

Perceptions, wellbeing and water quality management: An example from the Great Barrier Reef catchments

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Abstract

Over the last 150 years landscapes adjacent to the Great Barrier Reef World Heritage Area in Australia have undergone extensive modification. Continuous increase in the agricultural, mining, timber, tourism and residential land uses has resulted in continuous deterioration of the quality of water flowing into the Reef lagoon. Acknowledging this problem, Queensland State and Australian Federal governments have, in 2003, jointly develop The Reef Water Quality Protection Plan. The main approaches specified for achieving the objectives of the Plan are based on understanding that ongoing improvement in sustainability of land use practices at a property and landscape level is dependant on landholders understanding of their duty of care to the environment and the impacts of their activities. Sustainability concept might however be too abstract to capture attention and action from majority of the landholders and other on-ground stakeholders involved. This paper investigates one potential avenue for the “translation” of sustainability concept from the national to a more personal level - the wellbeing concept. Some of the results of the survey investigating individual wellbeing preferences in Social, Ecological and Economic domains, of residents of two Great Barrier Reef catchments, are presented. The paper also discusses the potential role individual perceptions of wellbeing could play in improvement of integrated water management.

INTRODUCTION

The Great Barrier Reef (GBR) World Heritage Area in Australia is of significant natural, social and economic importance. Over the last 150 years, the catchments adjacent to the Reef have undergone extensive modification and now support flourishing agricultural, mining, timber and tourism industries (Productivity Commission, 2003). Unfortunately, the quality of water flowing into the GBR lagoon has progressively deteriorated as catchment landscapes have been transformed. Significant impact is created by diffuse pollution from broad-scale agricultural land use and in particular by pesticide and nutrient applications (Furnas, 2003; Haynes, *et al*, 2000; Mitchell *et al*, 2005). Scientific evidence indicates negative impacts of sediments and nutrients from these land use activities on the inner reefs and seagrass areas of the Reef. In 2003, the Australian Federal government and Queensland State government adopted the Reef Water Quality Protection Plan. The Plan deals specifically with the diffuse sources of pollution and provides strategies for actions to minimise the entry of those pollutants to the GBR. The Plan embraces a cooperative approach that seeks to involve government, scientific, local and other stakeholders at all levels. The objectives of the Plan are to be achieved through improvement in sustainability of land use practices: ‘The focus of actions in the RWQPP [Reef Water Quality Protection Plan] is relatively low cost measures to encourage good planning and to assist landholders in adopting best management practices that are both profitable and environmentally sustainable’ (Australian Government and Queensland Government 2003, p. 2).

However, the concept of sustainability appears to be too abstract to capture the attention and action from the majority of landholders and other on-the-ground stakeholders. Understanding and acceptance of principles of sustainability could improve if national scale goals are “translated” into issues relevant to stakeholders on the ground (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 the policy makers. The concept of sustainable development, highly publicised following the Brundtland Report (WCDE, 1987), promotes economic policies that will sustain natural environments for future generations’ welfare, while ensuring that living standards in the present are maintained. The concept links ecological protection and economic development, while insuring human welfare. The concept of a “triple bottom line” (Elkington, 1998) sets a similar agenda for businesses, by encouraging them to look beyond their financial bottom line

and also include ecological and social “bottom lines” as indicators of their overall performance. There are a few related concepts with the potential to communicate sustainability between the policy level and the individual (personal) level, such as the concepts of standard-of-living, quality-of-life and wellbeing (see Larson *et al*, 2006 for literature review).

The research presented in this paper was conducted in two case study areas: Tully and Murray rivers catchment and respective coastal areas of the Cardwell Shire; and Whitsunday rivers catchment and respective coastal areas of Whitsunday Shire. The preliminary findings, investigating wellbeing as a potential tool for exploration and communication of stakeholders perceptions, are presented. First, the conceptual framework of the research is presented, followed by a section on design framework and methods. Presentation of the preliminary results is followed by discussion of the potential applicability of the approach and further activities planned. The paper closes with a few “take home” messages.

