Future Scenarios for the Great Barrier Reef Catchment

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The Water for a Healthy Country Flagship aims to achieve a tenfold increase in the economic, social and environmental benefits from water by 2025. The work contained in this report is collaboration between CSIRO and Australian and State government agencies, local government, regional Natural Resource Management (NRM) bodies, non-government organisations (NGOs), peak industry, and other research providers.

For more information about Water for a Healthy Country Flagship or the National Research Flagship Initiative visit www.csiro.au/org/HealthyCountry.html

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¹CSIRO Sustainable Ecosystems
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FOREWORD

The level of attention currently focussed on the Great Barrier Reef (GBR) and adjacent coastal catchments is unprecedented.

Declining water quality in the GBR from changes in land use to more intensive production activities in the adjacent catchments poses substantial risks to the GBR ecosystems, especially in the face of climate change where multiple stressors reduce system resilience to extreme events. Pressing environmental concerns are driving us to consider whether the current land use and management practices in the coastal catchments and the use and management of the GBR lagoon will continue to be appropriate in the future. If we do not, or cannot, continue with current use and management of our natural resources on land and at sea, which portfolio of choices can we envisage and which ones do we eventually choose, and on what basis?

History has shown that when acting alone, neither government, industry, community nor an individual has the answer in addressing these challenges. What is required is a process that builds consensus about how Australian society and in particular the GBR community, should collectively respond. As representatives from Australian and State government agencies, local government, regional Natural Resource Management (NRM) bodies, non-government organisations (NGOs), peak industry and research organisations, we welcomed the opportunity to participate in the CSIRO-led project Future Scenarios for the Great Barrier Reef Catchment.

Some of us have been involved in an interview where we provided information to define the key drivers of change in the GBR catchment and to develop four possible scenarios for the GBR catchment. In the Future Scenarios for the GBR Catchment Workshop our goal has been to assess the plausibility of the four scenarios for the GBR region for 2050 and consider their implications for our region’s future. In doing so, we have not made recommendations for specific investments or government policy; instead we have sought to present a coherent view of the various elements to be considered when developing future pathways for natural resource use and management.

The Future Scenarios for the GBR Catchment Workshop provided an opportunity for further discussion and while the views contained in this Report do not necessarily represent the views of any single, or all, organisations participating, we have been very pleased by the level of consensus that we have achieved in coming to terms with the subject matter.

We hope the successful conclusion of this project will assist in moving forward the debate on the future of the GBR region by providing useful input to decision-makers in government and industry on what options will need their careful consideration and further research.

Prepared by the Reef Water Quality Partnership support team on behalf of the workshop delegates.

May 2008
PREFACE

The Water for a Healthy Country Flagship is a national research program addressing one of Australia’s most pressing natural resource issues – sustainable management of our water resources. The Flagship is the largest research partnership focussing on water in Australia. The partners include CSIRO, State and Australian governments, private and public industry and other research providers.

In the Great Barrier Reef (GBR) region the Flagship focuses on providing solution-based science to assist in addressing the threat of declining water quality entering the Reef Lagoon. To tackle the issue of declining water quality, the Australian and Queensland governments jointly developed the Reef Water Quality Protection Plan (Reef Plan). The goal of the Reef Plan is to … halt and reverse the decline in water quality entering the Reef within ten years. A number of major challenges constrain our current understanding of GBR ecosystem influences and dynamics, and hence potentially limit achievement of the Reef Plan goal. One major challenge is the integration of biophysical, social and economic information into a reliable and coherent understanding of the entire system. This is required in order to adequately predict the consequences of natural resource management decisions.

The Future Scenarios for the Great Barrier Reef Catchment project was established two and a half years ago to begin tackling this major challenge. It is with great pleasure that I can introduce this project report. The report describes the journey taken by the Future Scenarios for the Great Barrier Reef Catchment project team.

Section 1 sets the scene for the project: its context, goal and objectives, and the scenario planning approach taken.

Section 2 outlines the collaborative approach taken, the selection of the participants, and details on how the scenarios have been developed.

Section 3 presents the four qualitative scenarios developed for the GBR catchment in 2050.

Section 4 reports on the collaborators’ responses to the scenarios at the Cairns project workshop.

Section 5 reports on what the next steps are and Section 6 provides final remarks on what has been achieved since the Cairns project workshop and the learnings from the research to date.

As with any scenario planning exercise, this report does not resolve all the uncertainties we in the research community, and other GBR stakeholders, face. However, it clearly articulates the key environmental, social and economic challenges that the Flagship, other researchers, NGOs and GBR communities all seek to address over the coming decades.

Bill Young
Theme Leader, Healthy Water Ecosystems
Water for a Healthy Country Flagship

May 2008
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1. A MUCH NEEDED DIALOGUE: THE GBR FUTURE SCENARIOS PROJECT

This section outlines the context, goals and objectives of the *Future Scenarios for the GBR Catchment* project and the process the project team adopted in developing the scenarios.

1.1. Context of the project

The *Future Scenarios for the Great Barrier Reef (GBR) Catchment* is a research activity of the CSIRO-led Water for a Healthy Country National Research Flagship that is aimed at developing a better understanding of future uncertainties facing the GBR region (the catchments and the marine ecosystem) through scenario planning. The Water for a Healthy Country Flagship is the largest research partnership focussing on water in Australia. The partners include CSIRO, State and Australian governments, private and public industry and other research providers (Hatton 2007).

The Flagship aims to achieve a tenfold increase in the economic, social and environmental benefits from water by 2025. Its research focuses on and supports major water policy and strategies. In the GBR region, the Flagship supports the implementation of the Reef Water Quality Protection Plan, commonly known as the Reef Plan (Australian Government and Queensland Government 2003). The purpose of the Reef Plan is to develop actions, mechanisms and partnerships to halt and reverse the decline in the quality of water flowing from the coastal catchments (Figure 1) into the GBR lagoon within 10 years (i.e. by 2013). Declining water quality has led to degradation of GBR ecosystems (Bell 1991; Anon 1993; GBR Protection Interdepartmental Committee Science Panel 2003; Brodie and Mitchell 2005; Fabricius 2005; Brodie et al. in press).

Changes in land use and the associated loss of riparian forests and freshwater wetlands to agricultural production, and changes in land management practices have been responsible for the decline in water quality, both of which have increased significantly since European settlement (Pulsford 1996; Johnson et al. 1998; Brodie et al. 2001). Associated with these changes have also been the conflicts over the use and values of our natural resources, such as land and water, and the natural assets, such as the GBR and Wet Tropics World Heritage Areas in the region (Moorhouse 2002; Tobin et al. 2005; Bohnet et al. 2006; 2007b).
Figure 1. Geographical location of the Great Barrier Reef (GBR) catchment and reef
1.2. Goal and objectives

The future of the GBR catchment and its residents will be shaped by a range of certain and uncertain forces. Moving towards a more sustainable pathway to achieve the objectives of the Reef Plan and to develop a long-term strategic plan for a sustainable GBR catchment and marine ecosystem requires understanding of these forces or drivers of change at global, national, regional and local scales and how these forces may interact and influence future change.

The primary goal of this research was to work in collaboration with representatives from Australian and Queensland government, local government, regional Natural Resource Management (NRM) bodies, non-government organisations (NGOs), peak industry and research organisations to:

- Identify and analyse the key factors or variables likely to fundamentally influence the behaviour of communities, industries and natural ecosystems in the GBR catchment;
- Articulate and challenge expectations about the future;
- Develop four plausible scenarios that describe what the GBR catchment might be like for communities, industries and resource agencies in 2050; and
- Facilitate wide and ongoing communication and uptake of the findings to enhance the capacity of planners and policy-makers in strategic decision-making about the future of the GBR catchment.

Anticipated project outcomes are:

- Increased understanding of the factors that drive environmental, economic and social change in the GBR catchment over coming decades by all participating agencies, organisations and industries.
- Increased collaboration between researchers, planners and policy-makers in ongoing strategic deliberations, and monitoring of the future as it unfolds.
- Enhanced ability to use the scenario development process and outcomes in strategic decision making about the future of the GBR catchment.

1.3. Scenario planning

This research uses a scenario planning approach to elucidate the dynamics that may characterise the longer-term (e.g. 40-50 years) future. Scenario planning in the GBR catchment addresses key questions such as:

- What are the main factors driving change in the GBR catchment?
- How might these factors change the GBR catchment and how might the region look by 2050?
- What are the risks and opportunities associated with these drivers of change?
- What are potential methods of responding and perhaps intervening?

Scenario planners have developed a range of different scenario planning processes (e.g. Wack 1985a, 1985b, Cocks 1999, Wollenberg et al. 2000; Peterson et al. 2003; Cork et al. 2006; MEA 2005; Bohensky et al. 2006, PRELUDE 2006, Bohnet and Smith 2007). While they may take a number of different forms, most follow a basic structure. The broad seven step process used in the development of the Future Scenarios for the GBR Catchment is underpinned by a modified version of the steps identified by Peterson et al. (2003). These are:
1. Review literature on past and present trends and drivers of change in the GBR catchment (Hug and Larson 2006; Bohnet and Bohensky 2007a)

2. Identify focal issue/s (Reef Plan; Gambley and Bohnet 2007)

3. Identify project collaborators responsible for the future of the GBR catchment (Gambley and Bohnet 2007)

4. Develop a set of draft scenarios for the GBR catchment based on the reviewed literature and interviews with collaborators (Bohensky and Bohnet in prep., Bohnet 2007, Bohnet and Bohensky 2007b, Bohnet et al. 2007a, Bohnet and Bohensky, 2008)

5. Test plausibility of draft scenarios with collaborators (covered in section 4 of this report)

6. Finalise scenarios and qualitatively discuss the potential consequences of the scenarios for the GBR catchment (covered in section 4 and 6 of this report)

7. Work with interested collaborators to apply the scenarios to specific policy or planning questions (covered in section 6 of this report)

In practice, steps 1–7 are not unidirectional and each step may involve a number of tasks. Constructing scenarios invariably results in an iterative process wherein collaborators move back and forth between the interrelated steps or tasks within a step.

1.4. Purpose of this report

The primary purpose of this report is to provide participants of the collaborator workshop held in Cairns on 14th February 2008 with a summary of the workshop. However, given the enthusiasm and suggestions of the participants that this project and the workshop outcomes could provide the basis for further dialogue about the future of the GBR and its adjacent catchments, the research team decided to include further sections in this report, which make it a stand alone document and therefore suitable for wider distribution. Section 2 provides the background to the collaborative approach taken in this research and details of how the scenarios have been developed. Section 3 presents the four qualitative scenarios for the GBR catchment in 2050. Section 4 reports on the collaborators’ responses to the scenarios, Section 5 reports on what the next steps are and Section 6 provides some final remarks on what has been achieved since the Cairns workshop and the learnings from the research to date.
2. A COLLABORATIVE APPROACH

This section outlines how collaborators have been engaged in the project to identify the key drivers of change in the GBR catchment and to inform the development of four future scenarios for the GBR catchment for 2050.

