.121	4.151	60.125	1.121	4.151	60.125	1.285	4.760	59.398
12	1.056	3.910	64.034	1.056	3.910	64.034	1.252	4.636	64.034

Extraction Method: Principal Axis Factoring (SPSS 14).

As the final step in the analysis, both data sets were combined and factor analysis was performed on the combined set. This analysis could not be meaningfully completed as no factors could be identified within 200 iterations. Therefore, it can be concluded that

the initial questionnaire contained a list of well dispersed and unrelated factors of wellbeing and that collapsing this list using factor analysis is not a valuable exercise as each original variable investigated different aspects of the perceived contributions to wellbeing.

Table 12. Composition of factors identified in factor analysis, both Shires

Factor	Original variables and directions	Original variables and directions
	Cardwell Shire	Whitsunday Shire
1	Water quality (B4) Air quality (B3) Soil quality (B5)	Water quality (B4) Air quality (B3) Soil quality (B5)
2	Community Relations (A2) Council relations (A9) Income/financial security (C2) (-)	Health services (C4) (-) Support services (C8) (-) Sports, travel, entertainment (A8) Work (C1)
3	Work (C1) (-)	Income/financial security (C2) (-) Roads condition (C9) Beauty of the landscape/beaches (B6) Housing (C3) (-) Housing (C3)
4	Fishing, hunting, collecting produce (B1) Personal/family health (A5) (-) Personal/family education levels (A6) (-) Sports, travel, entertainment (A8) Personal/family safety (A3) (-)	Council relations (A9) Personal/family health (A5) (-) Civil and political rights (A7)
5	Roads condition (C9) Health services (C4)	Housing (C3) Community Relations (A2) Cultural identity (A4)
6	Swimming, bushwalking and other outdoor activities (B2) Cultural identity (A4) Condition of the landscape/beaches (B7)	Recreational facilities (C7) Family Relations (A1) (-) Personal/family health (A5) (-)
7	Beauty of the landscape/beaches (B6) Condition of the landscape/beaches (B7) Sports, travel, entertainment (A8) (-)	Personal/family health (A5) (-) Access to natural areas (B8) Biodiversity (B9) Civil and political rights (A7)
8	Family Relations (A1) (-) Access to natural areas (B8)	Fishing, hunting, collecting produce (B1) Personal/family education levels (A6) (-) Work (C1)
9	Family Relations (A1) (-) Income/financial security (C2)	Beauty of the landscape/beaches (B6) Work (C1) (-) Swimming, bushwalking and other outdoor activities (B2)
10	Recreational facilities (C7) Public transport (C6) Personal/family safety (A3) (-)	Public transport (C6) Personal/family safety (A3)
11	Biodiversity (B9) Civil and political rights (A7) Training and education services (C5)	Support services (C8) (-) Roads condition (C9) Family Relations (A1) (-) Training and education services (C5)
12		Condition of the landscape/beaches (B7)

3.5 Community involvement

The research study followed a multi-step process, designed to enable and encourage continuous involvement of the community. Each step of the process was discussed with

the community representatives, and modified as deemed appropriate for the local conditions, before its implementation. The lessons learnt in each step were then presented back to the community and discussed as an introduction to the discussions on the next step in the research process. Both a formal approach to the engagement (through the Cardwell Shire Floodplain Program Steering Committee in the case of Cardwell Shire) and an informal approach (informal and semi-formal meetings with representatives of various community and government organisations and interested residents of Whitsunday Shire and media coverage) were tested.

Community engagement was achieved through a combination of face to face meetings, media coverage, a project dedicated web-site and a publication of results in reports dedicated to the community. For further information on those activities, please refer to Appendix 3.

Results of the primary data collection are presented in the next three chapters. Chapter 4 addresses contributors to wellbeing, while wellbeing satisfaction is presented in Chapter 5. The Index of Dissatisfaction, a tool that combines both satisfaction and importance of wellbeing contributors, is then presented in Chapter 6.

Chapter 4 Contributors to wellbeing

The literature review presented in Chapter 2 concluded with the “Emerging research questions”, as conceptualised in Figure 10 in Section 2.5. Secondary data relevant to this research and details of the primary data collection were then described in Chapter 3. This Chapter revisits the research questions and presents methods and results of the analysis exploring the first of the research questions:

What contributes to wellbeing, and by how much?

The following underlying and cross-cutting questions are also explored in this Chapter:

- What factors (*contributors to wellbeing*) are perceived as being the most/least important to individual wellbeing?
- Are the contributors to wellbeing *shared* by individuals within each Shire and across the region?
- Is choice of contributors to wellbeing *determined* by the characteristics of the person? Can characteristics of the person explain his or her wellbeing choices?

This Chapter starts with the presentation of the data analysis methods. Contributors to wellbeing at individual, shire and regional level are described in Section 4.2, while Section Table 18 investigates potential determinants of wellbeing choices. The Chapter closes with a discussion of the results (Section 4.4) and Conclusions.

4.1 Data analyses methods

4.1.1 Contributors to wellbeing

The questionnaire asked participants to select all factors that they considered as important to their wellbeing – their ‘Contributors to Wellbeing’. Building on this question, participants were asked to choose 5-7 of the factors they had just identified, which they considered to be the most important for themselves, personally.

To simplify the terminology used in the Thesis, the term “**contributors**” will be used to describe “wellbeing factors selected by individuals as important to their personal wellbeing”; while the term “**weights**” will denote “numerical weight assigned by individuals to the contributors”.

The respondents were asked to assign weights by allocating points between 1 (least important) and 100 (most important) to each contributing factor selected. Wellbeing factors not selected by a respondent thus received zero weight. The respondents were also instructed that more than one contributor could receive the same weight. The Percentage of Scale Maximum method (Cummins, 2003) was used to process thus collected individual weights: weights were standardised so that all the weights assigned by an individual add to 1. Thus, the percentage contribution of each wellbeing factor selected by an individual was calculated.

As all weights now added to 1, it was possible to compare relative importance of different factors and different domains, creating individual sets of “Contributors to Individual Wellbeing” (*CIW*). The *CIW* can be conceptualised as consisting of the sum of wellbeing factors selected (*F*) that have relative weights (*W*) assigned to them (formulas 1, 2 and 3), with the wellbeing contributors coming from the domain of either economy (*E*), nature (*N*) or society (*S*) (formula 4).

$$E_w = \sum_{i=1}^n * W_i \quad (\text{for Economic (E) factors } i) \quad (1)$$

$$N_w = \sum_{j=1}^m * W_j \quad (\text{for Nature (N) factors } j) \quad (2)$$

$$S_w = \sum_{k=1}^p * W_k \quad (\text{for Society (S) factors } k) \quad (3)$$

$$CIW = E_w + N_w + S_w = 1 \quad (4)$$

Where:

CIW = Contributors to Individual Wellbeing;

W = weights;

n, *m* and *p* = number of factors in *E*, *N* and *S*, respectively;

The normalised weights were then analysed to assess the relative importance of contributors across individuals. The analyses of the similarities and differences in selection and weighing of wellbeing contributors, explored the extent to which the contributors to wellbeing are *shared* by individuals within each Shire and across the region.

4.1.2 Determinants of wellbeing choices

Several attributes of the respondents were recorded during the survey. These attributes were tested against wellbeing choices made by respondents, as potential determinants of the choices. The economic, demographic and sense-of-place attributes recorded in the survey, together with the categories provided for each variable and an overview of the study response sample are presented in Table 13.

Table 13. List of attributes of the respondents captured in this study, with percentages for each category

Variable	Category	% of sample (n=375)
Shire	Whitsunday	52.2
	Cardwell	47.8
Demographic variables		
Gender	Male	47.0
	Female	53.0
Marital status	Married, no children	10.1
	Married, dependent children	29.9
	Married, children left home	37.3
	Single, no children	11.0
	Single, dependent children	2.2
	Single, children left home	9.6
Qualifications	No formal schooling	0.5
	Year 6 or less	3.3
	Year 10 or less	19.7
	Year 12 or less	7.7
	TAFE	14.5
	Trade / apprenticeship	18.9
	Work experience	14.8
	Tertiary / higher degree	20.8
Sector of employment	Agriculture	16.4
	Industry and services	38.6
	Tourism	10.1
	Government or govt service	15.8
	Private pension	8.5
	No employment	9.6
	Years of age	20 to 29
30 to 39	14.6	
40 to 49	19.2	
50 to 59	25.4	
60 to 65	13.5	
65 or older	17.0	
Sense of place variables		
Country of birth	Australia	85.7
	Overseas	14.3
Feeling like a “local”?	Yes	92.2
	No	7.8
Feeling respected?	Yes	73.4

Variable	Category	% of sample (n=375)
Participating in community activities?	No	26.6
	Yes	59.7
	No	40.3
A member of professional associations?	Yes	23.7
	No	76.3
Location of residence	coastal	40.6
	non-coastal	59.4
Years lived in area	< 5 years	10.8
	5 to 15 years	30.2
	> 15 years	32.9
	My whole life	26.1
Economic variables		
Owns productive land?	Yes	13.8
	No	18.1
	(no response)	(68.1)
Owns a farm or other business assets?	Yes	19.2
	No	12.0
	(no response)	(68.8)
Owns private residence (house or unit)?	Yes	61.6
	No	10.4
	(no response)	(28.0)
Owns investment property?	Yes	17.3
	No	13.9
	(no response)	(61.8)
Owns other investments?	Yes	18.6
	No	11.2
	(no response)	(70.1)
Household income	\$1 to \$20,000	14.1
	\$20,000 to \$35,000	14.1
	\$35,000 to \$50,000	17.1
	\$50,000 to \$75,000	14.9
	\$75,000 to \$100,000	12.5
	\$100,000 to \$150,000	6.9
	\$150,000 and above	3.7
(no response)	(16.7)	

Three types of tests were performed in the analysis of potential determinants. First, exploratory bivariate testing was done to explore the relationship between each variable (attribute of the respondent) and each wellbeing contributor. Correlations between the various demographic, economic and sense-of-place attributes of respondents were also explored. High correlations were found between several of the attributes and thus multivariate regression was used to explore relationships between the suite of attributes and the contributors.

When conducting multiple regression analysis, the ratio of cases to independent variables should ideally be at least twenty to one; with the minimum requirement of at least five times more cases than variables (Coakes and Steed, 2007). Given this

important requirement, multiple regression analysis was only conducted for the top-ten contributors, on the data set that combines cases from both shires. In addition, several variables were collapsed from the initial set of categories presented in Table 13 into a shorter set (Table 14). For example, the question on marital status was split into two “dummy variables”, marital status and children. Qualifications were also collapsed into two “dummy variables”, representing respondents with less than 12 years of schooling and those with post-schooling qualification (such as TAFE, apprenticeship or degree). A “dummy variable” representing the Whitsunday Shire was also introduced to assess potential differences in wellbeing choices across Shires.

Table 14. Demographic, sense of place and economic variables (characteristics of the respondents) elicited during the survey and included in the analyses

Demographic variables (6)	Sense of place variables (7)	Economic variables (6)
- gender (male/female)	- place of birth (Australia/overseas)	- owner of a farm / productive land (yes/no)
- marital status (married/single)	- respected by the community (yes/no)	- owner of a private residence (yes/no)
- children (with/ without children)	- involved in community activities (yes/no)	- owner of a private business (yes/no)
- age (20-29; 30-39; 40-49; 50-59; 60 and over)	- feeling as a “local” (yes/no)	- owner of an investment property (yes/no)
- qualifications (12 years of schooling or less/ schooling plus further education)	- member of associations (yes/no)	- owner of other type of investment (yes/no)
- employment sector (industry and transport; tourism; agriculture; government; passive income; unemployed)	- place of residence (coastal/non-coastal)	- income levels (up to 20,000\$ a year, 20-50,000\$, 50-100,000\$, above 100,000\$ and no answer)
	- Shire (Whitsunday/Cardwell)	
	- years lived in the area (less than 5; 5-15; more than 15; whole life)	

First, binary regression methods were used. For this analysis, wellbeing weights for all contributors were re-coded to a binary mode (with 0 = not important to my wellbeing, for wellbeing factors that did not receive any weights; and 1 = important contributor to my wellbeing, for factors receiving any weight) and tested against respondents’ attributes (as presented in Table 14 above).

Then, multivariate regression analysis was used to explore the relationship between the attributes and the weights.

Both standard and step-wise regression models were used. In the standard model, all independent variables entered the regression equation at once; while in the stepwise model both the number of the independent variables entered, and their order of entry, were determined by the statistical criteria of the procedure (Coakes and Steed, 2007).

The following sections present results of those analyses.

4.2 Contributors to wellbeing

4.2.1 Individual wellbeing

During the data collection process, participants were presented with a list of 27 wellbeing factors that might be of importance to them. Weights were assigned by participants to wellbeing contributors of their choice. The weights were then standardised, creating sets of “Contributors to Individual Wellbeing”. Differences between contributors selected and weights assigned by respondents are illustrated by two examples from the survey, below.

Example 1 presents a set of contributors selected by a single male in his twenties, Australian-born and with tertiary education, employed in a private service sector, with an annual household income of 100-150,000A\$, who has lived in the Shire for more than 15 years. He selected seven contributors, as follows:

Example 1: S (0.590), N (0.365), E (0.045)

[S (family 0.450 + health 0.085 + sport/entertainment 0.045 + political and civil rights 0.010)],

[N (fishing 0.230 + beauty of landscapes/beaches 0.135)],

[E (work 0.045)],

Where: E = economy; N = nature; S = society

This example indicates that the social domain is very important to this person’s wellbeing, in particular family relations – a contributor that on its own accounts for almost half of his overall wellbeing. He also assigned high weights to “fishing” and “beauty of the landscapes and beaches” giving nature a relatively high total weight. The only contributor selected from the economy was “work”, scoring relatively low at 0.045, and thus the economic domain appears of least importance to this individual.

A second example is a set of Contributors to Individual Wellbeing of an Indigenous

female in her thirties, who has lived all her life in the Shire, is currently living with a partner, has primary school education and an annual household income of 35-50,000A\$.

Example 2: S (0.720), E (0.246), N (0.034)

[S (family 0.480 + health 0.240)]

[E (work 0.100 + income 0.090 + health services 0.043 + housing 0.043)],

[N (beauty of landscapes/beaches 0.034)],

In contrast to the respondent in Example 1, she selected several contributors from the economic domain: work, income, health services and housing; and they were all given relatively high weights. As a result, the total weight she assigned to economy is much higher (0.246) than that of the respondent in Example 1 (Figure 15). Similar to Example 1, this respondent also assigned the highest weights to society (0.720), which in her case consists of two contributors: family relations and health. By contrast, she did not place much importance on nature, as indicated by a low weight assigned to a single contributor, “beauty of the landscape and beaches”. It is thus interesting to note in Figure 15 that although those two respondents assigned very different weights to economy and nature, the social domain weights are the highest for both, and family relations and health factors have been selected by both respondents.

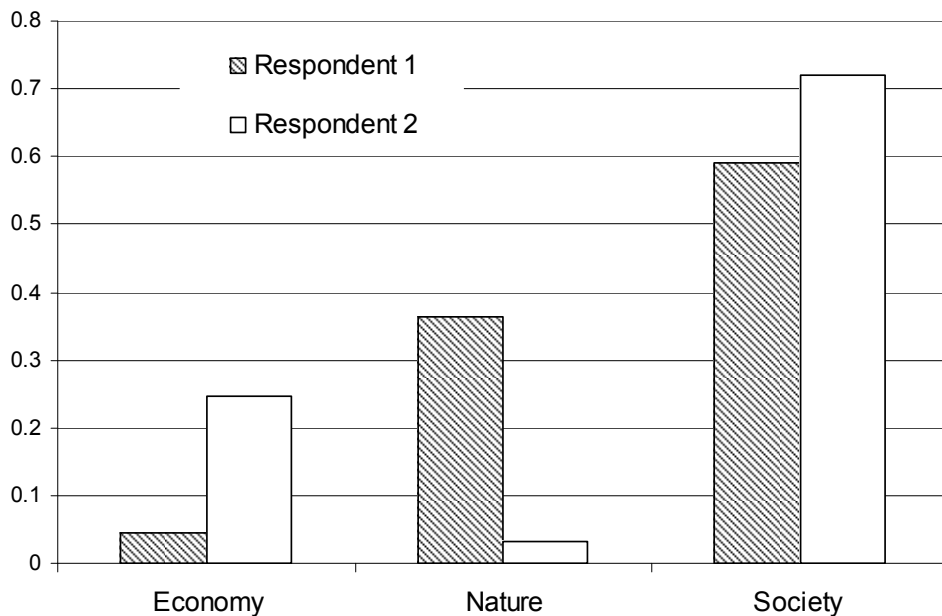


Figure 15. Comparison of weights assigned to each wellbeing domain by two survey respondents

The two examples presented here indicate that contributors to individual wellbeing can be meaningfully quantified. Also they confirm the expectation based on utility theory, that is, that individual utility functions are unique: each individual will select the contributors that maximise her or his utility the most, and will select them at the increments (levels) that suit them best.

A second level of data analysis investigated the differences and similarities in wellbeing choices across individuals. Findings of this part of the analysis are presented next.

4.2.2 Regional wellbeing

4.2.2.1 Cardwell Shire

This section presents aggregations of the weights assigned to each wellbeing contributor by each respondent in the Cardwell Shire. The mean and median weights assigned to each contributor were calculated. Table 15 indicates that the highest weights were assigned to: family relations, health, income, health services, safety and water quality. The percentage of respondents who identified these factors as contributors is also indicated in the table.

Table 15. Wellbeing factors selected by the highest percentage of respondents, with mean weights assigned, Cardwell Shire

Factor	Family relations	Health	Income	Health services	Safety	Water quality
Domain	Society	Society	Economy	Economy	Society	Nature
Mean weight	0.132	0.113	0.083	0.088	0.083	0.062
Median weight	0.143	0.143	0.111	0.114	0.098	0.000
Std. Deviation	0.143	0.117	0.079	0.101	0.086	0.078
Percentiles						
20	0.000	0.000	0.000	0.000	0.000	0.000
40	0.138	0.111	0.000	0.000	0.000	0.000
60	0.152	0.149	0.136	0.139	0.138	0.087
80	0.177	0.172	0.152	0.153	0.152	0.143
100	1.000	1.000	0.400	0.865	0.370	0.333
Respondents who identified this factor as important	114 68.3 %	107 64.1%	94 56.3%	92 55.1%	87 52.1%	70 48.9%

(n=167; factors ranked based on the % of respondents selecting)

Three factors from the social domain (family relations, health and safety), were identified as being important contributors to wellbeing by 68.3, 64.1 and 52.1% of the respondents, respectively (Table 15). Two factors in the economic domain - income and health services - were included by 56.3 and 55.1% of the respondents, respectively. Factors related to nature received more evenly distributed weights, with water quality alone being selected by 41.9% of the respondents.

Most individual factors received highly variable ratings, resulting in high standard deviations (Table 15, Figure 16). Nonetheless, the social domain emerged as consistently higher than the other two domains.

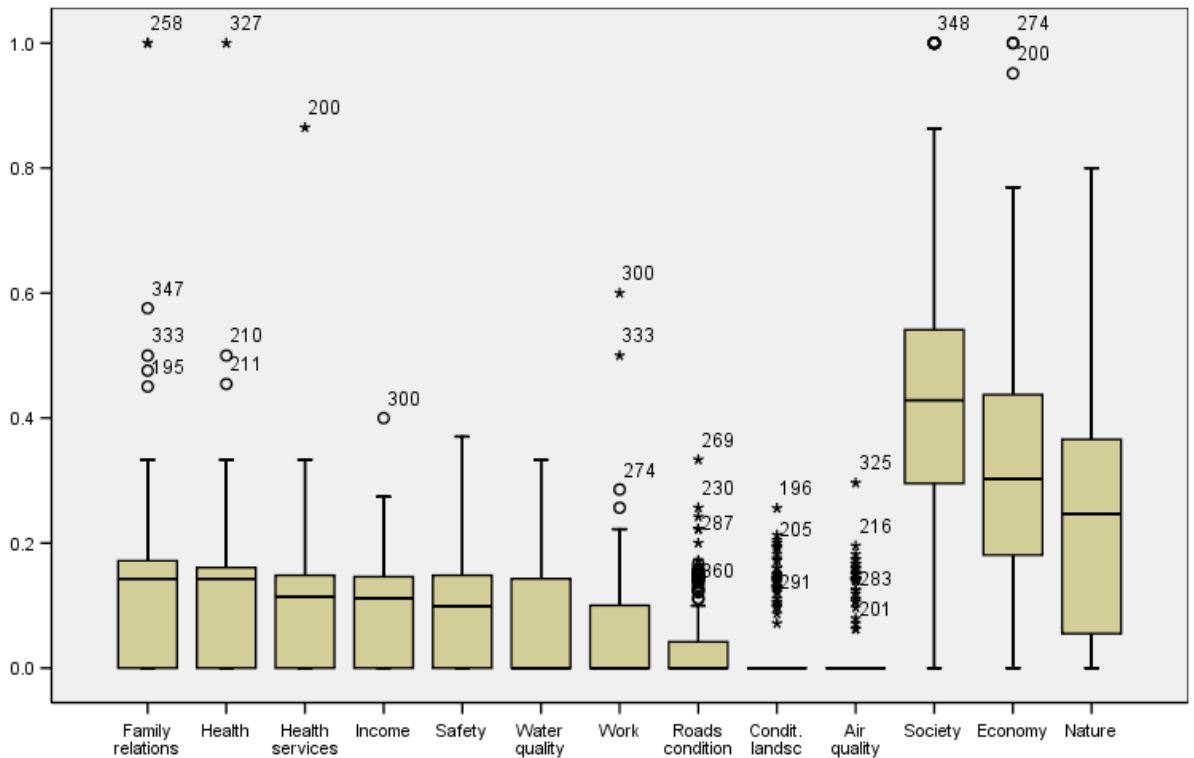


Figure presents median (line), interquartile range (length of the box), standard deviation, outliers (O), and extreme cases (*) of individual variables (n=167, factors ranked based on means)

Figure 16. Ten wellbeing factors receiving the highest weights and sum of weights for the three domains, Cardwell Shire

The mean weights (with standard deviations in brackets) were as follows:

$$S\ 0.429 (\pm 0.226),\ E\ 0.325 (\pm 0.205),\ N\ 0.247 (\pm 0.201),$$

where, S = society; E = economy; N = nature;

Family relations, health and safety received the highest weights in the social domain and thus contributed most to wellbeing at the regional level:

[S (family relations 0.1317 (0.1427), health 0.1131 (0.1175), safety 0.0826 (0.0864), all other Society factors)]

Health services, income, work and roads condition, emerged as the key contributors from the economy:

[E (health services 0.0877 (0.1011), income 0.0827 (0.0790), work 0.0476 (0.0887), roads condition 0.0447 (0.0735), all other Economy factors)]

In the natural environment domain, water quality, air quality and the condition of the landscape and beaches received the highest weights by the respondents in Cardwell shire:

[N (water quality 0.0623 (0.0778), condition of the landscape/beaches 0.0349 (0.0651), air quality 0.0329 (0.0628), all other Nature factors)]

A majority of respondents (77%) included at least one contributor from each of the three domains. That means that at least one factor from each domain (economy, society and nature) was identified as important to wellbeing by those respondents. Twenty three percent of respondents did not include any contributors from the natural environment domain; 10.8% omitted economic contributors; while only 5.4% did not include any social contributors.

4.2.2.2 Whitsunday Shire

The most important contributors to wellbeing in the Whitsunday Shire are presented in this section. The highest mean and median weights were recorded for the following contributors: family relations, health, income, water quality, safety and health services (Table 16). It can be observed from the Table that contributors selected by the highest numbers of respondents are the same as those selected in the Cardwell Shire. Three factors from the social domain (family relations, health and safety), were included as wellbeing contributors by 67.4, 63.6 and 47.6% of the respondents, respectively. Two

factors in the economic domain - income and health services - were included by 54 and 44.4% of the respondents, respectively. Again, factors in the natural environment domain received more evenly distributed weights, with water quality being selected by 50.8% of the respondents (Table 16). All factors received highly variable ratings, resulting in high standard deviations (Table 16 and Figure 17).