WELLBEING CONCEPT

The wellbeing concept is an integrative concept with a scope that can investigate social, ecological, economic, institutional, cultural and other domains. Furthermore, the concept of wellbeing has a potential to capture subjective understanding of each domain by stakeholders themselves. Questionnaires developed to measure wellbeing can provide: (1) a valid, reliable, comparable and comprehensive profile of wellbeing; (2) key information that is not available from standard data sources currently available to policy-makers working with local communities; and (3) a tool for measuring wellbeing over time and across communities (Christakopolou *et al*, 2001). The research presented in this paper aimed to develop a questionnaire that would provide insights into all three of the above proposed areas. Furthermore, the questionnaire would allow for a quantitative measure of wellbeing. The integrated conceptual model developed for this research was mainly influenced by human-ecosystem wellbeing models, an overview of which is presented in Larson *et al* (2006). It also draws on subjective understandings of wellbeing (Irvin, 2001), where environment is not “given”, but also created and interpreted by humans. The individuals are accepted as influenced by interactions with their natural and social world (Hodgson, 1992). Hodgson (1992) defines perception as an act of categorisation, and argues that categories are learnt through our education and socialisation to form a basis of our understanding of complex and changing world around us. Therefore, there is a need for an adequate understanding of how individuals, and communities, see and interpret the environment in which they reside. Approaches that take into account individual experiences help understand and communicate the interpretations, priorities and needs of those individuals (Deiner and Suh, 1997).

The focus of this research was to develop a tool that integrates social, economic and ecological concerns; and captures individual perceptions of those concerns. The tool developed also allows for quantification of the results. A hypothetical Individual Wellbeing Function (IWF) was developed (Larson, 2006). Individuals assign relative weights to the wellbeing factors most important to them, thus creating their IWF. The IWF can therefore be used to quantify levels of relative importance of different wellbeing factors, as perceived by individuals.

RESEARCH DESIGN AND METHODS

The research process comprised of several stages. Following a literature review of theoretical and empirical studies related to human wellbeing and a review of data available for the Great Barrier Reef region, a conceptual model of wellbeing was developed and discussed with key informants. Key informants included professionals, such as academics and government agency representatives, and community representatives from the proposed case study areas. Socio-economic and demographic data available for the specific case study area was also collated during this time. These steps aided in the development of a draft questionnaire, which was tested during the pilot stage of the study with key informants and additional community members.

Community engagement process

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 Cardwell Shire Floodplain Program Steering Committee) and an informal approach (informal and semi-formal meeting with representatives of various community and government organisations and interested residents of Whitsunday Shire and media coverage) were tested. The key steps of the project and therefore key time points for engagement to date were: presentation of literature reviews on human wellbeing and a review of data available for the Great Barrier Reef region; development of a conceptual model of wellbeing and the draft questionnaire in collaboration with key informants; and testing of the draft questionnaire in a pilot study conducted with the key informants and additional community members.

The study is attempting to develop a sense of ownership of the results and provide motivation for ongoing involvement. Therefore, reporting and dissemination of the findings of the research back to community members, participants, key informants and community and government bodies, is an important final step of the process. This is being achieved through face to face meetings, media coverage, and publication of results findings in reports dedicated to the community (for example, see Larson, 2007).

Questionnaire

The questionnaire consisted of three categories of questions: (1) socio-demographic questions; (2) questions about respondents' involvement in community ("sense of place" questions); and (3) questions about respondents' perceptions (wellbeing questions). The questionnaire drew on examples from the literature, but also included questions of relevance to the particular biophysical and socioeconomic setting. Table 1 presents the list of all personal wellbeing factors included in the final questionnaire, grouped into the domains of Society - family and community, Ecology - natural environment, and Economy and services. In order to minimise selection bias, six different questionnaire forms were produced, each presenting a different order of appearance of both domains and factors within domains.

Table 1. List of factors potentially contributing to individual wellbeing

Society – Family and community	Ecology – 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 outdoor activities	Condition of the roads
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

Participants were asked to select key factors influencing their wellbeing in two steps:

- (1) First, participants were asked to select all the factors (as per Table 1) that they considered as contributing to their wellbeing – their 'Contributors to Wellbeing'.
- (2) Second, participants were asked to choose 5-7 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. Points assigned to key factors were added and standardised to 1, thus creating an 'Individual Wellbeing Function'.

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 areas (Media M Group, 2006). The list was first stratified by locality, and then alphabetically organised, in order to ensure geographic representation in the sample. The survey was mailed to 410 (15%) of Cardwell Shire households and to 522 (10%) of Whitsunday Shire households. In the Cardwell Shire, a total of 180 valid responses were obtained, representing 6.8% of registered households. This also corresponds to the survey response rate of 44%. A total 193 valid responses were received in Whitsunday Shire, representing 3.7% of registered households and the survey response rate of 37%. The representativeness of the survey sample was tested by comparing the demographic data of participants with demographic data from the Australian Bureau of Statistics, for Shires as a whole. The comparison included gender, age, marital status, cultural background, education and sector of employment.

