

Natural Resource Management in Southern Tasmania

*A scan of strategic environmental
issues and emerging concerns*

Discussion paper

Prepared for

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Executive summary

REVIEWING THE NATURAL RESOURCE MANAGEMENT STRATEGY FOR SOUTHERN TASMANIA

NRM South commissioned Rare Consulting to undertake two background studies as part of the Natural Resource Management Strategy review process for Southern Tasmania (the Southern Region). The two studies include:

1. A reflective study entitled *Summary of principal achievements in natural resource management in the Southern Region of Tasmania since 2005*. This study reviews and reflects on the implementation of the 2005 Natural Resource Management Strategy for the Southern Region and summarises key achievements of the region in implementing natural resource management.
2. A strategic study entitled *Natural resource management in Southern Tasmania: A scan of strategic environmental issues and emerging concerns*. This study is a high-level strategic study as opposed to a detailed technical study. It provides an independent and objective analysis of the key issues for the region for the next regional strategic planning period based on a scan of existing natural resource management issues, emerging issues and consideration of changing socioeconomic, regulatory and political operating environments for the region. It also provides recommendations for the development of the 2010–2015 regional natural resource management strategy.

This paper largely discusses the findings of the second investigation but also provides a summary of the key findings from the reflective work. The findings of this work are discussed in the context of providing guidance on the key strategic issues and emerging issues that will likely shape the natural resource management agenda in Southern Tasmania in the near term.

Approach

The following outlines the approaches of both studies.

Summary of principal achievements

The study collated and summarised region-wide natural resource management activities and achievements since 2005. Achievements were interpreted as *accomplishments* and *successes*. Information about actions throughout the region was collected via:

- a desktop review of NRM South documents (including project reports, evaluation reports, annual regional investment planning documents, and reporting on activities by NRM South and other regional partners);

- an internet focused search of natural resource management stakeholder websites and other public information sources (i.e. newsletters, publically available government reports);
- consultation of NRM South personnel focused on information sharing and validation;
- the conduct of unattributed, semi-structured telephone interviews of eighteen ‘knowledge experts’ and regional natural resource management stakeholders, which enquired about achievements and key learnings.

All information collected on projects and their outcomes was summarised into data tables according to their relevance to the seven 2005 Strategy resource themes:

- integration
- managing water resources
- managing land resources
- managing marine, coastal and estuarine systems
- managing native flora and fauna
- managing cultural landscapes
- managing for sustainable communities and a sustainable economy.

The tables and interview findings were then used as the foundation for analysis of principal achievements and identification of significant achievement examples.

Scan of strategic environmental issues and emerging concerns

The scan of strategic environmental issues and emerging concerns comprised the following steps.

1. Analysis of the performance of the 2005 Strategy strengths and weaknesses.
2. A systematic scan of environmental condition and issues across the seven 2005 Strategy resource themes via:
 - a desktop literature review
 - reference to qualitative interviews with eighteen regional knowledge experts about ongoing and emerging issues
 - reference to stakeholder and technical consultations carried out by NRM South from 2007 to 2009.

Analysis provided information about relative condition of natural resources in the region since the 2005 Strategy, and identified current and emerging issues that are likely to impact on natural resource management and the operating environment for the Southern Region.

Change in the operating environment for natural resource management in the region and natural resource issues were assessed in the context of:

- community change (attitudes, values, awareness, and behaviour)
 - physical environmental change issues across scales
 - socio-economic change
 - political change (including policy and funding environments)
 - regulatory and legislative environments and change (including planning systems).
3. Identification of overarching and emerging issues of significance to be considered in the next regional strategy period.
 4. Development of recommendations for a framework for the 2010 Strategy.

A REFLECTION ON PAST ACHIEVEMENTS AND KEY LEARNINGS

Implementing the 2005 Strategy: Principal Achievements

While NRM South has undertaken a wide range of activities that are consistent with the original strategy, analysis of all of these activities gives rise to the identification of seven principal regional achievements:

- positive engagement of stakeholders and community across sectors
- working together and development of successful partnerships
- awareness raising in the community and targeted sectors
- developing and applying integrated and holistic approaches
- improving information and data consistency and access
- working towards better monitoring, evaluation and reporting for improvement
- building capacity in sectors of the community.

A summary of achievements and example projects is provided on the NRM South website at <http://www.nrmtas.org/whatsNew/south/latestNews.shtml>

While there have also been achievements in the maintenance and improvement in resource condition in parts of the region and in some resource areas (e.g. the eradication or significant reduction in some invasive weed species and improvement in Ramsar Wetland water quality and natural habitat), a lack of quantitative information on the state of natural resources made it difficult to provide a meaningful assessment of quantitative changes in the resource condition. The study team noted that the Tasmanian State of the Environment Report is due to be published in the near future and should provide more insight in respect of this issue.

The review of activities and achievements across the region also exposed some apparent deficiencies in respect of progress in natural resource management since 2005. These can be summarised as:

- an uneven distribution of natural resource management activities across the natural resource theme areas – areas of particular strength in activity included water resources, and native flora and fauna, whereas activity in the land resources, marine and cultural landscape theme areas tended to be less prolific;
- significant data gaps in baseline and monitoring data for natural resource condition assessment;
- a lack of progress in the improvement of integrated policy, planning (including regional strategic land use and settlement planning) and decision making across scales for improved natural resource outcomes.

Some other issues needing further attention were also mentioned, for example:

- the need for improved attention to the incorporation of cultural landscape values into natural resource management;
- the need to address rural tree decline.

Learning from the 2005 Strategy

Reflection on the review of achievements and review of the functionality of the 2005 Strategy identified six strategic insights around the performance of the 2005 Strategy. These have been considered as key learnings for improvement in future strategy development. They are:

1 The lack of strategic priorities and the problem of spreading resources too thinly

The 2005 Strategy spreads itself too thinly in terms of focused activities and desired outcomes as expressed through the targets for each natural resource theme area. Ultimately this has meant it has been difficult to deliver across all areas. It will be essential for the new strategy to better prioritise those natural resource management issues that require most urgent attention over the next five-year strategy period and to ensure these are realistic priorities based on regional capacity.

2 Paucity of baseline data on resource condition within the region

A paucity of baseline data has made it difficult to understand the extent of resource condition within the region, and has impeded effective prioritisation of investment activities and establishment of resource condition monitoring.

3 Difficulty in establishing progress due to gaps in the capacity to measure resource condition over time

Apparent gaps in the monitoring of resource condition has made it difficult for the region to establish progress towards many of the 2005 Strategy targets. While there has been progress in improved monitoring and evaluation systems it will be important to maintain attention to the need for improvement in these in order to establish useful and achievable indicators for use in measuring progress.

4 A poor level of fit between regional natural resource management aspirations and collective regional resources

A poor level of fit between regional natural resource management aspirations and the collective regional resources of key delivery agencies is evidenced by the variable implementation of activities across the 2005 Strategy themes since 2005. There is evidence from a review of achievements in the region that some natural resource theme areas have been more active than others. It is understood that there are varying reasons for this, particularly funding from traditional commonwealth and state government natural resource management programs according to their own agendas. It will be important therefore to consider other opportunities for funding beyond traditional commonwealth funding sources into the future.

5 Evidence of positive engagement activities in the region

Since the 2005 Strategy, the region has demonstrated a capacity to work together on a range of fronts and engage constructively with a variety of sectors in the community. This is a particular strength in the region and will hold the region in good stead into the future, as collaborative approaches and active engagement of the community will continue to be essential in the delivery of natural resource management.

6 A lack of achievable targets in the 2005 Strategy

Targets in the 2005 Strategy appeared ambitious in number and are often difficult to measure. The limitations associated with the availability of baseline data and monitoring capacity across all natural resource management theme areas points to the need for the development of targets or goals that are achievable and easily measurable in the next strategy period.

ENVIRONMENTAL SCAN OF ONGOING AND EMERGING ISSUES

The scan confirmed that natural resource management is complex and challenging for a variety of reasons, merely by the breadth of natural resource assets and issues, the diversity in values associated with natural resources and the integrated nature of the task of natural resource management itself.

Ongoing issues and pressures for the region

As the Southern Region moves into the next strategy period it is apparent from the scan that many of the issues associated with natural resource management will remain unchanged, particularly:

- the continuation of invasive weed management (an ongoing challenge for a variety of stakeholders);
- the management of impacts associated with urban and infrastructure development, and land use change;
- the management of rivers and catchments and estuaries to improve water quality, flows and ecosystem condition;
- the protection of ecosystems and species for biodiversity;
- the management of salinity.

New priorities for the community

Other issues have emerged in the community as new priorities, for example:

- understanding the implications of global warming on the future regional climate and understanding the implications of climate change on natural resource assets to identify priority issues (scenario modelling and risk and vulnerability assessment);
- developing strategies, and implementing these, for both mitigation of greenhouse gas emission and adaptation to climate change;
- pursuing more sustainable behaviours and practices across a range of community sectors (including households, industry and commerce and government);
- the recognition that natural resource management issues associated with new major infrastructure projects and cumulative development pressures need to be better managed (including integrated planning for the continued urban expansion of greater Hobart and coastal settlements, land use reclassification, and major infrastructure projects such as the Tasmanian Irrigation Development Scheme).

Emerging operating environments

In addition to changing community interests, operating environments for natural resource management in the region are changing. These include:

- an evolving climate change policy and regulatory environment that will present opportunities and risks for the regional economy and natural resource oriented industries, including:

- national economic reform through an emissions trading scheme that is intended to reduce the carbon intensity of the Australian economy through introducing a price for carbon. This will have a range of impacts on industry costs and efficiencies throughout supply chains and encourage less carbon intense commercial activities;
- requirements of larger emitters to monitor and report greenhouse gas emissions (including natural resource oriented industries and waste management authorities);
- establishment by federal and state governments of both ‘carrot’ and ‘stick’ incentives to reduce greenhouse gas emissions and enhance greenhouse gas sinks to work towards greenhouse gas reduction targets;
- an emerging understanding about bio-physical changes associated with climate change (risks, threats and opportunities) through the roll out of research activity in the climate change impacts and adaptation field across sectors and scales;
- demographic changes and population movement from the mainland associated with an ageing population and increasing attraction of Tasmania and the region for lifestyle purposes (sea-changers, tree-changers and rural lifestyle). This will have variable and locally specific impacts on the region, presenting opportunities and challenges for local communities, economies, services and the management of natural resources;
- the roll out of regional planning in Tasmania in which sustainability and natural resource management interests have the opportunity to become central considerations.

These changing operating environment and community priorities point to two core significant issues for the region. These are: climate change, particularly its implication for adaptation but also for opportunities in mitigation via natural resource activities; and ongoing pressures associated with land use change and development.

Significant issues going forward

Climate change

The global imperatives for acting on climate change, including the need for mitigation and adaptation, are now clear. The Australian Government is now a party to the Kyoto Protocol and is implementing a program of mitigation actions. It also has a National Adaptation Program which is rolling out and facilitating priority adaptation research, collaboration and engagement of stakeholders. Similarly the Tasmanian Government has recently committed to a greenhouse gas emission reduction target to reduce emissions to at least 60% below 1990 levels by 2050 while it also recognises that there are many climate change risk and adaptation issues that need to be understood.