2.1. Participants

Long-term strategic planning for the GBR region must involve a broad range of people who have a stake in or mandate to achieve the sustainable development of the GBR region and/or the reef (Gambley and Bohnet 2007). For this reason, the project team, with advice from the Reef Water Quality Partnership support team, selected a wide range of representatives from Australian and Queensland government agencies, local government, regional NRM bodies, NGOs, peak industry bodies, research organisations and some independent individuals.

Sixty-seven participants were selected based on their knowledge about the region, their research expertise, and their ability to influence strategic decision making in their sector or in their organisation. Chief Executive Officers (CEOs), senior management staff and researchers with expertise in key fields of interest to the region, such as climate change, coral reef studies, hydrology, environmental history, natural hazards, social science, humanities, and research and innovation, were invited to participate in the research by providing their expertise and views on the future of the region via an interview. A letter (Appendix A) was sent out together with a project brief (Bohnet and Bohensky 2007a) that included information about the project and its goals and objectives. In total, forty-seven people (about 70% of the selected) were interviewed for the project (see Appendix B for the list of interviewees). Some further people were interested in being interviewed for the project but were not available at the time, some others expressed interest in being kept informed about the project, and about six did not respond to numerous follow-up emails and phone-calls.

In addition to the interviews, briefing sessions about the project, its goals and objectives were presented to the Far North Queensland Statutory Regional Planning team in Cairns and to members of the Reef Water Quality Partnership in Brisbane to raise broad awareness of the project, discuss potential collaborations and the data and information needs of potential partners (see Appendix C for the briefing presentation).

2.2. Qualitative interviews

Qualitative interviews served two major purposes: to engage participants in the process of thinking about possible futures for the GBR region in 2050, and to gain information from them that would help shape the scenarios. The project team thus ensured that a cross section of people representing Australian and Queensland government agencies, local government, regional NRM bodies, NGOs, peak industry and research organisations were included. Based on the 47 interviews, which focused on the interviewees’ perspectives and thoughts on possible futures for the GBR region (see Appendix D for the interview questionnaire), we identified the key drivers of change in the GBR catchment that were considered to have the highest impact on the region and the highest uncertainty (Figure 2). These drivers are the ones most appropriately analysed by the scenario approach.
2.3. Key drivers of change

Review of the interview transcripts provided detailed information related to the key drivers of change in the GBR region. In cases where interviewees did not directly discuss what they considered the key drivers of change are, they often described their ideal future and what will prevent their ideal future from eventuating. Based on both detailed information on key drivers of change and contextual information the following list of key drivers was compiled from the interview analysis. The quotes associated with the key drivers provide an illustration of the information provided by the interviewees:

- **Population and demographic change**
  
  “The two key drivers that I see in that area is one, a population growth along the coast, so intensification of the coastal systems without adequate planning and thinking and the other is changes to our water systems and climate.”

- **Regional governance and leadership**
  
  “We do need to have very strong leadership ... we are not seeing that at this point in time at any level.”

  “You know, the tendency of the policy in Queensland is biased towards the South East, forgetting the regions to some extent. But by 2050, you never know, we may not have a state system. It might have been long abolished in favour of regional governments. And these regional governments may be the way of the future for dealing with things like threat of climate change, but also just building up regional economies.”

- **Water availability**
  
  “I’m still thinking that when people look at water, they’re going to start looking - their eyes are going to point north, and they’re not going to point north inland. They’re going to point coastal, and that’s what we could conceive, if we do get these global flows of people.”

Figure 2. High impact and high uncertainty were the criteria used to identify the key drivers of change in the GBR region.
“Water availability [is the aspect of the future I am most uncertain about.] And it’s not just whether or not it’s available up here, whether it’s gonna continue to be available in the same abundant supplies that we’ve enjoyed. And obviously that has to go south, and it has to. I’m not putting a value judgment on that. This is Australia, it’s not – we don’t own that water any more than any other Australian does. It’s a fact that water is a huge issue, I don’t care where you live in this country. And even though people can say there’s tonnes of water up here, a lot of it’s gonna have to go south and I don’t know if it’s gonna continue to always be there. But water is probably one of the biggest issues we have. Under that, of course, land availability for our industry, to accommodate the numbers of people that are coming up here. And number 3 would be the infrastructure needed to look after these people.”

“But, yeah, water – I think everyone’s got water on their brain at the moment. I think it’s – as a matter of fact, I think it’s overtaken terrorism as the single most important issue in what people care about.”

- Climate change

“The effect on the Great Barrier Reef through climate change is quite uncertain, and if that changes substantially it would change the attractiveness of the area.”

“Really, I guess the greatest risks in the area are environmental risks, and a lot of them are linked to climate change and to water.”

“We haven’t talked much about catastrophic events. If we have a series of catastrophic events in the catchment such as fire, a series of category 5 cyclones … you may have a very different outcome for 2050 than without … cyclones can have a big impact on the reef and the rainforest and biodiversity.”

- Oil/energy

(“I think a crisis will do it. I think increasing prices will probably drive some change. Things like fuel, as the price of fuel increases, it will drive people to re-evaluate how they might use fuel. Even though we could have another economy that’s based on fuel being twice the price it is, that change in price is something that really makes people sit back and look at it, whether it’s the price of fuel or electricity.”

“I think we have to say the price of oil, because it covers everything, it’s going to be a very important driver.”

- Infrastructure

“Well, I actually think government infrastructure investment will have a significant play on this, because so much is built around water and access transport, roads, ports, rail. There is no question that development will either be enabled or limited by access to major infrastructure.”

- Environmental policy
- Industry
- Disease

There’s other sorts of drivers … threats: we don’t know what’s going to happen with disease. A major bird flu epidemic might actually help the world - cut down the population"
- **Economy**

  “So for instance for tourism the state of the Barrier Reef is not the only issue it is also the state of the Barrier Reef, relative to the state of reefs elsewhere. If the reef can be maintained in a reasonable shape and reefs elsewhere massively degrade then it will become a rarer commodity and to some extent that’s happening already among an educated sector of the tourism.”

- **Tourism**

- **Attitudes and behaviour**

  “There really is a global epiphany happening about our interaction with the environment and climate change is bringing it home, even to places like China and India where people have many other things to worry about, but the national economies and national political systems are embracing this dependence between people and the environment like it’s never happened before. The environment movement is now 30 or 40 or 50 years old, but I think it’s about to go through - it might take 10, 20 years for it to fully occur, but there’s a major shift occurring. I think that’s the number one driver.”

  “I think it’s attitudinal change from people, every day people, but there’s also attitudinal change among policy makers which will create regulations and economic incentives for behavioural change also.”

- **Information and technology**

- **Media**

  “Media drives a certain amount of change. So it will be interesting in terms of how – what changes happen in terms of media role, the internet role, who owns media, media laws and things like that. I suppose fundamentally that probably comes back to government. … I think increasingly…that …information sources or information media is going to become more and more prevalent particularly areas further north in the catchment which I think, as we said before, will be more knowledge based economy.”

- **Global security**

  “All the global things, the Gulf, immediate neighbours, what happens with PNG are the influential drivers of change.”

From this list, we identified three drivers with the highest impact and highest uncertainty, based on the interview transcripts; they were climate change, globalisation and regional scale governance and leadership. The remaining drivers were also incorporated into the scenarios but did not define the key axes of uncertainty. Of all drivers, climate change was the most frequently mentioned and was discussed in the context of potential impacts on biodiversity, agricultural industries and land use, population and demographic change, tourism, diseases, and water availability. The timing and location of climate change impacts, and the vast array of potential consequences of these impacts, was discussed by many interviewees.

A second cluster was identified of drivers related to globalisation, which includes global trends in oil and energy, industry and trade, immigration, information and technology, global security, media, and attitudes, values, and behaviour. No single aspect was clearly identified as having greater significance than the others, and so they were retained as different facets of one major driver.

A third driver was identified as regional-scale governance and leadership, which includes regional environmental policy, water management, indigenous issues, infrastructure and economy, and attitudes, values, and behaviour that both underpin and emerge from governance and leadership at this scale.
It was not clear whether the globalisation cluster or regional governance cluster had higher impact, as both types of drivers were mentioned in interviews with about equal frequency. Upon further discussion and presentation to small research groups and at conferences (Bohensky and Bohnet 2007; Bohnet, 2007; Bohnet and Bohensky 2007b), we observed that the relationship between these two driver clusters was in fact a key uncertainty. Would global forces – namely the economy – or would regional governance be more important in driving the region’s future? We posited two possibilities: 1) global forces, primarily the economy, or 2) concern with environmental sustainability would drive regional decision-making. We acknowledge that these two possibilities are not mutually exclusive, and that both could be influential, but one is likely to dominate over the other in the time period to 2050, and which one dominates was thought to be highly uncertain by the interviewees.

Thus, the nature and timing of climate change, and the major influence on regional governance and leadership defined two axes of uncertainty and four quadrants in which four scenario storylines were developed (Figure 3). It is essential to note that these scenarios are alternative ‘stories’ of the future, but do not capture the full range of possibilities, nor are they mutually exclusive. However, they do consider what are presently thought to be the most important drivers of change and uncertainties relevant to the GBR region in the context of Reef water quality protection.
3. WHAT MIGHT THE FUTURE HOLD?  
FOUR QUALITATIVE SCENARIOS FOR 2050

Four future scenarios were developed from the interview analysis and the method used to identify the key drivers of change (Figure 3).

Figure 3. The four scenarios are defined by two key axes of uncertainty: impact of climate change, and influence of the global economy versus environmental concerns on regional leadership.

It is important to note that the colours underlying the scenarios do not have a specific meaning (e.g. traffic light – red, orange, green). The contrasting scenarios are neither mutually exclusive nor have been designed to be “good” versus “bad”, which would trigger the question good or bad for whom? Each of these scenarios are explained below.

3.1. Saving the Reef

In Saving the Reef, a major climate change event occurs in 2010 that has far-reaching effects across the GBR catchment and throughout Southeast Asia.

The environmental impact of the major climate change event is dramatic, but also acts as a catalyst for change in the region. By 2050, land in the GBR catchment is being used and managed with the primary goal of improving the quality of water entering the GBR lagoon. The scarcity of water in the catchment has also led to careful resource management.

As fears of rising sea levels and cyclones become more real, people’s perceptions begin to shift about coastal living, and they gradually leave the flood-prone seashore and settle away from the coast in areas that are considered safe.

High transportation costs and environmental consciousness lead to a high degree of regional self-sufficiency and a boost in organic farming. In areas that are prone to flooding, cropland is reduced considerably. Many farms in the region have become unviable over time and are now managed for environmental outcomes, i.e. ecosystem services. Others are focusing on growing regional products and organic food. In 2050, tourism is the backbone of the regional...
economy, despite reductions in international air travel. Climate friendly and nature-based tourism, such as hiking, biking and canoeing, is promoted.

3.2. No Limits to Growth

In *No Limits to Growth*, similar impacts of climate change as in the *Saving the Reef* scenario occur in 2010, but the response of the region is vastly different, marked by resistance to change. Most residents continue to live near the coast. Governments build seawalls to protect properties and residents, and sugarcane continues to be grown in coastal areas.