Table 16. Wellbeing factors selected by the highest percentage of respondents, with mean weights assigned, Whitsunday Shire

Factor	Family relations	Health	Income	Water quality	Safety	Health services
Domain	Society	Society	Economy	Nature	Society	Economy
Mean	.1258	.1097	.0847	.0738	.0769	.0695
Median	.1430	.1430	.1210	.0850	.0000	.0000
Std. Deviation	.1319	.0943	.0851	.0761	.0852	.0856
Percentiles						
20	.0000	.0000	.0000	.0000	.0000	.0000
40	.1350	.1284	.0000	.0000	.0000	.0000
60	.1510	.1490	.1376	.1300	.1430	.1244
80	.1736	.1708	.1510	.1454	.1534	.1484
100	1.0000	.5000	.4000	.2840	.3330	.5000
Respondents who identified this factor as important	126 67.4%	119 63.6%	101 54%	95 50.8%	89 47.6%	83 44.4%

(n=187; factors ranked based on the % of respondents selecting)

The mean weights (with standard deviations in brackets) assigned to the top ten wellbeing factors by the residents of the Whitsunday Shire were:

$$S\ 0.427 (\pm 0.197),\ E\ 0.299 (\pm 0.170),\ N\ 0.273 (\pm 0.186)$$

where, S = society; E = economy; N = nature;

The most important contributors to wellbeing emerging at the regional level were the same as those observed for Cardwell Shire respondents. In the social domain:

[S (family relations 0.1258 (0.1319), health 0.1097 (0.0943), safety 0.0769 (0.0852), educational levels 0.0310 (0.0684), all other Society factors]

The following were selected in the economic domain:

[E (income 0.0847 (0.0851), health services 0.0695 (0.0856),

roads condition 0.0380 (0.0720), work 0.0357 (0.0698), all other Economy factors]

Water quality, air quality and the condition of the landscape and beaches emerged as the factors receiving highest weights in the natural environment domain:

[N (water quality 0.0738 (0.0761), air quality 0.0459 (0.0683), condition of the landscape/beaches 0.0330 (0.0684), all other Nature factors]

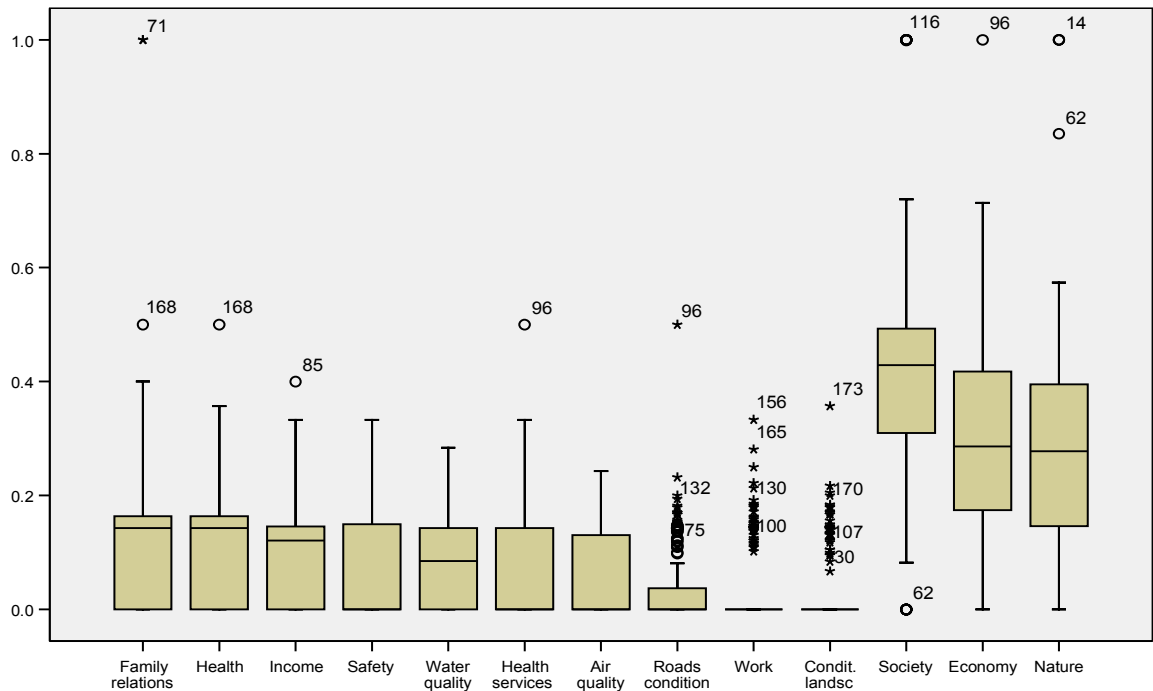


Figure presents median (line), interquartile range (length of the box), standard deviation, outliers (O), and extreme cases (*) of individual variables (n=187, factors ranked based on means)

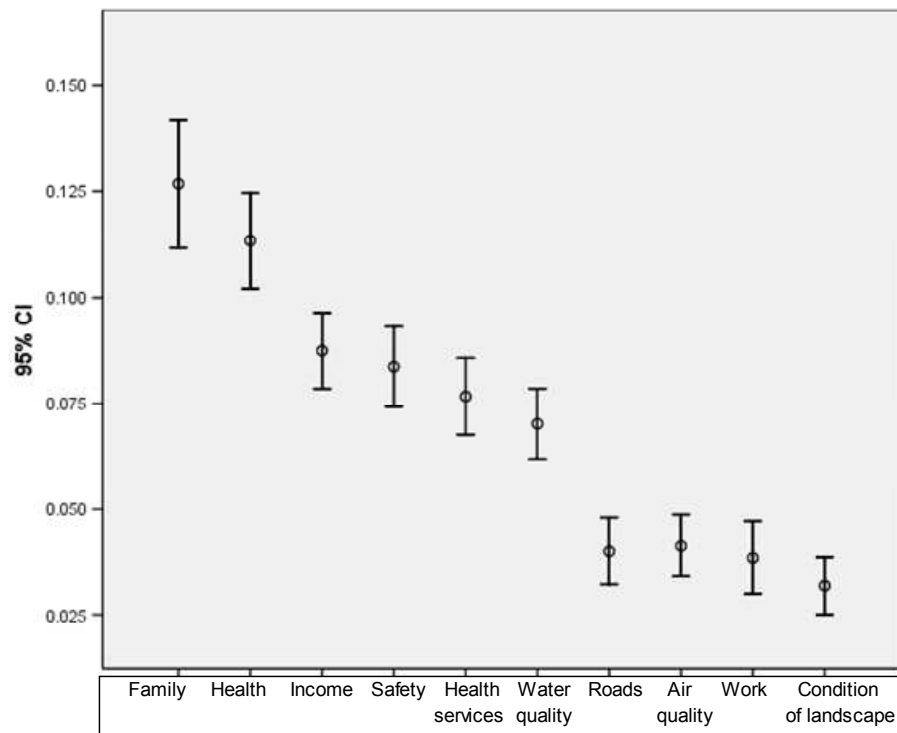
Figure 17. Ten wellbeing factors receiving the highest weights and sum of weights for the three domains, Whitsunday Shire

Overall, the weights assigned to factors in the social domain were higher than those assigned to the other two domains (Figure 17). In addition, only 4.8% of respondents did not include any contributors from the social domain. 11.2% of respondents omitted contributors from economy, while 15.5% of respondents did not include contributors from the natural environment domain. Therefore, 84.5% of all respondents included at least one factor from each domain in their sets of important wellbeing contributors.

4.2.2.3 Contributors to wellbeing across case studies

The ten wellbeing factors receiving the highest weights across both case studies are

presented in Figure 18. Family relations and health rank highest, receiving mean weights of 0.128 and 0.112 (out of a total score of 1), respectively. Income, safety, health services and water quality all received weights between 0.05 and 0.1 (Figure 18). The last set of contributors that can be observed in Figure 18 consists of roads condition, air quality, work and condition of the landscape and beaches, each factor receiving a mean weight of less than 0.05.



(n=348; mean with 95% confidence intervals)

Figure 18. Ten wellbeing factors receiving highest weights from the respondents, total survey sample

Interestingly, the top ten contributors selected by the majority of the respondents and receiving the highest weights were the same in both shires. However, two of the top ten contributors received different weights in the two shires: the mean weights assigned to air quality and health services were statistically different following non-parametric testing of the results (Table 17). Air quality recorded a higher mean weight in the Whitsundays (0.0459) than in the Cardwell Shire (0.0329); while health services were of higher importance in Cardwell (0.0877) than in the Whitsundays (0.0695). In addition, the factor of ‘sports, travel and entertainment’ was also perceived to be of higher importance in the Whitsundays than in the Cardwell Shire ($p < 0.01$).

Table 17. Ranking of the most important wellbeing contributors, by shire and overall

Factor	Cardwell Shire	Whitsunday Shire	Overall rank
Family relations	1	1	1
Health	2	2	2
Income	4	3	3
Safety	5	4	4
Health services*	3	6	5
Water quality	6	5	6
Road condition	8	8	7
Air quality*	10	7	8
Work	7	9	9
Condition of landscapes	9	10	10

* $p < 0.01$

Table 18. Interrelationships between ten most important factors, principle components analysis of the combined data set

Factor – Wellbeing Contributor	Environmental quality	Services	Financial security	Health and safety	Environmental condition
Family relations	-.326	-.403	-.539	-.153	-.474
Health	-.187	-.159	-.038	.675	-.134
Safety	.019	-.017	.112	.656	.117
Water quality	.847	.073	-.048	-.014	.068
Air quality	.807	-.126	-.071	-.070	-.129
Condition of the landscape	-.095	-.093	-.149	-.017	.863
Income	-.118	-.087	.803	.043	-.198
Health services	-.054	.789	.070	.050	-.267
Roads condition	-.012	.719	-.206	-.210	.197
Work	-.201	-.185	.507	-.553	.038

The combined data set was used to further explore the ten most important contributors to wellbeing, using principle components analysis (Varimax with Keizer normalisation, Eigenvalues >1). Results presented in Table 18 indicate that five factors were created as a result of the analysis. The first factor created, was dominated by high scores given to wellbeing factors related to environmental quality, water and air quality. The second grouping (Services) is dominated by high contributions from health services and road

conditions, while third factor is loaded by income and to certain extent by work (Financial security). Personal and family health and safety were the main contributors to the fourth factor. Interestingly, condition of landscape and beaches was separate and unrelated to other environmental factors or any other factors selected as ten most important contributors to wellbeing.

4.3 Determinants of wellbeing choices

This section presents results of testing respondents' attributes as potential determinants of wellbeing choices. Three types of tests were performed. Bivariate testing was done to explore the relationship of each variable (attribute of the respondent) with each of the top-ten ranking contributors to wellbeing. Correlations between the various demographic, economic and sense-of-place attributes of respondents were also explored. The results of those analyses are presented in the next sub-section. High correlations were found between several attributes and thus multivariate regression testing was used to explore relationships between the entire suite of potential determinants and the choice of the contributors. First, binary regression methods were used to explore what determines whether a person chooses a particular factor as a contributor to his/her wellbeing (Section 4.3.2). Then, multivariate regression analysis was used to explore the relationship between the attributes and the weights assigned to each contributor. Results of this analysis are presented in Section 4.3.3.

4.3.1 Exploratory tests

The first step in the analyses was to examine the association between each wellbeing factor and each potential determinant. A summary of the results of these statistical procedures (Mann – Witney and Kruskal-Wallis non-parametric tests) is presented in Table 19.

Table 19. Socioeconomic, demographic and sense of place determinants of selection and weighing of top-ten ranking wellbeing factors and the three wellbeing domains – non-parametric bivariate analysis

Analyses based on individual factors		
Factor	Determinants sign. at 1%	Determinants sign. at 5%
Family relations	-	Married (+)
Health	-	Born in Australia (+)
Income	People earning more than 150K (+)	Older people (-) Members of prof. associations (+) Owns asset: business (+)
Safety	Living in coastal location (-)	With dependent children (+) Owns asset: private residence (+) Owns asset: investment property (+)
Health services	With independent children (+) Older people (+) Owns asset: business (+) Owns asset: other investment (+)	Lived whole life in the area (+) Owns asset: farm/productive land (+) Owns asset: private residence (+)
Water quality	-	-
Work	With independent children (-) Older people (-) No income from employment (-)	No employment (-) Employed: livestock and forestry (-) Own assets: other investment (-)
Roads condition		Tertiary education (-) Lived < 5 years in the area (-) "Local" (+) Involved in community activities (+) Owns asset: farm/productive land (+)
Air quality		Involved in community activities (+)
Condition of landscapes	Living in coastal location (+) Has year 12 or less education (-)	Lived whole life in the area (-)
Analyses based on domains		
Domain	Determinants sign. at 1%	Determinants sign. at 5%
Society		Married (+)
Economy and services		Age 20-29 (-) Owns asset: farm/productive land (+) Owns asset: business(+)
Nature	Coastal location (+) No children (+)	Age 20-29 (+) Lived in area less than 5 years (+) Owns asset: farm/productive land (-) Owns asset: business (-)

A large number of variables were identified as significant determinants. For example, out of demographic variables, married people found family relations, and social factors in general, more important than others. Not surprisingly, respondents aged over 60, and those with children who already left home, found health services more and work less important. On the other hand, the youngest age group in the study, those between 20 and 29, gave more importance to the nature and less to economy; with those with no children also giving more importance to nature.

However, it could be argued that several of the characteristics of the person, emerging as determinants, might actually be symptoms of the same stage in the life cycle. If we take health services as an example (Table 19), it can be argued that people aged over 60 are more likely to have children who have already left home than younger people, and that they are also more likely to own various assets. In fact, respondents in this study aged over 60 were three times more likely to own (or have a mortgage on) their private residence than those aged 20-29.

Relationships among the 19 characteristics of the respondents collected in this study were therefore tested using Kendall's tau-b correlation coefficients. The results of the analysis, summarised in 0, indicate that correlations among variables tested are indeed many.

For example, marital status, age and presence of children in the family were highly correlated. In addition, these variables were correlated with the whole suit of variables indicating the ownership of assets: older, married people, with children who already left home, are significantly more likely to own homes, businesses, investment properties and other types of investment. In addition, owners of private property (home) were more likely to perceive themselves as locals and respected, and to be involved in community activities.

Table 20. Relationship among study variables, Kendall's tau-b correlation coefficients

	Non-coastal location	Female	Not married	Children	Age	Born o/ seas	Qualificat ions	Employment	Lives longer in area	Not a local
Cardwell	.112(*)	-.008	-.003	.078	.057	.011	.009	-.038	.170(**)	.003
Non-coastal location		-.039	-.031	.051	-.009	-.101	-.069	-.019	.361(**)	-.089
Females			-.085	.125(*)	-.066	.024	-.100	.136(**)	.045	-.048
Not married				-.220(**)	-.084	.020	.035	-.123(*)	-.070	-.011
Children					.650(**)	.102	-.195(**)	.281(**)	.211(**)	-.067
Age						.118(*)	-.232(**)	.372(**)	.214(**)	-.128(*)
Born overseas							.056	.006	-.118(*)	.029
Qualifications								-.131(*)	-.139(**)	.027
Employment									.042	-.053
Lives longer in area										-.296(**)
Not a local										

Relationship among study variables, continuation of the Table 20

	Not respected	Not involved w.comm	Not – prof. assocn	No assets: Land	No assets: Home	No assets: Business	No assets: Investment property	No assets: Other investment	Income Category
Cardwell	-.065	-.206(**)	-.037	-.250(**)	-.095	.018	.076	-.154	.040
Non-coastal location	-.067	-.046	.016	-.194(*)	-.027	-.036	.076	.140	-.031
Females	.003	-.077	.110(*)	.027	-.106	-.136	.021	.007	-.079
Not married	.108	.050	-.016	.316(**)	.300(**)	.350(**)	.356(**)	.356(**)	.072
Children	-.060	-.033	.128(*)	-.358(**)	-.397(**)	-.326(**)	-.372(**)	-.415(**)	-.009
Age	-.115(*)	-.050	.042	-.340(**)	-.400(**)	-.173	-.399(**)	-.459(**)	-.002
Born overseas	.045	.009	-.116(*)	.056	-.079	-.175	-.092	-.201(*)	-.068
Qualifications	-.092	-.148(**)	-.250(**)	.039	.041	-.107	-.214(*)	-.043	.027
Employment	-.041	.045	.150(**)	.106	-.047	.196(*)	-.035	-.027	-.003
Lives longer in area	-.193(**)	-.119(*)	.010	-.293(**)	-.067	-.054	-.262(**)	-.079	-.021
Not a local	.254(**)	.008	-.073	.141	.196(**)	.124	.116	.022	-.055
Not respected		.340(**)	.075	.303(**)	.266(**)	.135	.157	.180	-.004
Not involved with community			.161(**)	.138	.133(*)	-.010	.162	.127	.076
Not member professional assoc				.172	-.008	.219(*)	.203(*)	.157	-.047
No asset: Productive land					.500(**)	.589(**)	.587(**)	.545(**)	.141
No asset: Home						.529(**)	.608(**)	.677(**)	.013
No assets: Business							.516(**)	.629(**)	.222(*)
No assets: Invest. property								.576(**)	.108
No assets: Other investment									.070

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

4.3.2 Selection of contributors to wellbeing

As identified in the previous section, there are high levels of correlation between the characteristics of respondents. Therefore, it is possible that the results reported in that section (Table 19) are distorted by confounding, and thus have limited value. Consequently, the next step in the analysis was to investigate the entire set of characteristics of each person and explore whether they collectively determine selection of wellbeing contributors. The results are summarised in Table 21, with more details provided in 0.

Table 21. Determinants of contributors to wellbeing, top-ten ranking factors, binary stepwise (multivariate) regression analysis: summary of significant results from Table 22

Factor	Determinants sign. at 1%	Determinants sign. at 5%	Determinants sign. at 10%
Family relations	Married (+)	Employed: agriculture (+)	
		Unemployed (+)	-
Health	Born in Australia (+)	Owns: Home (+)	-
Income	-	Unemployed (-)	-
Safety	Children (+)	-	-
Health services	People over 65 (+)	Employed: government (+)	-
Water quality	-	-	-
Work	People over 65 (-)	Lived in area longer (+)	
		Members of professional associations (+)	-
Road condition	-	Owns : Home (+)	Employ: agriculture (+)
Air quality	-	No children (-)	
		Employ: agriculture (-)	-
		Involved in community activities (-)	
Condition of landscapes	-	Living in coastal location (+)	-

In light of high correlations between some of the variables, two models were constructed and are reported in 0. Table 21 reports the results of the second model only, the binary stepwise model, an analysis deemed more appropriate than a non-stepwise regressions, given the data correlations. Both models identified a number of significant determinants, however, their predictive capacity was rather weak (0).

Several statistically significant demographic characteristics of respondents emerged from the analysis, and some of them confirmed the findings of the bivariate analyses reported in Table 19. For example, married people were more likely to select family relations as important to their wellbeing, while those with children were more likely to select safety – and air quality as well. Older people were more likely to note the importance of health services, but less likely to select work as important to their personal wellbeing.

Sectors of employment also emerged as weak predictors of choice for several contributors. In addition, those not in employment were more likely to select family relations, but less likely to select income. The only economic characteristic of respondents that emerged as a determinant was ownership of a private residence. People owning (or purchasing) their home were more likely to select health and roads condition as important. Several sense of place parameters were also statically significant determinants, in line with findings of bivariate analyses reported in Table 19.

Details of the analyses are presented in 0, where each cell presents a coefficient B, followed by standard error in parenthesis. The Hoesmer-Lemeshow (H&L) test is reported in the table indicating the goodness-of-fit or appropriateness of the model. The insignificant χ^2 -values ($p > 0.05$) indicate that the model does not fit the data well. The overall evaluation of the model is presented as a range between the two likelihood ratio tests performed (R^2 test), Cox and Snell R Square test and the Nagelkerke R Square test. The ranges presented in the table indicate the percentage of variation of dependent variables likely explained by the test. For example, independent variables in the stepwise model for Family Relations explain between 9.1 and 12.5% of variation in decisions made by respondents in relation to Family. Only two of the stepwise models developed had predictive capacity over 10%. Work was more likely to be selected by people who lived in area longer, were members of professional associations and were less than 65 years of age. These three variables combined explained 22.3-31.7% of variation in selecting Work. Selection of health services was determined by age and government employment, with model explaining 14-18.7 of variation. Low ranges of the likelihood ratios recorded for all other wellbeing factors indicate that predictive capacity of the statistically significant determinants is rather weak.

Table 22. Socioeconomic, demographic and sense of place determinants of contributors to wellbeing, top-ten ranking wellbeing factors, results of binary regression analyses

Part A of the table: Family relations; Health, Income and Safety

Coefficient B (S.E.)	Family Relations		Health		Income		Safety	
	all variables	stepwise cond.	all variables	stepwise cond.	all variables	stepwise cond.	all variables	stepwise cond.
(Constant)	.627 (1.228)	-.385 (.287)	.279 (1.195)	-.704* (.409)	1.435 (1.242)	.622*** (.145)	-1.554 (1.171)	.215 (.155)
Cardwell	-.336 (.336)		.245 (.332)		.117 (.330)		.300 (.316)	
Coastal location	-.487 (.375)		-.182 (.379)		.607 (.388)		-.297 (.361)	
Male	-.173 (.341)		-.321 (.338)		.258 (.344)		.455 (.321)	
Married	.900** (.380)	.977*** (.322)	.195 (.376)		-.031 (.377)		-.248 (.368)	
No children	-.358 (.545)		-.433 (.529)		-.149 (.547)		-.477 (.525)	-.934*** (.320)
Dependent children	-.142 (.528)		-.192 (.514)		-.155 (.547)		.843* (.504)	
Age Group	.103-511 (.475-789)		-.269-538 (.752-649)		-.226-.715 (.587-758)		-.687-136 (.48-446)	
Australian	.334 (.448)		1.068** (.436)	.972*** (.370)	.186 (.442)		.344 (.420)	
Post-school training	-.014 (.382)		-.518 (.385)		-.352 (.382)		.469 (.357)	
Employment - industry or trade	-.054 (.444)		.001 (.454)		-.494 (.467)		-.867* (.447)	
Employment - tourism	.713 (.610)		.089 (.594)		-.669 (.584)		-.592 (.581)	
Employment - agriculture	1.219** (.588)	1.103** (.463)	.269 (.562)		-.648 (.565)		.136 (.531)	
Employment - government	.528 (.511)		.118 (.511)		-.444 (.516)		-.252 (.487)	
Employment - unemployed	1.710* (.911)	1.837** (.777)	.281 (.732)		-1.749** (.708)	-1.315** (.521)	-.798 (.695)	
Lived longer in the area	-.224-.319 (.470-669)		.091-.843 (.458-693)		-1.167-.15 (.683-462)		-.065-235 (.446-653)	
Not respected	-.002 (.385)		-.350 (.384)		.316 (.391)		.187 (.373)	
No community activities	-.013 (.365)		.427 (.361)		-.123 (.362)		-.053 (.349)	
Member of prof. association	-.471 (.391)		-.245 (.385)		.542 (.398)		-.138 (.379)	
Asset: Farm or business	-.018 (.390)		-.203 (.389)		.751* (.405)		-.133 (.379)	
Assets: Private residence	-.011 (.379)		.783** (.363)	.633** (.297)	-.042 (.365)		.187 (.344)	
Assets: Investment	.107 (.393)		-.015 (.400)		-.890** (.391)		.091 (.385)	
Income Category	-.296-.741 (.983-783)		-.248-.486 (.746-946)		-1.502-.16 (.942-792)		.784-2.218* (.873-918) ¹	
R ²	.148-.202	.091-.125	.118-.162	.050-.068	.143-.195	.030-.041	.137-.182	.039-.052
Chi ² (H&L test)	17.962 (.022)	1.118 (.773)	7.976 (.436)	.098 (.754)	10.580 (.227)	0	4.567 (.803)	0
N	224		226		227		226	

Part B of the table: Health services; Water quality and Work:

Coefficient B (S.E.)	Health Services		Water Quality		Work	
	all variables	stepwise cond.	all variables	stepwise cond.	all variables	stepwise cond.
(Constant)	2.300* (1.258)	1.041*** (.300)	.631 (1.139)		-2.342 (1.536)	-3.451*** (.791)
Cardwell	.254 (.340)		-.356 (.318)		.560 (.391)	
Coastal location	-.588 (.384)		-.159 (.356)		-.640 (.464)	
Male	-.236 (.349)		-.193 (.324)		.177 (.405)	
Married	-.458 (.378)		-.250 (.359)		.438 (.473)	
No children	-.252 (.540)		.142 (.525)		.678 (.672)	
Dependent children	-.142 (.520)		.161 (.525)		.249 (.628)	
Age Group	-1.161- 3.057*** (.488-902)	-.961- 3.131*** ⁽¹⁾ (.399-699)	-.202-.902 (.434-.638)		.2105- 3.539*** (.899-1.053)	2.213- 3.707*** ⁽²⁾ (.790-829)
Australian	-.368 (.458)		.045 (.423)		-.927* (.539)	
Post-school training	-.184 (.384)		-.411 (.352)		-.3037 (.458)	
Employment - industry or trade	-.065 (.477)		.697 (.438)		.605 (.558)	
Employment - tourism	.109 (.634)		-.204 (.581)		1.414** (.658)	
Employment - agriculture	-.022 (.565)		.192 (.518)		-.075 (.677)	
Employment - government	.688 (.542)	.865** (.408)	.097 (.487)		.968 (.605)	
Employment - unemployed	-.252 (.741)		.121 (.673)		.206 (1.276)	
Lived longer in the area	-.395-.882* (.483-480)		.316-656 (.642-.437)		-.170- 1.015** (.726-.550)	-1.057 ** (.465) ⁽³⁾
Not respected	.676* (.407)		.016 (.367)		.020 (.433)	
No community activities	-.384 (.368)		.189 (.345)		.136 (.421)	
Member of prof. association	.537 (.414)		-.023 (.378)		-.225 (.422)	.795** (.378)
Asset: Farm or business	-.307 (.395)		-.141 (.373)		-.034 (.435)	
Assets: Private residence	.570 (.377)		.290 (.343)		-.225 (.422)	
Assets: Investment	-.509 (.417)		.445 (.376)		-.352 (.478)	
Income Category	-.195-1.480 (.733-914)		-.554-2.136** (.873-.914)		-1.197-1.359 (.851-.1120)	
R ²	.243-.324	.140-.187	.110-.147	-	.274-.391	.222-.317
Chi ² (H&L test)	6.437 (.598)	.112 (.998)	10.421 (.237)	-	7.653 (.468)	7.518 (.482)
N	227		226		227	

(1) significantly more valued by eldest age category, over 65+

(2) significantly less valued by eldest age category, over 65+

(3) significantly more valued by people who lived in area more than 15 years

Part C of the table: Roads condition, Air quality and Condition of the landscape and beaches:

Coefficient B (S.E.)	Roads condition		Air Quality		Condition of the landscape/beaches	
	all variables	stepwise cond.	all variables	stepwise cond.	all variables	stepwise cond.
(Constant)	-4.242** (1.613)	-2.059*** (.371)	-3.554** (1.446)	-1.061*** (.222)	-5.027*** (1.536)	-1.509*** (.221)
Cardwell	.091 (.415)		.257 (.378)		.244 (.370)	
Coastal location	.002 (.457)		.030 (.416)		.812** (.410)	.798** (.317)
Male	.495 (.411)		-.490 (.390)		.228 (.376)	
Married	.362 (.486)		.230 (.432)		.054 (.409)	
No children	-.192 (.678)		-.429 (.390)	-.821** (.399)	.696 (.584)	
Dependent children	-.967 (.648)		.637 (.568)		.315 (.580)	
Age Group	.172--.724 (.811-1.348)		-.101- -1.807* (.864-.823)		-.431-.955 (.821-.754)	
Australian	.726 (.533)		.545 (.506)		.500 (.501)	
Post-school training	-.171 (.439)		.089 (.412)		.700 (.461)	
Employment - industry or trade	-.101 (.615)		.129 (.512)		.453 (.521)	
Employment - tourism	1.015 (.785)		.194 (.626)		-.163 (.726)	
Employment - agriculture	1.076* (.630)	.800* (.415)	-1.070 (.702)	-1.162 ** (.564)	.456 (.656)	
Employment - government	1.201* (.662)		.177 (.560)		-.660 (.569)	
Employment - unemployed	.459 (.854)		-1.257 (.784)		1.304* (.788)	
Lived longer in the area	.391-- 19.242* (.556-8546)		.490-1.115 (.537-.790)		.081-.447 (.546-.708)	
Not respected	1.110** (.483)		.327 (.428)		.257 (.432)	
No community activities	-.081 (.447)		.914** (.413)	.782** (.320)	-.246 (.409)	
Member of prof. association	.192 (.469)		.180 (.444)		.056 (.416)	
Asset: Farm or business	.461 (.465)		.258 (.453)		.658 (.447)	
Assets: Private residence	1.208** (.497)	.959** (.407)	.385 (.416)		-.058 (.416)	
Assets: Investment	-.375 (.495)		.306 (.444)		.172 (.443)	
Income Category	.136-.233 (.892-1.110)		.782-1.986* (.938-1.109)		1.399-2.219* (1.121-1.08)	
R ²	.161-.244	.046-.070	.156-.230	.060-.089	.109-.163	.028-.042
Chi ² (H&L test)	7.547 (.479)	3.102 (.212)	8.762 (.363)	1.568 (.667)	3.841 (.871)	0
N	210		227		226	

4.3.3 Weights assigned to wellbeing contributors

In this stage of the explorations, attributes of respondents were compared to the *level of importance* assigned by respondent to a contributor, in essence answering the following: Given that a respondent has selected a factor, are there socio-economic characteristics that will determine the weight assigned to the factor? A summary of the findings of the analyses is presented in Table 23, with more detailed results found in Table 24.