Mitigation of global warming (via measures to reduce greenhouse gas emissions and to enhance sinks) engages natural resource management through considerations around of the role of natural resources in carbon sequestration and the need to limit the removal of carbon sinks through the management of forests, land use change into the future and private landholder commercial carbon offsetting or soil sequestration opportunities. Mitigation responses will also need to pervade other sectors throughout the community, including the way we manage urban growth and development, individual lifestyles,

and industry, government and commercial activities. Some of these may have implications for natural resource management, such as the way we design and develop our urban environments into the future.

The most significant climate change challenge for natural resource management in the Southern region, however, will be the management of the impacts of climate change on natural resources, particularly key natural resource values. There are numerous issues for the region to consider, including understanding which natural systems and natural resource commercial activities are most at risk, and which natural systems we should facilitate adaptation for. Understanding the extent of the challenge spatially, sectorally and temporally will be crucial in the next regional planning period in order to begin to develop response strategies through collaborative efforts and stakeholder engagement.

Land use change and development pressures

The study affirms the continuing significance of development and land use change associated with human activities as core pressures on natural resource condition in the region. Examples of key pressures include:

- the impact on natural resources and natural resource management approaches of changing land use. For instance: from woodland to agriculture;
- the risk of fragmenting natural ecosystems, restricting ecosystem connectivity and the capacity to facilitate refuges for vulnerable species, due to the development of land for urban and infrastructure use, agriculture or forest plantations;
- the cumulative impact of urban expansion on natural resources including habitat loss, pollution of water ways and degradation of urban reserves and other ecosystems of value;
- the pressure to focus development in coastal and estuarine zones due to the relative attractiveness of these environments for human settlement, tourist activities and recreation;
- major infrastructure projects, for example the Tasmanian Irrigation Development Schemes, and major transport infrastructure projects.

Such pressures may also present opportunities for natural resource management interests to be better addressed, for example regional planning should facilitate community reflection on the character and form of urban development in the greater Hobart region into the future, while new irrigation infrastructure schemes may present opportunities for improving natural resource condition (such as river flows and sustainable practice in soil management).

Issues related to the management of natural resources

This study concluded that there are four overarching and fundamental issues for the effective management of natural resources in the Southern region which are likely to form the foundations for natural resource management programs. They appear as common threads in the environmental scan analysis in each of the theme areas, and include:

1 The need for baseline data

In order to better inform decision making, there is a strong need for baseline data. Not only does up-to-date data provide a means of assessing the effectiveness of prior actions, it significantly serves to guide future strategies by allowing the region to:

- quantify the extent of issues
- prioritise issues appropriately
- structure ongoing monitoring and evaluation appropriately.

2 Continued monitoring, evaluation, reporting and improvement systems and mechanisms

Monitoring, evaluation, reporting and improvement (known as MERI) are essential components of natural resource management, and are now established requirements in nationally funded natural resource management programs. Organisations responsible for the delivery of funded programs (such as state government agencies and NRM South) have a responsibility to implement MERI systems and mechanisms and to work with stakeholders and natural resource managers to develop good MERI activities, whether they are data collection activities (as part of monitoring) or evaluation processes (through independent review and multi-stakeholder participation). While there has been good progress since the 2005 Strategy there is much to do in the area of monitoring for the purpose of improving evaluation capacity in assessing resource condition and change, prioritisation of natural resource management projects and measurement and communication of progress towards strategic goals.

3 Development of systems and mechanisms for better policy, planning and decision making

A reoccurring theme throughout this study is the important role of policy, planning and decision making mechanisms in improved natural resource management outcomes. Since the condition of natural resources is invariably linked to a range of environmental factors, particularly the impact of human activities, it is vital to consider these impacts in a range of policy and planning instruments.

There have been some developments to improve the Tasmanian planning system recently, therefore the next regional natural resource management strategy period will need to focus on continued improvement in embedding sustainability and natural resource management considerations into both strategic and statutory planning instruments for improved decision making and natural resource management outcomes. This will also require improvements in integration and coordination between state government agencies, local government operational units and between state and local government. The region has experienced improved coordination and collaboration between local government with the formation of the Southern Tasmanian Councils Authority. Initiatives of this group in regional planning, and preliminary work around climate change adaptation issues for the region are positive developments that will need to be strengthened.

Likewise it is essential for the natural resource management community to engage with government on the initiation and development of more and improved high-order state policies to better guide decision making across scales for improved natural resource management outcomes. Without sound policy and planning, decision making for the delivery of sustainable outcomes and natural resource management is compromised and the delivery of improved natural resource management outcomes is difficult.

4 Engagement of the community in, and about, natural resource management

Effective participation and engagement across the community is a fundamental part of natural resource management. Engagement may include raising awareness about natural resource management issues and solutions in sectors of the community; comprehensive education programs and the provision of technical information for the implementation of more sustainable practices across a range of sectors (e.g. practices related to commercial activities in the marine environment, farming and land management practices, and recreational and household lifestyles); engagement of stakeholders in monitoring, evaluating and prioritising natural resource management issues; and collaboration with diverse stakeholders on natural resource management projects.

Community engagement for the purpose of building community-wide capacity in natural resource management and sustainability will therefore remain pivotal in the next regional natural resource management strategy period. Key challenges will include the need to engage with both traditional and new stakeholders as new issues such as climate change come to the fore; to engage the community effectively and constructively (especially when working on difficult natural resource management problems or on issues where there are diverse values); and to identify the most effective engagement and communication opportunities.

RECOMMENDATIONS FOR THE DEVELOPMENT OF THE 2010-2015 NATURAL RESOURCE MANAGEMENT STRATEGY FOR SOUTHERN TASMANIA

The study considered the further development process of the 2010 Strategy and made some recommendations on the framework for the strategy development. Four steps were identified in the strategy development process:

- **STEP 1** Identification of the Southern Region's aspirational goals for the next five years through stakeholder consultation.
- **STEP 2** Identification and prioritisation of achievable actions that will help to work towards the goals identified through stakeholder consultation.
- **STEP 3** Construction of headline indicators by which to measure natural resource management outcomes based on the headline goals identified.
- **STEP 4** Documentation of the 2010 Strategy in a succinct and easily referable way.

In the collective discussion of the headline goals for the region via stakeholder consultation forums, stakeholders will need to consider a range of priority actions. These will likely focus on four action categories as identified in the environmental scan:

- data and information
- policy, planning and decision making
- strategic and holistic on-ground natural resource management
- community engagement (capacity building activities).

In developing priority actions, consideration will also need to be taken of some overarching principles and considerations which pervade across most natural resource management challenges. These are the application of:

- sustainability thinking based on the statutory objectives of the Tasmanian Resource Management and Planning System;
- natural resource management best practice principles;
- thinking around the need to understand, and prepare for, climate change in the region.

It is important to point out that this paper does not recommend the attention to climate change in a separate theme. Instead it is recommending that ‘climate change thinking’ be embedded across themes. This way it can be addressed and managed consistently and in the context of sustainability and the myriad of other pressures.

1 About this paper

In August 2009, NRM South commissioned Rare Consulting to undertake a suite of tasks as part of the Southern Region Natural Resource Management Strategic Review. This study – *Natural resource management in Southern Tasmania: A scan of strategic environmental issues and emerging concerns* – is the second part of this project and contributes insights for the development of the next natural resource management strategy for southern Tasmania (the Southern Region), alongside the first discussion paper *Summary of principal achievements in natural resource management in the Southern Region of Tasmania since 2005*.

The report discusses the key issues of concern (present and emerging) for the Southern Region in natural resource management, and presents recommendations for the development of a strategic framework in preparation for the development of the *Natural resource management strategy for Southern Tasmania 2010*.

2 Study objectives

The principal objective of this study was to provide NRM South with an independent and objective analysis of the key issues for the Southern Region for the next regional strategic planning period, based on a scan of regional, state, national and global environmental change considerations.

The study is a high-level strategic study (as opposed to a detailed technical study). The three objectives of the study were to:

1. Provide insights into current and likely future challenges with regard to natural resource management in the Southern Region.
2. Provide a high-level critique of past regional achievements and performance against the *Natural resource management strategy for Southern Tasmania 2005* (2005 Strategy).
3. Provide recommendations on a draft strategic framework for moving forward.

3 Study approach

The study approach comprised four discrete steps. Each of these steps is summarised briefly below.

3.1 Analysis of the 2005 Strategy strengths and weaknesses (Stage 1)

Stage 1 involved an independent assessment of the strengths and weaknesses of the 2005 Strategy, both in terms of its format and its implementation. This was based on:

- Rare Consulting's expert knowledge about best practice strategic planning;
- consideration of opinions on key learnings gleaned from the knowledge expert interviews conducted in September 2009 (Section 3.2.2) and other *ad hoc* consultations with NRM South personnel and NRM South association members (through discussions at the NRM South Annual General Meeting);
- an assessment of the achievability of the 2005 Strategy's targets.

This analysis provided a high-level critique of past regional achievements and performance against the previous plan to inform recommendations for the format of the new regional strategy.

3.2 Environmental scan (Stage 2)

Stage 2 involved an in-depth scan of each of the seven natural resource management themes outlined in the 2005 Strategy. The study team systematically researched each of the sub-streams contained within the themes to provide insights into:

- the condition of natural resources in the Southern Region;
- current and emerging issues surrounding natural resources and their management in the Southern Region;
- the availability and quality of baseline and monitoring data to inform conclusions on current resource condition specifically.

The analysis assisted in identifying common issues across theme areas, significant emerging environmental issues for the region and overarching issues for natural resource management, by broadly illustrating the operating environment that regional natural resource managers will be working in, and identifying issues for each theme area moving forward. The following outlines how the analysis was undertaken.

3.2.1 Assessing the condition of natural resources

The condition of each natural resource area was assessed by:

- **A DESKTOP LITERATURE REVIEW** – to scan publications detailing aspects of resource condition since 2005;
- **COMPARATIVE ANALYSIS OF RELATIVE RESOURCE CONDITION CHANGE SINCE 2005, WHERE COMPARATIVE INFORMATION WAS AVAILABLE** – interpreted from research reports, publically available monitoring data, information logs and resource condition reports;
- **EXPERT VETTING AND VALIDATION OF DATA** – particularly where data was not up to date or information gaps were encountered (individuals with well-developed knowledge on the natural resource were consulted).

The 2009 Tasmanian State of the Environment Report had not been released at the time of writing. It is recommended resource condition results in the State of the Environment Report be considered alongside this discussion paper when developing strategic directions for the region.

3.2.2 Analysing the natural resource management operating environment for the Southern Region and identifying emerging issues

In addition to the assessment of resource condition information about changes in the operating environment for natural resource management in the Southern Region, each of the seven natural resource management themes was considered in the context of changes in a variety of operating environments, namely:

- community change (attitudes, values, awareness and behaviour)
- physical environmental change issues across scales
- socioeconomic change
- political change (including policy and funding environments)
- regulatory/legislative environment and change (including planning systems).

The changing operating environments for natural resource management, and identification of considered emerging and ongoing issues, are discussed and summarised for each theme. The findings are supported by comments from the regional knowledge expert interviews conducted in September 2009 as part of the first achievements review report (Rare 2009). These interviews sought opinion on emerging issues for the region through a semi-structured telephone interview process (Appendix A). Some eighteen experts from government agencies, natural resource management non-governmental organisations and research institutes were interviewed from each of the theme areas. Selected comments are presented individually as non-attributed personal communications or as collective opinions as illustrative of the points raised.