Economic growth is high on the political agenda to offset the impacts of climate change. Technical solutions are sought to adapt current agricultural industries to the changing climate, while many farms have amalgamated to gain economies-of-scale. Investments are also put towards the development of new agricultural industries and alternative energies to reduce CO₂ emissions. The resource boom continues, with mining and associated industries and port facilities expanding. Coal and other minerals are exported to the emerging global superpowers.

By 2050, land uses have intensified in the GBR catchment in response to increased economic growth. However, biodiversity in the Wet Tropics Rainforest and the GBR have been impacted by heat stress and habitat loss. Coastal erosion continues in places where coastlines are not actively managed and protected. In 2050, mining and farming are the backbones of the regional economy, while tourism is still a major contributor due to increased marketing efforts to attract visitors to the area.

3.3. Booming Sea-Change

In *Booming Sea-Change* the risks of climate change are not taken very seriously as no major climate events occur in the GBR catchment, and the issue is overshadowed by other social and political concerns. A ‘business-as-usual’ trajectory continues with major developments along the Queensland coast leading to urban and suburban sprawl at the expense of agricultural land.

Early on, agricultural products along with heavily mined minerals are exported which provides short-term economic gains without adding value to products in the region. However, by 2050 base load power production is largely provided by nuclear facilities along the Queensland coast. This leads to the development of industrial centres, where ports, power plants and other heavy industries are located, and tourism/educational centres, where there is a focus on tourism, arts and higher education.

In 2050, a patchwork of highly intensive land uses interspersed with a network of protected areas cover the region. This is impacting terrestrial biodiversity, despite major conservation efforts at the global level. Concerns over the storage of nuclear waste that were initially outweighed by the ability of nuclear power to cut greenhouse gas emissions are slowly rising. Oil drilling is being re-considered in the GBR area due to global oil shortages. Prosperity in the region remains largely resource-based despite attempts to move towards a knowledge- and-services economy.

3.4. Revitalised Country Towns

In *Revitalised Country Towns* the risks of climate change are taken seriously due to a growing global awareness of the issue, though no major climate change crisis has occurred in the GBR. This leads to major precautionary policy interventions.

Due to continuous droughts in the southern parts of Australia more and more farmers from the south are becoming interested in farming in the GBR catchment where water resources are perceived to be abundant. However, because of this pressure for agricultural intensification and conflicts over resources, policies are introduced to limit growth in all...
resource-based sectors including mining, agriculture, forestry and housing developments. It has become common practice for climate change predictions to be used by regional councils to inform decisions about land use along the coast, including areas for rehabilitation. Investment in new agricultural industries and water efficiency measures are also in place.

The new policies introduced by the regional councils early in the century hit some industries hard, including mining and coastal housing development, due to water and development restrictions. In retrospect, what was considered a sacrifice by some groups and sectors at the time paved the way for diversification of the economic and social base of regional country towns in the GBR catchment.

In 2050, land uses include agriculture, forestry, protected areas, mining, alternative energy, tourism, education, health and the arts. Farms are often community supported and act as social, cultural and educational places. Environmental impacts on water, biodiversity and landscape aesthetics are being mitigated through strict regulations supported by the community.
4. COLLABORATORS’ RESPONSE TO THE SCENARIOS FOR THE GBR CATCHMENT IN 2050

This section outlines the response from our collaborators (at the Cairns workshop) on the scenario stories that we have woven together based on the information and ideas provided in the interviews and the literature review.

4.1. The Cairns workshop

On 14 February 2008 a collaborator workshop, facilitated by Mary Maher (Mary Maher Associates) was held in Cairns to:

- consider the plausibility of the scenarios;
- explore the implications of the scenarios for the diverse industries, communities and ecosystems in the region; and
- scope common long-term strategic responses that contribute to the development of a sustainable GBR catchment (see Appendix E for the workshop program).

In total 41 people participated in the workshop including the project team (see Appendix F for list of workshop participants). Another 45 people were interested in the workshop but unable to attend. Everyone involved in the project that expressed an interest in coming to the workshop because of its potential relevance to their work was invited to the workshop.

Two workshops were considered initially, one in Cairns—in the GBR catchment—and one in Brisbane—outside the GBR catchment—to ensure that a core set of representatives from the various organisations and industries would be able to attend one of the workshops and to minimise travel time and costs for participants. However, as most people indicated that they could attend either a Cairns or Brisbane workshop the project team decided to organise one workshop where many representatives could be brought together for one day and would have the opportunity to talk and work together instead of two smaller, potentially more fragmented workshops. Organising one workshop, instead of two, also saved project resources.

Of the 41 workshop participants 11 were interviewed for the project previously and three had attended one of the briefing sessions. This means that less than half of the workshop participants were not actively involved in the project before the workshop. From the research team’s perspective this was considered advantageous as these participants could have a ‘fresh look’ at what had been achieved to date. However, some participants who had not been involved in the project expressed concerns that they felt they were not ‘up-to-speed’ on the scenarios, which might have been different if they were involved earlier on.

4.1.1. Desired outcomes of the workshop

At the start of the workshop participants were asked about their desired outcomes from the workshop. These could be summarised in a number of broad themes: biophysical science outcomes, social science outcomes, and operational outcomes. The following table provides a summary of the desired science and operational outcomes under each of these themes:
### Table 1. Summary of workshop participants desired workshop outcomes

<table>
<thead>
<tr>
<th><strong>Biophysical science outcomes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Better understanding of the long term patterns and cycles</td>
</tr>
<tr>
<td>Better understanding of the persistence of GBR systems</td>
</tr>
<tr>
<td>Information about ecosystem services at Wet Tropics scale</td>
</tr>
<tr>
<td>Understanding of how scenarios consider whole of system issues</td>
</tr>
<tr>
<td><strong>Social science outcomes</strong></td>
</tr>
<tr>
<td>Community perspective of collective effort</td>
</tr>
<tr>
<td>Improved collective effort</td>
</tr>
<tr>
<td>Consensus of where we need to be by 2050</td>
</tr>
<tr>
<td>Better understanding of how to collaboratively influence the primary drivers that cause potential threats to the region</td>
</tr>
<tr>
<td>Better understanding of how to reconcile varying views of future events</td>
</tr>
<tr>
<td>Identification of ideas on how to revolutionise catchment and land management</td>
</tr>
<tr>
<td>Matching of current planning with future scenarios</td>
</tr>
<tr>
<td>Clarification on how far have we progressed with planning processes and engaging the local community</td>
</tr>
<tr>
<td>Contribution to building resilience – ecological, social and economic</td>
</tr>
<tr>
<td>Agreement on where we want to go and where we don’t want to go – common vision, and principles that underlie future planning</td>
</tr>
<tr>
<td>Understanding of how exercises like this can affect planning</td>
</tr>
<tr>
<td>Better understanding of where our community is heading</td>
</tr>
<tr>
<td>Collect views and see where groups intent is – what is the next phase going to look like</td>
</tr>
<tr>
<td>Understanding of how to build and maintain long term sustainable communities in the context of carbon</td>
</tr>
<tr>
<td>Understanding of how to encourage community to adopt change</td>
</tr>
<tr>
<td><strong>Operational outcomes</strong></td>
</tr>
<tr>
<td>Identification of who is going to use this work</td>
</tr>
<tr>
<td>Understanding of how scenarios can play out in the wider area of NRM</td>
</tr>
<tr>
<td>Research opportunities for Tropical Landscapes Joint Venture</td>
</tr>
<tr>
<td>Ideas on future housing design</td>
</tr>
<tr>
<td>Planning for the next steps in the project and how to progress</td>
</tr>
<tr>
<td>Identification of next steps for changing political will to challenge progress</td>
</tr>
<tr>
<td>Better understanding of how to manage the GBR</td>
</tr>
<tr>
<td>Identification of links between scenario and climate adaptation planning</td>
</tr>
<tr>
<td>Understanding of how the scenarios can be used for GBRMPA's Outlook report</td>
</tr>
<tr>
<td>Assessment of the usefulness of process for internal planning processes at GBRMPA</td>
</tr>
</tbody>
</table>

Whilst the above table is somewhat a wish list of the biophysical and social science information that the science community is seeking, it highlights the potential contributions that scenario planning can offer. The list also highlights the importance of linking science, policy and management. Also, the list reflects the interests and responsibilities of the workshop participants.

Despite the gaps in scientific knowledge, there is an urgent need for community education and engagement in local and regional planning processes, and collective action. Furthermore, many questions are operational in nature which suggests that a different way of collaboration between scientists, natural resource managers, planners and policy makers is required for science, management, planning and policy to interface effectively.
4.1.2. Assessment of the scenarios

After short presentations on the scenario development process and two keynote presentations on the two axes of uncertainty (http://www.csiro.au/resources/pf16y.html), workshop participants assessed the plausibility of the four scenarios as well as the risks and opportunities associated with them in small groups. The results from the small groups’ assessment were reported back to all and are summarised below.

Scenario 1 – Saving the Reef

Group comments:

- Clarification is required on the climate change event; the group made the assumption that the climate change event occurs outside of the catchment, and highlighted the importance of defining the link of that event to the catchment. It was considered most likely that the event is a catastrophic series of coral bleaching, but in that case the effects on human behaviour are not clear (i.e. is it likely that people will change behaviour because of coral bleaching, if it is still disputed to be a result of climate change?). The plausibility of the scenario rests on the occurrence of an undisputed climate event that changes people’s behaviour.
- The group considered that the scale and focus of the scenario needs to be clarified and that it is important to define underlying assumptions for the scale and focus. For example, the assumption that tourism is the major backbone of the economy is not realistic across the GBR; in some places the influence of other industries such as mining and plantation forestry should be considered. This scenario was also perceived to focus on Cairns, not the whole catchment.
- The group questioned the statement about water scarcity in the scenario, indicating that the mechanism for such a change would need to be further elaborated.

<table>
<thead>
<tr>
<th>Risks:</th>
<th>Opportunities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Disillusionment could result if good actions in the GBR region are overwhelmed by external factors such as global events; or if benefits of saving the reef are achieved at timescales that are beyond scope of interest for communities and policy.</td>
<td>• Demonstration of win-win outcomes.</td>
</tr>
<tr>
<td>• Social disruption may impact on industry and lifestyles.</td>
<td>• Evolution of new industry types, leading to greater economic and landscape diversification.</td>
</tr>
<tr>
<td>• Uncertain knowledge of long-term outcomes of taking bold action now to save the reef.</td>
<td></td>
</tr>
</tbody>
</table>

Scenario 2 – No Limits to Growth

Group comments:

- The scenario was considered to be plausible, but would require defining the climate change trigger that would allow this type of behaviour to continue. The trigger could be in the GBR or outside, such as drought in the south or a change in the global economy, like a push for biofuels, that would require high levels of resource extraction in the GBR region.
• It was considered plausible that the government would support a “seawall” approach to climate change. This is a typical engineering approach – we adopt it because the social impacts in the beginning are low (e.g. dams).
• If the event was a cyclone in the north (or increased perception of risk of cyclones), people from the south would be unlikely to move north, but from a national perspective it would make sense to increase investment in the north.
• The scenario represents a situation in which it is not possible to influence policy at a higher level than the GBR because the focus is on economic growth. The regional government can change some aspects of its leadership, but not external divers.
• It was plausible to think that this could continue for ~40 years, but carbon trading might contain the coal industry, however, may shrink relative to other industries.
• New thinking will have to involve a generational shift.
• If real costs (externalities) of e.g. coal continue to be excluded, environmental technologies will not be seen as economically competitive with conventional ones.
• Perhaps there will be greater community-based leadership. There is a potentially strong driver in Queensland in the regional councils and management frameworks.