RESULTS

Contributors to wellbeing

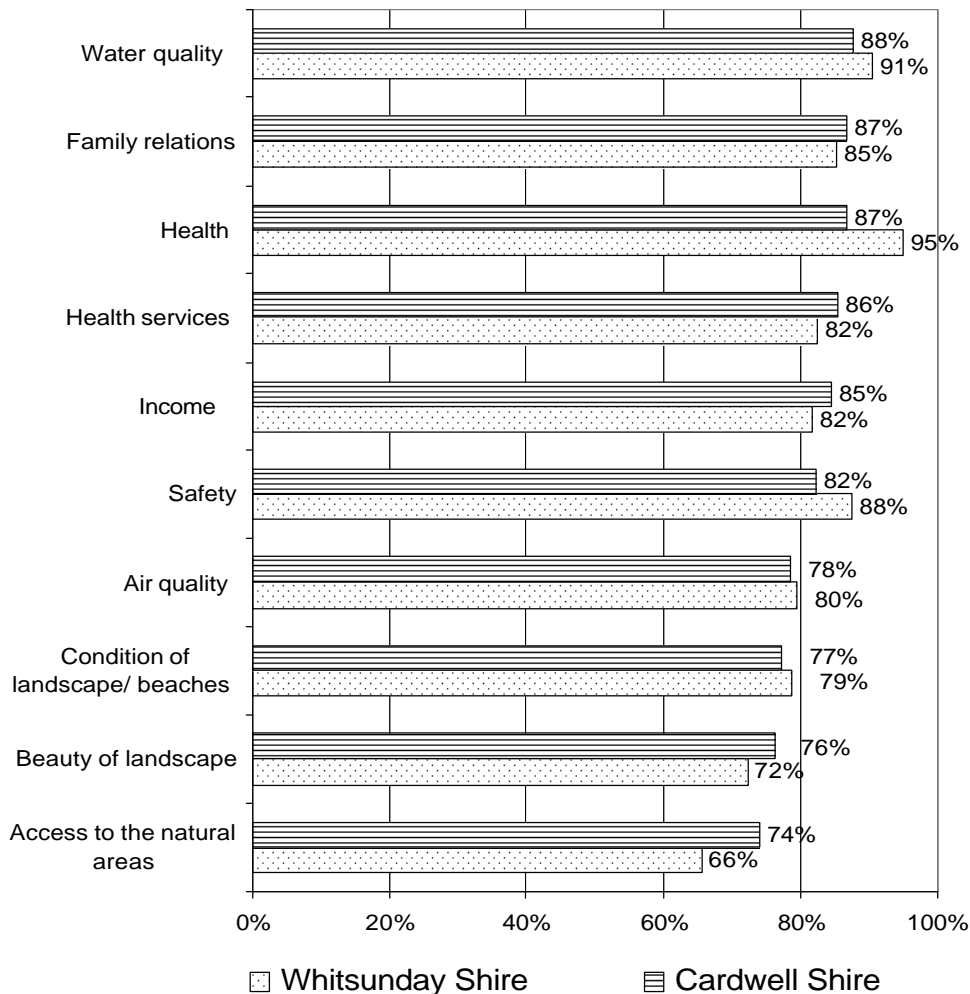


Figure 1. Percentage of respondents that identified each factor as contributing to their individual wellbeing (Cardwell Shire n=180; Whitsunday Shire n=193; only factors selected by more than 70% of respondents are presented)

Factors of wellbeing identified as important by more than 70% of respondents are presented in Figure 1. In Cardwell Shire, Water quality (88% of all respondents), Family relations (87%), Health (87%), Health services (86%), Income (85%) and Safety (82%) were selected by more than 80% of all respondents as contributing to their wellbeing. Health was selected by most respondents in Whitsunday Shire as important to their wellbeing (95%), followed by Water quality (91%), Safety (88%), Health services (82%), Income (82%) and Air quality (80%). It can be observed from Figure 1 that wellbeing factors selected by majority of the respondents are similar in both shires.

Individual Wellbeing Functions (IWF)

The factors that received the highest scores in the wellbeing functions and were selected by the highest percentage of respondents are presented in Table 2. Again, similarity between the two shires is considerable: Family relations, Health, Income, Health services, Safety and Water quality were selected as the most important factors of wellbeing by the highest proportions of respondents in both case studies, and received highest weights.