3.3 Identification of overarching and emerging issues of significance (Stage 3)

Stage 3 involved the identification of key overarching challenges for natural resource management in the next regional strategy period, and identification of significant emerging issues that will have implications for strategic priorities. These overarching and emerging issues are drawn from the synthesis of findings from Stage 2 of the study and form the foundation for considering the strategic priority action themes and overarching objectives of the new regional natural resource management strategy.

3.4 Recommendations on a draft strategic framework (Stage 4)

Stage 4 involved the development of recommendations on a draft strategic framework for the new regional natural resource management strategy. The recommendations are founded on the preceding analysis.

The results of the scan of strategic issues in the region are discussed in Section 5 and a summary of the themes and sub-streams are outlined in Table 3.1.

Table 3.1 Themes and sub-streams (from the 2005 Strategy)

Theme	Sub-stream
Integration	<ul style="list-style-type: none"> Policy planning and decision making Engaging the community Natural resource management data and information management
Managing water	<ul style="list-style-type: none"> Improving water quality Managing supply, allocation and use Protecting freshwater-dependent ecosystems
Managing land resources	<ul style="list-style-type: none"> Managing soils Managing geodiversity
Managing marine, coastal and estuarine systems	<ul style="list-style-type: none"> Protecting aquatic ecology Managing the interface between estuarine and coastal systems Sustainable development in coastal areas
Managing biodiversity (flora and fauna)	<ul style="list-style-type: none"> Protection of threatened or endangered species (hotspots) Management of pests, weeds and diseases
Building sustainable communities and sustainable economies	<ul style="list-style-type: none"> Manage impact of human activities Land and resources planning Promote innovative practices
Managing cultural landscapes	<ul style="list-style-type: none"> Protect Aboriginal cultural values Managing the aesthetic impacts and heritage values of landscape

4 Key strategic insights – performance, strengths and weaknesses of the 2005 Strategy

The second objective of this study is to provide a high-level critique of past regional achievements and performance against the 2005 Strategy. This section presents six strategic insights into regional performance and discusses the key strengths and weaknesses of the 2005 Strategy.

Rare Consulting's review of regional achievements since 2005 ('achievements review') included the achievements of NRM South as the first stage in the strategic review process. The review and summary of achievements focused specifically on *accomplishments* and *successes* rather than being a critique or evaluation of regional activities. The findings of this analysis revealed that much had been done in the region since 2005. While many learnings could be gleaned from the region's activities and natural resource management challenges since 2005, much had been achieved from on-ground action through to educational activities and improvements in approaches to natural resource management. The achievements review identified seven key achievements of the region, namely:

- positive engagement of stakeholders and community across sectors
- working together and developing successful partnerships
- awareness raising in the community and targeted sectors
- developing and applying integrated and holistic approaches
- improving information and data consistency and access
- working towards better monitoring, evaluation and reporting for improvement
- building capacity in sectors of the community.

The process of data collection and consultation involving NRM South personnel and various external knowledge experts exposed some insights into the performance of NRM in the region and by NRM South against the 2005 Strategy. Opinions about the inadequacies of the 2005 Strategy and the role of NRM South were also captured. In addition to these insights we have looked critically at the 2005 Strategy based on our expert experience with strategic planning, a review of information around the delivery of regional priorities, and reflection on the capacity of the region to adequately measure and evaluate progress towards the targets set in the 2005 Strategy.

The six strategic insights identified are summarised below and are further explained in the subsequent subsections.

- the lack of clear strategic priorities and the problem of spreading resources too thinly;
- problems associated with a paucity of baseline data on resource condition within the region;
- difficulty in establishing progress due to gaps in the capacity to measure resource condition over time;

- a poor level of fit between regional natural resource management aspirations and collective regional resources;
- evidence of positive engagement activities in the region;
- a lack of achievable targets in the 2005 Strategy.

4.1 The lack of clear strategic priorities and the problem of spreading resources too thinly

Natural resource management is complex and challenging by nature. It is complex for a variety of reasons, including the:

- wide range of natural resource assets that need managing;
- different values that are placed on natural resources by different sectors of the community;
- many different kinds of pressures (current and future) placed on the state of natural resources (i.e. local development pressures, pollution from industrial and commercial activities, individual human behaviours, extreme weather events);
- interconnectedness of most environmental and natural resource issues (i.e. integration within and between ecosystems and across landscapes and whole bioregions, the flow-on effects of environmental change on individual species, cumulative impact of environmental change);
- interconnectedness of environmental problem solving, and the implications on natural resource condition and natural resource management of decision making on a myriad of other issues;
- numerous stakeholders involved in natural resource management.

It is therefore not surprising that the first natural resource management strategy for the Southern Region was a bulky document, and appears very ambitious simply by the range of priorities and management actions identified. Despite these broad criticisms though, the 2005 Strategy has been an important strategic starting point for the Southern Region and its stakeholders and has served to establish a more focused and coordinated regional approach to natural resource management.

Nevertheless, the 2005 Strategy is a long document in any strategic planning sense. While it is comprehensive in that it aims to cover all aspects of natural resource management and identifies lists of management actions (essential details of projects required) to respond to these, its comprehensiveness presents challenges for prioritisation of implementation largely because of the risks associated with taking on too much.

In many respects, the 2005 Strategy reads as an action plan rather than a strategic prioritisation of issues to focus direction. Although strategic priorities are identified in the Strategy, they are not clearly visible to the reader and therefore do not act as effective guiding directions. Further, the Strategy's actions are not well supported by an understanding of the collective resource capacity of the region to deliver (funding, people and organisational), or of the mechanisms for accountability associated with delivery (i.e. who will do what, and by when) despite the discussion about how the Strategy should be implemented across the region and mention of the role of NRM South in

facilitating implementation. Without a regional understanding of the resource capacity to deliver natural resource management, it is difficult to effectively identify goals and prioritise actions to deliver realistic outcomes. As a result, the 2005 Strategy spreads itself too thinly in terms of focused activities and desired outcomes as expressed through the targets for each natural resource theme area. Ultimately this has meant it has been difficult to deliver across all areas. It will be essential for the new strategy to better prioritise those natural resource management issues that require most urgent attention over the next five-year strategy period and to ensure these priorities are realistic, based on regional capacity.

4.2 A paucity of baseline data on resource condition

A paucity of baseline data has made it difficult to understand the extent of resource condition within the region, and has impeded effective prioritisation of investment activities and establishment of resource condition monitoring. As a consequence, there may be issues in the 2005 Strategy that have unequal weighting in importance, both in terms of the relative magnitude of natural resource management issues and their temporal development. This presents the risk of directing scarce resources inefficiently over time and across natural resource management sectors.

While it is unrealistic to be able to collect baseline data on absolutely everything of value in the natural resource management area it is crucial to pinpoint what baseline data is required based on natural resource management issues of highest value and those that need most urgent attention. This is less a criticism and more an assertion of the need for continued attention to the baseline data challenge and the need to build coordination and collaboration opportunities between agencies who have an interest in the collection and use of such data.

4.3 Gaps in the capacity to measure resource condition over time (monitoring)

Gaps in the monitoring of resource condition over time has made it difficult for the region to establish progress towards many of the 2005 Strategy targets. There is evidence to suggest that monitoring systems, including coordination and data collection mechanisms, are being improved, particularly through coordination and commitment by NRM South and state government agencies. Many projects undertaken in the last five years were focused on establishing data collection methodologies and establishing baseline data. It will be important to continue to improve monitoring in order to establish useful and achievable indicators for use in measuring progress.

4.4 A poor level of fit between regional natural resource management aspirations and collective regional resources

A poor level of fit between regional natural resource management aspirations and the collective regional resources of key delivery agencies (such as NRM South, state government departments and other significant natural resource management non-governmental organisations) is evidenced by the variable implementation of activities across the 2005 Strategy themes. There is evidence from the review of achievements in the region that some natural resource theme areas have been more active than others. For example, in the review of achievements (Rare 2009) it was identified that activities around the management of water resources and native flora and fauna resources are considerably more

extensive than those in the cultural landscapes, land resources, and marine, coastal and estuarine systems themes.

Knowledge experts also provided comment on the more limited attention to some priority areas (particularly in the cultural landscapes theme), or were unable to point to much depth in activity in their theme area (e.g. the marine, coastal and estuarine systems theme). The quantity of activities, however, is not the only indicator of achievement. It is acknowledged that a few quality programs or projects may also provide significant outcomes, particularly if they have integrated objectives.

It is understood that there are varying reasons for the greater attention to some theme areas compared to others and it is clear that the availability and focus of Commonwealth and State government funding programs is an important factor in the distribution of activities. It will be important, therefore, to consider other opportunities for funding beyond traditional sources into the future (i.e beyond the Australian Government's Caring for our Country program). The climate change adaptation agenda is one area where new funding opportunities are emerging through sectorally focused National Adaptation Research Plans¹ and adaptation research collaborative opportunities via membership of relevant Adaptation Research Networks.² Natural resource management stakeholders in the region should seek to be involved with relevant networks. One of these (the Marine Biodiversity & Resources Network) is hosted in the region at the University of Tasmania.

Other funding opportunities via the private sector may be presented with increasing awareness of the need for sustainable practices in industry and commercial sectors and changing values associated with the security of natural resources under climate change. The 2005 Strategy achievements review (Rare 2009) found that partnerships with industry bodies were already being fostered, such as the collaborative work involving NRM South and the Tasmanian Seafood Industry Council.

4.5 Evidence of positive engagement activities in the region

A core goal of the 2005 Strategy was the recognition that good on-the-ground outcomes in natural resource management require the effective engagement of all sectors of the community using well designed communicative and collaborative approaches. The review of regional achievements found that since 2005:

- engagement of the community has been significant and has expanded beyond traditional natural resource management 'care' groups to engage the community across a range of sectors in awareness raising and active learning through on-ground activities around environmental management (including farmers, fishermen, school students and teachers, and the hospitality industry);

¹ For more information about these plans refer to <http://www.nccarf.edu.au/adaptation-research-networks>

² The aim of these networks is to facilitate collaborative climate change adaptation research, and open an exchange of information and sharing of climate change adaptation resources. The Adaptation Research Networks, and their host institutions are: Terrestrial Biodiversity (James Cook University), Primary Industries (Land & Water Australia – but expressions of interest being sought for alternative host), Water Resources & Freshwater Biodiversity (Griffith University), Marine Biodiversity & Resources (University of Tasmania), Human Health (Australian National University), Settlements & Infrastructure (University of New South Wales), Emergency Management (RMIT University), Social, Economic & Institutional Dimensions (University of Melbourne). For more information refer to <http://www.nccarf.edu.au/adaptation-research-networks>

- numerous partnerships have been formed, organisational relationships have been developed and successful collaborative projects have been undertaken in the region.

The review of regional achievements provides examples of particularly positive engagement activities such as the implementation of the little Swanport Catchment Management Plan, which involved a whole of catchment approach, engaged a range of stakeholders and created natural resource management champions; the Midland's Biodiversity Hotspots Project, which was lauded as a great success due to the successful engagement of landholders (farmers); and Bruny Island threatened species and weed management projects which fostered communication and collaboration between disparate sectors of the community. These projects in turn resulted in other positive outcomes ultimately working to build capacity within the community.

The following comments³ from an NRM South staff workshop around achievements and key learnings reaffirm the benefits of effective engagement, not only with local communities but also with state and local government:

'Little Swanport – brought together the community, which was really fractured, into the catchment...'