Out of the demographic attributes tested, gender emerged as a significant determinant of the weights assigned to income and work, with males assigning higher weights to both of those contributors than females (Table 23). The only economic characteristic of respondents that emerged as significant was ownership of private residence. The location of respondents' home in coastal or non coastal part of the Shire was also important, with respondents living in coastal areas assigning higher weights to air quality than those living inland.

Table 23. Determinants of weights assigned to wellbeing contributors, top-ten ranking wellbeing factors – Stepwise multivariate (regression) analysis: summary of significant results from Table 24

Factor	Determinants sign. at 1%	Determinants sign. at 5%
Family relations	-	Assets: Private residence (-)
Health	Employment - industry or trade (+)	-
Income	Male (+)	Assets: Private residence (-)
Safety	-	Employment – tourism (+); Assets: Investment (+)
Health services	-	Australian (-)
Water quality	-	Post-school training (+)
Work	Male (+)	Australian (-); Assets: Private residence (-)
Road condition	-	Post-school training (-)
Air quality	-	Coastal location (+)
Condition of landscapes	-	No children (+)

No determinants were significant at 10%

Details of the analyses are presented in 0 (coefficient B, followed by standard error in parenthesis). The overall evaluation of the model (likelihood ratio test) is presented as

an adjusted R^2 test. Similar to the results reported in the previous section, exploration of the likelihood ratios recorded in the analysis indicates weak predictive capacity of the statistically significant determinants (adjusted R^2). This means that the explanatory power of the statistically significant variables overall was rather low. Table 24 also reports recorded degrees of freedom and regression and residual numbers.

Table 24. Socioeconomic, demographic and sense of place determinants of weights assigned to wellbeing contributors, top-ten ranking wellbeing factors, regression analyses:

Part A of the table

Coefficient	Family Relations		Health		Income		Safety	
	all variables	stepwise cond.	all variables	stepwise cond.	all variables	stepwise cond.	all variables	stepwise cond.
(Constant)	-1.768 (-3.869)***	-1.424 (-12.786)***	-2.053 (-7.843)***	-1.707 (-49.169)***	-1.421 (-6.591)***	-1.696 (-27.132)***	-1.782 (-8.382)***	-1.777 (-60.367)***
Cardwell	-.059 (-.427)		-.060 (-.845)		-.026 (-.407)		-.041 (-.755)	
Coastal location	-.128 (-.864)		.010 (.123)		-.054 (-.791)		.053 (.870)	
Male	-.019 (-.134)		-.049 (-.659)		.160 (2.506)**	.155 (2.773)***	-.023 (-.413)	
Married	-.187 (-1.109)		-.008 (-.094)		-.130 (-1.745)*		-.144 (-2.311)**	
No children	.147 (.676)		.158 (1.311)		-.040 (-.412)		.171 (1.924)*	
Dependent children	.126 (.661)		.156 (1.524)		.050 (.557)		.143 (2.007)**	
Age Group	.013 (.177)		.030 (.721)		-.035 (-.980)		.012 (.386)	
Australian	.221 (1.117)		.030 (.292)		-.122 (-1.457)		.108 (1.351)	
Post-school training	-.107 (-.721)		-.061 (-.780)		-.021 (-.304)		-.080 (-1.269)	
Employment - industry or trade	.122 (.640)		.288 (2.997)***	.217 (3.147)***	-.094 (-1.148)		.054 (.729)	
Employment - tourism	.110 (.472)		.110 (.872)		-.157 (-1.420)		.238 (2.415)**	.217 (2.583)**
Employment - agriculture	-.029 (-.133)		.091 (.782)		-.231 (-2.343)**		-.065 (-.741)	
Employment - government	.026 (.119)		.091 (.819)		-.153 (-1.539)		.091 (1.081)	
Employment - unemployed	.084 (.313)		.174 (1.039)		-.220 (-1.251)		.144 (1.113)	
Lived longer in the area	.007 (.855)		.003 (.759)		.004 (1.026)		-.001 (-.339)	
Not respected	-.094 (-.565)		.021 (.253)		.083 (1.121)		-.053 (-.791)	
No community activities	.157 (1.069)		.107 (1.434)		.031 (.459)		-.018 (-.329)	
Member of prof. association	.167 (1.070)		-.013 (-.160)		.116 (1.627)		.024 (.401)	
Asset: Farm or business	-.174 (-1.137)		-.116 (-1.404)		-.046 (-.679)		.036 (.604)	
Assets: Private residence	-.239 (-1.534)	-.276 (-2.138)**	-.041 (-.443)		-.103 (-1.358)	-.158 (-2.427)**	-.021 (-.289)	
Assets: Investment	.056 (.377)		.064 (.804)		-.141 (-1.912)*		.181 (3.076)***	.096 (2.026)**
Income Category	.002 (1.161)		.002 (2.167)**		.002 (1.846)*		-.001 (-1.111)	
Adjusted R ²	-0.50	.027	.001	.065	.110	.081	.142	.083
F, degrees of freedom (regression, residual)	0.726 (22, 104)	4.572** (1, 127)	1.003 (22, 106)	9.903*** (1, 128)	1.700** (22, 103)	6.585*** (2, 124)	1.724** (22, 74)	5.426*** (2, 96)

Part B of the table:

Health services; Water quality and Work:

Coefficient	Health Services		Water Quality		Work	
	all variables entered	stepwise OLS	all variables entered	stepwise OLS	all variables entered	stepwise OLS
(Constant)	-0.988 (-2.362)**	-1.512 (-13.997)***	-1.830 (-8.724)***	-1.890 (-39.365)***	-1.380 (-2.373)**	-1.326 (-6.822)***
Cardwell	-.012 (-.099)		.053 (.795)		-.088 (-.509)	
Coastal location	.152 (1.033)		.017 (.221)		-.206 (-.757)	
Male	-.116 (-.928)		.034 (.549)		.330 (1.818)*	.331 (2.731)***
Married	-.022 (-.159)		.031 (.434)		-.063 (-.266)	
No children	-.073 (-.397)		.106 (1.144)		.122 (.471)	
Dependent children	-.087 (-.510)		.114 (1.241)		.027 (.101)	
Age Group	-.046 (-.642)		-.013 (-.421)		.086 (.770)	
Australian	-.200 (-1.329)	-.265 (-2.202)**	-.115 (-1.450)		-.483 (-1.947)*	-.436 (-2.581)**
Post-school training	-.125 (-1.005)		.115 (1.774)*	.123 (2.203)**	-.130 (-.531)	
Employment - industry or trade	.005 (.027)		-.026 (-.344)		.232 (.831)	
Employment - tourism	-.252 (-1.130)		-.039 (-.312)		.241 (.893)	
Employment - agriculture	-.072 (-.358)		-.003 (-.027)		.160 (.565)	
Employment - government	-.252 (-1.405)		-.008 (-.078)		.242 (.829)	
Employment - unemployed	.026 (.102)		.046 (.354)		.528 (1.049)	
Lived longer in the area	-.001 (-.141)		.001 (.334)		-.008 (-.762)	
Not respected	-.158 (-1.131)		.022 (.293)		-.152 (-.701)	
No community activities	-.123 (-.970)		-.002 (-.023)		.044 (.213)	
Member of prof. association	-.024 (-.173)		.007 (.095)		.079 (.401)	
Asset: Farm or business	.139 (1.043)		-.078 (-1.160)		-.154 (-.758)	
Assets: Private residence	-.058 (-.320)		-.007 (-.077)		-.274 (-1.248)	-.331 (-2.529)**
Assets: Investment	.075 (.569)		.004 (.062)		.169 (.734)	
Income Category	-.002 (-1.020)		-.001 (-.709)		.000 (-.038)	
Adjusted R ²	-.085	.038	-.086	.040	-.024	.199
F, degrees of freedom (regression, residual)	.655 (22,75)	4.850** (1,97)	.673 (22,69)	4.855** (1,91)	.941 (22,34)	5.630*** (3,53)

Part C of the table:

Roads; Air Quality and Condition of the landscape and beaches:

Coefficient	Roads		Air Quality		Condition of the landscapes	
	all variables entered	stepwise OLS	all variables entered	stepwise OLS	all variables entered	stepwise OLS
(Constant)	-0.639 (-1.102)	-1.625 (-16.691)***	-2.583 (-6.717)***	-1.918 (-39.557)***	-1.150 (-1.773)*	-1.850 (-34.252)***
Cardwell	.046 (.288)		.020 (.159)		.016 (.140)	
Coastal location	-.045 (-.261)		.305 (2.333)**	.180 (2.544)**	.123 (.805)	
Male	.014 (.090)		.002 (.016)		.008 (.054)	
Married	-.076 (-.382)		.126 (.944)		.031 (.195)	
No children	.090 (.414)		.282 (1.411)		.078 (.387)	.196 (2.121)**
Dependent children	-.374 (-1.978)*		.183 (1.043)		.160 (.973)	
Age Group	-.175 (-2.186)**		.052 (.732)		-.029 (-.462)	
Australian	-.029 (-.118)		-.159 (-.874)		-.374 (-1.742)*	
Post-school training	-.314 (-1.892)*	-.277 (-2.395)**	.001 (.008)		-.145 (-.687)	
Employment - industry or trade	-.035 (-.159)		.013 (.093)		.048 (.270)	
Employment - tourism	-.252 (-.926)		.127 (.703)		-.024 (-.103)	
Employment - agriculture	.081 (.272)		.225 (1.063)		.225 (.998)	
Employment - government	.073 (.245)		.043 (.268)		.127 (.520)	
Employment - unemployed	.228 (.649)		-.033 (-.125)		.078 (.267)	
Lived longer in the area	-.004 (-.369)		.011 (1.473)		-.004 (-.416)	
Not respected	-.080 (-.393)		-.049 (-.342)		-.150 (-.899)	
No community activities	.124 (.724)		.215 (1.592)		.248 (1.610)	
Member of prof. association	-.153 (-.878)		.127 (1.040)		-.067 (-.431)	
Asset: Farm or business	.095 (.444)		-.112 (-.841)		-.285 (-1.838)*	
Assets: Private residence	-.169 (-.630)		.075 (.368)		-.277 (-1.692)	
Assets: Investment	.212 (1.321)		-.009 (-.088)		.092 (.586)	
Income Category	-.001 (-.314)		-.001 (-.321)		.000 (-.086)	
Adjusted R ²	.006	.097	-.180	.102	-.079	.067
F, degrees of freedom (regression, residual)	1.013 (22,22)	5.738** (1,43)	.674 (22,25)	6.471** (1,47)	.840 (22,26)	4.497** (1,48)

4.4 Discussion

The research questions explored in this Chapter investigated which factors contribute to wellbeing of respondents in the two Shires under the study, and by how much. Factors perceived as being the most/least important to individual wellbeing were explored first. Similarities and differences were then explored within the region, and across regions. Potential determinants of the wellbeing choices made were also explored.

The same ten factors were identified as the most important contributors to wellbeing in both shires: Family relations, health, income, health services, safety, water quality, condition of the roads, air quality, work, and condition of the landscapes.

Some of those factors, such as family relations, health, income and safety, are very common, found in most models reported in the literature (see 0 and OECD, 1976; Mitchell, 2000; Cummins et al 2003; van Kamp et al, 2003). Cummins et al (2003) have also specified health services in their model, while most of the other models proposed, such as those developed by Mitchell (2000) or van Kamp et al (2003), include a general category “services” only.

Several factors from the natural environment domain were also in the top ten contributors in this study: water quality, air quality and condition of the landscapes and beaches. This is an interesting finding as most of existing academic models present the entire nature domain as a single factor, referred to as the “natural environment” (Veenhoven, 1996; van Kamp et al 2003), the “physical environment” (Mitchell, 2000), or the “state of environment” (Cummins et al, 2003), but do not break the domain down into more specific aspects. On the other hand, the New Zealand Ministry of Social Development Social Report (2008) includes two ecological measures under the “physical environment” domain: air quality and the quality of drinking water (see section 2.2).

This difference in accent assigned to the natural environment could potentially be explained by the fact that very few studies reported in the literature use frameworks that actually ask respondents to identify the contributors to their wellbeing, rather than using expert pre-determined lists. An interesting commonality of the results from the more participatory studies, is that factors selected tend to be more context specific than those that appear on expert lists. For example, the Millennium Ecosystem Assessment (MEA)

(2003) was used in a participatory manner in a study reported in South Africa (Bohensky et al, 2004). The wellbeing contributors selected as important included ability for self-determination and community sense of belonging. Participants of the study in Portugal's Sistelo region, also using MEA methodology, identified more than 40 factors of importance to them, including factors such as income, health, but also safe environment (defined as consisting of two sub-factors, water and air quality), capacity to work, and tranquillity (defined as "peace of mind") (Capistrano et al, 2005). The Human Scale Development framework (Max Neef et al, 1989, 1991) was used in the study conducted on the Gold Coast. In that study, high level of individualism, lack of equity, social isolation and high pace of life were identified as important negative contributors; while recognition and preservation of culture, participation in decision making and lifestyles were identified as important positive contributors to wellbeing (Cuthill, 2003). Another study reported from Australia, conducted with Indigenous populations in coastal Queensland, identified family and community; health and health services; country and culture; and housing and infrastructure, as the most important wellbeing contributors (Larson et al, 2006).

During the pilot stage of the project, stakeholders insisted on keeping "beauty of the landscape and beaches" and "condition of the landscape and beaches" as two separate independent wellbeing contributors. The factor "condition of the landscape and beaches" scored much higher than factor "beauty", being selected as one of the ten most important contributors to wellbeing. It is also interesting to note that the principle components analysis of the ten most important contributors to wellbeing, presented in Table 18, resulted in "condition of landscape and beaches" being defined as a separate factor, not related to other wellbeing contributors from the natural environment domain.

A total of 19 attributes of the respondents were recorded in this survey. These attributes were tested as potential determinants of (a) the choice of wellbeing contributors; and (b) the importance assigned to each contributor.

Several attributes were found to be statistically significant determinants of choice of wellbeing contributors (see Table 21). Interestingly, there was no statistically significant difference in selection of wellbeing contributors between the two case studies. However, people living in coastal locations in both shires were more likely to select condition of the landscape and beaches as important. Literature suggests that stronger attachments tend to develop with attractive landscapes (Kaltenborn, 1998), hence, it

would be expected that respondents who live in the attractive locations, in this case near the beaches, would assign more importance to those landscapes. Or, alternatively, it could be argued that people who value nature more in the first place, are the ones willing to accept premium real estate prices prevalent in the beach suburbs.

In most cases, attributes that determined the selection of a contributor were different to those determining the level of importance given to that contributor. For example, people living in coastal locations were more likely to select condition of the landscape and beaches as important to them. Having identified condition of the landscape and beaches as important, people with no children assigned it higher weights (see Table 23).

Very few recent studies that have explored the determinants of wellbeing contributors were found in the literature, as contemporary work mainly concentrates on determinants of the satisfaction scores (explored and discussed in the next Chapter). Some of the findings of this study are, however, supported by the literature. For example, male respondents in this study reported higher importance of both income and work than females. This is in line with the study conducted by Pacione (2003) in social housing suburbs in Glasgow, which specifically investigated gender differences and found that males were more concerned about unemployment, bad housing and poor educational opportunities.

Although multivariate regression models identified several attributes of the respondents as statistically significant determinants, the overall explanatory power of the models was very low. For example, the explanatory power for the model on importance of wellbeing contributors was highest for work, where statistically significant variables of gender, country of birth and ownership of the residence together explained 20% of variation in scores assigned to work. On the other hand, the explanatory power was lowest for family relations, where the only statistically significant determinant (ownership of the private residence) explained just 2% of the variation in scores assigned to that wellbeing contributor. “Family relations” is a very complex and personal concept and thus it is expected that a large number of variables impacts on such a concept, only few of which appear to be captured in this study.

4.5 Conclusions

Results concerned with the first set of research questions, exploring the self-reported

contributors to wellbeing and the potential determinants of wellbeing choices, were reported in this Chapter.

The same ten wellbeing factors were identified as the most important contributors to the wellbeing by respondents in the both case studies. These were: Family relations, health, income, health services, safety, water quality, condition of the roads, air quality, work, and condition of the landscapes. Thus, it can be concluded that the contributors to wellbeing are indeed shared not only by the individuals within each Shire, but also across the region. Nonetheless, some differences in the importance of factors selected were noted, with air quality receiving a higher ranking in Whitsunday Shire while health services were perceived as of more importance in Cardwell Shire.

The ten highest ranking contributors to wellbeing were collapsed into five contributing components: environmental quality, services, financial security, health and safety, and environmental condition. The five distinctly separate components appear to support the “sustainability” and the “triple bottom line” approaches, as these components can be interpreted as representing natural environment, financial environment (financial security) and social environment (issue related to social responsibility such as services and public safety). It is interesting to note that scoring for the factor “condition of the landscape and beaches” was not related to that of environmental quality factors such as air and water quality.

The choice of contributors to wellbeing appears to be determined by some of the characteristics of the person. However, in most cases, attributes that determined the selection of a contributor were different to those determining the level of importance given to that contributor. No statistically significant difference was recorded between the two case studies in either the selection or weighing of wellbeing contributors. The overall explanatory power of the models was very low. Given the complexity of the multivariate models, this low explanatory power is potentially at least partially due to the size of the study sample. Therefore, further investigations of the potential determinants of wellbeing choices are warranted.

Chapter 5 Wellbeing satisfaction

The most important contributors to individual and regional wellbeing, as selected by respondents, were described in the previous Chapter. This Chapter explores the next research question, that is:

What are the current levels of satisfaction with wellbeing contributors?

The following sub questions are addressed:

- How satisfied were residents of the region with the various wellbeing contributors at the time? Are the satisfaction levels shared within and across the regions?
- How similar are the satisfaction scores of residents in the regions to the national scores?
- Can satisfaction scores assigned to wellbeing factors by a person be explained by socioeconomic, demographic or sense of place characteristics of that person?

Data analysis methods are described first. Section 5.2 presents results of the analysis of satisfaction scores and the comparison to national survey. Potential determinants of satisfaction scores are then presented in Section 5.3. The Chapter closes with a discussion of results presented (Section 5.4) and conclusions.

5.1 Data analysis methods

5.1.1 Wellbeing satisfaction in the regions

Primary data on the respondent's satisfaction with wellbeing contributors were collected during the survey. For each factor selected as important, respondents were asked to assign their current levels of satisfaction with that factor, on a scale from 0 (least satisfied) to 100 (most satisfied).

To simplify the terminology used in the Thesis, the term “**satisfaction**” will be used to describe “current satisfaction with the wellbeing contributors”; while the term “**scores**” will denote “numerical level of current satisfaction”.

The Percentage of Scale Maximum method (Cummins, 2003) was used to process the data, which was then analysed by independent t-tests. The data sets from two case

studies were explored for similarities and differences of satisfaction scores.

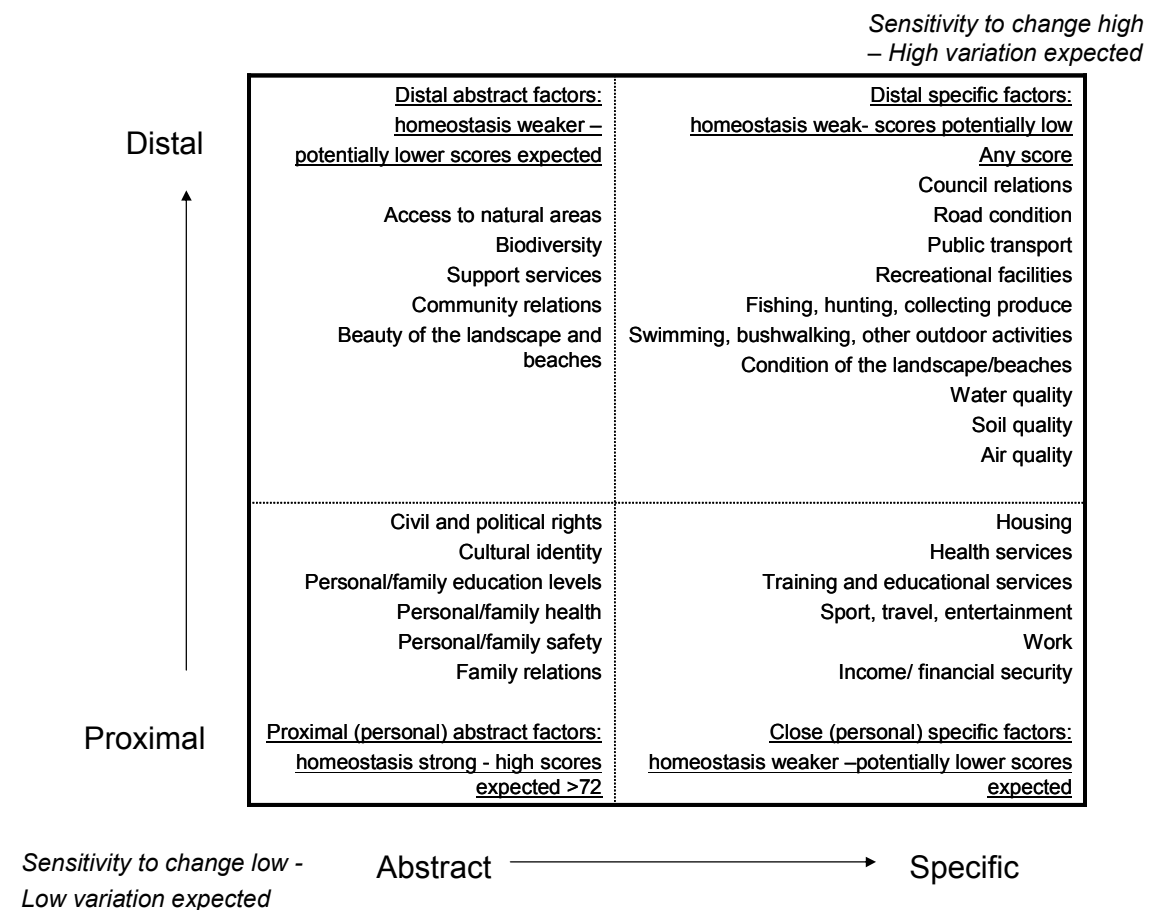
According to the “homeostasis theory” developed by Cummins and colleagues (see literature review Section 2.2.1; or Cummins and Nistico, 2002; Cummins et al, 2002; 2003) “normal” levels of satisfaction for Australian adults are in the range of 73 to 76%. Thus, they argue that policy and decision makers should not be concerned about wellbeing factors receiving satisfaction scores above 70%, but rather should investigate causes of lower scores, as low scores might indicate “objective” problems. Factors receiving satisfaction scores of below 70% are therefore presented in bold in the results table.