Table 2. Factors receiving highest scores in the Individual Wellbeing Functions (IWF), with percentage of respondents selecting the factor

2a. Cardwell Shire

Factor	Family relations	Health	Income	Health services	Safety	Water quality
Domain	Society	Society	Economy	Economy	Society	Ecology
% respondents *	68.3 %	64.1%	56.3%	55.1%	52.1%	41.9%
Mean weight	0.132	0.113	0.083	0.088	0.083	0.062
Median	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

2b. Whitsunday Shire

Factor	Family relations	Health	Income	Water quality	Safety	Health services
Domain	Society	Society	Economy	Ecology	Society	Economy
% respondents *	66.9%	64.6%	54.7%	51.4%	48.1%	45.9%
Mean weight	0.130	0.110	0.080	0.070	0.080	0.070
Median	0.140	0.140	0.130	0.090	0.000	0.000
Std. Deviation	0.133	0.094	0.083	0.076	0.086	0.086

* Percentage of respondents who included this factor into their IWF (Cardwell Shire n=180; Whitsunday Shire n=181)

DISCUSSION

Results of the questionnaire-based mail survey, investigating individual wellbeing of the residents of two catchments/ Shires in the Great Barrier Reef region, were presented in this paper. The questionnaire drew from the literature, but also addressed areas identified as of relevance by the on-the-ground stakeholders, including beauty and the condition of the landscape and beaches, and road conditions. The research process developed here served as a replicable benchmark that allowed comparison of perceptions of factors that are important to the wellbeing between the two different Shires of the GBR. The process developed could also serve as a replicable benchmark that allows comparison of perceptions in the same area over time.

The individual wellbeing

The research aimed to create a tool that could be used to communicate stakeholder priorities to policy makers. The questionnaire allowed for the collection of information on residents' wants and priorities, which are not readily available in standard data sources. Furthermore, the Individual Wellbeing Function concept, developed for the purpose of this study, permits one to quantify the relative importance of wellbeing factors across multiple domains. The survey has highlighted the importance of social factors to the individual wellbeing of respondents. Factors from the Society

domain have both been selected by largest proportion of respondents and received highest scores in the wellbeing functions. High importance assigned to factors in Social domain might have important implication for policy planning.

Interestingly, the “Water quality” factor was included in the wellbeing functions of 41.9% and 51.4% of the respondents (Cardwell and Whitsunday Shire, respectively). Participants’ concern about water quality, captured through this questionnaire, indicates that policy actions resulting in improved water quality may generate greater support from the community than is expected by policy makers. The perceptions of the water quality will be further investigated in face-to-face interviews with the residents, planned for later this year.

Role of perceptions

The tool developed and described in this paper allows for understanding of wellbeing as subjectively perceived by individuals. Hodgson (1992) argues that perceptions are acts of categorisation, and that the categories are learnt, through our education, socialisation etc. This research indicates that ecological factors, in particular water quality, are perceived as important to individual wellbeing by members of the GBR communities. If the improvement of the water quality is a policy goal, then its importance could be reinforced by “education”, such as improved information dissemination and awareness campaigns. Learning through “education” could in turn re-enforce learning through “socialisation”. Water-quality related issues might thus become even more prominent for individual wellbeing, and therefore increasingly worthy of individual actions. In turn, policy goals would be easier to achieve when dealing with individuals willing to take actions that reinforce those goals.

The improved understanding of factors of importance to catchment populations’ wellbeing can support decision-makers in devising desirable and therefore acceptable options for integrated management at the catchment scale. Abstracts goal such as “sustainable development” can be translated into issues perceived as important by individuals themselves. Such “translation” would not only promote sustainable development, but would also appeal to local residents.

TAKE HOME MESSAGES

- The paper discusses a new tool available to natural resources managers: Individual Wellbeing Function (IWF). This new tool allows for collection of information that is not readily available from standard data sources; yet is important for successful NRM;
- The tool can be used to quantitatively measure – and therefore rank - factors important to individual wellbeing of residents, as well as satisfaction with those factors;
- The tool can be used for the comparison of individual wellbeing and satisfaction both across communities (for example, across different communities within GBR as demonstrated here), or over time (for example, as a tool for monitoring change within a community over time);
- Important part of the tool is the actual process of implementation: transparency of the process and openness of the process to true participation are essential in developing community interest, engagement and a sense of ownership;
- Water quality was very important to the individual wellbeing of the respondents: this is a significant finding for policy-makers trying to improve water quality of the GBR region and should be investigated further;
- Understanding of the “world around us” is important. However, understanding of stakeholder’s perceptions of this “world around us” is equally important for both improved communication between stakeholders and policy makers as well as improved adoption of policy recommendations.

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