'Local people – champions in priority areas are very important to achieving on the ground.'

'The nature of our relationships has improved – i.e. state government policy and planning, local government...'

The natural resource management agenda requires a whole of region approach since issues and management responses are often cross-cutting and interconnected in nature. Although there is no single institution responsible for delivering natural resource management in the region, NRM South has demonstrated its capacity to be a lead agency in facilitating coordinated regional direction and collaborative projects that engage with necessary community sectors.

Numerous other groups (non-government and government organisations) involved in natural resource management in the region have also embraced the challenge of community engagement activities. These range from raising awareness about natural resource management issues through campaigns, forums, festivals and field days, to involving community members in on-ground works (i.e. removal of invasive weed species, regeneration of degraded land), monitoring, and natural resource management planning activities. This regional capacity to engage constructively with a variety of sectors in the community is a strength in the region and will hold the region in good stead into the future as collaborative approaches and active engagement of the community will continue to be essential in the delivery of natural resource management.

³ Comments are personal communications (non-attributed) – NRM South Achievements Meeting – 5 Aug 2009

4.6 A lack of achievable targets

The limitations associated with the availability of baseline data and monitoring capacity across all natural resource management theme areas points to the need for the development of targets or goals that are achievable and reflect core stakeholder priorities obtained by consultation.

There are well known guidelines for the establishment of goals that can be realistically achieved and measured. These are the *SMART* principles – that is, the goals should be:

- Specific** (also significant and stretching)
- Measurable** (also meaningful and motivational)
- Agreed upon** (also attainable, achievable, acceptable and action-oriented)
- Realistic** (also relevant, reasonable, rewarding and results-oriented)
- Time-based** (also timely, tangible and trackable).

Further, a lack of baseline data on resource condition and the impact of variables outside the control of natural resource management delivery partners (such as the impact on a healthy ecosystem of unexpected bushfire or other extreme events, or the removal of funding for measurement of resource condition due to economic downturn) force the use of *lead indicators* (as opposed to *lag indicators*) – that is, the need to quantify what action has been taken, as opposed to trying to quantify changes in resource condition. This is premised on the assumption that action taken will lead to improvement. For example, an assumption that the number of awareness raising activities will lead to an increased level of awareness in the community about a natural resource management issue should, in turn, lead to an increase in the incidence of on-ground actions in the community which, in turn, is assumed to lead to resource condition improvement. Therefore, without data on resource condition a measure could simply be ‘the number of awareness raising activities’; or ‘the number of hectares cleared of an invasive weed’.

Figure 4.1 demonstrates the different complexities of indicators. The new regional natural resource management strategy may consider using a range of lead and lag indicators depending on the availability of data.

4.7 Summary

These key strategic insights are intended to help guide improvement in the development of the next regional natural resource management strategy. They can be summarised in the context of seven improvement criteria, namely the need to:

- maintain improvement in baseline data collection and prioritise the areas of most urgent information need;
- continue to build monitoring, evaluation and reporting systems to enhance the capacity to reflect, review and improve;
- establish realistic and achievable targets or goals;

- better focus strategic actions;
- better prioritise actions in the context of regional resource capacity (funds and people);
- better identify stakeholder responsibilities in delivering strategic actions;
- maintain positive engagement activities in the region across and between community sectors.

These criteria are incorporated into the recommendations made on a draft strategic framework in Section 7 of this report.

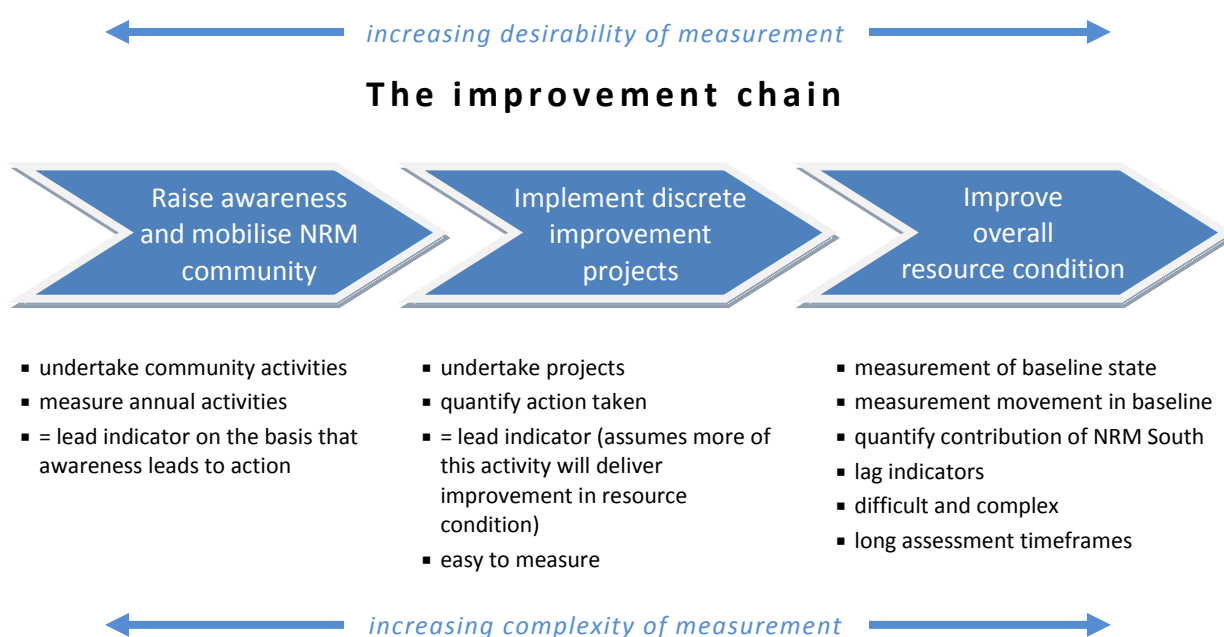


Figure 4.1

Consideration of indicators according to the improvement chain

5 Environmental scan by theme area

The 2005 Strategy presents seven focus themes under which management actions and targets are presented. These are:

- integration
- managing water
- managing land resources
- managing marine, coastal and estuarine systems
- managing native flora and fauna
- managing for sustainable communities and sustainable economy
- managing cultural landscapes.

Each stream has a number of strategic issues which form the foundation for the development of high-priority actions and the long list of management actions developed through the previous regional strategic planning process. In this section we systematically review the strategic issues to:

- reflect on the core objective of the strategic issue and what the region has been attempting to achieve;
- indicate any changes that can be detected in natural resource (environmental) condition since the 2005 Strategy;
- identify key existing and emerging issues and pressures and consider how these might change the context and characteristics of the strategic issue;
- make some conclusions about data quality and availability, especially for monitoring, by identifying whether there is:
 - data on the baseline state of the natural resources / environmental issue
 - annual or periodic monitoring and measurement of the resource state.

This analysis will assist in assessing the relevance and adequacy of the strategic issues in light of the changing regional and external environment, helping to form the foundation for recommendations around goals and outcomes-oriented priority actions for the 2010 Strategy.

The structure of the natural resource management focus streams and related strategic issues are shown in Figure 5.1 and are analysed in the following sections.

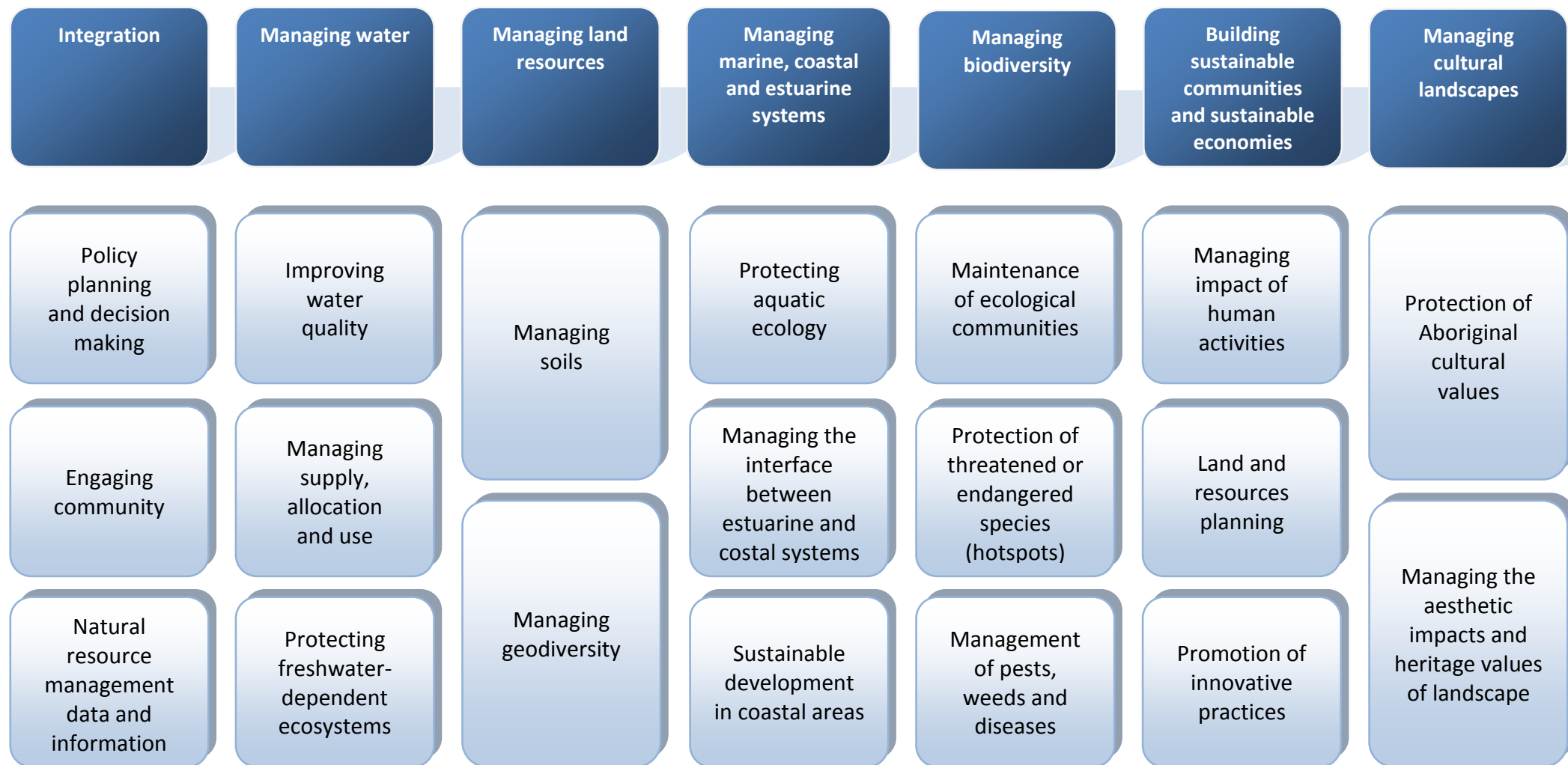


Figure 5.1

2005 Strategy – natural resource management focus streams

5.1 Integrated natural resource management

The ‘integrated natural resource management’ theme in the 2005 Strategy identifies three significant cross-cutting issues and common challenges relevant to a range of (if not all) natural resources in the region. The 2005 Strategy talks about the importance of looking at natural resource management in an integrated way since natural resource management issues are not always bounded, and since responses often require integration and coordination via a number of mechanisms and at a number of levels or tenures (e.g. regions, state and local government; private and public natural resource managers; industry and business; and decision makers and those affected by the decisions). The following are identified as the three overarching strategic action areas under the integration theme:

- policy, planning and decision making
- building community participation and engagement in natural resource management
- improved natural resource management data and information management.