Table 3. Risks and opportunities of the ‘No Limits to Growth’ scenario as identified by the small working group

<table>
<thead>
<tr>
<th>Risks:</th>
<th>Opportunities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology will be pursued to meet needs of economic growth and will justify further growth.</td>
<td></td>
</tr>
<tr>
<td>Lack of incentives to change behaviour.</td>
<td></td>
</tr>
<tr>
<td>Mining will dominate industry and have environmental impacts.</td>
<td></td>
</tr>
<tr>
<td>Positive spin-offs of increased wealth allow greater investment in green technologies, changing their image as environmental “luxuries”.</td>
<td></td>
</tr>
</tbody>
</table>

**Scenario 3 – Booming Seachange**

**Group comments:**

• The scenario was considered to be likely (and probably the most likely scenario to happen given current circumstances), except it is possibly unlikely that a major climate change event will not occur before 2050.
• Implies a continued influx of population to the region.
• Regional variation needs to be accounted for; for example, impacts of continued population increases along the coast on inland areas.
• “Business as usual” will have to change; for example, agriculture will decline unless there is value-adding, and increased pressure on water resources will have implications.
• Scenario raises questions about energy sources, including likelihood of nuclear, in light of peak oil and political change (e.g. nuclear power was an election issue).
• Scenario could be impacted if mineral boom can no longer be sustained.
Table 4. Risks and opportunities of the ‘Booming Seachange’ scenario as identified by the small working group

<table>
<thead>
<tr>
<th>Risks:</th>
<th>Opportunities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Drilling for oil on GBR increases risk of contamination.</td>
<td>• Population growth brings skills and resources into the region.</td>
</tr>
<tr>
<td>• Potential impacts of increased urban and industrial development on water quality, biodiversity and agricultural land; increased demand for infrastructure and services, potential increase in crime.</td>
<td>• Larger economic centre able to influence policy at regional and state levels, and influence social and cultural change.</td>
</tr>
<tr>
<td>• Nuclear power could make region a terrorist target, and may increase reliance on one energy source.</td>
<td>• Resources boom brings greater influence in global economy and can lead to economic improvement and more power on national and global stages.</td>
</tr>
</tbody>
</table>

Scenario 4 – Revitalised Country Towns

Group comments:

- A scenario we’d like to see but many aspects were considered unlikely: first, is proactive management likely in the absence of a major climate change event? Second, do regions really have self-determination? Can we really anticipate a regional consensus on future?
- Water aspects need more thought; even though there is more controlled development, water resources may not increase or even be maintained.
- The sense of community increases and diversifies, leading to increased resilience to change.
- Need change in governance arrangements – e.g. GBRWHA management.
- Clarification is required on the scale of scenario: does this apply only to specific localised communities or GBR-wide?

Table 5. Risks and opportunities of the ‘Revitalised Country Towns’ scenario as identified by the small working group

<table>
<thead>
<tr>
<th>Risks:</th>
<th>Opportunities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Small enterprise-based systems vulnerable to external pressures (risk to community resilience).</td>
<td>• More managed development could allow reef to be protected.</td>
</tr>
<tr>
<td>• Reliance on regulation may drive industry elsewhere.</td>
<td>• Diversification of employment and skills base.</td>
</tr>
<tr>
<td>• Slow, cumbersome blunt tools – not very adaptive, flexible.</td>
<td>• Increase in perceived natural values.</td>
</tr>
<tr>
<td>• Self-determination may bring risk of insular approach</td>
<td>• Focus on ‘local’ has positive influence on carbon footprints and oil reliance.</td>
</tr>
<tr>
<td>• Winners and losers in different industries.</td>
<td></td>
</tr>
</tbody>
</table>

Overall, the four draft scenarios were considered plausible by the workshop participants. However, participants also expressed that added details about underlying scenario assumptions, e.g. population, scope and scale of the scenarios, as well as the definition of the climate change event/s, would be useful.
4.2. Issues across all scenarios

After each of the scenarios was discussed in some detail, the whole group looked at issues arising from all scenarios that require further attention or clarification. The following list provides a summary of the issues discussed:

- **Scale**: The group discussion identified the need to clarify the scale for each scenario, i.e. local, regional or GBR-wide. It was felt that some aspects of the scenarios, such as the focus on the impacts of a cyclone on infrastructure on Cairns, were not applicable beyond a local area.

- **Diversity**: It was felt that single scenarios across the whole of the GBR region do not necessarily capture the full diversity in the region, suggesting that more local scenarios or multiple-scale scenarios would be useful to explore.

- **Assumptions**: What are the assumptions underlying the scenarios?

- **Scale and type of event**: It was felt that the climate change event has to be catastrophic and GBR-wide to drive major change. However, some working groups acknowledged that events happening outside the region could influence change within.

- **Type of future**: A need was expressed to clarify what is a ‘desirable’ future versus a ‘plausible’ future, and which type(s) we are striving to create.

- **Uncertainty**: The uncertainty of the implications of the scenarios needs to be expressed in order to allow appropriate planning responses.

- **Global influences and side effects**: The significance of these influences e.g. refugees, war, terrorism was acknowledged and questions were raised about how these can be reflected in the scenarios.

4.3. Learnings from the scenarios

Debate about the presented future scenarios for the GBR region in 2050 and the issues needing further attention and/or clarification led to a thought provoking discussion of what we can learn from the scenarios and where these lessons can take us. The following summary provides a synthesis of the discussion:

1. The Future Scenarios for the GBR Catchment, presented as short narratives, provide a means to raise awareness about the future and to communicate complex information in an accessible way.

2. The scenarios are a tool that allows stakeholders with different and conflicting views to get together to collaborate and discuss pressing issues, such as the decline in GBR water quality, and to define common goals.

3. The complexity of the scenarios requires collaborators to look at the hard realities and to start identifying “compromises” between ecosystem health and resource use e.g. are we prepared to sacrifice the inshore reefs in order to carry on farming the way with do?

4. The scenarios point out that, despite a wide diversity of interests and values, a common set of big picture issues such as biodiversity and water quality are still fundamental gaps in state-wide policy.

5. The scenarios provide a backdrop for progressing a common vision at a range of scales. The group identified the following points that would need to be addressed in order to define a common vision for the GBR region:
- **Setting the limits of sustainable (agreed) use of the natural resources** (e.g. Vegetation Management). This emphasises the importance of setting targets that are achievable within available resources.
- **Deciding what is best use of the resource within those limits.** Obtain an agreed commitment from decision makers to these limits.
- **Defining what is needed to make it happen.** Gauge sense of use and how to achieve targets at local area level – what are the institutional arrangements needed to make it happen?
- **Negotiating wins and losses.** Agreement on how inevitable trade-offs arising in the definition of a vision can be managed (e.g. compensation, tax rebates).
- **Developing strategies on how to keep demand on the use of natural resources within the limits of the system.**

6. Given the diversity of interests and influences across the region, it is highly likely that a combination of the four scenarios may unfold in the future.

### 4.4. Implications of the scenarios … to 2050

Based on the overall agreement by the workshop participants that the four scenarios are plausible, the implications of these scenarios for i) research and knowledge, ii) regulation, iii) infrastructure and land use planning, iv) industry and production, and v) traditional owners were discussed by all participants in a whole workshop group session. However, participants with expert knowledge in these fields were encouraged to provide their views first, which were subsequently discussed, clarified and elaborated on. The implications of the scenarios for the first four themes were part of the workshop program, whereas the fifth theme, i.e. the implications for traditional owners, was added by the participants.

#### 4.4.1. Research and knowledge

In this section the research and knowledge required to meet some of the challenges presented in the four scenarios are summarised:

- There is a need to improve science integration – social, economic, biophysical and institutional – and need to reduce uncertainty in the current knowledge of the system. An example of a science integration infrastructure could be the Reef Water Quality Partnership and the products of it.
- Research needs to be place-based, with an emphasis on mitigation and control and the level of coping and systems adaptation.
- Integrated approaches to monitoring and modelling, and performance assessment must be progressed.
- Foundations for co-research require further development; this will require a cultural shift in the way that managers and research currently interact.
- There is an opportunity with Marine and Tropical Science Research Facility (MTSRF) round II (i.e. beyond June 2010) to address some of the challenges coming out of the scenarios by tightening up research programs and making them more integrated.

#### 4.4.2. Regulation

In this section the implications and considerations for regulation to meet some of the challenges presented in the four scenarios are summarised:

- The mismatch in the timeframes between system response to management efforts and policy response timeframes presents a challenge. In addition, there is a lag in changing policy and regulation and the implementation of those actions on ground.
- Cumulative events must be considered – it is hard to tie future scenarios to single policies.
• Development controls and adaptation planning will be critical.
• Minimum regulation is preferable, but where necessary regulating for outcomes is priority.
• Co-regulation is encouraged where regulators and community jointly agree on how to move forward – encouraging a shift in implementation from compliance to education.
• Incompatibility of policies requires assessment and prioritisation of issues to be addressed.

4.4.3. Infrastructure and planning

To meet the infrastructure and planning challenges presented in the four scenarios the following points were discussed by the participants:

- Incorporating climate change and precautionary principle to future management approaches.
- Proactive future orientated planning.
- Build assessments of material use and resilience into building codes and carbon credits.
- Integrated planning (e.g. local government and regional NRM).
- Encouraging capacity building and learning from other countries.
- Promoting local government leadership for community.

4.4.4. Industry and production systems

Discussion on the implications of the scenarios for industry and production systems focused on the following:

- Defining the sustainable limits for industry and production systems.
- Identifying targets for production systems and offer incentives to implement actions to meet those targets, e.g. protection of good quality agricultural land and economic interests of farmers.
- Private versus public good issues and offering incentives that present GBR (public good) outcomes.
- A myriad of planning processes are applied in parallel (e.g. NRM, local government, industry) and inconsistently across industries and production systems.

4.4.5. Traditional owners

In addition to the themes discussed above, participants felt that the scenarios have important implications for traditional owners, in particular:

- There is a need to establish and maintain long term arrangements to implement management objectives.
- Capacity building is needed from clan to subregional entities to facilitate greater involvement in future management arrangements.
5. WHAT ARE THE NEXT STEPS?

This section outlines the final workshop session in which participants provided their views on how the scenarios might be applied and their level of influence, what the next steps for the project are from their different perspectives and positions, and what they got out of the workshop.