The phenomenon of “positive bias” was also explored. Cummins et al (2003) proposed that the scores assigned by people are influenced by two main drivers: (a) the abstract-specific dimension, where it is argued that more specific questions will generate greater variation in responses than more abstract questions; and (b) distance from self, or the proximal-distal dimension, where distant factors are expected to create greater fluctuation in responses than more personal issues (see literature review Section 2.2.1. and Figure 3 for further details). Therefore, Cummins and colleagues (2003) argue that abstract and proximal wellbeing contributors (such as personal relations) are likely to evidence little sensitivity to changing objective circumstances, while specific and distal factors, such as air quality or support services, would reflect well the variation in the object or experience being evaluated. This is a very interesting point for decision makers, as most policy interventions deal with distal and specific issues, and therefore changes in satisfaction with such issues should be readily identifiable in the satisfaction scores.

To explore this hypothesis, contributors examined in this Thesis were overlaid with the bi-dimensional model of subjective wellbeing as proposed by Cummins et al (2003), that is, a conceptual framework was developed to “predict” the locations and scores of wellbeing contributors (Figure 19). However, it has to be noted that Cummins et al’s (2003) framework for the “sensitivity to external forces of change” provides only examples but no specific guidance on how to determine the exact proximity or specificity of the contributors, that is, their “place” in the framework. This task would fall back on the subjective opinion of the “experts” who would need to agree on the appropriate quadrant for each contributor. Thus, such frameworks – including the one developed for this Thesis and presented in Figure 19 – are conceptual, rather than

empirical.

Proximal and abstract factors, for which a low variation in satisfaction scores is expected, are presented in the lower left quadrant of Figure 19. The predicted score for these factors is over 70%, that is, at a homeostatic level or above (Cummins et al, 2003). Greater variation in scores (and potentially lower satisfaction scores) is expected as factors “fan out” towards “specific” and “distal” dimensions. These factors are expected to record scores lower than the homeostasis level if “objective” conditions are unsatisfactory. The highest sensitivity to the condition of the external factors is expected to be recorded in the top right quadrant, hence, very low scores might be observed. This framework was tested using the satisfaction data collected in this study, and results are presented later in this Chapter.



Based on Cummins et al, 2003

Figure 19. Conceptual bi-dimensional model of subjective wellbeing sensitivity to external forces of change

5.1.2 Comparison to the national scores

In the next step, satisfaction scores recorded in this study were compared with the satisfaction scores from the national Australian Wellbeing Index. The survey of the Cardwell and Whitsunday shires was performed between July and December 2006. Thus, data from the national survey conducted in October 2006 were used for comparison (Cummins, 2006; n=2,003).

Table 25 presents the questions as they were phrased in the Australia-wide Personal Wellbeing Index and National Wellbeing Index, in comparison to the wording used in this study. Data were analysed for differences and similarities of average scores using an ANOVA test, the same methods used to report the findings of the national survey (Cummins, 2006). Given the differences in sizes of the two survey samples (2,003 and 372, respectively) and the difference in actual questions asked, these analyses were treated as purely exploratory in nature.

Table 25. Wording of the questions used in both the Australian Wellbeing Index and in this study

Australian Wellbeing Index	Cardwell and Whitsunday shires survey
<i>How satisfied are you ...?</i> (<i>Personal Wellbeing Index</i>)	<i>How satisfied are you with ...?</i>
- with your personal relationships?	- Family relations
- with your health?	- Personal / family health
- with how safe you feel?	- Personal / family safety
- with your standard of living?	- Income (as a proxy for standard of living)
- with feeling part of your community?	- Community relations
<i>How satisfied are you with life in Australia?</i> (<i>National Wellbeing Index</i>)	<i>How satisfied are you with ...?</i>
- the state of the natural environment in Australia?	- (average satisfaction score for all natural environment questions)
- Government in Australia?	- Civil and political rights (as proxy for national government)
	- Council relations (as proxy for local government)

5.1.3 Determinants of satisfaction scores

Satisfaction scores of respondents were tested against a suit of their attributes. The economic, demographic and sense-of-place attributes recorded for each respondent and the categories provided for each question were the same as those presented in the previous Chapter, in Table 14.

Multivariate regression analysis was used to explore potential determinants of respondents' satisfaction. In the questionnaire, respondents arrived at the satisfaction scores in two steps: first, they were asked to select their contributors to wellbeing; and then, to assign satisfaction scores to the selected wellbeing contributors only. This design meant that a version of a two-step multivariate regression model should be used for the analyses of the data. The first step of analysis was used to calculate unstandardised predicted values for each wellbeing contributor. This predicted value was based on whether the wellbeing factor was selected as important or not in the first place. This predicted value was then used as an additional independent variable in the second step of the analyses, where both a standard regression model and the step-wise model were constructed.

5.2 Wellbeing satisfaction

5.2.1 Satisfaction in the study regions

During the survey, respondents were asked to record satisfaction with each contributor to their personal wellbeing. Thus recorded satisfaction scores were aggregated to the shire level. Differences and similarities between the two shires, based on the results of the independent t-tests, are presented in Table 26.

It can be observed from the table that satisfaction scores are fairly consistent across the two shires. In both Cardwell and the Whitsunday Shire, the respondents were most satisfied with family relations, safety, health, education levels, cultural identity and work. Least satisfaction (less than 50%) was recorded with council relations, roads condition, public transport and recreational facilities. Several factors are experiencing satisfaction scores well below “homeostasis levels”, and thus “objective failure” of condition of those factors might be present in the regions.

In addition, a few factors appear to be influenced by local conditions. For example, levels of satisfaction associated with both housing and water quality are significantly

higher in Cardwell than in the Whitsunday Shire (Table 26).

Table 26. Levels of satisfaction with the wellbeing factors, for each shire individually and the combined levels for the entire survey sample

Wellbeing factors	Both shires	Cardwell Shire	Whitsunday Shire
Family relations	86.2	88.0	84.6
Safety	83.2	84.2	82.3
Health	79.2	79.2	79.3
Education levels	77.3	79.2	75.7
Work	76.1	75.8	76.4
Swimming, bushwalking and other outdoor activities	74.7	76.7	72.9
Cultural identity	74.3	73.3	75.0
Air quality	73.3	70.1	75.3
Income/ financial security	73.0	72.0	73.9
Beauty of the landscape/beach	71.9	70.8	72.9
Soil quality	69.8	69.2	70.3
Community relations	68.6	65.3	71.8
Support services	68.3	61.3	75.3
Water quality	64.2	73.2***	57.6***
Training and education services	62.7	50.8***	74.6***
Health services	61.7	56.5***	67.8***
Housing	61.6	77.4***	49.9***
Biodiversity	61.3	-	61.3
Condition of the landsc/beach	60.6	56.2	64.5
Sports, travel, entertainment	60.5	66.5	57.9
Access to natural areas	58.0	55.0	61.2
Fishing, hunting, collecting	57.0	55.0	58.4
Civil and political rights	56.3	53.7	58.3
Recreational facilities	50.2	50.7	49.9
Public transport	46.9	33.8	68.0
Roads condition	42.7	40.4	44.7
Council relations	35.8	45.7	28.8
Average satisfaction score for all respondents (sd)	70.03 (16.94)	70.68 (16.40)	69.45 (17.43)
Number of respondents	334	158	176

*** P<0.001; In bold = Factors receiving satisfaction scores of below 70%

Wellbeing factors listed based on first set of rankings, combined data set for both shires; satisfaction scores range is from 0 lowest to 100 highest;

Satisfaction with factor Biodiversity was not recorded by any respondents in Cardwell Shire

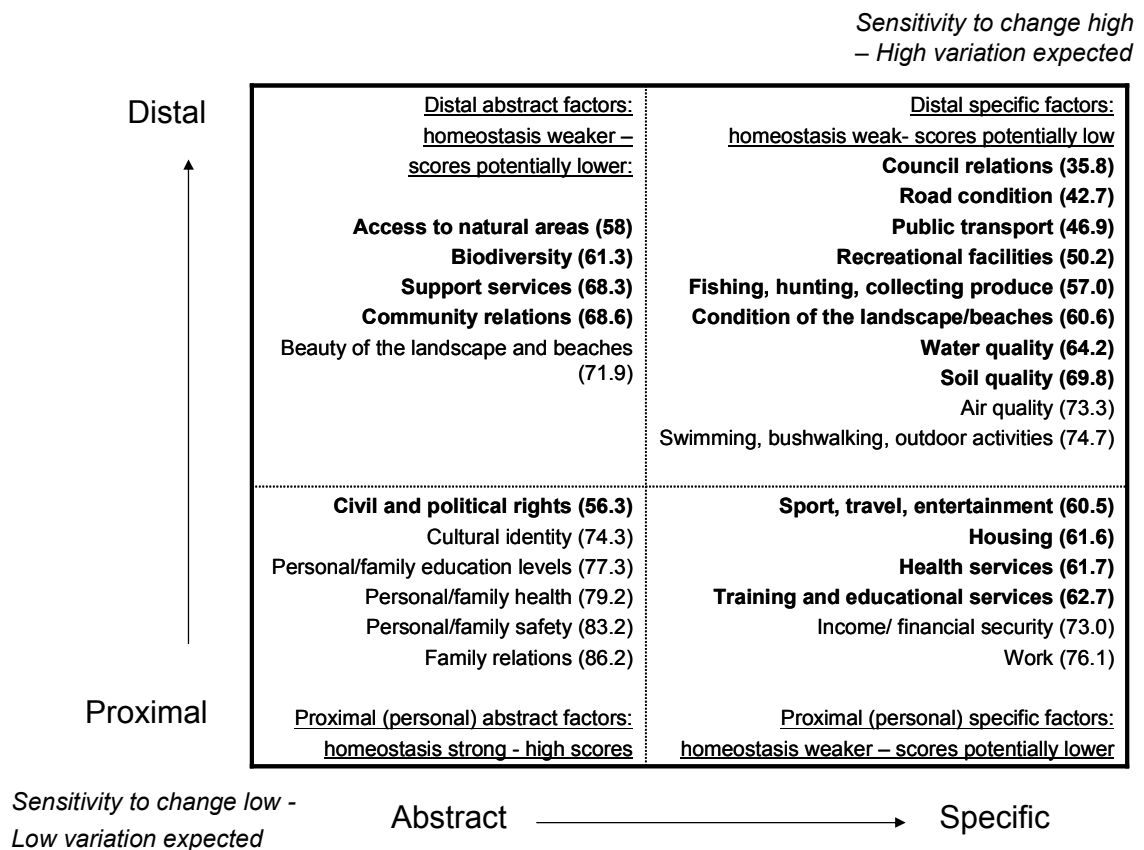
Housing received an average satisfaction score of 77.4% in Cardwell, while the score was significantly lower in the Whitsunday Shire, 49.9%. Water quality received scores of 73.2% and 57.6%, respectively. On the other hand, health services and training and educational services received significantly higher satisfaction scores in the Whitsundays

than in the Cardwell Shire. Public transport and support services also received very different rankings between the two shires, however, the results were not significant, potentially due to the low numbers of respondents selecting those factors.

The average satisfaction score for respondents in this study was 70%, lower than the “normal range of wellbeing for the nation” reported in Australian national wellbeing studies (reported as 74.5 in the national survey conducted at the time of this survey, Australian Unity, 2008, p10). This lower overall score is likely due to the methodological differences between the two studies. Respondents of this study have provided satisfaction scores for the wellbeing factors they feel are most important to them only. In the national studies, on the other hand, respondents need to provide responses about satisfaction with all of the factors on the list they are presented with, thus implicitly being asked to score their satisfaction with the factors they do not necessarily care about or have an opinion on. It is possible that such approaches are “masking” the true levels of wellbeing by diluting low satisfaction scores for important factors; with high satisfaction scores for un-important factors. This proposition indeed warrants further study.

The results of this study appear to support “positive cognitive bias” theory (Cummins et al, 2003): more personal factors such as family relations and safety have recorded high satisfaction scores, while distant factors such as council relations and roads condition have received low scores (Table 26). To explore this further, wellbeing satisfaction scores were overlaid with the bi-dimensional model of subjective wellbeing sensitivity to change (Figure 20).

As expected, the highest scores recorded in the study are for the contributors in the proximal-abstract quadrant. It is however unexpected that civil and political rights received satisfaction scores under 70. Positive cognitive bias theory proposes that proximal-abstract contributors to wellbeing are the most resilient, that is, our cognitive mechanisms resist change in satisfaction with those factors. It could therefore be argued that major “shocks” are needed to undermine the resilience of contributors in this quadrant, and that, therefore, any score under 70 might be worth further investigation. In their surveys of wellbeing in Switzerland, Frey and Stutzer (2002) found that perceptions of political freedom, and indeed perceptions of local autonomy, had a significant impact on levels of happiness. Very low satisfaction recorded in this study with civil and political rights suggests that further study is warranted.



In bold = Factors receiving satisfaction scores of below 70%

Figure 20. Bi-dimensional model of subjective wellbeing sensitivity to external forces of change, with observed satisfaction scores

As we move towards distal and specific factors, resilience to change weakens and satisfaction scores are expected to be better aligned with objective circumstances. Contributors in the distal-abstract quadrant recorded scores between 58 and 72 points, with those in the proximal-specific quadrant recording scores between 61 and 76. Given the weakening resilience to change, it would be expected that a lesser “shock” is needed to disturb the satisfaction scores in those two quadrants: Could it therefore be that a score of 60 in those quadrants is not as “bad” as a score of 60 in the proximal-abstract quadrant? This indeed would be very interesting information for decision makers.

As expected, the highest range of fluctuations in scores was recorded in the distal-specific quadrant: 35.8 to 74.7. The above argument persists: given that the cognitive “resilience” to change is lowest in this quadrant, could it be that a contributor receiving

lower scores here (i.e. 50) is actually in a better “objective condition”, is “less of a problem” than a contributor in a more resilient quadrant receiving a higher score?

In the current framework, placing of a contributor into a specific quadrant relies on a subjective expert opinion. Thus there appears to be a need for an objective measure that would allow quantification and thus provide clarification of relative importance of each contributor, without expert influence. In addition, it would be beneficial to have a method that would allow decision makers to quantify importance of recorded low satisfaction scores. Thus, information on the importance (weight) assigned to each contributor by respondents themselves could potentially be used to provide such quantification – and this proposal will be further explored in the next Chapter.

5.2.2 Comparison of regional and national satisfaction scores

Comparison of results recorded in this study with the national-level satisfaction scores for Australia is presented in this section. The average scores (mean with standard deviation) are presented in Table 27.

Table 27. Comparison of national (based on Australian Wellbeing Index) and regional (based on this study) levels of satisfaction

Factor	Australian Wellbeing Index ¹	Cardwell Shires survey	Whitsunday Shires survey
Family relations	77.95 (22.67)	88.0 (14.81) ***	84.6 (19.40) ***
Personal / family health	74.66 (19.17)	79.2 (19.56)	79.3 (18.84)
Personal / family safety	77.83 (17.97)	84.2 (15.70) ***	82.3 (20.58)
Income (standard of living)	77.94 (16.83)	72.0 (21.34) **	73.9 (22.12)
Community relations	69.58 (19.69)	65.3 (24.80)	71.8 (25.61)
Average score: personal wellbeing factors only	75.6	77.7	78.4
Natural environment	55.83 (20.33)	67.1 (22.80) ***	62.6 (24.58) **
Civil and political rights	52.61 (25.05)	53.7 (28.90)	58.3 (23.39)
Council relations	52.61 (25.05)	45.7 (32.07)	28.8 (25.24) **
Average score: all factors	67.4	69.4	67.7

¹ from Cummins et al, 2006;

averages with (standard deviation);

** P<0.05 and *** P<0.001, results significantly different to national level scores

Both Cardwell and the Whitsunday Shire recorded higher average scores for satisfaction with the personal wellbeing factors than the average recorded in the national level

study. This is in accordance with the findings of the initial national survey conducted in 2001, which explored the impact of respondents' location on their personal satisfaction scores. In that survey (Cummins et al, 2003), satisfaction scores were reported separately for three "accessibility groups": highly accessible areas, such as the main metropolitan areas; accessible areas, such as fringe metropolitan and major other cities; and moderate-low accessible areas, such as rural and remote Australia. Indeed, the overall satisfaction score with the personal index was the highest in most remote areas (77) and the lowest in high accessibility areas (73.9). In addition, eight out of ten "happiest" electoral divisions in Australia (Australian Unity, 2008) were located outside metropolitan areas, while unhappiest were low-end socioeconomic metropolitan suburbs.

Specifically, during the national survey, people in remote and rural areas assigned statistically higher scores to family relations and community relations (81 and 76, respectively, Cummins et al, 2003). High satisfaction with family relations, recorded in this study, is therefore in line with the national findings. However, satisfaction with community relations, although higher in Whitsunday, was lower than the national average in the Cardwell Shire (Table 27). This is an unexpected result, and it might indicate a failure of community relations in Cardwell.

Safety received statistically higher scores in this survey compared to the national data, and this finding will be further explored later in the text.

Levels of satisfaction with income appear to be lower for the respondents of this study than for the nation as a whole, however, the question asked for this factor was not identical in both studies and thus this suggestion needs to be taken with caution. Similarly, questions asked for the natural environment were not the same, and thus apparent higher satisfaction with the natural environment recorded in this study should also be taken with caution.

The satisfaction score for the "government in Australia" question from the national study and the satisfaction scores for the civil and political rights factor based on this study are very comparable. However, if satisfaction scores for council relations are compared to the national survey score for "government in Australia", the scores for council relations obtained in this study are much lower.

5.3 Determinants of satisfaction scores

A suite of respondents' attributes was tested as potential determinants of their satisfaction scores using multivariate regression analysis. A summary of the findings is presented in Table 28, with more detailed results presented in Table 29.

Several demographic attributes emerged as statistically significant determinants of satisfaction. For example, males were less satisfied with their family relations, and so were respondents with dependent children. The national survey conducted at about the same time as this study (Cummins, 2006) found similar patterns. Males were less satisfied with relationships than females. The gap in relationship satisfaction in national surveys was quite pronounced in the period of 2001-2004, but has become less pronounced in the October 2006 survey. Although living with a partner was generally advantageous to wellbeing, the addition of children diminished that advantage. Indeed, satisfaction with the family relationship in the national survey was significantly lower for people with children at home.

Data in this survey indicates that people with no children were more satisfied with their work. People with higher educational levels were more satisfied with their health status, while unemployed people were more satisfied with the provision of the health services. This is an interesting finding, as unemployment is generally associated with lower satisfaction scores across the entire range of contributors (Cummins, 2006).

A few economic factors also emerged as significant. People with higher incomes and those owning investments were more satisfied with their income levels, another finding supported by the national survey (Cummins, 2006). Respondents who own a farm or a business were less satisfied with water quality.

It also needs to be noted that predicted values for satisfaction with health and work (Table 29) were statistically significant. This means that determinants of satisfaction were influenced by persons' choice to include this factor as important to their wellbeing or not, and the sign of the coefficient indicates direction. For example, the more likely a person is to include health as a wellbeing factor, the less likely they are to be satisfied with it. On the other hand, for work, the more likely respondent was to include it, the more likely they were to be satisfied with their work. Further, as we know from Table 21 that respondents born in Australia and those owning a home were more likely to select health as an important contributor to their wellbeing, and hence will be more

likely to state their satisfaction with this factor. Similarly those living in the Shire longer and being members of professional organisations were more likely to select work as important – while people over 65 years of age were less likely to include work (Table 21).

Table 28. Socioeconomic, demographic and sense of place determinants of satisfaction – summary of key findings from stepwise regression results (Table 29)

Factor	Determinants sign. at 1%	Determinants sign. at 5%	Determinants sign. at 10%
Family relations	Male (-)	Dependent children (-)	-
Health	Member of professional association (-)	Post-school training (+)	-
Income	-	Investments (+) Income (+)	-
Safety		Not respected (-)	-
Health services	Unemployed (+)		-
Water quality	Cardwell Shire (+)	No community activities (+) Farm or business assets (-)	-
Work	No children (+)	-	-
Road condition	-	-	-
Air quality	Dependent children (+)	Coastal location (+)	-
Condition of landscapes	-	Cardwell Shire (-)	Coastal location (+)

Several of the sense of place variables also emerged as significant. These findings are difficult to compare to other satisfaction studies as such attributes are rarely recorded. For example, people living in coastal parts of either shire were more satisfied with the condition of the landscapes and beaches and air quality. People living in the Cardwell Shire were less satisfied with the condition of the landscapes and beaches; but were more satisfied with water quality than those residing in Whitsundays. Respondents not involved in community activities were also more satisfied with water quality. Further, respondents who perceived themselves as not respected were less satisfied with safety; while members of professional associations were less satisfied with their health.

Several statistically significant determinants were found in the analysis, however, their predicative powers were rather low (Table 29). Only two models explained more than 10% of the total variance in satisfaction scores: 15% of variation in air quality satisfaction scores could be explained by influence of coastal location and dependent children; while the presence of children in the family explained 13.6% of variation in satisfaction with work.

Table 29. Socioeconomic, demographic and sense of place determinants of satisfaction, results of regression analysis

Coefficient	Family Relations – all variables	Family Relations – stepwise	Health – all variables entered	Health – stepwise	Income – all variables entered	Income – stepwise	Safety – all variables entered	Safety – stepwise
(Constant)	2.094 (1.114)	3.471 (1.864)*	3.600 (1.060)	5.985 (2.877)***	-1.853 (-.489)	.970 (.598)	1.970 (.583)	1.340 (.655)
(Predicted value)	2.395 (.550)	1.285 (.629)	-5.014 (-1.239)	-4.408 (-2.015)**	4.343 (.910)	-.355 (-.185)	2.227 (.387)	2.056 (.908)
Cardwell	.604 (1.079)		-.047 (-.095)		-.463 (-.821)		.217 (.355)	
Coastal location	-.001 (-.002)		-.104 (-.180)		-.386 (-.732)		.080 (.115)	
Male	-1.381 (-2.523)**	-1.212 (-2.614)***	-.529 (-1.086)		-.118 (-.266)		-.568 (-.836)	
Married	.208 (.302)		.070 (.112)		.158 (.287)		.087 (.103)	
No children	.795 (.753)		.635 (.763)		-.208 (-.348)		.068 (.593)	
Dependent children	-.719 (-.945)	-1.125 (-2.267)**	.794 (1.170)		-1.181 (-1.704)*		-.393 (-.464)	
Age Group	.446 (1.324)		.450 (1.596)		.098 (1.089)		-.160 (-.393)-	
Australian	.524 (.587)		.771 (1.044)		.077 (.107)		.226 (.243)	
Post-school training	.553 (.743)		1.054 (2.004)**	.955 (2.114)**	-.257 (-.448)		.183 (.218)	
Employment – industry/ trade	.326 (.403)		.987 (1.561)		.051 (.073)		1.025 (1.255)	
Employment - tourism	.907 (.855)		1.064 (1.263)		.556 (.687)		1.016 (.840)	
Employment - agriculture	.967 (1.089)		1.028 (1.299)		-.660 (-.886)		.821 (.798)	
Employment - government	.560 (.607)		-.021 (-.026)		.333 (.479)		1.106 (1.112)	
Employment - unemployed	-.241 (-.227)		-.287 (-.254)		1.806 (1.389)		1.415 (1.114)	
Lived longer in the area	-.032 (-.983)		.004 (.145)		-.008 (-.305)		-.027 (-.752)	
Not respected	-.243 (-.356)		-.785 (-1.423)		-.330 (-.514)		-2.076 (-2.705)***	-1.179 (-2.041)**
No community activities	.007 (.012)		1.081 (2.263)**		.445 (.895)		1.107 (1.564)	
Member of prof. assocn	-.147 (-1.338)		-1.213 (-2.003)**	-1.342 (-2.656)***	-.777 (-1.420)		-.445 (-.496)	
Asset: Farm or business	-.303 (-.465)		.126 (.179)		-.308 (-.562)		.792 (.973)	
Assets: Private residence	.581 (.902)		-.221 (-.317)		-.267 (-.457)		-.433 (-.522)	
Assets: Investment	-.370 (-.543)		.661 (1.153)		.889 (1.617)	.985 (2.231)**	.665 (.995)	
Income Category	-.004 (-.420)		-.009 (-1.202)		.022 (3.085)***	.016 (2.495)**	-.017 (-1.422)	
Adjusted R ²	-.029	.054	.046	.032	.056	.094	-.020	.035
F, d. freedom (reg, residual)	.856 (21,114)	5.140** (1,133)	1.288 (21,110)	4.467** (1,129)	1.370 (21, 105)	4.979** (1,124)	.882 (21,82)	4.164** (1,102)

Part B of the table: Health services; Water quality and Work:

Coefficient	Health Services – all variables entered	Health Services – stepwise	Water Quality – all variables entered	Water Quality – stepwise	Work – all variables entered	Work – stepwise
(Constant)	5.484 (1.239)	1.663 (1.145)	-5.276 (-1.817)*	-.566 (-.331)	2.145 (.582)	-2.371 (-1.438)
(Predicted value)	-7.139 (-1.661)	-1.455 (-.837)	.197 (.067)	1.362 (.749)	2.509 (.636)	5.168 (2.586)**
Cardwell	-.237(- 2.137)**		1.593 (2.876)***	1.322 (2.746)***	-1.169 (-1.073)	
Coastal location	.095 (.182)		.860 (1.141)		.799 (.590)	
Male	-.362 (-.810)		-.359 (-.646)		.781 (.906)	
Married	-.126 (-.220)		1.010 (1.606)		-.619 (-.527)	
No children	-.504 (-.599)		2.924 (3.504)***		.432 (2.876)***	2.379 (2.876)***
Dependent children	-.322 (-.453)		1.886 (2.421)**		-1.263 (-.997)	
Age Group	.244 (.915)		.619 (2.068)**		.308 (.594)	
Australian	-.446 (-.631)		.524 (.701)		-.505 (-.417)	
Post-school training	.452 (1.005)		.422 (.791)		1.079 (.871)	
Employment - industry or trade	-.375 (-.567)		-.304 (-.477)		.467 (.312)	
Employment - tourism	-1.482 (-1.696)*		-.767 (-.644)		1.172 (.680)	
Employment - agriculture	.126 (.176)		1.239 (1.451)		.652 (.434)	
Employment - government	.513 (.818)		1.765 (1.967)*		-.807 (-.549)	
Employment - unemployed	1.926 (2.142)**	1.914 (2.737)***	.109 (.891)		1.312 (.452)	
Lived longer in the area	.013 (.470)		.019 (.570)		-.006 (-.102)	
Not respected	-.509 (-.938)		-.288 (-.458)		-1.683 (-1.459)	
No community activities	.803 (1.647)		1.190 (2.050)**	1.041 (2.171)**	-.052 (-.048)	
Member of prof. association	.004 (.006)		-.438 (-.716)		-1.705 (-1.591)	
Asset: Farm or business	.389 (.757)		-1.487 (-2.550)**	-1.139 (-2.176)**	-.801 (-.802)	
Assets: Private residence	.385 (.585)		.746 (.846)		-1.704 (-1.514)	
Assets: Investment	.604 (1.035)		.015 (.027)		1.818 (1.446)	
Income Category	-.013 (-1.487)		-.009 (-.905)		-.003 (-.164)	
Adjusted R ²	.006	.080	.163	.096	.102	.136
F, degrees of freedom (regression, residual)	1.073 (21,84)	5.626*** (2,104)	1.951** (21,80)	4.714** (1,98)	1.243 (21,29)	8.276*** (1,49)

Part C of the table: Roads; Air Quality and Condition of the landscape and beaches:

Coefficient	Roads – all variables entered	Roads – stepwise	Air Quality – all variables entered	Air Quality – stepwise	Condition of landscapes – all variables	Condition of landscapes – stepwise
(Constant)	2.421 (.525)	.569 (.409)	-14.425 (-2.120)**	-1.799 (-.599)	1.934 (.835)	-.571 (-.520)
(Predicted value)	-1.642 (-.320)	-1.154 (-.643)	9.884 (1.344)	2.653 (.746)	-7.081 (-1.359)	2.233 (1.585)
Cardwell	.305 (.333)		-1.194 (-1.256)		-.364 (-.523)	-.996 (-2.251)**
Coastal location	.763 (1.012)		.257 (1.786)*	1.807 (2.261)**	2.642 (2.359)**	.312 (1.955)*
Male	-.746 (-1.127)		-2.309 (-2.282)**		.992 (1.245)	
Married	-.805 (-.806)		-.076 (-.067)		-.927 (-1.338)	
No children	-.175 (-1.086)		3.296 (2.117)**		.011 (.074)	
Dependent children	.714 (.829)		3.229 (2.020)*	2.440 (2.833)***	.591 (.802)	
Age Group	-.053 (-.145)		1.290 (2.135)**		.368 (1.176)	
Australian	.796 (.746)		.167 (.116)		2.688 (2.127)**	
Post-school training	.509 (.502)		.150 (.168)		.001 (.001)	
Employment - industry or trade	.147 (.124)		2.750 (2.659)**		-.811 (-.914)	
Employment - tourism	-1.179 (-.938)		4.320 (2.694)**		-1.574 (-1.346)	
Employment - agriculture	-.386 (-.261)		5.093 (2.991)***		-1.284 (-1.035)	
Employment - government	.024 (.018)		3.282 (2.580)**		-.949 (-.965)	
Employment - unemployed	.632 (.448)		6.328 (2.274)**		-1.902 (-1.407)	
Lived longer in the area	.033 (.739)		.016 (.333)		.021 (.498)	
Not respected	-.866 (-.950)		.516 (.455)		.132 (.167)	
No community activities	.151 (.166)		2.691 (2.556)**		-.088 (-.110)	
Member of prof. association	-.415 (-.495)		1.453 (1.453)		-.324 (-.474)	
Asset: Farm or business	-.563 (-.605)		-2.076 (-1.848)*		.386 (.604)	
Assets: Private residence	-2.250 (-1.797)*		-1.548 (-.752)		.500 (.710)	
Assets: Investment	.370 (.423)		1.472 (1.631)		-.209 (-.308)	
Income Category	.000 (-.019)		.009 (.513)		-.005 (-.431)	
Adjusted R ²	-.230	-.012	.359	.150	.098	.078
F, degrees of freedom (regression, residual)	.587 (21,28)	.414 (1,49)	2.404** (21,30)	5.113** (1,49)	1.251 (21,28)	5.068** (1,48)

5.4 Discussion

This Chapter explored the second research question, focusing on satisfaction. Similarities of satisfaction scores to the national survey were also explored, as well as potential determinants of the scores.

At the time of the study, residents of both shires were most satisfied with the family relations, safety, health, education and work.

Work by Cummins and colleagues (Cummins et al, 2003; Cummins and Nistico, 2002) indicates that sensitivity of wellbeing contributors, that is variation in the satisfaction scores, will increase as contributors become more specific and more distant from the person. *Viceversa*, highest scores and least variation in scores are to be expected for matters that we find personal: our relations, our safety, our health. Indeed, the findings of this study support this hypothesis. But if the personal factors tend to receive higher satisfaction scores due to cognitive bias, then self-assessment of personal factors is not necessarily correlated with the “objective conditions” present. To explore this proposition further, subjective perception of safety was compared to the crime data in both Shires. Based on objective data, high satisfaction with safety (83.2 points out of 100, see Table 26) does not appear to be warranted.

As summarised in Chapter 3, two out of three crime parameters reported in Queensland: offence rates against person; and drugs, liquor and good order offences; are higher in both areas under study than in Queensland on average. And the differences are not negligible: rate of offences against person in the study areas is about 50% higher than the Queensland average, while rates of other offences are double the Queensland average rate in Whitsunday, and almost three times higher in the Cardwell Shire. These objective data therefore do not support the high levels of satisfaction with safety in the region, but do indeed support the positive cognitive bias theory. On the other hand, an explanation could potentially be found in the third crime data parameter reported in Queensland: crimes against property. The offence rate for this category was lower than the State average in both shires. Therefore, high satisfaction with safety might be driven by this category of safety statistics, that is, safety is perceived as satisfactory as long as the ratio of offences against property is low.

Satisfaction scores were significantly different between the two shires for water quality, training and education services, health services and housing. “Evidence” of objective

conditions that could cause such differences were investigated, based on Shire data presented in Chapter 3. For example, satisfaction with housing was statistically higher in Cardwell Shire (77.4) than in Whitsunday Shire (49.9). In terms of objective housing conditions in the Shires at the time of the surveys (as summarised in Chapter 3), median monthly mortgage repayment by family in Cardwell Shire was half of that in Whitsunday Shire. Furthermore, a large percentage (45%) of families in Cardwell Shire fully own their homes (with no mortgage repayments), while the equivalent in Whitsunday is 22%. In addition, the average house price in Tully, the largest township in Cardwell Shire, was half the average house price in Cannonvale, the largest town in the Whitsunday Shire. Thus, the difference in satisfaction with housing between the two shires appears warranted, and is supported by the objective data available.

However, some of the results, such as those for water quality, do not appear so straightforward. Water quality is indeed recognised as an important issue for natural resources management (NRM) and marine environment management throughout the Great Barrier Reef region. Three of the top-ten regional NRM issues identified in the Wet Tropics (Cardwell Shire) and the Mackay-Whitsunday NRM Region (Whitsunday Shire) are related to the deterioration in water quality (McDonald and Weston, 2004; MWNRMG, 2007; see also Chapter 3). So although high importance assigned by the respondents to water quality appears justified based on secondary data, there appears to be no objective reason for differences in satisfaction between the two shires. A follow-up enquiry conducted in the Whitsunday Shire indicated discoloration present in drinking water as the main water-quality concern (Larson and Stone-Jovicich, in press). Although this is indeed an objective indicator that affects satisfaction with water quality in the Whitsunday Shire, it is not an indicator that can be readily found in the secondary data, but rather was discovered using additional primary qualitative data collection.

Therefore, objective data can provide some insight in the likely perceptions of the local residents, but in some instances the perceptions might be a result of the conditions either not recorded in the secondary data or not readily available.

Comparison of the survey results to satisfaction levels recorded in national survey indicated that people in this survey were more satisfied with the family relations and safety. Indeed, several studies from Australia (Cummins, 2006, Australian Unity, 2008) suggest that residents of the rural areas are overall happier than those in the metropolitan areas. This is an interesting proposition worth follow-up in the future.

An interesting question arising from the exploratory comparison of this to the national survey is the very relevance of national concerns to regions. Out of 27 wellbeing factors included in the survey instrument based on consultation with local residents, only four were directly comparable with the wellbeing factors included in the national-level surveys: family relations, health, safety and community relations. And indeed, three of these factors were selected as the most important contributors to regional wellbeing (previous Chapter). However, the majority of the top-ten contributors, such as water quality or roads condition, are not recorded in the national surveys. Furthermore, several of the wellbeing factors receiving low satisfaction scores in this regional study (such as council relations, roads condition, public transport) are not included in the national surveys. So it appears that although some of the important contributors to wellbeing transcend to national level, the others do not. Region-specific concerns are unlikely to be included in the subjective wellbeing studies that are based on a pre-defined list of wellbeing factors devised by experts or based on international and national literature only. So how relevant are surveys that capture only some of the concerns of the people? Are we potentially recording contributors people are satisfied with (personal, abstract) but omitting the contributors that cause concerns (specific, distal ones)? If it is specific, distal concerns that can be addressed by policy, then the approaches such as one used here could, potentially, improve decision making and policy relevance for the regions.

Potential determinants of satisfaction scores were also examined in this Chapter. Several attributes of the people emerged as important determinants of the satisfaction scores they assigned to various contributors. Some of those determinants have also been identified in the national survey (Cummins et al, 2006). For example, the national survey found that satisfaction with family relations was reduced for people living with children and for sole parents. This study also found lower satisfaction with the family relations in people with children at home. Scores obtained for single people with dependent children were very low, but differences were not statistically significant in the multivariate analyses. The finding of the national study that marriage “buffers” the effects of low income and unemployment was also supported, as married people (with or without children) reported high satisfaction with income. The result was however not significant in the multivariate analyses, where people with higher income and owners of the assets emerged as the most satisfied with their income levels.

On the other hand, some determinants of satisfaction scores identified at the national

level did not emerge in this study. For example, findings that males are more satisfied with safety or that people who live alone are less satisfied with their health were not supported. In addition, the national study reported unemployed people as having lower than normal satisfaction levels for all domains tested; while results of this study indicate that unemployed people are more satisfied than others with health services.

It has to be noted, however, that several of the large-scale studies reporting on relations between attributes of respondents and satisfaction scores, including the Australian Wellbeing Index (Cummins et al, 2003) and the Hunter Valley Wellbeing Watch (Hunter Valley Research Foundation, 2008) are not based on multivariate regression analysis but rather on bivariate analyses of variance tests. As demonstrated in the previous Chapter, several of the characteristics of the respondents are highly correlated. The use of bivariate analyses to determine influences of a suite of correlated characteristics is methodologically questionable, although some of the overlaps in results reported between the two methods are interesting.

In this study, several attributes emerged as determinants of satisfaction levels, but they were of rather weak predictive power. Such low explanatory powers are in line with the international literature. For example, Tepperman and Curtis (1995) conducted multivariate analyses of satisfaction data in several studies from Mexico, USA and Canada and found a total of eight statistically significant attributes with a combined explanatory power of 15.8%. The lowest explanatory power in their studies was recorded for education, and the highest for age.

Interestingly, several ‘sense of place’ parameters were found in this study to be important in determining satisfaction levels. The role that ‘sense of place’ plays in perceptions of importance and satisfaction with wellbeing contributors at the regional levels appears to warrant further research. In the next section, sense of place determinants that might be regarded as proxies for culture-specific characteristics of the respondents, will be discussed in more detail.

5.4.1 Cultural considerations

Cultural considerations were explored in this Thesis in two different dimensions. “Cultural identity” was included as one of the proposed factors of wellbeing in order to gauge the contribution which a cultural identity makes to personal wellbeing and satisfaction.

In parallel, a number of sense of place variables were tested in this Thesis as potential determinants of both wellbeing choices as well as a satisfaction. Literature suggests that individuals develop and maintain a sense of place through an array of social and cultural mechanisms that ascribe meanings or values to them (Cheung et al 2003; Sampson & Goodrich 2009). Thus, four sense of place and demographic variables that might be considered as “proxies” for cultural factors were further explored: (a) people declaring themselves as Indigenous versus Non-Indigenous; (b) those born overseas versus those born in Australia; (c) age, as a proxy of “youth culture”; and (d) the length of time the person lived in Shire, as a proxy for “settler culture”.

In conclusion, “cultural identity” does not play an important role as a contributor to wellbeing. Out of 374 respondents, only ten selected cultural identity as an important contributor, five from Cardwell and 5 from Whitsunday Shire. Males (7 out of 10 respondents), married people (9 out of 10), those born in Australia (9 out of 10), employed in industry or services (6 out of 10), feeling local (8 out of 10) and respected (7 out of 10), and engaged in community activities (7 out of 10), were more likely to select this factor as important to them. In addition, scores assigned to this factor by those feeling “local” were significantly higher. However, only 7 respondents included their satisfaction scores for the factor “cultural identity”, and thus those scores were not further analysed. No person identifying him or herself as Indigenous included cultural identity as one of the most important factors contributing to their wellbeing.

In a second dimension of testing for cultural considerations, several sense of place and demographic characteristics of the respondents were tested in order to explore if cultural factors played a role as determinants of wellbeing choices and satisfaction. In summary, place of birth, and to some extent age and length of time in the region, played a role as determinants of wellbeing choices. Analysis was not conducted on Indigenous status of the respondent as more than half of the respondent chose not to answer this question. For example, in Cardwell Shire, where Census data indicates that Indigenous people comprise 6% of total population, only 96 of the 167 respondents answered this question, with only 3 respondents (3.5%) declaring themselves as Indigenous. An attempt was made during face to face interviews to amend this gap, however, respondents specifically targeted for their Indigeneity either chose to not declare themselves or declared themselves as “non-Indigenous”.

Almost 86% of respondents were born in Australia, and place of birth was found to play

a role in determining wellbeing choices. Those born in Australia were more likely to select health as important to them (as per Table 21), but assigned less weight to the importance of health services and work (Table 23). There was however no difference in levels of satisfaction between those born overseas and those born in Australia (Table 28).

Age also played a role as a determinant of wellbeing choices, with people over 65 years of age reporting work as less and health as more important to their wellbeing than other age groups. Age played no role as a determinant of weights assigned nor of satisfaction scores.

Similarly, those living in the area for longer were more likely to select work as important to them, but length of time in the region had no impact on weights assigned to wellbeing factors nor on satisfaction scores.

5.5 Conclusions

The satisfaction of respondents with the various wellbeing contributors was explored in this Chapter. The highest levels of satisfaction were reported with family relations, safety, health, educational levels and work.

Satisfaction with family relations, safety and health was, on average, higher than national averages. This is a very interesting finding, in line with the findings of the national survey, which suggests that people in rural areas might be more satisfied with their quality of life overall. Given the lack of studies specifically investigating quality of life of people living in rural regions of developed countries, this potential difference in wellbeing satisfaction between rural and urban populations warrants further research.

Levels of satisfaction with several contributors from this study were difficult to compare to national level study as the questions asked, and thus factors explored, were not the same. This is due to the methodological difference between the studies: in this study, contributors to wellbeing were self-selected by respondents from a list of the proposed factors; the list was derived from literature but also from consultations with local stakeholders and residents. In national studies, the list is pre-determined by experts, and respondents are asked to provide answers to all factors on the list, not only the ones they deemed important. Essential differences emerging from the comparison of two sets of questions (self-selected importance versus “blanket” pre-determined

importance) rise interesting questions about very usefulness of pre-determined expert lists for policy making. Furthermore, expert lists record mainly “personal” aspects, which correspond poorly with “objective conditions”. The respondents selected more of the distant and specific factors, such as roads condition or council relations, and since these are the factors that can be influenced by decision makers, the methodological approach used in this study may prove to be more relevant if wellbeing is to be used in decision-support.

Several characteristics of the respondents emerged as statistically significant determinants of their satisfaction scores. However, the overall explanatory powers of the determinants were low.

Chapter 6 Combining importance with dis-satisfaction

Self-reported satisfaction scores were presented in the previous Chapter. Such scores provide insights into the current levels of participants' satisfaction with various factors of wellbeing, and can thus provide valuable information for policy makers. However, levels of satisfaction with wellbeing factors do not provide any insight on how important each of these factors are to respondents in the region overall. This Chapter thus examines the relationship between satisfaction scores and importance levels, exploring the last research question of this Thesis:

Can a better understanding of importance and satisfaction with 'wellbeing contributors' assist policy and decision making processes?

That is,

- Can we integrate satisfaction and importance into one metric?
- Can this metric help identify wellbeing factors that might warrant attention from decision and policy makers in the region under investigation – i.e. can it help identify regional priorities or an “action list”?

For ease of argument later in the Chapter, satisfaction scores presented in Chapter 5 were inverted and are referred in this Chapter as “dis-satisfaction” scores.

Data analysis methods are presented first. Sections 6.2 and 6.3 present results of exploration of relationships between dis-satisfaction and importance at the individual and regional level, respectively. Section 6.4 then proposes a metric that quantifies the combined satisfaction and importance - “Index of Dis-Satisfaction” (IDS). The Chapter closes with a discussion exploring the suitability of the proposed Index as a tool to assist in the identification of regional priorities. “Action lists” based on data from both shires are presented to illustrate.

6.1 Data analysis methods

6.1.1 Lessons from the literature

The economic literature examining human wellbeing recommends that recording both the importance of wellbeing contributors (weights) and the satisfaction levels (scores) is essential for gaining a better understanding of both personal utility and aggregated

social welfare (Sen 1999; Max-Neef, 1991, Costanza et al, 2007). However, recent literature from the field of psychology critiques this approach and suggests that the recording of satisfaction scores only provides sufficient information about human wellbeing. The points of this critique, and potential ways of overcoming some of the problems identified in the literature, are presented in this section.

In the psychological and mental health literature, studies conducted prior to the late 1990s contained questions about both satisfaction and importance (for example, Andrews and Withey, 1976; Campbell et al, 1976; Ferrans and Powers, 1985; Becker et al, 1993; Frisch, 1993; Oliver et al, 1995). This was done in recognition of the fact that satisfaction scores only produce an inaccurate representation of the quality of life, as people differ with regard to which dimensions are dominant in importance to them (Ferrans and Powers 1985). Oliver et al (1995) argued that “*each person will have a unique combination of weightings for the set of life domains which produce their global subjective quality of life*” (p2). Consequently, the relationship between perceived satisfaction and importance was typically examined using three steps (Evans, 1991): Step 1 involved investigation of Satisfaction (S), Step 2 of Importance (I), and Step 3 of the composite (S x I).

However, several critiques of this approach were published post 1990s, calling into question both the validity and the desirability of such an approach. Three key arguments for measuring the satisfaction scores only were put forward by opponents:

- Empirical problems;
- Conceptual problems; and
- (Psycho) Metric problems.

Each of these critiques is further discussed in sections below.

6.1.1.1 Empirical issues

A critique based on empirical considerations goes back to the results of what are, arguably, the two most influential studies in social and psychological quality of life literature: Andrews and Withey (1976); and Campbell et al (1976). Both studies found that data about the importance people assigned to particular concerns did not increase the accuracy with which feelings about life-as-a-whole could be predicted. Cummins (2002) reported similar results, with no residual variance contributed by the

multiplicative composite: although the composite (S x I) did not adversely affect the outcome of the analysis, it failed to explain any additional variance beyond that explained by Satisfaction and Importance, separately. High correlations have also been reported by Wu (2008), Trauer and Mackinnon (2001) and Staples and Higgins (1998). Thus, Trauer and Mackinnon (2001) argue that for a sake of parsimony, both measures should not be used.

The critiques discussed above deal with correlations of satisfaction and importance within an individual response. However one cannot assume that what is relevant at the individual level will also be relevant at the regional level. This leaves a significant gap in the literature for further investigations.

Furthermore, there are studies which have not reported a high correlation between importance and satisfaction. For example, a study by Juniper et al (1996) recommended the introduction of individualised factors, as the use of “importance” aided in the identification of key health issues for individuals. It could therefore be argued that in studies that seek to identify potential problem areas, such as the one proposed in this Thesis, potential benefits in terms of additional information gained if both measures are included should be considered.

6.1.1.2 Conceptual issues

The conceptual problem argued by Trauer and Mackinnon (2001) is that wellbeing factors typically included in studies are usually determined on the basis of previous surveys, previously published lists of values, consultations with peers or on the basis of the attention they are receiving from national press or social and political bodies. Thus, Trauer and Mackinnon (2001) argue, “*they may be regarded as already having importance built in to them*” (p580). This is indeed a valid proposition, but just how much importance and to how many people, and how is it related to other current issues of importance, is typically what policy makers are interested in understanding better. Thus, from the policy making point of view, the key is not whether a wellbeing factor is important or not; but how important it is relative to other important factors (Feldman, 1980).

Further, Trauer and Mackinnon (2001) argue that, at the personal level:

“a respondent who indicates satisfaction or dissatisfaction with a domain is highly likely to be simultaneously indicating that it has some importance to him

or her. This would be especially the case if the expression of (dis)satisfaction is extreme” (p580).

This argument does not really clarify why learning about importance is not important, rather, it only indicates that sufficient measure of importance is whether the factor was included (scored) by the respondent or not. Following on Feldman’s argument above, however, one would still need to determine just *how* important the factors are.

A second conceptual issue raised by Trauer and Mackinnon (2001) relates to concerns over the interpretation of multiplicative composite values. They note that similar composite values can occur for different reasons, by combining either a high satisfaction rating with a low importance rating; or a low satisfaction rating with a high importance rating. They argue that such different situations cannot represent “*the same ‘true’ level of the quality of life*” (p580). Mainstream economic thought dealing with the issue of quality of life or utility has however long rejected the notion that “true levels” of utility can or should be measured. Indeed, the idea is to measure the changes in levels of utility, or changes in satisfaction with various individual contributors; not to determine the actual level of utility (quality of life). Nonetheless, the above point still holds. Costanza and colleagues (2007) agree that recording and tracking how much importance contributes to the overall score as opposed to satisfaction is important. This Thesis therefore does report on satisfaction and importance individually, as well as on both measures combined.

6.1.1.3 Psychometric issues

The third major critique of combining satisfaction and importance scores discussed in the psychological and mental health literature is methodological or rather psychometric in nature. The critique argues that Likert scales are typically used in satisfaction surveys, and two main methodological issues related to this use of scales are questioned.

One problem with using Likert scales is that such scales typically do not have a natural zero point, and thus do not have ratio properties (Stevens, 1957; Trauer and Mackinnon, 2001). However, this issue could be easily mitigated in the survey development stage by including a ‘Not important at all’ point to the scale or, as was done in this survey, by specifically asking respondents not to provide satisfaction responses to factors they do not consider important.

The other issue with the Likert scales is that there is no evidence that ranges between

two given scale points are the same, that is, that the difference between for example satisfaction 6 and satisfaction 7 is equal to the difference between satisfaction 1 and satisfaction 2. This assumption is almost certainly false, Cummins (2002) argues, as psychometric distance between choice points varies along the length of scales (McHorney et al, 1994). In this study, actual weights and not scale ranking were used, and thus equal difference was not assumed in the survey design. Indeed, results reported in Chapter 4 of this Thesis (Figure 19), obtained using weights and not scale, support the above argument: distances between the top-ten ranking factors were not equal. Rather, three clusters of factors could be observed: two top-ranking factors, family relations and health, were close together; followed by a gap in score to the next cluster consisting of four factors; followed by another gap to the last four factors, closely spaced.

Furthermore, an additional assumption is that the same value at two scales (satisfaction and importance) is equivalent, for example, that a score of 5 on a 7-point scale of importance has the same relative value as a score of 5 on a scale of satisfaction. This has not been demonstrated, argues Cummins (2002). He further points out that Likert scale data are quasi-interval, not ratio, and the procedure of multiplying two quasi-interval scales is conceptually flawed (Cummins, 2002).