The objectives of the strategic action areas and key issues and emerging concerns are discussed below.

5.1.1 Policy, planning and decision making

Objective

The 2005 Strategy discusses separately the fundamental issues around policy, planning and decision making.

The *policy* core objectives for natural resource managers in the region are interpreted as being to:

- support the implementation, and improve the effectiveness, of natural resource management policies across governance scales;
- contribute to better balancing conflicting values and aspirations around environmental and natural resource issues in policy development;
- raise awareness about the impacts of inconsistent or contradictory policies on natural resources and the capacity of the region to tackle the causes of natural resource degradation.

The *planning* core objectives for natural resource managers in the region are interpreted as being to:

- identify opportunities to improve the effectiveness of the current planning system to secure optimal natural resource management outcomes;
- raise awareness about the lack of integration between statutory planning across land and water and different land and water tenures;
- strengthen planning for natural resource management generally;
- raise awareness about inconsistency in local government responses to natural resource management issues;
- identify opportunities to improve natural resource management outcomes through a more integrated approach to planning (i.e. coastal zone);

- raise concerns about the separate treatment of some activities (i.e. forestry, mineral exploration and marine farming) outside local government planning schemes and the Resource Management and Planning System.

The *decision making* core objectives for natural resource managers in the region are interpreted as being to:

- identify and communicate perceptions around, and risks associated with, disjointed and *ad hoc* decision making;
- identify opportunities to improve processes for community expressions of interest, viewpoints and concerns;
- review natural resource management decision making structures to ensure there is:
 - effective coordination
 - a commitment to implement policy decisions, and follow through at a regional level
 - effective communication between people and organisations about policy implementation
 - improved decision making, based on adequate and complete information
 - effective consultation and resolution of areas of conflict.

Current and emerging issues

A scan of policy and planning activity in Tasmania in the past five to ten years has revealed very little evidence of improvement in policy and planning, unlike attempts for improvement in planning for sustainability in a number of states around the country (New South Wales has an integrated State Plan, Victoria has pursued regional planning around sustainability indicators, and South-East Queensland is frequently looked to as a demonstration of better practice in integrated regional planning). This is despite the mention of sustainability objectives in government legislation.⁴

While there have been some small steps toward improvement in policy development and implementation (e.g. the review and development of the Draft State Coastal Policy 2008), and in planning and decision making for better environmental outcomes (via recent review and reform recommendations for the Tasmanian planning system), most of the objectives outlined in the 2005 Strategy are still relevant today. Indeed, a number of respondents in the knowledge experts interviews were of the opinion that there had been no significant achievements in the natural resource management realm in policy and planning, which had been a disappointment of the past five years.

The issues around planning, in particular as raised in the 2005 Strategy, have been common to most state planning jurisdictions in Australia for some time, despite differences in planning systems. However, Tasmania lags behind in the delivery of essential high-order policies and integrated regional planning in particular. In fact, a national monitor of planners' opinions prepared by the Planning Institute of Australia (PIA) since 2006 ranks Tasmania very poorly across a number of indicators in

⁴ The Tasmanian Resource Management and Planning System outlines five sustainable development statutory objectives (<http://www.planning.tas.gov.au/planning/legislation>)

planning performance, including growth management and planning around sustainability indicators (PIA 2006, 2007 & 2008).⁵

A public discussion paper prepared for the Tasmanian Government in 2004 pointed out that a key flaw in the effectiveness of the planning system in Tasmania to deliver more comprehensive and integrated outcomes for its community and to better manage environmental and natural resource concerns has been the lack of high-order state policy and regional planning (DPIWE 2004). This is despite the fact that it was envisaged that the Tasmanian Resource Management and Planning System (introduced in 1994) would be supported by a series of planning instruments, specifically state policies and planning schemes (DPIWE 2004, p. 4).

The most recent Tasmanian planning review process (2008) has resulted in some recommendations to change key elements of the current system, such as improving state planning resources to deal with strategic planning and policy issues in particular. Should these recommendations be implemented, then a framework for strategic regional planning that can more effectively integrate sustainability principles should be established, allowing improved attention to natural resource management issues into the future.

The need to pursue integrated regional planning to provide a strong strategic framework on which to base local strategic plans and inform local planning schemes are fundamental components of good planning practice and have long been recognised as such. In other states such as Queensland, Western Australia, Victoria⁶ and New South Wales, regional planning is an important mechanism, bridging the gap between high-level policy and local planning schemes that ultimately guide day-to-day planning decisions. The impending development of regional settlement strategies in the three regions of Tasmania and the increased coordination and collaboration between southern regional councils via the Southern Tasmanian Councils Authority are positive moves in the right direction.

The Southern Tasmanian Regional Planning Project intends to deliver improved comprehensive regional land use and infrastructure planning; the development of a model planning scheme to aid review and improvement in local planning schemes; and the development and review of sub-regional land use strategies to ensure consistency across planning scales (STCA 2009). These planning improvements present an opportunity for natural resource managers to constructively engage with the planning processes to help work towards improved planning outcomes for natural resources.

⁵ The PIA undertook annual assessment report cards on the relative performance of Australian State and Territory planning systems (PIA 2006, 2007 & 2008). While there is not a specific focus on the performance against delivery of natural resource outcomes there are a variety of indicators that are suggestive of performance in key planning processes and delivery that are related to planning for natural resources (i.e. performance in planning around sustainability indicators, planning for growth management and performance in public participation). It is interesting to note that, relative to other Australian states, the report cards rate Tasmania very poorly (rated a 'C-' overall and ranked last in 2006, and rated D+ and ranked bottom with New South Wales in 2008). Areas where there have been recognised improvements in Tasmanian planning are public participation in strategic planning processes (B- in 2008) and 'streamlined assessment' (C in 2008). Streamlined assessment processes, however, do not necessarily provide a good indicator of integrated planning and decision making, nor necessarily reflect good planning outcomes; indeed they may serve to do the opposite if streamlining is to the detriment of comprehensive assessment.

⁶ More recent better practice examples of regional planning include the South-East Queensland Regional Plan (Queensland Department of Infrastructure and Planning 2009) and the Melbourne Metropolitan Plan, Melbourne 2030, (Victorian Department of Sustainability and Environment 2005).

Ultimately, environmental issues (of which natural resources are a part) will not be able to be addressed effectively unless they are embedded into regional and local strategic plans and, subsequently, their supporting statutory instruments. The interconnectedness of many natural resource management issues, their extension beyond local government boundaries and the frequent need to consider natural resource management from a wider landscape or bioregional perspective are further important reasons for promoting the need for regional planning. Much has been written around this over the past decade (e.g. Brunckhorst 2000) and attempts to at least adopt elements of bioregional approaches in the development of regional policies, planning instruments and decision tools have been made in other states (e.g. various New South Wales State Environmental Planning Policies are aimed at protecting biodiversity or particular ecosystems; and biodiversity planning in Victoria has a strong bioregional mapping basis).

The 2005 Strategy's reference to the lack of integration between statutory planning across land and water and different land and water tenures; the need to strengthen planning for natural resource management generally; the evident inconsistencies in local government responses to natural resource management issues; the need for improved natural resource outcomes through a more integrated approach to planning; and perceptions about *ad hoc* or disjointed decision making generally, are all concerns that can be addressed through the much improved integration of state policies, and regional and local planning.

The Draft State Coastal Policy (TPC 2008) is a move in the right direction but it is only one example of a number of state policies that are needed to deal more effectively with the numerous natural resource management issues and pressures associated with development and human activities (currently there are only four state policies). The coastal policy development process has also been criticised widely as taking far too long, thus impeding its implementation. Climate change presents yet another reason for the establishment of a much improved system of integrated policy, and strategic and statutory planning instruments. Whether it is planning for coastal change associated with sea-level rise and storm events, or facilitating adaptation in vulnerable ecosystems due to changes in temperature and rainfall, the risks associated with climate change will need to be assessed and incorporated into planning mechanisms at a range of scales. Some local councils in the region have commenced the process of assessment of risks and identification of adaptation strategies, however attention has focused on the risks to the built environment. Clarence City Council was the first council to undertake such a study.

It will also be important for state policies to be complementary in nature and not present new contradictions for decision makers. It will be essential for key stakeholders involved in natural resource management to be genuinely engaged with policy development and implementation as well as in strategic planning processes (including regional planning for urban growth management and regional infrastructure planning).

There are many trade-offs to be made in planning, but good regional planning processes supported by clear state policies should be able to better manage pressures on natural resources as well as prepare for future pressures and risks.

These considerations will require improvements in integration and coordination between state government agencies, local government operational units and between state and local government. The region has experienced improved coordination and collaboration between local government via the Southern Tasmanian Councils Authority. Initiatives of this group in regional planning, and preliminary work around climate change adaptation issues for the region are positive developments that will need to be strengthened and supported.

5.1.2 Building community participation and engagement in natural resource management

Objective

As the 2005 Strategy points out, management of natural resources is the responsibility of the whole community:

Management occurs through the combined efforts of the individual resource managers, both public and private, large and small-scale. It is also the responsibility of the broader community, whose consumer preferences and demand for goods and services drive economic decisions and affect natural resource management practices. (NRM South 2005)

The core objective of the 2005 Strategy revolves around the need to build on the existing excellent work being conducted by a range of stakeholders, and to build partnerships to better address natural resource management issues in the Southern Region. This includes the engagement of volunteers, public and private land managers, local government natural resource management managers, and the Aboriginal community.

Current and emerging issues

Effective participation and engagement across the community (including government, industry, commercial interests, individual resource managers and the broader community) is a fundamental part of natural resource management and has emerged as a particularly strong feature of the Southern Region's approach prior to and since the 2005 Strategy. It is now well understood that active participation and improved understanding of natural resource issues and management practices helps build crucial capacity across the community in sustainable management practice, while it is also crucial in collecting important information about the condition of resources and how they are changing.

Importantly, bottom-up attention to natural resource management issues via the active engagement of the community is vital to the physical management of natural resources through on-ground activities. However, these efforts will only be truly successful if coupled with strong top-down guidance (such as the strategic direction of the regional natural resource management strategy, the development and implementation of well integrated policy and planning instruments [Section 5.1.1] and/or regulation and codes of practice), and sound mechanisms that allow the bottom-up and top-down to meet in the middle (e.g. via catchment management committees and other spatially specific natural resource management organisations) to effect communication and implementation (Lovell *et al.* 2003).

Engagement across scales is consequently most important and demonstrates another consideration of integration for natural resource management and one that will require ongoing attention in the Southern Region.

The focus on engagement of the community will invariably remain an important element of the new strategy for the Southern Region, and the fundamental objectives and issues raised in the 2005 Strategy remain unchanged. However, the notable shift in community attitudes and aspirations towards environmental issues generally in the last five years, spurred on by the significant growth in awareness about, and interest in, climate change and drought-associated water availability issues nationwide, should serve to present new opportunities to work at community scales and with industry and commercial groups who recognise the economic and social value of becoming more sustainable.