5.1. Potential applications and influence of the scenarios

The discussion on how the scenarios might be applied focused around two major areas, levels of influence and requirements to achieve these applications. Some further potential applications were discussed as well as a few questions. The two major areas where the scenarios were considered most applicable were:

1. To influence political directions and funding.
   - Requires strong support from CSIRO/Water for a Healthy Country Flagship at CSIRO executive level.
   - Requires strong support from high level policy makers such as senior staff within the Australian Government Joint NRM Team, and the Reef Plan Secretariat.
   - Requires wider engagement process with Reef Plan, new phase of the Reef Water Quality Partnership and roll out of the Reef Rescue Plan with a focus on next 10 year cycle (beyond 2013).

2. For community engagement, social learning, and consensus building.
   - The scenarios provide an exercise to imagine futures. However, to achieve community engagement, social learning and consensus building, advocates would be required for the process, working with communities to identify what futures need to be avoided and what needs to be done to create a common future.

Further potential applications of the scenarios discussed included:

- Engagement in the process of influential change by establishing underlying common scenario themes to progress towards more sustainable futures within a range of planning strategies (e.g. NRM review, Far North Queensland Regional Plan).
- Provision of a platform to bring stakeholders together to share views.

A number of questions with the process were raised by the workshop participants. These were:

- How will the research team move the scenario planning process out of research into the policy arena?
- How is the research team going to fill the gap of missing participants in finalising the current scenarios (e.g. Canegrowers, Agforce)?
- Whilst the workshop tests the methodology for developing scenarios, it is not an actual decision making process. How can we move from the method to application in a decision making process?

These queries are addressed in the following section.
5.2. Next steps for the project

As suggested in the previous section there are many questions and ideas about how we will move this project out of the research and into the management or policy arena. There is significant potential for the project to be applied in these areas however careful planning, engagement, commitment and support is required to achieve these outcomes. Suggestions made by workshop participants about how the project team might do this included:

1. Complete this stage of the research by writing it up in a way that completes the project (i.e. research that has tested a new scenario methodology and developed qualitative scenarios for the GBR catchment).
2. Develop documentation for communication activities, e.g. support materials for community exercise.
3. Analyse risks and opportunities for all scenarios by synthesis of major limiting factors of the future of the GBR.
4. Analyse the social and economic implications of the scenarios.
5. Engage with planning and decision making at a range of scales.

To move the project forward participants suggested that the scenarios presented are used as a vehicle to address concerns in ramping up or raising the issues relating to NRM planning for the GBR in the longer term. One immediate application for use of the scenarios was suggested as the planning for the Reef Rescue Plan and engagement in a potential Reef Plan Summit that will bring together decision makers and stakeholders to agree on the way forward for GBR water quality management. Participants felt that if the scenarios could be used in assisting with a visioning exercise to 2050 then the Summit participants could start to collectively analyse where they were heading and how to manage for multiple scenarios. This type of exercise could form the foundation for the Summit with risks and opportunities, operational needs and partnership arrangements emerging. However, it would be important to get all parties to agree with this process, take it seriously and generate a common operational plan based on a set of common targets and objectives.

5.3. What participants got out of the workshop

The participants offered the following comments on what they learnt from the scenario planning exercise in the final workshop session:

- The method provides a good way to flesh out people’s ideas and values and where they want to go into the future. The method presents a good format for progressing this approach because scenarios can be good capacity building and communication tools.
- Coming up with feasible alternative scenarios—if they are robust and challenged—empowers the community to build viable plans for the future.
- Scenarios can help to identify which ways we don’t want to go in the future of the GBR region by highlighting the issues and threats.
- The method provides useful preparation for risk analysis work and discussions for what is considered to be acceptable in terms of use of the resources in the GBR region and potential changes.
- Scenarios of what to avoid could be run; builds a common ground for future planning.
- Scenario planning takes people above and beyond own sector so they view more than one part of the picture and therefore puts the issues into perspective.
- If the research team want to raise the profile of the research in the next six months then the Reef Rescue Plan and the potential Reef Plan Summit will be a very important exercise to become involved in.
- Scenario planning is a robust strawman to move into the future with multiple options.
The research team was encouraged to spend more time exploring the drivers and factors for the scenarios identified by interviewees – and why the presented scenarios focused on these drivers over others. The development of more scenarios incorporating further dimensions may be useful and valuable.

In addition, 24 workshop participants filled out the workshop evaluation sheet (Appendix G), in which they provided further individual information. A summary of this information is provided in Appendix H.
6. SOME FINAL REMARKS

This final section summarises what has been achieved since the Cairns workshop and concludes with the learnings from the research to date.

6.1. What has been achieved since the Cairns workshop?

Within a week of the workshop, a webpage (<http://www.csiro.au/science/GBRCairnsWorkshop.html>) was put together that briefly summarised the workshop and provided links to the workshop presentations. Stimulated by the workshop results (see section 5.1) the project leader took the opportunity to discuss and raise the profile of the research through a number of internal and external meetings with:

- CSIRO Leadership team of the Water for a Healthy Country Flagship Healthy Water Ecosystems Theme
- Australian Government Natural Resource Management Team, Department of Agriculture, Forestry and Fisheries (DAFF) / Department of the Environment, Water, Heritage and the Arts (DEWHA)
- Australian Government Marine Implementation and Coastal Policy Section, DEWHA
- WWF
- Reef Water Quality Partnership support team

The research was presented in two public seminars at the:

- CSIRO Land and Water, Canberra
- DEWHA, Canberra

Interactions with potential users of the scenarios were also fostered since the workshop.

According to the suggested next steps for the project (see section 5.2) the research team has written this report in a way that completes the research while providing opportunities for building on the activities and ideas presented in this report.

6.2. Learnings from the research

There are a number of findings from this research to date, which can be divided into different categories. There are learnings from the scenario planning process for the research team regarding the usefulness, limitations and challenges of the approach (Table 6). These have mainly come out of discussions at the Cairns workshop and discussions following the public seminars presented in Canberra.
Table 6. Summary of the usefulness, challenges and limitations of scenario planning used in a NRM context

<table>
<thead>
<tr>
<th>Scenario planning approach</th>
<th>Usefulness</th>
<th>Challenges</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tool to think through complex issues</td>
<td>• Clarifying pathway to impact or success in scenario planning</td>
<td>• Inability of participants (including research team) to perceive their own assumptions and failure to state them</td>
<td></td>
</tr>
<tr>
<td>• Tool that enables discussion about long-term risks and opportunities</td>
<td>• Measuring the success of scenario planning</td>
<td>• Inability of participants to think beyond a “business as usual” future or beyond what they consider positive or negative change</td>
<td></td>
</tr>
<tr>
<td>• Allows stakeholders with different views to come together (e.g. industry, conservation, indigenous groups)</td>
<td>• Managing diverse stakeholder expectations (in contrast to a well defined stakeholder group with a clear goal, e.g. Shell)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Potential to build consensus at different levels through shared awareness raising (e.g. local community level, regional, state, federal level)</td>
<td>• Deciding who should be involved in the process</td>
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<tr>
<td>• Emphasis on the big picture instead of narrow focus (narrow focus may fall short in looking at “big” change that is required to achieve goal)</td>
<td>• Dealing with stakeholders who should be involved but aren’t involved</td>
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<tr>
<td></td>
<td>• Moving scenario planning from research into management and policy</td>
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</tbody>
</table>

There are also specific learnings from the Future Scenarios for the GBR Catchment project for the different sectors, which were discussed at the Cairns workshop and are summarised in section 4.4.

Finally the most important learning from this and other scenario planning exercises that the research team has been involved in might be that scenarios can be developed at a range of scales, with differing levels of detail, and differing collaborators, but need to have adequate flexibility to suit the particular needs. Each of the scenario planning exercises may have slightly different objectives and subsequently different levels of detail and different collaborators. For example, GBR wide scenarios may aim to achieve a commitment to Reef Plan/Reef Rescue Plan by all government and industry stakeholders whereas catchment scale scenarios may aim to achieve a common community vision for the catchment that provides input into the local government planning scheme.
The questions about scale, diversity, scenario assumptions, scale of event, type of future, uncertainty, global influences and potential side effects discussed at the Cairns workshop (section 4.2) may be clarified through continuation of the project in a more applied sense in collaboration with a particular planning or policy initiative.

The learnings about the scenario content and process are being further analysed and written up as manuscript (Bohnet and Bohensky in prep.) which will contribute to the knowledge base for scenario planning and its application to management problems.
7. **ABBREVIATIONS AND ACRONYMS**

- **CEO** Chief Executive Officer
- **CSIRO** Commonwealth Scientific and Industrial Research Organisation
- **DEWHA** Department of the Environment, Water, Heritage and the Arts
- **DAFF** Department of Agriculture, Fisheries and Forestry
- **GBR** Great Barrier Reef
- **GBRMPA** Great Barrier Reef Marine Park Authority
- **NGO** Non-government organisation
- **NRM** Natural Resource Management
- **PNG** Papua New Guinea
- **WWF** World Wildlife Fund
8. REFERENCES


Bohensky, E., Bohnet, I. *In prep*. Drivers of future change in Australian regions: what can we learn from global, national, and regional scenarios? For submission to *Global Environmental Change*.


Bohnet, I., Bohensky, E. *In prep*. The role of scenario planning for addressing management problems in the Great Barrier Reef region of Australia. For submission to *Global Environmental Change*.


Moorhouse, M. 2002. *Industries in the Great Barrier Reef catchment and measures to address declining water quality*. Submission Sep 2002 to Productivity Commission by Alliance to Save Hinchinbrook Inc (ASH) PO box 2457 Townsville Q 4810.


Tobin, R.C., Pears, R.J., Marshall, N., Marriott, R.J., Busilacchi, S., Bergenius, M.A.J. 2005. Fishing for More: A student-stakeholder workshop on the biology, ecology and economics of fisheries. CRC Reef Research Centre and James Cook University, PO Box 772, Townsville QLD 4810 Australia.


Dear (insert name here),

What will the Great Barrier Reef Catchment look like by 2050?

We are writing to invite you to take part in an innovative research project being undertaken by the CSIRO.

The project ‘Envisioning Possible Futures for the Great Barrier Reef Catchment’ will draw on the knowledge and views of key regional leaders and creative thinkers to generate four detailed ‘future scenarios’ for the Great Barrier Reef (GBR) catchment.

Scenario planning, a method for thinking creatively about possible complex and uncertain futures, is used in this research. The central role of scenario planning, in contrast to other planning exercises, is to consider a variety of futures that address key uncertainties in the linked social-ecological system rather than to focus on the accurate prediction of a single outcome.

These scenarios will aim to build on other futures planning work that has been conducted in the region and integrate with your visions, plans and strategies. They will be useful for management agencies, policy-makers, industry groups and coastal communities to test their strategies and plans across each of the “worlds” depicted in the scenarios.

Your participation would involve an interview of approximately one hour about your expectations for the future of the GBR catchment. All comments will be treated with strict confidentiality. The interviews we conduct will then guide us in developing future scenarios for the GBR catchment. At a later stage, we may ask you to participate in a workshop in which the scenarios are discussed and revised.

The enclosed project brief provides further details about the project, but please do not hesitate to call me on 07 4091 8826 if you have any questions.

Having your involvement in the project will contribute to the success of the project.

The project team is looking forward to speaking with you soon.