The issue of scale ranges is indeed an important critique, leading to the conclusion that multiplying satisfaction and importance based on scaled responses might not be methodologically correct. Consequently Likert scales were not used in this Thesis. Instead, respondents were asked to assign points between 1 and 100 to each factor identified as important (with factors not important to them thus receiving a weight of 0) and points between 0 and 100 for satisfaction scores. Furthermore, respondents were instructed that more than one factor could receive an equal number of points, thus allowing for the possibility that two or more factors were of equal importance (or gave equal satisfaction) to that person, an option not available to respondents in ranking systems.

6.1.1.4 In summary

This study has attempted to mitigate empirical, conceptual and psychometric problems identified in the literature. The argument that combining satisfaction (S) and importance (I) does not provide better insight than recording S only was explored by comparing

satisfaction scores only to scores obtained using a combination of S and I. In addition, the method proposed in this Thesis reports on both S and I, as well as combined scores, thus circumventing a concern that reporting of one composite score does not allow us to understand underlying contributions. Indeed, even when underlying contributions of S and I are stated, the need to better understand the causes for reported weights and scores remains. The metric is proposed as only a first step in the investigation and identification of regional priorities or “action items”. It is recommended that all top ranking action items identified should indeed be further explored using qualitative data collection methods.

6.1.2 Combining dis-satisfaction and importance on individual level

Dis-satisfaction scores and importance weights were first combined at the individual level. First of all, satisfaction score (S) that each respondent, i , gave to each factor, k (yielding S_{ik}) were inverted into a dis-satisfaction score (DS_{ik}) as follows:

$$DS_{ik} = 100 - S_{ik} \quad (5)$$

The aim of this analysis was twofold. First, correlation between dis-satisfaction and importance was explored and reported, as some of the literature reports high correlation scores. In addition, the data were tested for potential insights that might be gained if dis-satisfaction and importance data are combined, rather than by using dis-satisfaction only.

6.1.3 Combining dis-satisfaction and importance at a regional level: Development of Index of Dis-Satisfaction (IDS)

In this analysis, the correlation between dis-satisfaction and importance was explored and reported at the regional level. Levels of importance and dis-satisfaction scores for the wellbeing factors were first transformed using natural log function, and the relationships between the two variables (proportional importance and dis-satisfaction) were plotted for visual observations. Logged scores were used as they better described the data.

Visual observation of data indicated that further investigations of links between dis-satisfaction and importance might be warranted. Thus, the weights, W , which each respondent, i , assigned to each factor, k , were combined with the dis-satisfaction score (DS_{ik}). Combination of individual weights attributed to factors and individual dis-

satisfaction with that factor was therefore used to construct a weighted regional Index of Dis-Satisfaction (IDS) for each factor k :

$$IDS_k = \frac{1}{N} \sum_{i=1}^N W_{ik} \cdot DS_{ik} \quad (6)$$

Where N is the number of respondents per shire, be it Cardwell or Whitsunday.

The following variables are thus taken into account in creation of the IDS: the average weight assigned to the factor by all respondents; the percentage of respondents selecting the factor; and the average dis-satisfaction score assigned to the factor. Table 30 highlights the characteristics of the IDS:

- 1) factors with high importance and high dis-satisfaction (*i.e.* low satisfaction) score highly in the index;
- 2) factors with high importance and low dis-satisfaction or low importance and high dis-satisfaction score modestly;
- 3) factors with both low importance and low dis-satisfaction only contribute marginally.

Table 30. Characteristics of the Index of Dis-satisfaction

	Dis-satisfaction	High	Low
Importance			
High		++	+
Low		+	0

The “homeostasis theory” presented in the literature review (Section 2.2.1; see Cummins and Nistico, 2002; Cummins et al, 2002; Cummins, 2003) might be of interest if IDS is to be used as a tool for informing policy and decision makers. The proponents of homeostasis theory argue that policy and decision makers should not be concerned with wellbeing factors receiving satisfaction scores above 70%, but rather should investigate causes of lower scores. Therefore, IDS proposes to exclude wellbeing factors receiving high satisfaction (low dis-satisfaction) scores. Thus created regional “action lists” would concentrate on factors that have lower scores, and thus higher potential to improve quality of life of the residents, if restored.

6.2 Dis-satisfaction and importance at individual level

Three individual responses are presented as examples in this Section, in order to explore the relationship between importance and dis-satisfaction at the individual level (Table 31).

Table 31. Comparison of importance and dis-satisfaction with wellbeing factors selected by respondents, individual examples

Example A:

Wellbeing factor selected	Importance	Dis-satisfaction
Council relations	0.096	60
Health	0.120	40
Condition of the landscape / beaches	0.181	25
Support services	0.120	25
Family relations	0.120	10
Safety	0.241	10
Sports, travel, entertainment	0.120	10
Pearson's correlation (sign.)		-.485 (.270)

Example B:

Wellbeing factor selected	Importance	Dis-satisfaction
Health services	0.865	90
Health	0.029	40
Condition of the landscape/ beaches	0.015	40
Family relations	0.001	30
Work	0.087	0
Pearson's correlation (sign.)		.821 (.088)

Example C:

Wellbeing factor selected	Importance	Dis-satisfaction
Sports, travel, entertainment	0.133	80
Education	0.147	70
Transport	0.133	60
Roads	0.147	50
Family relations	0.147	40
Safety	0.147	20
Beauty of the landscape / beaches	0.147	10
Pearson's correlation (sign.)		-.631 (.129)

Individual A, in the first example, had the lowest dis-satisfaction score of the three

respondents (average dis-satisfaction score of 25 out of 100, where importance and dis-satisfaction assigned to each contributor were multiplied and then the average was calculated). Thus this respondent appears to be the most satisfied of the three, followed by person B (40) and person C (47).

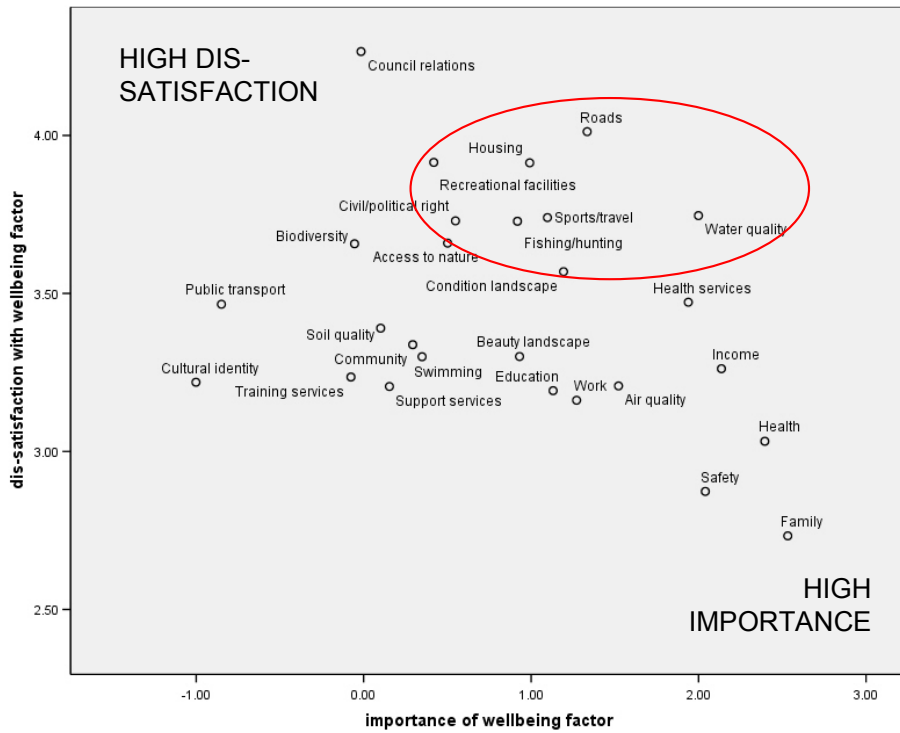
However, data on importance provides some interesting insights. In some cases respondents assigned equal importance to several contributors, but gave them different satisfaction scores. In other instances, contributors received the same satisfaction scores but were of different importance to the respondent.

Data presented for respondent B is rather extreme. This respondent has assigned more than 85% of total weight to the importance of one single wellbeing factor, health services. In addition, he has assigned a very high dis-satisfaction to this factor (90 out of 100). Although he is satisfied with the family relations and work, these factors are of very little relative importance to him. Such scoring resulted in a statistically significant correlation between dis-satisfaction scores and importance weights for this individual ($R= 0.821^*$). Thus, it can be proposed that the “overall dissatisfaction” of this respondent is even higher than it appears from looking at the dissatisfaction scores only.

Based on this brief exploration, it appears that further investigations of relations between importance and satisfaction are warranted. The relationship between importance and satisfaction with wellbeing factors at the regional level is reported in the next section.

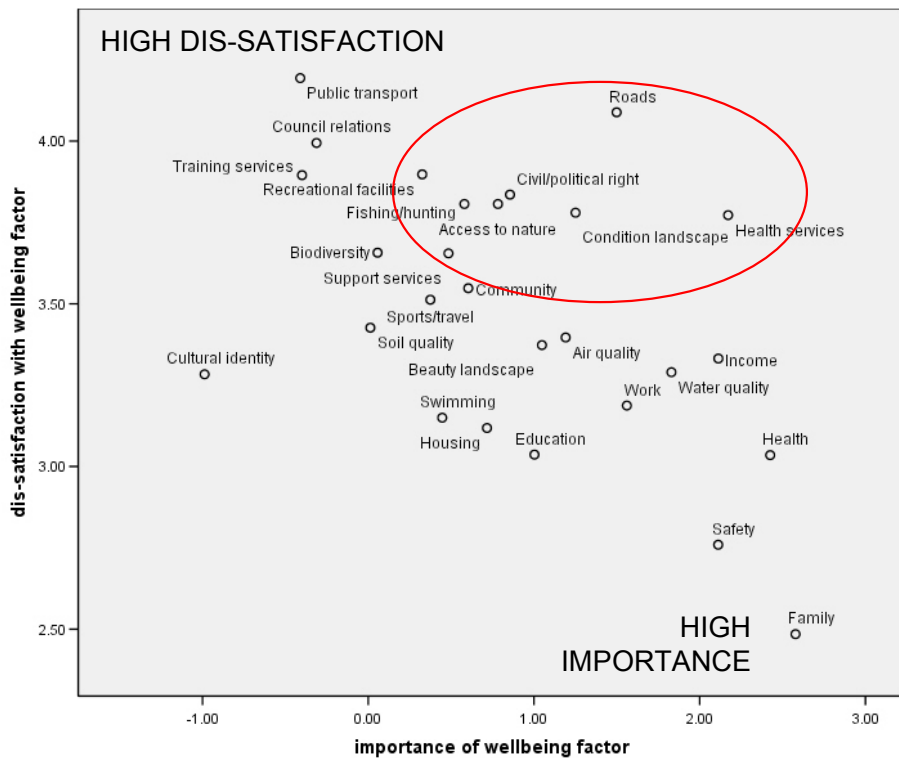
6.3 Combining dis-satisfaction and importance at a regional level

In the first instance, the mean importance of each factor was plotted against its mean dis-satisfaction score for the region (Figure 21). The majority of the wellbeing factors in the graph appear to be arranged along a negatively sloping curve, less pronounced in the case of the Whitsunday Shire ($R=0.302$; Figure 21.A) than the Cardwell Shire ($R=0.512$, Figure 21.B). The factors range from those receiving high dissatisfaction scores but low importance, located in the upper left quadrant of the graphs, to those receiving very high importance but low dissatisfaction scores, located in the lower right quadrant.



(A) Whitsunday

Shire



(B) Cardwell

Shire

Figure 21. Graphical representation of importance and dis-satisfaction with wellbeing factors in Whitsunday Shire (A) and Cardwell Shire (B), natural logs

However, a few wellbeing factors appear as outliers. For example, cultural identity, located in the lower left quadrant, received low weights for importance but relatively high scores of dis-satisfaction. The low importance of this factor is partially due to the low numbers of respondents selecting it as a contributor to their wellbeing. Therefore, this group of factors might be of a concern to only a specific sub-group of population.

Another group of outliers, located in the upper right quadrant of Figure 21 (circled), has received both high importance weights and high dissatisfaction scores. In the Whitsunday Shire, this group comprised of roads condition, water quality, housing, sport travel and entertainment, health services, fishing and hunting and the condition of the landscapes and beaches; while in Cardwell Shire it comprised of roads condition, health services, civil and political rights, condition of the landscape and beaches and access to the natural areas. These wellbeing factors are labelled as “action items” as they appear to be issues that should receive further attention.

6.4 Index of Dis-Satisfaction

A visual observation of the data in the previous section indicates that a further investigation of the links between satisfaction and importance is warranted. This section proposes, and demonstrates the use of, an index which combines information about importance with that on satisfaction: the “Index of Dis-satisfaction” (IDS). Results for the Cardwell Shire are presented below, with the Whitsunday data analyses presented in Section 6.4.2.

6.4.1 Index of Dis-Satisfaction - Cardwell Shire

Table 32 presents indices of dis-satisfaction (IDS) as calculated for the Cardwell Shire. For comparison, the table also reports dissatisfaction scores associates with each factor.

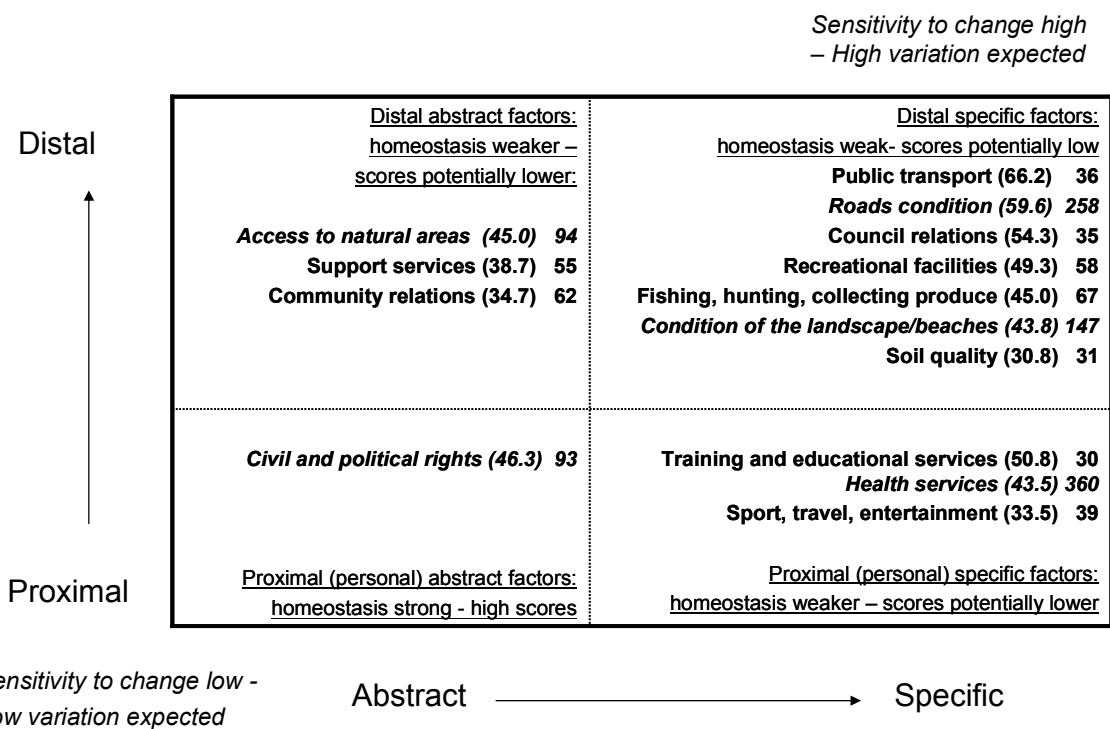
Combining satisfaction with importance provided remarkably different rankings for the wellbeing factors compared to the rankings based on dissatisfaction alone. The IDS identifies health services and roads condition as factors worthy of attention. Indeed, they are both important to residents (as discussed in Chapter 4) and ranked poorly on the satisfaction scale (Chapter 5). In contrast, public transport is placed very low in the index. Although dissatisfaction with this factor was high (ranked 1st based on dissatisfaction only), it was relatively unimportant to the wellbeing of the majority of residents. A similar story emerges for council relations.

Table 32. Comparison of Index of Dis-Satisfaction (IDS) with the dis-satisfaction scores alone, all wellbeing factors, Cardwell Shire

Wellbeing factor	IDS	Std. Deviation	Dis-satisfaction score (mean)
Health services	360	4.900	43.5
Roads condition	258	4.693	59.6
Income	(218)	3.065	(28)
Health	(208)	2.999	(20.8)
Water quality	(170)	3.040	(26.8)
Family	(164)	4.592	(12)
Condition of the landscape	147	3.232	43.8
Safety	(119)	2.065	(15.8)
Work	(99)	2.587	(24.2)
Access to nature	94	2.556	45
Civil and political rights	93	3.178	46.3
Air quality	(88)	2.141	(29.9)
Beauty of the landscape	(82)	2.583	(29.2)
Fishing, hunting	67	2.160	45
Community relations	62	2.278	34.7
Recreational facilities	58	2.283	49.3
Support services	55	2.084	38.7
Education	(52)	1.497	(20.8)
Sport, travel, entertainment	39	1.441	33.5
Public transport	36	2.170	66.2
Council relations	35	1.944	54.3
Soil quality	31	1.341	30.8
Training and education	30	1.456	49.2
Swimming, bushwalking	(27)	0.935	(23.3)
Housing	(27)	0.965	(22.6)
Cultural identity	(7)	0.595	(26.7)
Biodiversity	(0)	0.000	(-)

In brackets = Factors receiving low dis-satisfaction scores

To further investigate the relationship between satisfaction and the importance, a bi-dimensional model of ‘subjective wellbeing sensitivity to external forces of change’ was re-constructed with the factors that received high dis-satisfaction scores (higher than 30, experiencing a failure of homeostatic levels), only. Both satisfaction scores and the IDS scores were recorded (Figure 22). Factors receiving high IDS scores are presented in italics in Figure 22. It can be observed in this model that the IDS has provided information different to satisfaction scores only, pinpointing a few factors in each sphere that are both important and that have experienced a change in homeostasis level. Proximal and specific factors serve as a good example of this point: although dis-satisfaction with health services is not much different to that expressed towards training and educational services or sport, travel and entertainment opportunities, due to their overall regional importance health services have recorded a significantly higher IDS score.



Factors receiving dis-satisfaction scores higher than 30% only

Dis-satisfaction score in brackets, followed by the IDS score

In italics = Factors receiving high IDS scores

Figure 22. Bi-dimensional model of subjective wellbeing sensitivity to external forces of change, combination of observed satisfaction scores (in brackets) and IDS scores, Cardwell Shire

6.4.2 Index of Dis-Satisfaction – Whitsunday Shire

The Index of Dis-satisfaction (IDS) scores, as well as dissatisfaction scores for the Whitsunday Shire, are reported in Table 33, with the bi-dimensional model presented in Figure 23.

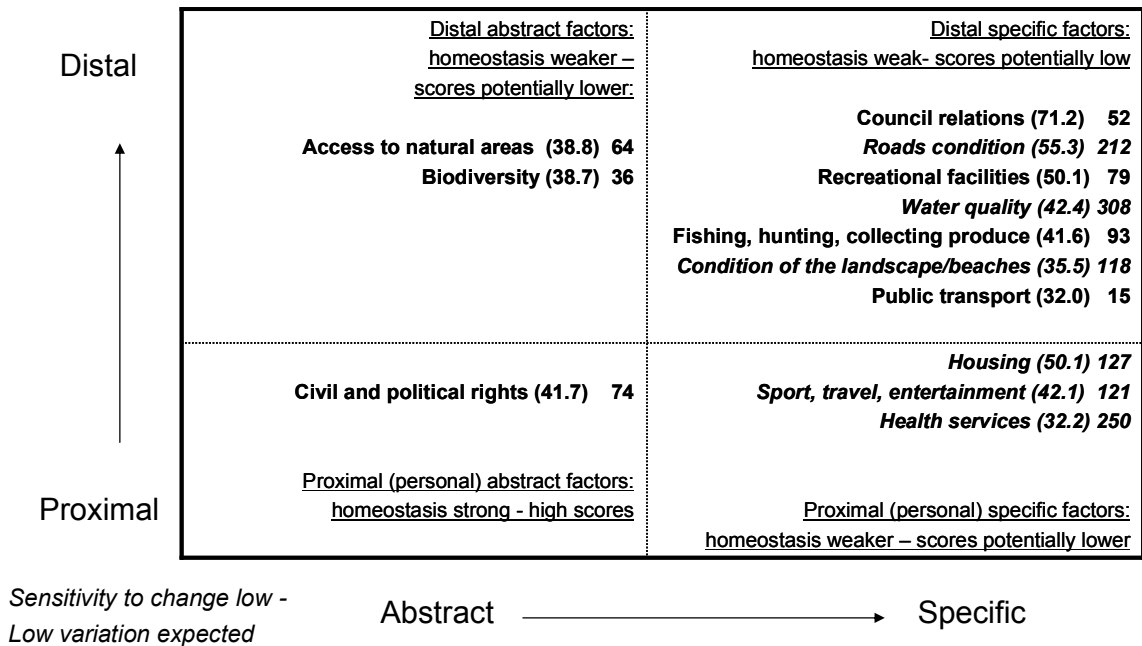
The emerging picture is similar to that observed for Cardwell Shire. Some factors with recorded high dissatisfaction, such as council relations and recreational facilities, were not considered as important by the majority of residents and thus obtained low scores in the Index. In this Shire, water quality and health services emerged to top the IDS table.

Table 33. Comparison of Index of Dis-Satisfaction (IDS) scores with dis-satisfaction scores, all wellbeing factors, Whitsunday Shire

Wellbeing factor	IDS	Std. Deviation	Dis-satisfaction score (means)
Water quality	308	4.549	42.4
Health services	250	6.505	32.2
Personal health	(216)	3.167	(20.7)
Road condition	212	4.531	55.3
Income/ financial security	(204)	3.352	(26.1)
Family	(170)	3.162	(15.4)
Safety	(133)	2.783	(17.7)
Housing	127	3.384	50.1
Sport, travel, entertainment	121	2.997	42.1
Condition of the landscape	118	2.983	35.5
Air quality	(106)	2.406	(24.7)
Fishing, hunting	93	2.719	41.6
Recreational facilities	79	2.486	50.1
Education	(78)	2.623	(24.3)
Work	(74)	1.986	(23.6)
Civil and political rights	74	2.361	41.7
Access to nature	64	2.211	38.8
Beauty of the landscape	(64)	2.119	(27.1)
Council relations	52	2.573	71.2
Community relations	(38)	1.795	(28.2)
Biodiversity	36	1.657	38.7
Swimming, bushwalking	(36)	1.617	(27.1)
Soil quality	(29)	1.189	(29.7)
Support services	(26)	1.297	(24.7)
Training and education	(22)	1.016	(25.4)
Public transport	15	1.036	32
Cultural identity	(5)	0.476	(25)

In brackets = Factors receiving low dis-satisfaction scores

*Sensitivity to change high
– High variation expected*



Factors receiving dis-satisfaction scores higher than 30% only

Dis-satisfaction score in brackets, followed by the IDS score

In italics = Factors receiving high IDS scores

Figure 23. Bi-dimensional model of subjective wellbeing sensitivity to external forces of change, combination of observed satisfaction scores (in brackets) and IDS scores, Whitsunday Shire

Although there are several similarities in the data between the two shires, some interesting differences can also be observed. In particular, some of the factors that experienced a significant homeostatic failure in Whitsunday, and thus resulted in very high dis-satisfaction scores in that Shire, can be clearly observed as highly ranking concerns in IDS for Whitsunday Shire. For example, housing has received a very high IDS score (127). Sport, travel and entertainment feature in the IDS of Cardwell Shire but received a relatively low score of 39, while the score in the Whitsundays was much higher, 121. On the other hand, roads condition, health services and condition of the landscape and beaches featured highly in IDS for both shires.

6.5 Discussion

Commonalities and differences in factors recorded using different approaches explored in this Thesis (Index of Dis-satisfaction, Sensitivity to change model, Importance, and

Satisfaction) are presented in Table 34. It can be observed from the table that only one factor, roads condition, has been consistently flagged using all the approaches. For example, health services were not flagged when lowest satisfaction approach was considered; while several other factors, such as recreational facilities, sport, travel and entertainment, access to the nature, and civil and political rights, were not highlighted as the most important factors in the region.

There are several similarities between the IDS approach and the sensitivity to change model. Roads condition, health services, recreational facilities, sport, travel, entertainment, access to nature and civil and political rights were all flagged using either approach. However, IDS approach provides two potential advantages: it removes the need for expert determination; and it provides numeric quantification of the factors, thus providing an additional information, that of the magnitude of the difference between factors.

Comparison of the regional factors to the national questions was difficult due to the differences in questions asked (as discussed in Section 5.4). The vagueness of the term “natural environment” included in the national surveys and other conceptual frameworks, was discussed in Section 4.4. An interesting observation emerging from this table is that other factors related to satisfaction with life in Australia in the national survey are also rather vague, such as the factor “government” or “social conditions”. Indeed, it is difficult to “translate” these factors into factors selected as important on the regional level. “Government”, for example, might be assumed to cause dis-satisfaction with several factors that emerged as important in the regional study, for example, for poor condition of roads or health services.