A national survey on environmental views and behaviour (ABS 2008) found that around three-quarters (73%) of the Australian population during 2007–08 was concerned about climate change. The level of concern for Tasmania was on a par with this national average and above the level of concern in New South Wales and Queensland. It will be economic and social reasons though (rather than altruistic values towards the natural environment) that will continue to motivate the interest in sustainability as society considers the implications of environmental change and economic pressures associated with the move to a low carbon economy on their lifestyles and livelihoods.

Greater awareness about climate variability generally, threats associated with climate change and recent experiences of drought in rural areas are already engaging stakeholders in new debates and collaborative research around natural resource management; some of these stakeholders are new to natural resource management, thus expanding the relevance of natural resource management throughout the community. It will be important to continue to extend this engagement constructively (i.e. through collaborative research focused on understanding the challenges of climate change and/or through collaborative efforts to develop sustainable adaptation strategies).

Productive industries that rely on natural resources in the Southern Region are likely to become more interested in the future condition and availability of natural resources and will therefore have an increasing ‘stake’ in their management. It will be crucial to work in partnership with these industries and commercial interests to help facilitate the identification and implementation of sustainable natural resource management practices.

Industries and commercial interests facing a range of impacts due to climate change include the seafood industry, the tourism sector, various agricultural interests (e.g. honey farmers, dairy farmers, vegetable and fruit growers, and the wine sector). Some economically important industries to the Southern Region are particularly vulnerable (such as the dairy industry should adaptation strategies not be considered); others (such as the wine industry) may benefit from climate changes.

Increased sea surface temperatures may present challenges for the production of cool-water farmed aquaculture species (such as Atlantic salmon), although there is potential for adaptation by the industry (DCC n.d.), while climate change impacts will likely lead to a decline relative to what would

otherwise have been an increase in Tasmanian farm output. Dairy output, for instance, is projected to decrease by around 8% by 2030 and by 12.5% by 2050 (DCC n.d.).

While the productive sectors of the community are likely to offer new opportunities for participation and engagement in natural resource management, the broader community of individuals and households are more likely to be concerned about sustainable living issues (particularly improving energy efficiency, implementing renewable energy solutions, and waste management and household consumption issues) rather than issues that traditionally lie in the realm of natural resource management. However, there is anecdotal evidence from organisations such as Sustainable Living Tasmania that there is a growing interest at the household and neighbourhood scales in developing more resilient lifestyles (e.g. lifestyles that involve using natural resources more efficiently, sourcing locally produced goods and services, and seeking more organically produced products). This interest is likely to increase in the future with expected increases in the cost of living due to the move towards a low carbon economy. The movement presents a range of issues for natural resource management organisations in the Southern Region, including the encouragement via consumer demands to practice more sustainable natural resource management and the transition to more sustainable production and business opportunities that use natural resources.

Engagement of the broader community, however, in traditional on-ground natural resource management activities (i.e. weed management, regeneration works) through volunteerism is less likely to expand significantly. Although there are no significant surveys in Tasmania that monitor environmental attitudes and participation, we can look to the New South Wales monitor of environmental attitudes and behaviours, *Who cares about the environment?* (1994–2006) to get an idea of the segmentation of the community according to environmental concerns and actions.

The most recent *Who cares* survey (DECC 2006) found that while the majority of the community was concerned about the environment (some 87% of people surveyed), sustainable lifestyle issues around human settlements dominated, while issues such as biodiversity, cultural heritage and nature conservation remained the concern of a smaller ‘altruistic’ proportion of the community who valued the natural environment highly. Importantly, the New South Wales survey did not demonstrate much of a shift in values by the mainstream community towards issues such as biodiversity and cultural heritage, thus exposing a division in environmental issues and the type of community participation. This division in interest in environmental issues presents a number of challenges for community awareness and education into the future. Again climate change may present additional opportunities for the community to engage in public conversations about natural resource values outside the traditional sustainable living agenda, particularly as we learn more about the system-wide implications of climate change.

5.1.3 Improved natural resource management data and information management

Objective

The 2005 Strategy places an important emphasis on the improvement of data and information management. It recognises the need for improved data around resource condition and change (in

particular improved coordination of information and data that is available so that it can be used more effectively) and improved access to information and data that is available to improve the capacity of stakeholders such as local government and on-ground landcare groups to adapt natural resource management practices and identify priority issues.

Current and emerging issues

The issues raised in the 2005 Strategy remain relevant. Invariably there is always a need for better information and there are always limited resources to draw on. A major achievement in the region since the 2005 Strategy, however, has been attention to the improvement in information and data in order to plug gaps in knowledge, improve consistency in data collection and access across the region, and develop new decision information tools (e.g. spatial analysis or mapping information tools).

Projects have involved collaborations between NRM South, state government agencies and local government, and specialist researchers and research institutes. Some of the more significant outcomes associated with data and information projects (as noted in the *Summary of principal achievements* report [Rare 2009]) undertaken as part of the process of strategy review include:

- an enhancement of data sharing for councils, regions and other stakeholders due to the collaboration of state government agencies (DPIPWE) and NRM South to facilitate access to data from their servers, and the continual improvement of data consistency across the region through the Data Access Working Group⁷;
- the development of more holistic and useful indicators of river condition which is essential for integrated planning, management and prioritisation of investments (a statewide collaborative project involving NRM South, Earth Tech, DPIPWE, NRM North and Cradle Coast NRM);
- baseline natural resource condition information, such as the Port Davey Marine Pest Survey (Tasmanian Aquaculture and Fisheries Institute and NRM South) which provided a greater understanding of ecological and biodiversity values in the Port Davey wilderness region; Ramsar character descriptions for the Ramsar sites in the Southern Region; and coastal values mapping in Tasmania's south-east which is now being undertaken statewide and is proving to be essential baseline information for understanding the implications and risks associated with climate change in coastal zones.

The continued collection of baseline data about resource condition is essential for understanding natural resource management problems and for prioritising investments. Baseline information is also essential for the future monitoring of natural resource condition issues and for evaluating the effectiveness of natural resource management programs.

The key issues for the Southern Region will be to continue to foster collaborative partnerships around data collection, monitoring, evaluation and reporting and to continue to work on improving access to information that serves to assist communities to better understand natural resource management problems and implement appropriate natural resource management responses. The challenge will be to

⁷ The Data Access Working Group initiative (partnership between the NRM regions and DPIPWE) is improving access of NRM data, improving data consistency and strengthening data and information relationships across the region.

improve data availability and quality with limitations on regional resources and the need to identify prioritisation in data collection and monitoring into the future. As it is impossible to measure the condition of every ecosystem, processes for identifying what will be most important to measure and monitor into the future are essential. Managing natural resources under climate change places even more importance on this, while it also exposes a range of questions around our knowledge of resource condition and the relative vulnerability of ecosystems, species and physical resource condition.

Without input data for measuring relative vulnerability to climate change across a range of natural resource systems it will be difficult to make decisions about climate change priority issues and develop adaptation strategies in preparation for climate change. Informed adaptation planning around natural resource management issues requires knowledge around the sensitivity, exposure and expected adaptive capacity of the natural resource or system being assessed (vulnerability assessments), the development of risk assessment tools, and spatial information decision support tools. There has already been a commitment to some investment in such information by the Tasmanian State Government through the *Natural Systems Resilient to Climate Change* initiative mentioned in the Tasmanian State Budget 2009–10 (Tasmanian Government 2009).

5.1.4 Summary of findings

Integration	Issues
Policy, planning and decision making	<ul style="list-style-type: none"> ▪ Lack of high-level state policy guiding development and impacts on natural resource management ▪ Poor comprehensive and integrated regional planning (especially land use and infrastructure plans) ▪ Weak local statutory instruments to deal with development control due to a lack of higher order guidance ▪ Continuation of conflicting and cumulative development pressures requiring strategic guidance ▪ Current and emerging opportunities for natural resource managers to input into regional planning strategies ▪ Need for improved integration and coordination between governance scales and between government agencies/units (state and local)
Building community participation and engagement in natural resource management	<ul style="list-style-type: none"> ▪ Continued attention to constructive community engagement in and about natural resource management ▪ Emerging opportunities to engage with new stakeholders, particularly those with commercial interests ▪ Growth in the sustainable lifestyle movement may provide opportunities to raise awareness about natural resource management issues and build community resilience
Improved natural resource management data and information management	<ul style="list-style-type: none"> ▪ Continued need for targeted and prioritised natural resource management baseline data and monitoring capacity ▪ Need to foster collaborations/partnerships in data collection and monitoring ▪ Need for baseline data to understand integrated vulnerability and risks associated with climate change

5.2 Managing water

The consideration of water resources in the context of the 2005 Strategy is inclusive of rivers, wetlands, groundwater and freshwater ecosystems. This scan considered the current state of water resources in the region, examining the objectives of the management of water resources and the principal issues and emerging concerns facing the Southern Region.

5.2.1 Improving water quality

Objective

Land and water use practices have resulted in high salinity levels in surface and groundwater systems, and significant incidences of low water quality in some areas. The 2005 Strategy identifies a need to manage water resources more effectively and in an integrated manner, so that water quality is improved. It is also acknowledged that adequate management is contingent on an increased understanding of the impacts of changing land management on groundwater systems, and sufficient data on water quality.

Current and emerging issues

The study team found that water resource condition was generally poorer when compared to 2005 benchmarks. The water monitoring reports indicated that for the majority of catchments condition was fair, but was subject to increases in pH, turbidity, salinity and nutrient levels.

The water quality within key wetlands and surface water catchments in the Southern Region is likely to face increasing pressure from surrounding agricultural and urban developments. There is a concern that future activities in wetland surrounds will likely endanger water quality through eutrophication (excessive nutrient loading) and sedimentation. Such activities may include greater vegetation clearance, residential effluent, dumping of vegetative material, and general disturbance from noise, domestic pets, and human activity (DEWHA 2009a).

It is likely that the above issues will be exacerbated by growing agricultural needs and increasing urban development encroaching on surface waterbodies. In addition, the emerging issue of climate change has significant potential to impact on water quality via the impact on flows in the region (DCC n.d.). With a strong correlation between low stream flow and poor water quality, increased scarcity of water, for instance, may have flow-on effects on catchment water quality. Preliminary modelling by Climate Futures for Tasmania suggest variable change in rainfall towards the end of the century with significant drying in parts, such as the south-west in summer and the east coast in winter, and increased rainfall in others, such as the east coast in summer (Boyer 2009). This variability across the state and the region points to further likely variable impact on river flows and catchment health requiring ongoing understanding.

Availability of data

A desktop review of available literature and published data was conducted in order to best ascertain the current state of water quality in the Southern Region. The key data source of up-to-date information on catchment health was considered to be the DPIPWE Annual Catchment Reports that

form a part of the Department's ongoing water monitoring program (DPIPWE 2009a). These reports provide information on key indicators of water quality, with additional reports providing data on pesticide levels (DPIPWE 2008). The 2005 and 2008 reports were compared to provide an indication of the relative condition.

DPIPWE reports also provided the primary data for groundwater and salinity trends. A review indicated that there is limited up-to-date information on groundwater condition in the Southern Region, and a 2007 report indicated that there are insufficient monitoring bores in place to constitute a reliable source of baseline or monitoring information. There is no plan in place to monitor groundwater in the region, and it is likely that data availability will be an ongoing issue. Other data sources, particularly around rainfall modelling and river flows, include Hydro Tasmania and Climate Futures for Tasmania (climate modelling specifically).