Yours Sincerely

Dr Iris Bohnet, Project leader, CSIRO Sustainable Ecosystems
Envisioning Possible Futures for the Great Barrier Reef Catchment

What are the main factors driving change in the Great Barrier Reef (GBR) catchment?

How might these changes manifest and how might the region look by 2050?

What might the major ecosystem services and industries be?

What might life be like for the people living in different parts of the GBR catchment?

INTRODUCTION

The catchment adjacent to the GBR lagoon is a region of economic significance and exceptional environmental value. It extends about 2300 km along the coast of Queensland, from the Tropic of Capricorn in the south, to the tip of Cape York in the north.

In order to maintain productivity, improve water quality, sustain healthy ecosystems and communities and protect the Reef, it is important to carefully plan future land-use and landscape management options.

WHY USE SCENARIO PLANNING?

Scenario planning is a method used to think creatively about possible complex and uncertain futures. Scenario planning differs from other forms of planning such as trend projections, forecasts or predictions as it ultimately helps to make more robust policy and planning decisions in situations of high uncertainty that are difficult to control.

The central role of scenario planning, in contrast to other methods, is to consider a variety of futures that address key uncertainties in the system rather than to focus on the accurate prediction of a single outcome. The use of scenario planning for futures analysis has increased since the late 1980s in response to the failure of strategic planning based on seeking ‘optimal’ strategies for the future. While these strategies have been successful in more controllable systems, they are not well-equipped to address the complexity and unpredictability of social-ecological systems such as the GBR catchment.

WATER FOR A HEALTHY COUNTRY GOAL: To achieve a tenfold increase in the social, economic and environmental benefits from water by 2025
Scenarios are increasingly being developed to explore the uncertainty related to social and environmental problems, but to date a participatory scenario process has not been undertaken in the GBR catchment.

This project is being conducted under the Water for a Healthy Country National Research Flagship. The research team will be collaborating with a broad cross-section of people who have key roles in research, planning and policy development in the GBR region to ascertain their views and expectations for the future of the region.

Interviews will be carried out with individuals from government, natural resource management, industry, research, social and environmental sectors, arts and culture organisations.

Management agencies, policy-makers, business and coastal communities will be able to test their strategies and plans across each of the 'worlds' depicted in the scenarios.

Once the scenarios are developed, the research team will work with interested collaborators to apply the scenarios to specific policy or planning questions, with the aim of informing strategic planning, and assisting managers to prepare for and adapt to possible future changes and opportunities.

**RESEARCH OBJECTIVES**

The research team aims to work in collaboration with government, natural resource management, industry, other research providers, and representatives of key social, environmental and cultural sectors to:

- identify and analyse the key factors or variables likely to fundamentally influence the behaviour of communities, industries and natural ecosystems in the GBR catchment
- articulate and challenge expectations about the future
- develop four plausible scenarios that describe what the GBR catchment might be like for communities, industries and resource agencies in 2050 and
- facilitate wide and ongoing communication and uptake of the findings to enhance the capacity of planners and policy-makers in strategic decision-making about the future of the GBR catchment.

**GREAT BARRIER REEF CATCHMENT FACTS**

The GBR catchment covers about 22% (425,964 square kilometres) of Queensland’s land area and is home to about 20% of Queensland’s population (about 830,000 residents). The adjacent GBR lagoon covers a marine area of about 350,000 square kilometres.

Major land uses include nature conservation, cattle-grazing, sugarcane cultivation, cropping, horticulture and mining.

Major urban centres include Rockhampton, Gladstone, Mackay, Townsville, Thuringowa and Cairns.

Land-based activities in the GBR catchment account for about 36% of the gross state production and 60% of exports.

The Great Barrier Reef was listed as a World Heritage Area in 1981 in recognition of its outstanding universal value.

Its direct economic value, in terms of marine tourism, commercial fishing and recreational use, is estimated at $1 billion Australian dollars annually, with flow-on effects to the regional economy.
RESEARCH PLAN

The research will be conducted in five phases that will broadly encompass:

- building partnerships with the project collaborators
- developing future scenarios for the GBR catchment based on interviews with project collaborators
- refining scenarios with project collaborators
- communicating scenarios for the GBR catchment to a wide range of audiences and
- applying scenarios to specific policy planning questions.

Collaboration is a core element of the research. Our collaborators will provide information, act as a reality check and guide the uptake and use of the scenarios.

Where possible, we will use in-depth and comprehensive data to verify that the scenarios are grounded in the experiences of those who will ultimately benefit from them and represent a logical sequence of events.

DELIVERABLES

- A methodology describing the process of developing future scenarios for the GBR.
- Analysis of key variables likely to fundamentally influence the behaviour of communities, industries and natural ecosystems in the GBR catchment.
- A set of up to four plausible future scenarios for the GBR catchment.
- Communication of scenarios and dissemination of information to a wide audience.

RESEARCH OUTCOMES

- Increased understanding of the factors that drive environmental, economic and social change in the GBR catchment over coming decades.

- Increased collaboration between researchers, planners and policy-makers in ongoing strategic deliberations, and monitoring of the future as it unfolds.

- Enhanced ability to use a scenario development process and outcomes in strategic decision making about the future of the GBR catchment.

The GBR lagoon has 2900 individual reefs, of which 760 are nearshore fringing reefs and about 200 are inshore reefs close to the coast, and 260 coral cays.

Scenario Development Process and Main Collaboration Phases

<table>
<thead>
<tr>
<th>Scenario Development Process</th>
<th>Main Collaboration Phases</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Review literature on past and present trends and drivers of change in GBR catchment</td>
<td></td>
<td>June 2006</td>
</tr>
<tr>
<td>2. Identify key issues and challenges</td>
<td></td>
<td>September 2006</td>
</tr>
<tr>
<td>3. Identify project collaborators responsible for the future of the GBR catchment</td>
<td>Individual interviews on the future of the GBR catchment</td>
<td>December 2006</td>
</tr>
<tr>
<td>4. Develop a set of draft scenarios for the GBR catchment based on the reviewed literature and interviews with collaborators</td>
<td>Workshop to revise future scenarios</td>
<td>April 2007</td>
</tr>
<tr>
<td>5. Revise draft scenarios with collaborators</td>
<td></td>
<td>June 2007</td>
</tr>
<tr>
<td>6. Finalise scenarios and evaluate the consequences of the scenarios for the GBR catchment</td>
<td>Strategic planning and actions</td>
<td>September 2007</td>
</tr>
</tbody>
</table>

The scenario development process and associated main phases of collaboration.
Some of the most diverse landscapes on the Australian continent are located in the GBR catchment, ranging from wet tropical landscapes to tropical savannahs and desert uplands.

**EXAMPLES OF SCENARIO PLANNING**

Avon River Basin W.A., CSIRO 2006
http://www.csiro.au/CSIRO/content/standard/ps230.html

Energy Futures Forum, CSIRO 2006
http://www.csiro.au/CSIRO/content/standard/ps120.html

Sustainable Landscape Planning in the Wet Tropics. CSIRO 2005
http://www.csiro.au/research/landscapescensarios/

Shell Oil
http://www.shell.com/scenarios

The Millennium Ecosystem Assessment. 2005

Prelude, European Environment Agency 2005

**RELEVANT LITERATURE**


This research is part of 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.

The research is a collaboration between Australian and Queensland government agencies, regional natural resource management boards, local government, the Cardwell Shire Floodplain Program, James Cook University and CSIRO.

**CONTACT**

Dr Iris Bohnet
CSIRO Sustainable Ecosystems
Tropical Forest Research Centre
PO Box 780 Atherton QLD 4883
Phone: 07 4091 8826 or 04 2720 8883
Email: Iris.Bohnet@csiro.au

Dr Erin Bohensky
CSIRO Sustainable Ecosystems
Devises Laboratory
Townsville QLD 4814
Phone: 07 4753 8569
Email: Erin.Bohensky@csiro.au

For information on the Water for a Healthy Country Flagship
http://www.csiro.au/healthycountry/
APPENDIX B – INTERVIEWEES FOR THE PROJECT

NRM groups
1. Allan Dale, terrain NRM
2. Bob Frazer, BDTB
3. Colin Creighton, Machay Whitsunday NRM

Research
4. Geoff Lawrence, UQ
5. Janice Elder, JCU
6. John Beaton, Academy of the Social Sciences in Australia
7. John Byron, The Australian Academy of the Humanities
8. Jon Brodie, ACTFR, JCU
9. Jon Nott, JCU
10. Keith Bristow, CSIRO
11. Norman Palmer, Research & Innovation, JCU
12. Peter Griggs JCU
13. Robert Miles, CQU
14. Steve Turton, TJVP
15. Terry Hughes, Centre of Excellence for Coral Reef Studies, JCU
16. Toss Gascoigne, Council for the Humanities, Arts, & Social Sciences
17. Vern Veitch, ACTFR, JCU

Industry
18. Ian Ballantyne Canegrowers
19. Jeremy Blockey, The 20/20 Group, Cairns Chamber of Commerce
20. Jim Burgess Timber Queensland
21. John Futer, Housing Industry Association
22. Les Robertson, SRDC
23. Rachel Mackenzie, Growcom
24. Robin Hansen Qld Seafood Industry Association
25. Tony Fontes, Tech Dive Academy, LMAC
26. Wayne Hall, Manager Northern Production Research, Meat and Livestock Australia

Indigenous
27. Philipp Rist, Girrigun

Government
28. Adam West, DPI&F
29. Beth Woods DPI&F R&D Deputy Director
30. Doug Yuille – EPA Director of strategic projects
31. Hugh Yorkston, GBRMPA
32. Kirsten Dobbs, GBRMPA
33. Malcom Petrie NRM Project Coordinator Local Government Association of Qld
34. Mike Lee, General Manager, Australian Government NRM team
35. Paul Marshall, GBRMPA
36. Rachel Eberhard, RQWP
37. Robin Clark, Local Government, FNQ 2025
38. Russell Reichelt, former RRRC, chair GBRMPA
39. Sheriden Morris, RRRC
40. Thilak Mallawaarchchi, ABARE

Conservation
32. Kirsten Dobbs, GBRMPA
33. Malcom Petrie NRM Project Coordinator Local Government Association of Qld
34. Mike Lee, General Manager, Australian Government NRM team
35. Paul Marshall, GBRMPA
36. Rachel Eberhard, RQWP
37. Robin Clark, Local Government, FNQ 2025
38. Russell Reichelt, former RRRC, chair GBRMPA
39. Sheriden Morris, RRRC
40. Thilak Mallawaarchchi, ABARE

Conservation
41. Kirk Smith, Landcare
42. Roger Phillips, ARF
43. Jason Alexandra, Earthwatch Australia
44. Richard Leck WWF
45. Nick Heath WWF

Other
46. Di Jay, Planning Institute of Australia
47. Diane Cilento, Actor, Karnak Playhouse & Rainforest Sanctuary
APPENDIX C – BRIEFING PRESENTATION

Envisioning possible futures for the Great Barrier Reef Catchment

Background

Project scope

This project sits within a research area in CSIRO that aims to understand human-driven processes, combine with human drivers to impact on our environment for developing sustainable pathways to achieve the objectives of the Reef Water Quality Protection Plan.