Table 34. Comparison of top-ten ranking action items, based on: IDS (Cardwell Shire example), sensitivity to change model (Cardwell Shire example), importance, satisfaction, and the national survey

IDS Cardwell*	Sensitivity to change model**	Most important***	Lowest satisfaction****	National study*****
Roads condition	Roads condition	Roads condition	Roads condition	Government?
Health services	Health services	Health services	-	Government?
Recreational facilities	Recreational facilities	-	Recreational facilities	Government?
Sport, travel, entertainment	Sport, travel, entertainment	-	Sports, travel, entertainment	Government? Social conditions?
Access to nature	Access to nature	-	Access to nature	Natural environment
Civil and political rights	Civil and political rights	-	Civil and political rights	Government? Social conditions?
Fishing, hunting, collecting	-	-	Fishing, hunting, collecting	Natural environment
Condition of the landscape	-	Condition of the landscape	Condition of the landscape	Natural environment
Community relations	-	Safety	-	Social conditions?
-	-	Water quality	-	Natural environment
-	-	Family relations	-	Relationship
-	-	Air quality	-	Natural environment
-	-	Work Income	-	Work
-	Public transport	-	Public transport	Government?
-	Council relations	-	Council relations	Government? Social conditions?

* based on Table 31

** based on Figure 22

*** based on Figure 16

**** based on Table 25

*****based on Cummins, 2008

Thus, it could be argued that questions posed in the national survey, and indeed factors proposed in conceptual frameworks in the literature and summarised in Table 1, would

benefit from further clarifications. It would indeed be difficult to develop either policy or science conclusions based on broad concerns such as those listed in the last column of Table 34. Respondents themselves have identified very specific factors as important to them, factors that are also more influenced by “objective conditions” and thus ones that could be improved through policy actions.

The index of dis-satisfaction (IDS), presented in this Chapter, combines data on importance of wellbeing factors with the data on satisfaction. The combined scores present a new angle to the data.

Proponents of homeostasis theory argue that policy and decision makers should not be concerned with factors receiving dis-satisfaction scores lower than 30%. Thus, the “action lists” of the key regional concerns should concentrate on factors that have high dis-satisfaction scores, and thus higher potential to improve the wellbeing of residents, if restored. The “action lists” for the two Shires, modified accordingly, are summarised in Table 35.

Factors receiving the highest scores in the IDS correspond well with the factors in the top right quadrant of Figure 21. The IDS method also appeared capable of capturing specific differences between the two Shires. For example, both water quality and housing had low satisfaction scores in the Whitsunday Shire and retained their prominent positions in the IDS for that shire (Table 35). Differences between the two shires are in line with different satisfaction results reported in Chapter 5. However, further testing of validity, sensitivity and transferability of the index is warranted.

Overall, the ranking of the factors at the regional level changed significantly when both importance and satisfaction were recorded rather than satisfaction only. For example, public transport, roads condition and council relations, received the lowest satisfaction scores in the study. However, once the satisfaction scores were combined with importance scores, out of those three factors only the condition of the roads maintained its prominent position (Table 35).

It appears that IDS does indeed provide more insights to the problems perceived by people than a simple solicitation of satisfaction scores, in particular in relation to the methodologies where respondents are not left with an option of not choosing a particular factor because they do not care about it. As an example, if we assumed that the condition of the roads and public transport, were of equal importance to respondents

in Cardwell Shire (i.e. we did not test for their importance), it would appear to the decision makers that both factors are of similar “urgency” (with dis-satisfaction scores of 59.6 and 66.2, respectively). However, once the stated importance to personal wellbeing is included in the evaluation, roads condition became clearly more “urgent” than public transport (258 versus 36, respectively).

Table 35. Action lists based on the IDS, where higher scores indicate higher rank on action list

Cardwell Shire			Whitsunday Shire		
Wellbeing action list	IDS scores	(I, S)	Wellbeing action list	IDS scores	(I, S)
Health services	360	(.083, 56.5)	Water quality	308***	(.072, 57.6)
Road condition	258	(.044, 40.4)	Health services	250*	(.073, 67.8)
Condition of the landscape	147	(.034, 56.2)	Road condition	212	(.038, 44.7)
Access to nature	94	(.023, 55.0)	Housing	127***	(.027, 49.9)
Civil and political rights	93	(.022, 53.7)	Sport, travel, entertainment	121***	(.029, 57.9)
Fishing, hunting	67	(.017, 55.0)	Condition of the landscape	118	(.034, 64.5)
Community relations	62	(.016, 65.3)	Fishing, hunting	93	(.025, 58.4)
Recreational facilities	58	(.013, 50.7)	Recreational facilities	79	(.015, 49.9)
Support services	55	(.017, 61.3)	Civil and political rights	74	(.019, 58.3)
Sport, travel, entertainment	39	(.014, 66.5)	Access to nature	64	(0.16, 61.2)
Public transport	36	(.006, 33.8)	Council relations	52	(.009, 28.8)
Council relations	35	(.007, 45.7)	Biodiversity	36***	(.009, 61.3)
Soil quality	31	(.010, 69.2)	Public transport	15	(.005, 68.0)
Training and education	30	(.007, 50.8)			

IDS scores for wellbeing factors different between the two shires at * =10% level; ** = 5% level and *** = 1% level (independent t-tests)

I = importance weight ; S = satisfaction score

Two of the high scoring factors in the IDS, water quality and the condition of the landscape and beaches, came from the natural environment domain, thus indicating the importance of integrated approaches to wellbeing that also include environmental concerns.

Although the IDS method allowed the researcher to determine “problem areas” as perceived by the majority of respondents, the method does not provide an insight into the nature of the problem perceived. A more specific, detailed and qualitative participatory method should be used as a follow up to this tool to further the understanding of the context and background of each wellbeing factor with high IDS

score.

A role of this information as a tool for improved sustainability of the regions will however depend on what a policy response to findings would be. Would decision makers rush to provide better condition of the roads and thus improve the satisfaction of local residents, or would they acknowledge the importance of public transport to the future sustainability of the region and thus fund awareness programs that would potentially increase the desire to use (and importance of) public transport?

6.6 Conclusions

Results presented in this Chapter indicate that the satisfaction scores and importance weights can be meaningfully combined into one metric. Further, this metric appears to provide interesting information relevant to policy and decision makers.

The main focus of the subjective approaches to wellbeing is to provide insights into individual satisfaction with various contributors to wellbeing. They take into account individual experiences and help understand and communicate the interpretations, priorities and needs of the individuals. To better understand the subjective wellbeing on an aggregated level such as a region, it is therefore important to communicate both needs and the perceived satisfaction of those needs.

This Thesis proposes a tool for aggregation of data on both importance and satisfaction with the wellbeing factors, Index of dis-satisfaction (IDS). The index was tested in two Shires, and differences between them were recorded both in terms of importance of wellbeing contributors and levels of satisfaction. Factors receiving the highest scores in IDS, that is being of high importance to large number of respondents and attaining low satisfaction scores, came from both the domain of economy and services as well as from the natural environment domain. The important role of ecological factors as contributors to wellbeing recorded in this study supports other studies suggesting that the natural environment should be incorporated in wellbeing studies on a more equal footing to other domains.

Application of this tool in other regions would be needed to further investigate its validity, sensitivity and transferability. Factors of wellbeing important to rural populations in developed countries are not necessarily well understood, and this study aimed to further our understanding of both the wellbeing contributors and the perceived

satisfaction in this context. Combining importance with satisfaction provided a potentially useful policy tool that allows for ranking and creation of “action lists” of few factors most relevant in a specific regional context.

Chapter 7 Discussion and conclusions

The paradigm of sustainable development, and the implicit requirement for understanding the needs of people, have become important aspects of policy and decision making over the last 30 years (WECD, 1987; United Nations 1992; Quarrie, 1992). Understanding the needs of people benefits policy assessments as it allows mapping of the envisaged impacts of policy (negative and positive ones) against identified priorities, that is, domains of life most important to people. The primary aim of this Thesis was to improve our understanding of what people value and find most important to their wellbeing, at the regional scale.

Summary of the findings for each research question addressed in this Thesis is provided in the next section, Section 7.1. Several methodological contributions were made in this Thesis, and they are discussed in Section 7.2. The Chapter closes with the potential avenues for further research, based on the exploration of theoretical concepts from both the economic and physiological literature (Section 7.3).

7.1 Summary of the findings

Explorations of the first research questions, “What contributes to wellbeing, and by how much?” were presented in Chapter 4, while the second research question, “What are the current levels of satisfaction with wellbeing contributors?” was explored and discussed in Chapter 5. Chapter 6 presented findings related to the third research question, “Can a better understanding of importance and satisfaction with ‘wellbeing contributors’ assist policy and decision making processes?”. Some of the key findings of those three chapters are resented in the next few paragraphs.

Contributions to a better understanding of the needs of the residents in regional Australia were presented and discussed in Chapter 4 of the Thesis. In both case studies, the same ten wellbeing factors were identified as the most important contributors to wellbeing by respondents. These were: Family relations, health, income, health services, safety, water quality, condition of the roads, air quality, work, and condition of the landscapes. Thus, it can be concluded that the contributors to wellbeing are indeed shared not only by the individuals within each Shire, but also across the region. Determinants of the choices of wellbeing factors were also explored. In most cases,

attributes that determined the selection of a contributor were different to those determining the level of importance given to that contributor. However, the overall explanatory power of the models was very low.

Current levels of satisfaction with important wellbeing contributors were explored and discussed in Chapter 5. The highest levels of satisfaction reported were those associated with family relations, safety, health, educational levels and work. Satisfaction levels with those factors were similar across the case studies, however, satisfaction with family relations, safety and health was on average higher than the national averages. Levels of satisfaction with several contributors from this study were difficult to compare to a national level study (Cummins, 2006) as the questions asked, and thus factors explored, were not the same. This is probably due to the methodological approach where contributors to wellbeing in this study were self-selected by respondents, and not pre-determined by experts (an important issue discussed later in this section). Several characteristics of respondents emerged as statistically significant determinants of their satisfaction scores. However, here too the overall explanatory powers of these models were low.

Chapter 6 then proposed, tested and discussed an approach to creating a quantitative composite value that combines information on both satisfaction and importance at the regional scale, the Index of dis-satisfaction (IDS). Factors receiving the highest IDS scores were those that were of high importance to a large number of respondents and which also attained low satisfaction scores. These came from both the domain of economy and services as well as from the natural environment domain. The approach demonstrated that IDS is a potentially useful policy tool that allows for ranking and the creation of “action lists” of factors most relevant in a specific regional context.

Chapters 4, 5 and 6 have provided important regionally specific information, potentially useful to the decision makers. In addition to the conclusions summarised above, several important cross-cutting findings emerged from the study.

First, it is clear that methodological approaches matter. In this study respondents were asked to choose what was important to wellbeing, and how important it is. As a result, the list of wellbeing contributors identified was different to expert-derived lists common in literature and practice. Expert-derived lists often include very vague and broad wording of potential contributors to wellbeing, such as “natural environment”,

“government” or “economy”. The list derived by respondents was very specific and also included several “distal” factors, removed from “self”. Specific and “distal” wellbeing contributors are indeed the ones that can be influenced and improved by policy actions. Thus, respondent generated lists appear to be of more relevance if the subjective wellbeing approach is to be used in the policy and decision making context. In other words, it seems that one is able to gain a better understanding of the needs and aspirations of the people currently living in the regions if their “priorities” and their current satisfaction are elicited from the ground up, rather than being imposed from the top down. This type of methodological approach thus brings us a step closer to understanding how these regions can be best developed and the welfare of their residents best enhanced.

This Thesis also acknowledged that policy and decision makers would need to be familiar with not only what the needs of the residents are, but how those needs are distributed in the society. Thus, this research examined various social, economic and sense of place attributes of the respondents, with the aim of investigating if such attributes potentially determine stakeholders’ choices, the weighting of wellbeing factors, and satisfaction levels. No robust typologies emerged from this study. However, multivariate analysis was found to be useful in bringing into focus differences between the respondents that would potentially be masked if using only bivariate approaches.

An approach that provides a more complex approach to considering both what people value most and how satisfied they are at the moment, Index of Dissatisfaction (IDS), was tested in this Thesis and it is clear that one’s recommendations regarding regional priorities differ depending on which approach is used, i.e. whether one consults only the importance of factors; only the current satisfactions; or a combination of both. Thus, this Thesis supports the propositions that combining both satisfaction scores and importance weights is justified in the policy making context, and the IDS appears to offer itself as a practical approach for doing so at the regional scale.

7.2 Methodological contributions

Methodological contributions made in this Thesis are organised in the following sections: contributions to data collection process; data analysis; and interpretation of the results.

7.2.1 Data collection process

Several important considerations in collecting primary data to inform a study of subjective wellbeing were identified during the literature review. The four main considerations identified were:

- Participation: the ability to capture and communicate personal perceptions, opinions and values;
- Equity: a need to use quantification methods that are not measured in monetary units, thus circumventing issues of income levels and unequal income distributions;
- Integration: a need to evaluate social, cultural, ecological, economic, institutional, and other concerns on an equal footing; and
- Scale: an ability to identify and quantify priorities at the regional scale.

Each consideration will be discussed in more detail in the following sub-sections.

7.2.1.1 Participation

The methodological approach presented in this Thesis was based on the learnings from the wellbeing literature, however, it also addressed areas identified as being of relevance to on-the-ground stakeholders. The literature was used to inform the initial discussion and selection of wellbeing factors for this study, however, the final list of wellbeing factors was generated in collaboration with local residents. Further, the approach invited respondents to identify the factors most important to his or her wellbeing.

Participatory approaches to the selection of wellbeing factors, such as that used in this Thesis, have the potential to minimise one of the key errors of subjective wellbeing approaches: where the “objective expert” determines what is included and what is not included in the discussion (Max-Neef, 1989; McAllister, 2005; Constanza et al 2007). It also allows respondents to assign the weights to factors selected, thus further removing a selective bias that might occur with methods where weights are determined by experts or arbitrarily (McAllister, 2005).

However, the approach developed in this Thesis is not fully subjective, as participants in the mailout survey were presented with a suggestion-list of the wellbeing factors they might want to consider as the most important contributors to their wellbeing. Literature

indeed indicates that such “suggestions” tend to bias respondents into picking some of the presented factors rather than brainstorming for the new ones. Nonetheless, the study did not presuppose what respondents think is important by allowing them to make a number of important contributions. In the preparation stages, (a) focus groups were run with key informants from the region to come up with regionally relevant lists of factors; and (b) these lists were then further refined during the pilot stage of the project with the actual residents to arrive at a “final list” of factors employed in the mailout survey. Further, during the mailout stage, (c) respondents were asked to indicate which (if any) of those factors were important to them; and then (d) asked to indicate just how important they were. Only then was the satisfaction score for “important” wellbeing factors elicited. Such an approach is indeed very different to standard list-based elicitations of satisfaction scores, which simply provide respondents with a list of scientist or expert derived factors and ask them to indicate how satisfied they are. Therefore, one of the key considerations for this method – and potentially one of the key shortcomings in its future use – is that the relevance of the findings will largely depend on the comprehensiveness and quality of the initial consultations and pilot testing step, when the list of regionally relevant wellbeing factors is developed.

Importantly, the approach proposed in this Thesis should be used only as a first step in an investigation of regional wellbeing. The wellbeing contributors identified by respondents in the region as being most important to them, should then ideally be investigated using more participatory and qualitative methods, allowing for greater depth of understanding of actual issues behind the wellbeing choices, and thus allowing for more targeted decision making. Qualitative approaches would also provide a validation of respondents’ understanding of concepts. This is particularly important when dealing with wellbeing factors potentially open for interpretations, such as “water quality” or “beauty of the landscapes and beaches”. For example, a follow-up study to this research was conducted in Whitsunday Shire by Larson and Stone-Jovicich (in press) in order to further explore the perceived importance and low satisfaction with “water quality” in this Shire. The study found that “water quality” was perceived by respondents as both representing “water in environment” (i.e., quality of river water or bathing water quality) as well as quality of drinking water. Low satisfaction was consequently linked to both perceived pollution of water in environment, in particular by sediment runoff, as well as poor quality of drinking water, related to the

discoloration of the tap water that sometimes occurs in the city water supply.

Purely qualitative research is reliant on expert opinion, and is therefore unlikely to be repeatable as expert perspectives, and experts, change over time. Application of the quantitative methods, on the other hand, allows for repeatability and a wide coverage of the sample population, but not necessarily for understanding of why a change is occurring and what is behind it. As Emtage and colleagues (2006) put it, quantitative methods provide a “skeleton” of information and qualitative studies “put the flesh on the bones”.

The understanding and acceptance of the principles of sustainability by local stakeholders on the ground could be improved if sustainability goals were “translated” into issues relevant to them. In turn, the relevance of national or other higher level goals to on-the-ground stakeholders could be improved through communication of concerns of stakeholders to policy makers.

7.2.1.2 Equity

Two of the most common approaches in the literature for stating preferences and valuation are economic monetary approaches and the political or social preference approaches. Monetary valuation methods are specifically criticized for excluding sustainability concerns such as rights, fairness and equity (Spash, 2007). Since the approach presented in this Thesis is not using a price-based valuation method, it is not income dependent and thus provides equal opportunity to all respondents to voice their preferences.

Political processes on the other hand can be dominated by coercion, rather than open deliberation, between individuals and social groups, argues Spash (2007). Another shortcoming of political valuations he identifies is failure of “willingness to say”, that is exclusion from the process on the basis of an inability to articulate an argument. He particularly warns that this might be of importance in situations of cultural and historic conflicts, such as the Indigenous situation in Australia. Stating preferences in an anonymous independent way via mail survey, used in this method, rather than in a group environment typical of deliberative processes, might encourage respondents to voice their preferences more freely. On the other hand, administration of a written survey instrument needs to proceed with caution in regions or within groups with poor literacy rates. Methods that rely on opinions of the sample of the population surveyed

for their conclusions need to allocate significant attention to minimisation of the sample coverage error, as well as other common sampling errors. In this study, good coverage was monitored using ABS Census data for the regions and ensuring a sample composition which is representative of the region.

In addition, this methodological approach is based on aggregation of weights assigned across the individuals to the wellbeing contributor, and not on aggregation of individual utilities. Thus, the aggregation does not require one to try and estimate individual utility functions, or harder still, a social utility function.

7.2.1.3 Integration

The integrated approach presented in this Thesis encompasses factors related to the natural environment, family, community, the economy and services. The majority of the respondents in the study included factors from each domain as contributors to their wellbeing (77% of respondents in Cardwell Shire and 84.5% of all respondents in Whitsundays).

An interesting finding of this Thesis is that the same ten wellbeing factors emerged as “most important” in both Shires. Moreover, the top two factors, family relations and health, received much higher weights in both case studies than the third ranked factor. This finding is in line with work of Easterline (2003), who suggested that health and time available for family are more important for the long-term improvement in quality of life than economic production, and thus should receive greater consideration from policy makers. Overall, factors from the social domain received the highest weights, highlighting the importance of family and community to respondents. The average weight for this domain was also remarkably similar across the two shires, with an average weight of 42.9 (out of a 100, $sd \pm 22.6$) assigned to the social domain in the Cardwell Shire, and 42.7 ($sd \pm 19.7$) in the Whitsunday Shire.

By explicitly including natural environment and social aspects of life, this method moves towards an integrated, and potentially more sustainable, view of human wellbeing. Application of this integrated approach also confirms that the natural environment is indeed a vital input for human wellbeing and thus an important aspect to monitor and measure in studies of the quality of life, as proposed by several researchers in various contexts (Dasgupta 2001, Veenhoven, 2002; van Kamp et al, 2003, Hassan et al, 2005; Larson et al, 2006).

7.2.1.4 Scale and different levels of policy making

Most of the wellbeing factors selected by respondents in this study are common throughout the literature, such as for example health, safety and income. However, some of the findings also appear to be specific to the region under study, such as the high importance assigned to the condition of the roads. Addressing issues related to the geographic scales and societal levels at which research is conducted, remain an important consideration in any approach that proposes aggregation of information collected at the individual level to larger scales. Considerations of scale and societal levels warrant further research.

The approach presented in this Thesis allows for the communication of residents' priorities to various institutional levels of policy-making. For example, the availability of health services and income levels were identified as very important to wellbeing. Income levels are widely acknowledged as important contributor to social welfare, and are regularly measured by central data collection agencies. However, the high levels of importance assigned to health services, captured in this research, suggest that this might be a factor worth monitoring in the region. Health services are principally managed at the State level in Australia. This information could therefore contribute to State level policy-making by indicating that expenditures for improvements in health services are likely to result in broad support.

As another example, the "water quality" factor was included as an important wellbeing contributor by 42% of the respondents. The deteriorating quality of waters flowing into the Great Barrier Reef lagoon is also acknowledged by the Australian Federal government and Queensland State government. The governments have, in 2003, jointly adopted the Reef Water Quality Protection Plan, acknowledging water quality deterioration as being chiefly a result of pollution from broad-scale agricultural land use activities (Furnas, 2003; Haynes, et al, 2000; Haynes et al, 2001; Mitchell et al, 2005). However, little progress seems to have been made in the implementation of specific actions to target the reduction of agricultural pollution levels. The emphasis on concerns about the costs to agricultural incomes, over the environmental degradation, is acknowledged in Australia (Cocklin et al, 2006; Gray and Lawrence, 2001). Yet, the role water quality plays in the wellbeing of local residents of the Great Barrier Reef, as captured in this research, is significant. This finding indicates that policy actions resulting in improved water quality have the potential to generate greater support from

the community than might be expected by policy makers. The Reef Water Quality Protection Plan and other natural resources management plans are being implemented on a regional basis, thus making this approach relevant at the regional level of decision-making.

Recent changes in governance arrangements in Australia have resulted in two seemingly inconsistent trends in public policy. On the one hand, there is considerable centralization in federal-state relations, yet on the other, there is a significant increase in delivery of policy and service at lower levels (Brown 2007). Local governments in particular are expected to deal with an increasing number of social, ecological and economic issues (Bellamy, 2007). As an example, it is estimated that local governments in Australia receive only about 5 per cent of total government expenditure, yet contribute some 53 per cent of total government environmental spending (Dovers and Wild River 2008).

Local governments in Australia typically deal with the issues related to all three domains of wellbeing included in the approach presented in this thesis, and, in the face of budgetary constraints, are facing continuous trade-offs between aspects to be improved. Local government councils in the Great Barrier Reef region have expressed interest in this approach, acknowledging that it “*had the potential to provide much clearer insight about strategic directions Council needs to take in planning and in day-to-day operational activity to effectively and realistically help protect the Great Barrier Reef.*” (Proserpine Guardian, 2006).

This approach also appears suitable for corporate social responsibility reporting, or similar sectoral decision-making, and the use of such an approach should be tested in the future.

7.2.2 Data analyses and explorations of typologies

The “typologies” approach is generating significant interest in recent years, particularly among modellers. The approach proposes that, if we can develop a limited set of “typologies” (groups of people that share similar values and beliefs, or are likely to act in similar ways), we could develop a variety of future scenarios to predict the way certain perturbances or impacts (policy action or other) will propagate through the needs system. To test the validity of such approach the existence of objectively identifiable “types” of respondents was explored in this Thesis. Specifically, it sought to investigate

linkages between the attributes of respondents and their wellbeing choices. This was done using both bivariate and multivariate analysis.

Typologies are typically based on personal attributes such as age, occupation, income, educational levels etc (Emtage et al, 2006) and three groups of attributes were tested in this study: economic, demographic and sense of place.

The results of the preliminary bivariate analyses indicated high levels of correlation between attributes, suggesting that respondents might belong to different “types”, most strongly associated to the stages in life cycle. Despite the fact that some obvious linkages were observed (such as importance of health services to older people, who also tend to have residential property in the area, be married and have children who have left home), the results of the multivariate analyses were not conclusive in determining connections between specific “types” of respondents and wellbeing preferences, evidenced by low explanatory powers of most models.

Although the use of a “typologies” approach appears to be growing in popularity in Australia, in particular in the area of decision-making and policy support (Vanclay, 2005; Porter et al, 2007; Schwarz and McRae-Williams, 2009; Kuehne, 2009), these findings suggest that such approaches should be used with caution. Indeed, the findings reported in this Thesis are in agreement with mainstream socio-economic literature which maintains that the attributes, values and choices of a person are not singularly linked to personal characteristics (Myers and Diener, 1996). For example, a very extensive three-year project exploring time series data from 15 countries in the European Union (“The Dynamics of Social Change in Europe”) concluded that the “*overlap between the dimensions [personal characteristics] is far from perfect*” (Whelan et al, 2003) and that ‘welfare-type’ typologies are “*useful for explaining differences, although they do not always fit perfectly*” (European Commission for Socio-economic Science and Humanities, 2009). Indeed, a total of 12 characteristics of the respondents used to construct the structural equation model developed by Porter et al (2007) for Australian farmers, explained only 14% of variation in land management practices of the respondents. Thus, it might be argued that although explorations of typologies are informative and broaden our understanding of the individuals and communities with whom researchers work, they need to be approached with great care when applied in the decision-making context. Conclusions based on limited explanatory power might misinform, and indeed even lead decision-makers to erroneous actions.

7.2.3 Interpretation of results: satisfaction and importance as a single metric

An approach that combines satisfaction and importance values into a single metric, Index of Dis-satisfaction (IDS), was proposed and tested in this Thesis.