5.2.2 Managing supply, allocation and use

Objective

The 2005 Strategy recognises that agricultural requirements and low rainfall have had significant impacts on environmental flows in the region, and there is a need to manage surface and groundwater supplies in a sustainable manner. Increased allocations of flows for irrigation purposes, and inefficient water use practices have been identified as a primary cause of degraded freshwater ecosystems and poor water quality.

Current and emerging issues

The overwhelming evidence in monitoring reports and general commentary around catchment health indicates that the drought and ongoing agricultural needs have had significant detrimental impacts on water resource health. The key contributor to water resource condition in the region was found to be a significant reduction in stream flow. Across the majority of catchments, the drought had led to a reduction in flow of up to 90% when compared with 2005 flows. However, agricultural requirements have meant that allocations (predominantly for irrigation purposes) declined by only 50% over the same period.

That water quality and ecosystem health has declined with reduced flows points to an ongoing need to manage available water resources in a sustainable manner. Although 2009 has been a particularly wet year, this is likely to be a temporary respite from more long-term climatic cycles involving periods of low rainfall. As a result, the region faces the key issue of managing the combined water needs of an agricultural industry and those of a healthy catchment.

Indeed, discussions with regional experts revealed a growing concern about the likelihood of sustainable irrigation development (pers. com. knowledge experts interview). Both large- and small-scale dam developments have been 'getting away' from management bodies and there is an apparent need to consider (a) what is in place to ensure that the land condition does not suffer from irrigation, and (b) that dams release appropriate flows.

Additional concern has been expressed regarding the ability of farmers to irrigate the land in a sustainable manner. The Tasmanian Irrigation Development Scheme will roll out irrigation

infrastructure projects in the Midlands, south-east and Shannon-Clyde areas within the Southern Region. The proposed schemes are likely to increase the need to engage and educate landowners in desirable irrigation practices (pers. com. knowledge experts interview).

Further, the historical allocation of 100 per cent of river flows impounded in hydro dams will also require reinvestigation given improvements in knowledge about flows and the health of downstream ecosystems and potential water resource users.

Emerging impacts associated with climate change will also require consideration in future decision making on water allocation and use, and agricultural production potential. As previously mentioned, there is uncertainty around the change in rainfall associated with climate change. Preliminary results from high resolution modelling for the state show significant drying in some parts of the region in summer for instance, but increases in rainfall in other areas during winter. Such spatially and seasonally variable projections and other sources that cite up to an 8% decrease in rainfall in the north-eastern areas of Tasmania that experience similar rainfall patterns to the south-western areas (DCC n.d., NWC 2005) ultimately point to the need for greater attention to the management of water allocations and usage, and assessment of future agricultural production potential.

Availability of data

Annual catchment monitoring reports (DPIPWE 2009a) contain data on environmental flows and allocations, although the data is available only for selected study areas. Comparison of reports between 2005 (considered the baseline) and 2008 provides an indication of the average catchment flows in a given area, and the allocations for agricultural purposes from the total flows. A general trend can be mapped, indicating a reduction in flows, but not a corresponding reduction in allocations, suggesting an increased stress on water quality and ecosystem health.

It is likely that the water monitoring will continue under the state government program, and will continue to provide insights into the ratio of flows to allocations. It is then desirable that this information be used to guide decision making on the use of water resources in the region.

5.2.3 Protecting freshwater-dependent ecosystems

Objective

Freshwater-dependent ecosystems include those within wetlands, floodplains, and aquatic, riparian and groundwater environments. Water availability and water quality directly impact on ecosystem health, and the management of these issues must therefore be integrated for the best possible outcomes.

Current and emerging issues

As discussed in Sections 5.2.1 and 5.2.2, land and water use practices have resulted in increased stresses on water quality and availability, and subsequently there are likely to have been impacts on freshwater-dependent ecosystems. Taxonomic diversity assessments (DPIPWE 2009a) suggest significant disturbance in the majority of habitats, with a general declining trend when compared with 2005 condition assessments.

Published data on wetland condition in the Southern Region indicates little change between 2005 and 2007; however, up-to-date research has not been conducted. The Australian Wetlands Database indicates a range of degraded to good condition wetlands in the region, with condition trends static around 2005. There is some indication that reduced flows in the past have led to significant eutrophication (nutrient overloading) of Ramsar Wetlands, with surrounding agricultural and urban developments also creating sedimentation and further nutrient load issues.

In 2008, Federal Environment Minister, Peter Garrett, responded to low water levels and acted to protect the Interlaken Ramsar site and endangered fish by refusing a request to release more water from Lake Crescent. As with the water catchment areas, reduced water levels appear to have had the most significant impact on wetland health in recent times (Garrett 2008).

The level of priority allocated to the protection of freshwater-dependent ecosystems will depend largely on the future management of water resources (use and quality) and the subsequent impacts on ecosystem health. Management actions may be increasingly guided by improved understanding around the impacts of climate change and rainfall in the region. As discussed above, reduced flows are linked to poor ecosystem health and taxonomic diversity so it will be important to improve understanding about potential future flows in the region under climate change.

Availability of data

Information relating to the water quality of freshwater-dependent ecosystems is available in part from the annual catchment monitoring reports (DPIPWE 2009a). These are a broad indicator of the ecosystem health band that a test site falls into; however, there are some limitations to the conclusions that can be drawn from data provided by these reports. Monitoring may need to be expanded beyond the river systems to provide similar information on wetland and estuarine ecosystem health.

Further information on the extent and condition of wetlands was obtained from the Australian Wetlands Database, maintained by the Department of the Environment, Water, Heritage and the Arts (DEWHA 2009a). Although the database is updated with the most recent research where possible, it is unclear as to how representative the published information is of the current condition, and new assessments may be required. The 2005 Strategy does acknowledge that there is a poor level of data available on the condition of freshwater-dependent ecosystems.

5.2.4 Summary of findings

Water resources	Issues and pressures	Data availability and adequacy
Improving water quality	<ul style="list-style-type: none"> ▪ Low flows impacting on water quality ▪ Urban and agricultural development pressures leading to eutrophication and sedimentation ▪ Unknown impact on water quality of variable rainfall change associated with climate change 	<ul style="list-style-type: none"> ▪ Water quality monitoring data is good, with data compiled annually for major catchments (however, this may miss other hotspots of concern) ▪ Groundwater monitoring is poor; no baseline data is available and monitoring bores are insufficient to meet the needs of the region ▪ Need for improved understanding about the impact of rainfall change due to climate change and its impact on water quality and catchments
Managing supply, allocation and use	<ul style="list-style-type: none"> ▪ Low stream flow and ongoing agricultural water needs have impacted on catchment health ▪ Risk that new irrigation plans may exacerbate existing issues of salinity and catchment health ▪ Unknown impact on region-wide water supply under climate change (possible spatial and seasonal variable impact) 	<ul style="list-style-type: none"> ▪ Annual data on stream flow and allocations are available through the catchment monitoring program ▪ Only available for selected catchments ▪ Need for improved understanding about the impact of rainfall change under climate change on water availability and distribution
Protecting freshwater-dependent ecosystems	<ul style="list-style-type: none"> ▪ Reduced stream flow has led to significant disturbance in the majority of habitats, with a general declining trend ▪ Eutrophication of Ramsar Wetlands, enhanced by low flows and surrounding agricultural and urban developments creating sedimentation and nutrient load issues ▪ Unknown impact of climate change on freshwater-dependent ecosystems 	<ul style="list-style-type: none"> ▪ Broad taxonomic indicator bands for reviewed catchments updated annually, providing a general indicator of health ▪ No up-to-date information on wetland condition, with some data available on commonwealth wetlands database, dating back to 2002–2003 ▪ Need for improved understanding about future water availability and flows connected to climate change and risk and vulnerability assessments of freshwater-dependent ecosystems

5.3 Managing land resources

Management of land resources primarily comprises consideration of soils and the potential impacts of salinity, erosion and fertility issues. Geodiversity and key karst areas are also considered in the 2005 Strategy. The following summarises the objectives of the natural resources management foci for land resources, outlines what we know about the resource condition and considers the principal issues and emerging concerns facing the Southern Region.

5.3.1 Managing soils

Objective

Soil condition and the sustainable management of soils are threatened mostly in the region by a number of key challenges, including soil erosion; soil structure, fertility and organic matter content; salinity levels; soil sodicity (sodium levels); and the use of wastes on agricultural soils. The management of soils in the region has focused on these aspects.

Current and emerging issues

It is difficult to gain an accurate picture of the state of land resources in the region, given the lack of up-to-date research on the relevant issues. However, it is considered likely that areas of severe and moderate salinity will have experienced ongoing stresses from irrigation practices since 2005, with an estimated rate of increase in salinity of 1.5% (Bastick and Walker 2000). The online benchmark reports published by Tasmania Together (2009) indicate that the number of hectares of salinity-affected land in the state increased from 53,500 to 73,900 between 2001 and 2003; however, this is a statewide measure that does not refer directly to conditions within the Southern Region. The site does indicate, however, that progress is not being made towards maintaining or reducing the amount of land affected by salinity.

Discussions around land resources focus heavily on the spread of salinity in the region, and it is apparent that this remains the key issue into the future. In particular, concerns have been expressed that future irrigation plans may exacerbate the existing salinity issues across agricultural lands. In particular, the proposed Midlands irrigation scheme is considered a key risk to land resource health, as the scheme involves the irrigation of areas identified as having high salinity risk.

While the irrigation plans may lead to a doubling of agricultural production over the next five years (TAPG 2008), there is a risk that current knowledge of the condition of the area is not adequate and that the Midlands region may fall into a situation similar to that of the Murray–Darling Basin (ET 2009). Discussions with stakeholders revealed that the management of soils may be best targeted by engaging the agricultural sector and improving landowners' soil management and adaptation techniques (pers. com. knowledge experts interview). These may include such practices as stubble retention, direct drilling and improving the understanding of issues such as water retention in the soil.

Soil condition is strongly influenced by vegetation cover, with erosion and salinity issues reduced by adequate tree populations. Rural tree decline is generally known to be a significant issue; however, no formal data has been compiled detailing the extent of the problem. Discussions with experts suggest

that what was considered dry woodland ten years ago is now classified as agricultural land (pers. com. regional knowledge expert) thus encouraging vegetation removal on such land and risking exacerbation of the issues of erosion and salinity.

An understanding by landholders of the impacts of climate change may also be necessary, with a projected increase in the number of extreme weather events (DCC 2009). Such events are linked to erosion, with storms and flash flooding impacting on topsoil stores. Mitigation practices may need to be undertaken by private landowners, with a potential for changes in the use of productive land. Indeed, such changes may arise anyway, with trees holding a monetary value to farmers as carbon offsets, or soil sequestration emerging as a commercial greenhouse gas mitigation opportunity.

Availability of data

Although the 2005 Strategy identifies five key challenges to be addressed in the management of soils, information was available only on the issue of salinity. Even in this area, efforts to verify the current condition of soils in the Southern Region were hampered by a lack of either recent or scientifically supported data.

An extensive assessment of the impacts and degree of salinity in Tasmania was completed by DPIPW in 2000, and further work was completed as a part of the 2001 National Salinity Audit. Much of this data is provided in the Australian Natural Resource Atlas (ANRA 2009); however, there have been no updates since 2002. A further review of salinity and management approaches was conducted by Sinclair Knight Mertz in 2005 (SKM 2006); however, this was a desktop review with little up-to-date information from on-the-ground research. The government site, Tasmania Together, provides online benchmark reports which were consulted for the latest available data.