Primary goal of the project:

Develop future scenarios (alternative futures) for the GBR catchment for the year 2050 together with key stakeholders/collaborators.

Research approach

Scenario planning is the tool that we will use to identify future visions for the GBR.

- It is a method of thinking creatively about possible complex and uncertain futures.
- It is different from all other forms of planning such as bond evaluations, forecasting or predictions, and
- it is most useful when dealing with high uncertainties in the system that are difficult to control.

Future Scenarios for the Great Barrier Reef Catchment  Page 38
**Research Approach**

**Example of Scenario Planning**

**Scenario Storylines**

- **Global:** Unregulated, globally connected economy that focuses on global trade and economic development. "TechnoGarden" is an example of this scenario.
- **Order from Strength:** Regionalized and regulated world, experiencing rapid economic development and new strategies and policies to address global problems.
- **Adapting Measure:** Reorganized regulatory and institutional sectors, and the focus on pollution and climate policies. Urbanization is a key theme, and "TechnoGarden" is an example of this scenario.

**Scenario Planning Steps**

1. Review the data on past and present trends and drivers of change in the GBR catchment.
2. Identify key issues and challenges.
3. Identify potential collaborative opportunities for the future of the GBR catchment.
4. Develop a set of draft scenarios for the GBR catchment based on the reviewed literature and workshops with stakeholders.
5. Refine draft scenarios with stakeholders through workshops.
6. Finalize scenarios and evaluate their consequences for the GBR catchment, and
7. Work with focused collaboration to apply these scenarios to specific policy or planning questions.

**How does this link to strategic planning?**

Futures thinking expands the possibilities for the future, while strategic planning decides how to deal with these possibilities (Gold et al., 2019). We would like to be able to work with you so that you could use the future visions generated from this project in your strategic or other planning processes. We need to understand the best ways of working with you to provide you with information that is both relevant and useful.

**Engagement**

Engagement is the key to scenario planning success because:

- future analysts rarely have access to the same knowledge and experience as the key decision-makers, and
- if developed in partnership with key decision-makers, the identified future visions may be applicable in strategic and operational planning processes.

**Stakeholders**

We plan to work with a broad cross-section of industry, government, research, social and environmental sectors. The primary aim of bringing key stakeholders together to develop future scenarios is:

- to challenge preconceptions about the future,
- to involve them from the start in the research, and
- to develop a long-term working relationship with decision-makers.
Your questions / our questions

- Would you be able to use the information about possible futures for the GBR in the year 2050 for your planning purposes?
- How can we work with you to tailor the scenarios to meet or inform your future planning needs?
- Using Reef Plan, NRM Plans and Regional Plans as our key forum areas, who should we be involving in our interviews?
- What decision-making level should we be aiming at?
- From the workshop today we would like to identify who could be interviewed to help build the scenarios, who would be appropriate?

Contact CSIRO

Email: csiro.research@csiro.au
Website: www.csiro.au
APPENDIX D – INTERVIEW QUESTIONNAIRE

WATER FOR A HEALTHY COUNTRY FLAGSHIP PROJECT:

Envisioning Possible Futures for the Great Barrier Reef Catchment

Collaborator perspectives interviews on the Future of the GBR

April 2007

NAME:

ID:

AFFILIATION:

DATE:

PLACE:

INTERVIEWER:

LENGTH OF RECORD:
Interview Preamble

[Make sure that they have a copy of our project brief, which has our contact details]

This interview is part of the Water for a Healthy Country Flagship funded ‘Envisioning Possible Futures for the GBR Catchment’ project, which is focusing on possible futures for the GBR catchment. We are particularly interested in identifying the key factors which will fundamentally influence the behaviour of communities, industries and natural ecosystems in the GBR catchment. The information from these interviews will help us understand the range of perspectives on the key factors which we will use to develop draft scenarios for the future of the GBR catchment for 2050.

Your responses will be treated as confidential and we will ensure that you are not personally identified in the results of the study. However, we would like to include your name in our list of interviewees to illustrate that we have represented a wide range of sectors. Is that Okay with you?

We would like to discuss and refine the draft scenarios that we will be developing based on the information gathered in the interviews with some of our collaborators in a 1-day workshop later this year. Would you be interested in taking part in this workshop? Answering ‘yes’ now is not a commitment, simply an indication of interest.

With your permission, this interview will be tape recorded and your statements summarised. Is that alright with you?

Our discussion will include:

- Some background on your role or interest in the planning, policy, and/or decision-making arena;
- Your thoughts on how the GBR and its catchments will look like by 2050;
- Your perspective on the main factors driving these changes in the Great Barrier Reef (GBR) catchment and the key uncertainties;
- Your thoughts on what kind of future you would like to see and how it could be achieved.

Do you have any questions before we begin?
SECTION 1: CONTEXT

1. How long have you been working on GBR related issues?

We’d like some information about your “role” in the sense of your ‘responsibilities’?

2. Firstly, what roles do you play within your work organisation?

3. What other roles do you play in the GBR region? For instance, do you have a formal “role” in any committee / group / etc?

SECTION 2: FUTURE OF THE GBR CATCHMENT

We are interested in your thought on the future of the GBR catchment.

4. What do you think the GBR catchment and lagoon will look like by 2050?

4. a What are the main environmental changes you envisage?
4. b What will be the major land uses (e.g. protected areas; mining; agriculture – sugarcane, grazing, cropping; forestry; urban; rural residential)?

4. c What will be the major industries (e.g. tourism, fishing, mining, forestry, agriculture)?

4. d What are the main societal changes you envisage?

5. Will there be major differences between regions within the GBR catchment? *If yes, what are they? If no, why not?*
SECTION 3: MAIN FACTORS DRIVING CHANGE & KEY UNCERTAINTIES

Thinking about what you just discussed, we are interested in finding out

6. Who or what, do you think, will be most influential in driving these changes (e.g. climate change, energy, water, economics, institutions/governments)?


7. What is the biggest change you expect?


8. What might be the surprises you envision?


SECTION 4: IDEAL FUTURE & HOW TO GET THERE?

9. What would be your ideal future?
10. What obstacles do you envisage in achieving your ideal future?

SECTION 5: RESPONSES AND ADAPTIVE CAPACITY
Thinking about the GBR catchment in 2050 ….

11. How, do you think, communities, industries, and government, will respond to environmental problems? *Will they be prepared to respond to environmental problems or will they only react once it happens? How will they prepare or react to change?*

11.a Will there be differences between regions within the GBR catchment in terms of their responses to environmental problems? *Will some regions be better prepared than others?*

12. What capacity to adapt to change will exist in different regions, communities, industries, and government in the GBR by 2050?
13. In what ways do you think the scenarios for the GBR that we are developing could assist you in your work / or could assist your organisation in informing strategies or plans to achieve a more sustainable future?


IN CLOSING

14. Do you have anything else you would like to add that we haven’t covered? Any final comments?


Future Scenarios for the Great Barrier Reef Catchment
## Future scenarios for the Great Barrier Reef Catchment

### Workshop objectives & program outline

**Date**: Thursday 14th February 2008  
**Time**: 8.45am for 9.00am start – 4.30pm  
**Venue**: Cairns JCU, Building E2 (Sir Robert Norman Building also known as ATFI building), Room: 113 and 113A

**Workshop objectives**
1. To assess the plausibility and the applicability of the scenarios to a range of decision-making processes.
2. To explore the implications of the scenarios for the diverse industries, communities and ecosystems in the region.
3. To scope common long-term strategic responses (priorities) that contribute to the development of a sustainable GBR catchment.

The one day program of presentations, discussion and small group work will be facilitated by Mary Maher.

### Program outline

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>9.00</td>
<td>Welcome</td>
<td>Rhonda Brim – Traditional Owner</td>
</tr>
<tr>
<td>9.20</td>
<td>Project overview</td>
<td>Iris Bohnet, Erin Bohensky</td>
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<tr>
<td>9.40</td>
<td>Key notes on ‘axes’ of uncertainty</td>
<td>Jonathan Nott – Climate change</td>
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<td></td>
<td></td>
<td>Sheridan Morris – Leadership</td>
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<tr>
<td>10.00</td>
<td>Scenarios outlined</td>
<td>Questions &amp; Answers</td>
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<td>10.40</td>
<td>Morning tea</td>
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<tr>
<td>11.00</td>
<td>Testing the scenarios</td>
<td>Small groups review a scenario</td>
</tr>
<tr>
<td>11.40</td>
<td>Robust scenarios</td>
<td>Group synthesis – the 4 scenarios for GBR catchment 2050</td>
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<tr>
<td>12.30</td>
<td>Lunch</td>
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<td>1.15</td>
<td>Implications of the scenarios … to 2050</td>
<td>Panel of key interest groups (cane, beef, timber, tourism, development industries, governments, NRM, health, indigenous, research): Small groups discuss the 4 scenarios and their implications for: research / knowledge regulation infrastructure and land use planning industry and production</td>
</tr>
<tr>
<td>2.30</td>
<td>Summary</td>
<td>Key implications and their relative importance</td>
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<tr>
<td>3.00</td>
<td>Tea</td>
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</table>
| 3.15  | Scenarios informing decisions of regulators and investors                                  | How might these scenarios be applied?  
What might they influence?  
What are the caveats for their use? |
| 4.15  | Close & thanks                                                                             | Iris Bohnet                                        |
Key note speakers

Biography
Professor Jonathan Nott graduated with a PhD in Geomorphology from the University of Wollongong in 1991. He undertakes research into extreme natural events such as tsunamis and tropical cyclones and specializes in post-event surveys of these hazards both in Australia and overseas. He also reconstructs long-term natural records of these extreme events so that we can gain a more realistic guide to their long-term behaviour and derive more accurate estimates of their return intervals for risk assessment. Prof. Nott has published many articles on these topics in international science journals and has provided the first detailed review of the techniques involved in reconstructing these long-term records in his book ‘Extreme Events’ published by Cambridge University Press in 2006.