Critiques of combining importance and satisfaction of wellbeing factors come chiefly from the psychological literature and studies that aim to predict likely satisfaction scores at the individual level. Yet, the idea of combining both measures is well supported in the economic literature. For example, Sen argues that “*focusing on the space of functioning does not entail that each functioning must be taken to be equally valuable, or valuable at all*” (Sen, 1999, p32). Rather, he proposes, the choices are related to underlying concerns and values of the person, where “*some definable functionings might be important and others quite trivial and negligible.*” Findings presented in this Thesis support the argument that satisfaction and importance are two independent measures that each provide valuable information.

Apart from the conceptual and empirical considerations, one of the critiques identified in the literature is related to metric issues, that is, the use of ranking methods. Typically, political or social preference valuation is based on ranking and does not get involved in the issue of how much higher one rank is compared to the next rank. This point however might be important, as findings of this study indicate that distances between two ranks are indeed not the same. Therefore, this Thesis supports arguments that factors are not equally spaced between ranks, but rather follow more of a log curve where a few factors dominate the wellbeing set. This observation also warrants further research and method comparison.

The Index of Dissatisfaction proposed in this thesis and the resulting action lists distil factors that are of high importance, yet have received low satisfaction scores. However, two other groups of wellbeing factors have the potential to become “problem areas” in the future. One type are factors currently rated as being of high importance and also receiving high satisfaction scores, such as for example safety. This type of factors might be susceptible to a sudden change in satisfaction levels, for example, as a result of change in recent experience (such as a terrorist attack). The other type of factors of potential interest in the future are those which receive low satisfaction scores but are only considered to be important by a minority of the residents, such as public transport.

Factors receiving low satisfaction scores could become important in the future if the number of people concerned with the factor increase, for example, if more people become interested in public transport. Although the mechanisms by which those two types of factors would potentially become issues in the future are different, both types of factors might warrant long term monitoring of change.

Therefore, problem areas are likely to change over time, as a result of both extrinsic drivers and the intrinsic changes in population such as the current stage in an individual's life cycle, recent experiences, or the attention particular factors receive from respondent's peers (Schwarz and Strack, 1999). Longitudinal studies are thus of vital importance to follow regional trends. By tracking both satisfaction and importance scores separately, researchers could test whether overall scores are improving because of changes in how well needs are being met or because of changes in the importance of wellbeing factors (Constanza et al, 2007). Wellbeing factors included in studies should also be periodically re-assessed, as marginal utility theory suggests that new issues and concerns are bound to emerge in the future, while some of the currently relevant issues might fade in importance.

The approach proposed in this Thesis was developed in the context of strategic impact assessment, as a support-tool for policy and decision making at the regional level. The potential of this approach to be used as a support tool in other types of assessment, such as sustainability assessment, vulnerability assessment or social impact assessment, would warrant further research. In addition, this approach also has the potential to be used in sectoral analysis, and testing of the tool in the context of Corporate Social Responsibility would be an interesting area of research in the future.

7.3 Theoretical explorations and avenues for further research

Literature from both social science and economics discusses the importance of allowing the respondents themselves to select the wellbeing factors they are going to be surveyed on (CEPAUR 1986; Max-Neef et al, 1989; Sen, 1993a; Irwin, 2001; Costanza et al, 2007). Indeed, an important critique of most current methods in use is their "expert dependency" (Sadler, 2002), as they typically rely on experts to both provide lists of indicators to be followed, as well as to provide relative weights of importance for each indicator included. This Thesis provides an approach alternative to the expert decision

making, as both individual wellbeing “spaces” and the weighting of factors contributing to wellbeing was performed by respondents, not experts.

Decisions on the most important factors of wellbeing and their relative weights, made by respondents themselves, confirmed expectations based on utility theory, namely that individual utility functions are indeed unique. Different respondents selected different contributors, and selected them at different increments (levels). Although the proposed approach was well understood and accepted by respondents, and yielded functional sets of individual utility “spaces”, the approach proposed would certainly benefit from further testing, comparison and validation.

The threshold hypothesis, proposed by Max-Neef (1995), as well as the work of Daly and Farley (2004) on marginal dis-utility, suggests that the substitution of monetary with non-monetary goods as the main source of wellbeing is expected to occur once a country reaches certain levels of development. Indeed, the findings of this study (Chapter 4) support this proposition. Although the Australian government appears chiefly concerned with fiscal improvements (for example, Eckersley 2000), it appears that their constituency might have moved on. In this study, family relations and health were ranked as more important than income, and income was perceived as only marginally more important than safety, health services and water quality. This is likely to be, at least partially, due to the law of diminishing marginal utility. As any one good becomes relatively more abundant, the satisfaction people get from that good will typically wane in relation to the satisfaction they get from other goods (Lane, 2000). One wellbeing factor potentially worth further research along those lines is “cultural identity”, as it received very little attention from the respondents. It would be interesting to investigate if this is indeed due to the lack of interest in cultural aspects, or rather due to the law of diminishing marginal utility, where government policy in the area of cultural diversity is well established and well functioning, and hence satisfaction of cultural aspects and freedoms is currently high and thus not “registering” as a need. Importantly, ongoing changes in historical and social circumstances, as well as changes in tastes and fashion, make longitudinal studies essential in this context. Ideally, decision making processes should be adaptive and informed by findings of longitudinal studies.

Human needs must be understood as a system that is inter-related, interactive and where no hierarchies exist within the system, argues Max-Neef (1991). Testing of the

sensitivity of the needs system to perturbation and change, via longitudinal studies, would thus be of particular interest for future research. Depending on the nature of the assessment, the response could be investigated in relation to policy change or in relation to other types of change (for example, changes in the needs system in the context of climate change). More detailed studies of the relationship between “objective conditions” of the regions versus perceived subjective satisfactions would also be relevant in this context.

The interdisciplinary focus of this research allowed for the integration of economic, social and ecological concerns on an equal footing. The importance of natural environment to human wellbeing, proposed in several studies from the literature (Veenhoven, 2002; van Kamp et al 2003; Hassan et al, 2005 Larson et al, 2006), was also supported by this research. However, it would be of interest as part of further research to test these assumptions when the tool is used in a different context: in the urban metropolitan context or in developing country rural context.

Valuable insights in the study of regional wellbeing can be gained from the literature in the field of psychology. In particular, homeostasis theory (Cummins et al, 2002) and the positive cognitive bias theory (Cummins and Nistico, 2002, Cummins et al, 2003) appear pertinent. Homeostasis theory suggests that our perception of wellbeing is regulated by an internal mechanism similar to that of temperature control. Contributors to wellbeing receiving low satisfaction levels are a sign of “homeostatic failure”, of an external influence that is negatively affecting our internal systems. “Homeostatic failures” should therefore be of concern to policy makers, who should aim at actions that improve objective conditions and in turn restore satisfaction levels to “normal”. Support for the homeostatic failure theory was reported in this study, however, it would be interesting for further research to test this hypothesis in longitudinal studies, assessing if there is indeed a correlation between policy intervention and increases in satisfaction scores, as a result of restoration of homeostasis.

The positive cognitive bias theory indicates that the sensitivity of wellbeing contributors, that is the variation in satisfaction scores, will increase as contributors become more specific and more distant from the person. *Vice versa*, highest scores and least variation in scores are to be expected for matters that we find personal: our relations, our safety, our health. Indeed, the findings of this study support this hypothesis. But if the personal factors tend to receive higher satisfaction scores due to

cognitive bias, then self-assessment of personal factors is not necessarily correlated with the “objective conditions” present. This proposition was explored to some extent in this Thesis, through comparison of subjective satisfaction scores and the “objective data”. High satisfaction with safety, for example, did not appear to be warranted. Overall, the implications of the positive cognitive bias theory might be quite significant for the use of the subjective wellbeing approaches in the policy context and thus, warrant significant further research activity.

In particular, learnings from psychology could be of interest to research in the area of utility and wellbeing functions. Many computer models assume that a marginal utility log-type curve is the right functional relationship for all wellbeing factors. However, implications of positive cognitive bias theory indicate that this is not necessarily the case. If the concept of human wellbeing (quality of life) is to be used for modelling and predictions of the future, we would need to understand the functions (curves) that guide subjective perception of each contributor to wellbeing. For example, some of the contributors from the natural environment, such as water quality (Fiering 1982) or fisheries (Walters 1986), are found not to follow a log-type or linear curve in their responses to impacts, but rather to “flip” from the positive state to a negative state (Holling 1973). Is it possible that our responses to changes in the state of those contributors would also follow more of an S-curve rather than a log-curve? Furthermore, would the shape of our response curve be more influenced by objective characteristics of the system (i.e. our response curve would “flip” from satisfaction to dissatisfaction once fisheries collapse); or would it be determined by the proximity of the wellbeing contributor to “self” or by how abstract it is (where more personal abstract factors such as family relations experience different response curve to more distant factors such as fishing)? Or would our response curve be dominated by the importance that a particular contributor has to a person, thus implying that there would be no single response curve for a given contributor but rather that importance of that factor to the individual would need to be factored before we can estimate his or her response curve (i.e. response curve of recreational fisherman versus someone who does not care about fishing)? Given the increasing reliance of research and research findings on models that make not always well substantiated “assumptions” on issues such as those discussed above, testing of those important assumptions would indeed warrant further research.

One of the key conditions for ‘efficient’ investment in regional development requires that one invests resources on items that generate the highest marginal returns. The results of the two case studies presented in this Thesis suggest that the marginal returns on investment in social and environmental factors are at least as high as those associated with investment in economy and services – perhaps higher – and that these factors thus warrant further attention from decision makers in these regions. Whether or not the same holds true in other regions, is a topic worthy of further investigation.

Chapter 8 References

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Appendix 1 Human Ethics Committee Approval letter

ADMINISTRATIVE DOCUMENTATION HAS BEEN REMOVED

Appendix 2 Mail-out survey documentation package, including questionnaire



Listening to Reef community voices

INTRODUCTION

CSIRO researchers are committed to understanding community responses to policy changes in the Great Barrier Reef catchment areas. This project is particularly interested in understanding livelihood systems and wellbeing in the area, and the way these interact with policy.

Our research is contributing to the development of the best decision making practices that ensure that those who live in the region are heard and their views are taken into account.

What is a livelihood system and wellbeing?

A livelihood system is a set of activities and structures put in place by people to achieve their personal and/or family goals.

Wellbeing refers to influences that contribute to personal happiness and satisfaction, such as the satisfaction of basic material needs, the experience of freedom, health and personal security, good social relations or healthy ecosystems.

Livelihoods in the GBR catchment are largely dependent on the land. Improved understanding of livelihoods will lead to better land use and management options.

Regional policy initiatives can only succeed if these community factors are taken into account. In order to understand these issues, we are carrying out a variety of investigations, including meetings with community members.

Our aim is to provide real information to contribute to future policy and planning.

Understanding community wellbeing is important for the development of effective policy and tools



Livelihoods in the Great Barrier Reef Catchments are largely dependent on the land. Improved understanding of the livelihoods will help in the development of improved land use and land management options

We would like to talk to anyone **who runs a business** in the Whitsunday Shire area, or **anyone living in the Shire** who would like to contribute to this project. The information you give us will remain anonymous.

GETTING INVOLVED

If you would like to be involved, or you know someone you think we should talk to, please contact Silva Larson from CSIRO:

Email: silva.larson@csiro.au

Phone: 07 4753 8589

Mobile: 042 707 84 36

For more information on Water for a Healthy Country Flagship please contact CSIRO:

Phone: +61 2 6246 4565

Web: www.csiro.au



This research contributes to The Great Barrier Reef Catchment Theme in the Water for a Healthy Country Flagship. Our goal is to provide solution science to support landholders, decision makers and the community in halting and reversing the decline in water quality entering the Great Barrier Reef lagoon.

This research is a collaboration between Australian and Queensland government agencies, regional natural resource management boards, local government, James Cook University and CSIRO.



ADMINISTRATIVE DOCUMENTATION HAS BEEN REMOVED



REGIONAL WELLBEING SURVEY

Whitsunday Shire Case Study

**James Cook University
and
CSIRO Davies Laboratory**

Townsville

November 2006

A. General questions

Resident location (town only) _____

1. **Are you (PLEASE TICK ONE)** Male Female

2. Marital status:

Which stage describes you best? (PLEASE TICK ONE ONLY)

Married or in relationship with:

- No children
- With dependent children
- Children not dependent or left home

Single with:

- No children
- With dependent children
- Children not dependent or left home

3. Age: What is your age group? (PLEASE TICK ONE)

<i>20-29</i>	<i>30-39</i>	<i>40-49</i>	<i>50-59</i>	<i>60-65</i>	<i>Over 65</i>

4. Cultural background:

Are you: **(PLEASE TICK ONE)**

- An Indigenous person
(Aboriginal or Torres Strait Islands)
- Non-indigenous person

Were you: **(PLEASE TICK ONE)**

- Born in Australia
- Born overseas

Where overseas? _____

5. Qualifications and special skills, which ones apply to you?

(PLEASE TICK AS MANY AS APPLY TO YOU)

- No formal schooling
- Finished year 6 or less
- Finished year 10 or less
- Finished year 12 or less
- TAFE qualification
- Trade/ apprenticeship
- Work experience (farming, mechanical, admin, crafts, etc.)
- Tertiary education / higher degree

6. What would you describe as your MAIN sector of employment?

(PLEASE TICK ONE ONLY)

<p>Industry and services:</p> <p><input type="checkbox"/> mining</p> <p><input type="checkbox"/> transport</p> <p><input type="checkbox"/> construction</p> <p><input type="checkbox"/> manufacturing</p> <p><input type="checkbox"/> environmental protection</p> <p><input type="checkbox"/> trade (retail or wholesale)</p> <p><input type="checkbox"/> tourism</p> <p><input type="checkbox"/> other private sector service (such as hairdresser, shop assistant etc, please specify):</p> <p>_____</p> <p><input type="checkbox"/> government or government service (such as teacher, Council worker etc, please specify):</p> <p>_____</p>	<p>OR: Agriculture:</p> <p><input type="checkbox"/> fruit, nuts, vegetables</p> <p><input type="checkbox"/> sugar cane</p> <p><input type="checkbox"/> livestock</p> <p><input type="checkbox"/> fishing</p> <p><input type="checkbox"/> forestry</p>
	<p>OR: No income from employment:</p> <p><input type="checkbox"/> income from investment/ private pension</p> <p><input type="checkbox"/> support from family/friends</p> <p><input type="checkbox"/> support from government</p> <p><input type="checkbox"/> CDEP</p>
<p>OR: Other: <input type="checkbox"/> Please specify _____</p>	

7. How long have you lived in the area ?

Please include the approximate total time, if there were breaks in between. (PLEASE TICK ONE)

- Less than 5 years Between 5 and 15 years
- More than 15 years My whole life

8. How would you consider yourself?

A "local" ? Yes No

Respected, someone people look up to or listen to in your community?

- Yes No

9. Have you recently been involved in community activities or voluntary work (such as sporting clubs, school activities, church, meals-on-wheels etc?) Please list here:

10. Do you belong to any industry or professional association or other organisation? If yes, please list here:

B. 1. Personal wellbeing questions

Wellbeing is usually described as being the result of aspects of life that contribute to happiness, quality of life and welfare.

Many of the components of wellbeing are common to all Australians. Health, good family and community relations, fulfilling jobs and sufficient incomes are some of the components of wellbeing. However, the needs and aspirations of different people, and the communities they contribute to, also vary in important ways.

Reflecting this diversity is not easy. Therefore, we are asking you to share with us your personal ideas on what is important in your life and what makes you satisfied or dissatisfied with the “way things are.”

The picture below presents some of the factors typically identified by people as contributing to their personal wellbeing.

PLEASE TICK THE BOXES NEXT to the factors that you consider important to you personally. If something you consider important to you is not listed in the picture, please feel free to write it down under "OTHER".

(PLEASE TICK ALL THAT APPLY TO YOU)

The diagram consists of three large overlapping circles. The top-left circle is titled 'Family and Community' and contains a list of factors A1 through A11. The top-right circle is titled 'Environment' and contains a list of factors B1 through B11. The bottom circle is titled 'Economy and Services' and contains a list of factors C1 through C11. In the center, where all three circles overlap, is a smaller circle titled 'Your personal wellbeing' with a smiley face icon. Each factor in the lists has two empty boxes next to it for ticking.

Family and Community	
A1 Family relations	<input type="checkbox"/>
A2 Community relations	<input type="checkbox"/>
A3 Personal/family safety	<input type="checkbox"/>
A4 Cultural identity	<input type="checkbox"/>
A5 Personal/family health	<input type="checkbox"/>
A6 Personal/family education levels	<input type="checkbox"/>
A7 Civil and political rights	<input type="checkbox"/>
A8 Sports, travel, entertainment	<input type="checkbox"/>
A9 Council relations	<input type="checkbox"/>
A10 Other :	<input type="checkbox"/>
A11 Other :	<input type="checkbox"/>

Environment	
B1 Fishing, hunting, collecting produce	<input type="checkbox"/>
B2 Swimming, bushwalking and other outdoor pursuits	<input type="checkbox"/>
B3 Air quality	<input type="checkbox"/>
B4 Water quality	<input type="checkbox"/>
B5 Soil quality	<input type="checkbox"/>
B6 Beauty of the landscape / beaches	<input type="checkbox"/>
B7 Condition of the landscape / beaches	<input type="checkbox"/>
B8 Access to natural areas	<input type="checkbox"/>
B9 Biodiversity	<input type="checkbox"/>
B10 Other :	<input type="checkbox"/>
B11 Other	<input type="checkbox"/>

Economy and Services	
C1 Work	<input type="checkbox"/>
C2 Income / financial security	<input type="checkbox"/>
C3 Housing	<input type="checkbox"/>
C4 Health services	<input type="checkbox"/>
C5 Training and education services	<input type="checkbox"/>
C6 Public transport	<input type="checkbox"/>
C7 Recreational facilities	<input type="checkbox"/>
C8 Support services	<input type="checkbox"/>
C9 Roads condition	<input type="checkbox"/>
C10 Other :	<input type="checkbox"/>
C11 Other:	<input type="checkbox"/>

Your personal wellbeing
😊

Now you have ticked ALL the factors that are important to you, we would like you to think about which of these factors are THE MOST important ones for you personally.

C. Optional answers

C.1. Do you own or have a mortgage on any of the following?

(PLEASE TICK ALL THAT APPLY TO YOU)

Asset	Whitsunday Shire	Elsewhere	Do not own
Farm / Productive land			
Private residence (House or a unit)			
Business or business assets			
Investment property			
Other investment (shares, art....)			

C.2 In what category would you place your total annual household income? (PLEASE TICK ONE)

- | | |
|---|--|
| <input type="checkbox"/> \$ 1 to \$20,000 | <input type="checkbox"/> \$ 100,000 to \$150,000 |
| <input type="checkbox"/> \$ 20,000 to \$35,000 | <input type="checkbox"/> \$ 150,000 and above |
| <input type="checkbox"/> \$ 35,000 to \$50,000 | <input type="checkbox"/> don't know |
| <input type="checkbox"/> \$ 50,000 to \$75,000 | <input type="checkbox"/> prefer not to specify |
| <input type="checkbox"/> \$ 75,000 to \$100,000 | |

Thank you for taking the time to complete this questionnaire. Your assistance is much appreciated. If there is anything else you would like to tell us about this survey, please do so in the space provided below:

If you have any questions regarding this survey please contact:

Silva Larson, CSIRO Davies Laboratory

Private Mail Bag, Aitkenvale QLD 4814

Phone: 07 / 4753 8589 or E-mail: silva.larson@csiro.au



Should you have any comments or questions about the conduct of this survey, please contact:

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Email: Tina.Langford@jcu.edu.au

Appendix 3 Outputs of this research

“Imagine that the well-being of Robinson Crusoe is measured using the sum of vegetation on his island and his knowledge of philosophy.”

Ruth Veenhoven (2009), on relevance of expert derived objective measures to assessment of human wellbeing

Scientific outputs:

Journal articles:

Larson S, DeFreitas DM and Hicks CC (submitted): Does sense of place determine how people connect to the environment? Implications for coastal conservation planning in the Great Barrier Reef, Australia. *Ecology and Society*

(Five-Year Impact Factor: 4.705; ERA 2010 A* journal, environmental sciences)

Larson S. (2010). Regional wellbeing in tropical Queensland, Australia: developing a dis-satisfaction index to inform government policy. *Environment and Planning A*, 42: 2972 - 2989

(Five-Year Impact Factor: 1.726; ERA 2010 A journal, urban and regional planning)

Larson S and Stone-Jovicich S (2010): Community Perceptions of Water Quality and Current Institutional Arrangements in the Great Barrier Reef Region of Australia. *Water Policy Journal*, available online.

(Impact factor 1.175)

Larson S (2010): Understanding barriers to social adaptation: are we targeting the right concerns? *Architectural Science Review*, Vol. 53 (1): 51-58

(ERA 2010 A journal, architecture)

Larson S (2009): Communicating stakeholder priorities in the Great Barrier Reef region. *Journal of Society and Natural Resources*, 22 (7): 650-664

(Five-Year Impact Factor: 1.725; ERA 2010 A journal, multidisciplinary)

Book chapters:

Larson S (2010): Understanding barriers to social adaptation: are we targeting the right concerns? In: S Roaf (ed). Transforming Markets in the Built Environment: Adapting for Climate Change, Earthscan, London, UK.

Bohensky E, Stone-Jovicich S, **Larson S**, Marshall N (2010): Adaptive capacity in theory and reality: implications for governance in the Great Barrier Reef region. In: D. Armitage and R. Plummer (eds.) Adaptive capacity: Building environmental governance in an age of uncertainty. Springer, Heidelberg, pp 23-41.

Conference papers:

Larson S (2008): What can we learn from combining wellbeing satisfaction with the relative importance of wellbeing contributors? 10th Australian Conference on Quality of Life, Melbourne, Australia, November 19-20 2008, p8.

Larson, S and Stone-Jovicich S (2008): Community perceptions of water quality and current institutional arrangements in the Great Barrier Reef region of Australia. IWRA World Water Congress, Montpellier, France, September 1-4, 2008. Book and CD of proceedings

Larson S (2008): Individual Wellbeing Function: A methodological approach for improved communication of the stakeholder priorities in catchments of the Great Barrier Reef, Australia. Proceedings of the International Sustainability Conference, Basel, Switzerland, August 20-22, 2008; Edited by Daub CH, Burger P and Scherrer Y, p232. Also available online at: <http://www.sustainabilityconference.ch>

Larson S (2007): Local stakeholder's perceptions and integrated water management of World Heritage Areas in northern Queensland. Proceedings of the 10th International Riversymposium and Environmental Flows Conference, Brisbane, Australia, 3-6 September 2007, p65

Larson S (2007): Perceptions, wellbeing and water quality management: an example

from the Great Barrier Reef catchments, Australia. Shifting Sands: Inaugural Queensland Coastal Conference, Bundaberg, Australia, 17-19 September 2007, p59 and CD of proceedings

Larson S (2006): Wellbeing function as a support tool for communication of the stakeholder priorities and goals on catchment scale. Proceedings of the 10th International Conference on Diffuse Pollution and Sustainable Basin Management, September 18-22, 2006, Istanbul Turkey, p122 and CD proceedings (kc97)

Larson S (2005): Livelihoods systems and wellbeing of the Great Barrier Reef communities. Rainforest meets Reef: Joint Conference of CRC Reef and Rainforest CRC; November 22-24 2005, Townsville

Community interactions and outcomes

In addition to the scientific impact, this research study also aimed at producing impact at the local level - at the communities involved in the original research, and at the policy level. Several meetings, consultations and presentations with the key bodies in the regions under study (such as Shire Councils, industry organisation, regional development bodies and regional natural resources management bodies) were conducted throughout the project.

Contact with the wider community of the case study regions was maintained using media coverage and printed materials. The following outputs were produced for the benefit of the local community:

Project Website:

“Listening to Reef community voices” :

<http://www.csiro.au/science/reefcommunityvoices.html>

Reports to the community:

Larson S (2007): Wellbeing and livelihoods survey of the Whitsunday Shire: Report to the community. CSIRO: Water for a Healthy Country National Research Flagship, Canberra, August 2007. Available online at:

<http://www.csiro.au/resources/WhitsundayLivelihoodsReport.html>

Larson S (2007): Wellbeing and livelihoods survey of the Cardwell Shire: Report to the community. CSIRO: Water for a Healthy Country National Research Flagship, Canberra, February 2007. Available online at:

<http://www.csiro.au/resources/CardwellLivelihoodsReport.html>

Both scientific publications and media releases and brochures helped in communication of the findings to the policy makers. Several levels of decision makers were particularly targeted: Local councils; Regional NRM bodies; and state/commonwealth agencies. As a result, a number of presentations of the study findings were organised at relevant local councils (Whitsunday Shire Council and Cardwell Shire Council) as well as at relevant NRM bodies (Terrain and Mackay Whitsunday Regional Natural Resources Management Board).

Contribution to the state and commonwealth planning processes was provided via attendance at two expert workshops:

- “A social and economic framework for water quality improvement in the GBR region”, expert workshop organised by Great Barrier Reef Marine Park Authority in October 2007; and
- “Social dimensions of reef sustainability”, Social and Economic Sub-Group Expert Panel Workshop organised by Great Barrier Reef Foundation in May 2010.