Biography
Sheriden Morris is Managing Director of the Reef & Rainforest Research Centre (RRRC), implementing the Australian Government’s Marine and Tropical Sciences Research Facility (MTSRF) in Far North Queensland. Sheriden was formerly Director of Water Quality and Coastal Development with the Great Barrier Reef Marine Park Authority and Manager of the Great Barrier Reef program of CSIRO’s Water for a Healthy Country Flagship. Sheriden is experienced in tropical agriculture industry, natural resource management, environmental management and policy development. The RRRC, the successor entity of the CRC Reef and CRC Rainforest, is a science brokerage organization with offices in Cairns and Townsville and a Queensland stakeholder representative board. In 2006 the RRRC was awarded the management of the MTSRF, an initiative of the Australian Government that will invest in world-class public good research over 4 years from July 2006. Through the MTSRF and RRRC activities a range of research is being undertaken that is targeted for public benefit and towards delivering useful products that support the health of the Great Barrier Reef, the Wet Tropics and the adjoining coastal catchment regions.
APPENDIX F – LIST OF WORKSHOP PARTICIPANTS

GBR Future Scenarios Collaborator Workshop 14.02.08

List of workshop participants

1. Alan Cummine, Treefarm Investment Managers Association
2. Allan Dale, terrain NRM
3. Bruce Cowie, NRW
4. Claire Rogers, Fitzroy Basin Association
5. Colette Thomas, CSIRO
6. David Osborne, GBRMPA
7. Ed Donohue, NRM
8. Erin Bohensky, CSIRO
9. Felicity Adams, Department of Local Government, Planning, Sport and Recreation
10. Fergus Molloy, GBRMPA
11. Fiona Henderson, CSIRO
12. Gary Barns, Greening Australia
13. Hilton Taylor, DEWR/NRW
14. Hugh Yorkston, GBRMPA
15. Iris Bohnet, CSIRO
16. James Butler, CSIRO
17. Jane Waterhouse, CSIRO
18. John Armour, NRW
19. John Baldwin, GBRMPA
20. John Futer, Qld Housing Industry Association
21. John Rainbird, GBRMPA
22. Jon Brodie, JCU
23. Jonathan Nott, JCU
24. Karla Henry, NRW
25. Kathleen Shurcliff, terrain NRM
26. Lance Rodman, Farming For the Future
27. Maree Grenfell, Douglas Shire Council
28. Max Chappell, Wet Tropics Management Authority
29. Michael Hanslip, Bureau of Rural Sciences
30. Peter Elliot, DPI&F
31. Philipp Rist, Girringun
32. Rachel Eberhard, Reef Water Quality Partnership
33. Rhonda Brim, Traditional Owner, Aboriginal Rainforest Council
34. Sarah Faulkner, Cairns City Council
35. Sarah Hood, QLD NRM Regional Groups Collective
36. Scott Ritchie, Qld Tropical Health Unit
37. Sheriden Morris, Rainforest to Reef Research Centre
38. Stacy Juniper, ARC Coral Reef Studies at ANU
39. Steve Turton, JCU
40. Sue Sargent, Burnett Mary Regional Group
41. Wayne Hall, Meat and Livestock Australia
# APPENDIX G – WORKSHOP EVALUATION SHEET

## WORKSHOP EVALUATION SHEET

Have you been interviewed for the GBR Future Scenarios Project  

- [ ] yes  
- [x] no

Please indicate your level of agreement with the following statements on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree):

1. My perceptions of change and the drivers of change in the GBR region are different from those I had at the beginning of the workshop.

| Strongly Disagree | 1 | 2 | 3 | 4 | 5 | Strongly Agree |

If they are different, how have they changed?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

2. The scenarios provided me with a better understanding of potential long-term strategies and their likely effectiveness.

| Strongly Disagree | 1 | 2 | 3 | 4 | 5 | Strongly Agree |

Your Comments:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

3. I have identified the need for new collaborations with other organisations from today's workshop.

| Strongly Disagree | 1 | 2 | 3 | 4 | 5 | Strongly Agree |

Your Comments:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

4. My understanding of other organisations operating within the GBR region has improved.

| Strongly Disagree | 1 | 2 | 3 | 4 | 5 | Strongly Agree |

How?

________________________________________________________________________
5. What message will you take back to your organisation in light of today’s workshop?

________________________________________________________________________________

________________________________________________________________________________

6. The key drivers of change in the GBR region and the future scenarios were explored and assessed to a satisfactory level.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Your Comments:

________________________________________________________________________________

________________________________________________________________________________

7. The venue was suitable for the workshop.

Strongly Disagree 1 2 3 4 5 Strongly Agree

8. The format of the program was appropriate.

Strongly Disagree 1 2 3 4 5 Strongly Agree

9. The facilitation was effective.

Strongly Disagree 1 2 3 4 5 Strongly Agree

10. Your general comments on the workshop (suggestions, improvements to its processes, outcomes):

________________________________________________________________________________

________________________________________________________________________________

11. How would you rate the overall value of the workshop?

HIGH [ ] MEDIUM [ ] LOW [ ] UNCERTAIN [ ]

Name: (optional) ____________________________________________
APPENDIX H – WORKSHOP EVALUATION

WORKSHOP EVALUATION

The workshop evaluation sheet was filled out by 24 of the 41 participants at the end of the workshop. Four of the people who filled out the evaluation sheet had been interviewed for the project whereas twenty were not interviewed.

Workshop participants were asked to indicate their level of agreement with the statements provided on a scale of 1 (strongly disagree) to 5 (strongly agree) to find out whether the workshop had contributed new knowledge and information to their current understanding. In addition, participants were encouraged to comment on each of their scaled responses by providing details to their answers. The scaled responses are summarised in bold numbers under each of the scales as well as a summary of the written responses is provided below each of the scales.

1. My perceptions of change and the drivers of change in the GBR region are different from those I had at the beginning of the workshop.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

In summary, none of the participants had very different perceptions of change and the drivers of change when they entered the workshop. Participants who agreed that their perception had changed through the workshop stated that they “had not thought about leadership as one of the key drivers” and that “there is more emphasis on agriculture than I expected.” Participants who felt their perceptions were not different from those they had when they entered the workshop mentioned that their “knowledge expanded somewhat through the discussion process” and that they did not think of a “climate change event as a catalyst or even as a necessary event to achieve change.” Another participant stated that the workshop provided an opportunity “to flesh out current understanding.”

2. The scenarios provided me with a better understanding of potential long-term strategies and their likely effectiveness.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Participants who agreed that the scenarios provided them with a better understanding of potential long-term strategies indicated that “the debate substantially broadened the scope of potential future management possibilities” and that “scenario planning is developing better strategies that will be more effective, including risk management.” Participants who felt that the scenarios did not provide long-term strategies as yet stated “the day has provided a possible framework for how some strategies can be developed.” Other comments ranging on the scale from 2 to 4 included: “the likely scenarios were depressingly too familiar and the rather less likely outcomes seem unexpected. The strategies for all, despite the differences, seem fundamentally similar.” Another participant commented: “for the more pro-active scenarios, however, I feel like there needs to be a radical shift in jurisdiction (...) to enforce plans and to prioritise which regions/industries require the most change for effective reef management.”
3. I have identified the need for new collaborations with other organisations from today’s workshop.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>0</td>
<td>5</td>
<td>3</td>
<td>11</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Participants who strongly agreed/agreed with the above statement provided the following comments: “If we do not collaborate we will not get our desired outcomes for the reef.” Another comment highlighted the role of collaboration and authority to act: “There needs to be a forum in which all stakeholders’ interests are clearly communicated – separate from NRM groups which do not currently have adequate authority to implement management.” Participants disagreeing with the statement offered the following explanations “I knew that collaboration is essential and knew most the organisations presented on the day.”

4. My understanding of other organisations operating within the GBR region has improved.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>0</td>
<td>5</td>
<td>7</td>
<td>12</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

For some participants there were “no major surprises” whereas for others the day “improved [their] awareness of the Reef Partnership” and their “appreciation of the complexity of the relationships of various players.”

5. What message will you take back to your organisation in light of today’s workshop?

In summary there were four key messages that participants took back to their organisations:
- Need for collaboration, e.g. how industry needs to be involved in the process, and participation in the Reef Summit.
- Need for support (e.g. agency, industry) of own organisation for this work.
- Scenario planning is valuable preparation for risk analysis and basis for discussion on limits of acceptable change/use; tool for community engagement and development of a shared vision.
- Opportunities for co-research and the need for research to effectively communicate to decision-makers the likely outcomes if appropriate measures are not put in place now.

6. The key drivers of change in the GBR region and the future scenarios were explored and assessed to a satisfactory level.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>16</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

While most participants felt “that we could not have gone deeper in one day” but “more time would have helped” to further explore the drivers of change in the GBR region, one participant stated “slightly overemphasised the scenarios and perhaps not enough on where to in the light of assuming the scenarios are OK.”
7. The venue was suitable for the workshop.  
   Strongly Disagree 1 2 3 4 5  
   Disagree 0 2 17 5  
   Agree  

8. The format of the program was appropriate.  
   Strongly Disagree 1 2 3 4 5  
   Disagree 0 0 4 16 4  
   Agree  

9. The facilitation was effective.  
   Strongly Disagree 1 2 3 4 5  
   Disagree 0 0 1 12 11  
   Agree  

10. Your general comments on the workshop (suggestions, improvements to its processes, outcomes):

   Overall, the feedback received was very positive. Comments included: “I am glad I came…”; “well done, was sceptical at start but generally excited at potential application of the research”; “extremely well facilitated and constructed.”

   Some participants provided feedback regarding process and outcomes of the workshop. These comments included: “What the research team wanted (the objectives) out of the workshop should be more clearly stated at the beginning.” Another suggestion offered by one of the participants, was almost a response to the previous comment: “I think future workshops on this topic would benefit from an up-front discussion on how an operational plan could be developed based on reactions to each scenario.”

   One participant suggested that: “Perhaps we need to reach consensus on what the shared future should be. It’s going to take some hard and difficult decisions – if we do nothing then our only options are Booming Sea-Change and No Limits to Growth, i.e. business as usual. Not exactly a SMART STATE CHOICE.”

11. How would you rate the overall value of the workshop?

   HIGH  MEDIUM  LOW  UNCERTAIN
   11     13      0      0
THE GREAT BARRIER REEF CATCHMENT IN 2008

This section outlines the features that combine to make the GBR region unique. The Great Barrier Reef (GBR) catchment extends approximately 2300 km along the north-east coast of the state of Queensland from the Tropic of Capricorn in the south to the tip of Cape York in the north (Figure 2). The catchment area covers about 22% (425 964 km²) of Queensland's land area and is home of about 20% of Queensland's population (approximately 830 000 people). Major urban centres include Bundaberg, Rockhampton, Gladstone, Mackay, Townsville and Cairns. The adjacent GBR lagoon covers an area of approximately 350 000 km² on the north-eastern Australian continental shelf.

Some of the most diverse landscapes on the Australian continent are located in the GBR catchment ranging from wet tropical landscapes to tropical savannahs and desert uplands. The main land uses include nature conservation, cattle grazing, sugarcane cultivation, cropping, horticulture and mining (Great Barrier Reef Marine Park Authority 2001). The Wet Tropics for example, which is one of seven bioregions in the GBR catchment, is home to 36% of Australian mammals, 48% of birds, 26% of frogs, 58% of butterflies, to just name a few, of which many are endemic (Goosem et al. 1999). Land based activities in the GBR catchment account for about 30% of the Gross State Production and 60% of exports (Productivity Commission 2003).

The GBR seascapes consist of some 2900 individual reefs of which 760 are nearshore fringing reefs and about 200 are inshore reefs close to the coast, and 250 coral cays. Habitats include seagrass beds, mangroves, sponge gardens, soft sediments and deep water areas all of which support a great diversity of species (Furnas 2003).

The GBR was listed as a World Heritage Area in 1981 in recognition of its outstanding universal value. It was the world's largest marine protected area, before 2006, and is a multiple-use park (Valentine et al. 1997). The total (direct plus indirect) economic contribution of tourism, commercial fishing, and cultural and recreational activity in the GBR and its catchments to the Queensland economy is $5.4 billion per annum (gross product) and employs about 56,000 persons (Access Economics 2007; 2005-06 estimates).