Commentary from Environment Tasmania (ET 2009) provided a broad view on the state of land resources in the region; however their views are largely speculative and precautionary in nature. It has been reported that the CSIRO is due to release a detailed report into the extent and level of salinity in the region that also assesses the soils and their condition. A report card is not due, however, until the latter part of 2009 and data was not available as guidance for this study.

A scan of available literature found that there were significant gaps in published data in the area of soil management. Soil structure, sodicity and the impacts of wastes on soils do not appear to have been measured in the past, and no baseline or ongoing monitoring data exists for these areas. Geographic information systems (GIS) output maps are available, but provide only a visual analysis of the extent of erosion and salinity in the region in 2005. As a result, it is likely to be difficult to establish priorities or measure success, and there is a need to develop a more accurate understanding of the state of soils in the region and the nature of the challenges faced.

5.3.2 Managing geodiversity

Objective

Managing geodiversity relates to the maintenance of the condition of karst areas, riverine environments and coastal locations. Key issues relating to geoconservation as identified by the 2005 Strategy include damage to karst systems (from disturbances, poor water quality and fire); damage from the collection of geological material; damage to coastal sites; erosion, sedimentation, flow

regulation and sediment extraction from rivers; and effects on peat soils from fire. The 2005 Strategy seeks to address these issues and maintain the condition of identified areas.

Current and emerging issues

A broad set of geodiversity issues are addressed by the state government (DPIPWE), with reference to those challenges identified above. Wave wake and erosion of coastal areas are targeted by the department, with a number of waterbodies identified as particularly prone to vessel wake erosion. However, the issue is only broadly discussed, and the extent or longevity of the problem is not identified.

An emerging issue is that of the management of the impacts of climate change on coastal zone geodiversity following preliminary investigation of the implications of climate change on Tasmania's coastal zone.

Work by Sharples (2006) for DPIW has mapped indicative vulnerability of the Tasmanian coast to climate change (i.e. storm-surge and flooding) and sea-level rise. This work states that physical changes resulting from sea-level rise, especially on soft sandy shores and in low-lying coastal areas, are likely to be sufficiently significant in some areas, over future decades, as to pose risks not only for buildings and infrastructure but to cause changes to coastal landform process systems and biological communities in vulnerable coastal areas.

Availability of data

The study was unable to locate any baseline or monitoring data relating to the condition of karst systems or the geoconservation status of the region. Broad issues of concern are identified within the 2005 Strategy and by DPIPWE; however, no condition assessments were located. The Tasmanian Geodiversity Database is due for completion in 2010, and should serve to better guide the level of priority that the region allocates to the issue. The database will contain an inventory of sites of concern and their condition, identify threatening processes and establish management plans for all significant sites.

5.3.3 Summary of findings

Land resources	Issues and pressures	Data availability and adequacy
Managing soils	<ul style="list-style-type: none"> Salinity is considered to be the most significant issue, with up to a 1.5% annual rate of increase Heightened risk of exacerbated salinity problems associated with proposed irrigation schemes (e.g. in Midlands area) Rural tree decline furthering erosion and salinity problems Increased incidence of extreme weather events may cause erosion and loss of topsoils into the future. Need for further understanding of the risks. 	<ul style="list-style-type: none"> Although five key challenges are identified by the 2005 Strategy, salinity is the only issue with any baseline or monitoring data (albeit outdated) Comprehensive salinity data dates back to 2001–2002 as a part of the National Salinity Audit. Up-to-date data is likely to be available from the CSIRO in late 2009 No published data on rural tree decline, although it is generally known to be an issue Significant gaps in published data: soil structure, sodicity and the impacts of wastes on soils have no baseline or ongoing monitoring data (only GIS maps)
Managing geodiversity	<ul style="list-style-type: none"> Wave wake (from recreational boating) and erosion of coastal areas Understanding local coastal erosion risks associated with sea-level rise and extreme weather events (storm surge and flooding) under climate change scenarios, and developing adaptation responses where identified as required 	<ul style="list-style-type: none"> No baseline or monitoring data available on geoconservation status of the region Some target sites of concern cited but no quantitative information Geodiversity database due for completion in 2010 with inventory of sites of concern and their condition; threatening processes; management plans for all significant sites

5.4 Managing marine, coastal and estuarine systems

Key targets within the 2005 Strategy consider the sustainable management of marine, coastal and estuarine resources in the Southern Region. This includes the protection of ecosystems and key habitats in these areas through sustainable development and use, as well as working to ensure that any interface between urban developments and marine, terrestrial and freshwater systems is managed to maintain water quality. The following discusses the objectives of the management of the natural resource, the current resource condition, and the principal issues and emerging concerns facing the Southern Region.

5.4.1 Protecting aquatic ecology

Objective

The 2005 Strategy identifies three key threats that should be minimised in order to protect the ecology of marine, coastal and estuarine systems: over-fishing, habitat loss and degradation, and introduced pest species.

Current and emerging issues

A scan of current and emerging issues in the marine, coastal and estuary theme noted a few resource condition contexts, primarily that:

- recreational water quality breaches declined from 4.9% to 4.1% across the state between 2005 and 2008 (Tasmania Together 2009); however, this measure solely considers bacterial contamination and is not very meaningful in isolation;
- the 2005–2007 period saw a decline in suspended solids and organic matter in the Derwent Estuary, but there was an increase in nutrient levels, predominantly from sewage effluent (DEP 2007). Although heavy metal levels remain high in the estuary, strong efforts to target this issue have reduced levels significantly since 2005. A high density of invasive species was noted in the report;
- an examination of commonwealth government reports into the management of Tasmanian fisheries indicated across-the-board compliance with requirements for ecologically sustainable management practices (DEWHA 2009b). Assessments conducted between 2005 and 2008 indicated that managed fisheries in the state were not having detrimental impacts on marine, coastal or estuarine ecosystems, and were in compliance with the Commonwealth Government's *Guidelines for the ecologically sustainable management of fisheries*.

It is worth noting that no new marine protected areas have been established since 2005 (Tasmania Together 2009). Although there are currently protected areas in two bioregions in the state, there is a target of six regions set for 2010 that is unlikely to be reached. Ocean Planet (2009) considers that no marine park areas in the southern region receive adequate protection, in spite of the fact that the region features some marine reserves with outstanding natural resource values. The Tinderbox, Ninepin Point, and Maria Island marine protected areas in the southern region all display a wide diversity of species and marine habitats, offering an effective area for protecting biodiversity and ecosystem processes. In fact, research at Maria Island has shown that marine species diversity and abundance are

highly dependent on protected areas, which offer an environment that restores heavily fished species. These can help to control invasive species and create a balance and resilience in a marine ecosystem. The research showed that in protected areas, natural predator abundance was greater, and urchin numbers were reduced by 40% (Ocean Planet 2009). The long-spined urchin is considered one of the most notable invasive species in Tasmania's waters, and destroys kelp forests and habitats critical to healthy ecosystems.

Although the study was not able to locate data on the condition of these marine protected areas, the Tinderbox and Ninepin Point reserves were to be enlarged in 2009. Concern has been cited over the lack of marine protection within the Davey bioregion and the Southwest National Park World Heritage Area. One marine reserve exists in this region, and this Port Davey Marine Reserve is considered to provide much needed protection to a highly sensitive environment. However, the reserve is not linked to any other protected areas, giving rise to concerns about the consequences should a catastrophic event occur and damage the isolated representative area (Ocean Planet 2009).

A key emerging issue that is receiving a reasonable amount of attention in the research context is the impact of climate change on marine environment and resources. A briefing note from the National Climate Change Adaptation Research Network for Marine Biodiversity and Resources (ARNMBR 2009) explains that scientific research is indicating that the seas off the east coast of Tasmania are the fastest warming in the southern hemisphere and some of the fastest warming globally due to global warming. This warming brings with it changes to the habitat condition of marine ecology which need to be understood to be managed. Marine-based industries will also need to adapt to this new environment since there are indications that there will be direct changes in the magnitude of harvests, the distribution of species and the species being harvested.

Both positive and negative impacts of climate change on Tasmania's marine ecosystems and marine resources have been projected. For example, while rock lobster stocks are expected to diminish on the east coast owing to poor recruitment, they may in fact become more productive on the west coast due to warming temperatures, increased recruitment and increased upwelling. Similarly, some of the species moving south, such as snapper, are already being seen as iconic recreational species that could support commercial fisheries. Southern bluefin tuna and other large pelagic species, and their commercial and recreational fisheries might also benefit. In contrast, one of the negative impacts of climate change is its impact on the spread of invasive species such as the northern sea urchin which is quite destructive to coastal aquatic habits (ARNMBR 2009).

Availability of data

- Prior studies provide an in-depth assessment of the condition of some locations in the region, such as the CSIRO study into the Huon Estuary from 1996 to 1999 (Butler *et al.* 2000); however, more recent analysis was not available.
- Fisheries are assessed under the Commonwealth Government's *Guidelines for the ecologically sustainable management of fisheries*, and the condition and management of Tasmania's fisheries was informed via a review of published assessments dating from 2005 to 2008 (DEWHA 2009b).

- The most reliable information was contained within the annual report card for the Derwent Estuary (DEP 2007). Supplemental data on water quality came from the Tasmania Together project, but because it is a statewide program figures cannot be attributed to the Southern Region with any certainty.
- The Tasmanian Marine Protected Areas Strategy was developed in 2001, and seeks to ensure the long-term ecological viability of Tasmania's marine environment. The strategy lays out the methodology for identifying, selecting and managing marine protected areas; however, it does not provide a foundation for ongoing monitoring. As a result, quantitative data was not available for assessment of the existing status of marine parks.
- The Ocean Planet Tasmania partnership works with a number of government and non-government organisations to protect Tasmania's ocean environments, and basic qualitative information in the form of case studies was available (Ocean Planet 2009).

5.4.2 Managing the interface between estuarine and coastal systems

Objective

Management of the interface between estuarine and coastal systems requires consideration of the negative downstream effects from land and water management practices upstream, including industrial and agricultural activities, urban developments and reduced flows.

Current and emerging issues

- Published reports cite ongoing threats from increased urban sprawl and associated runoff contaminants and domestic animal attacks on fauna (Pryor and Wells 2009). Increasing urbanisation has been linked to higher levels of pollutants and sediments with stormwater flowing into surrounding waterways (Whitehead 2009), and urban encroachment is likely to be an ongoing issue that requires careful monitoring and management at the ground level, with active intervention demonstrated to be successful.
- Environmental flows are also likely to be a key issue into the future, with agricultural demands needing to be balanced with those of estuarine waters (in particular those subject to industry and wastewater treatment plant effluent releases).

Availability of data

- Catchment monitoring reports (DPIPWE 2009a) provide data on the upstream flows and allocations for agricultural purposes, giving some indication of the potential downstream flows.
- Individual estuary monitoring (e.g. Derwent program) provides data on water quality and possible linkages with industrial or urban activities, although 2007 was the most recent available report.
- No data was located on specific impacts related to new urban developments and runoff impacts.

5.4.3 Sustainable development in coastal areas

Objective

The 2005 Strategy seeks to integrate planning and management activities in the coastal zone, reducing the fragmentation between control and responsibility and promoting sustainable development while also protecting natural areas and breeding sites.

Current and emerging issues

The study revealed a number of diverse issues for sustainable development in coastal areas.

- A review of identified key habitat areas for the little penguin (*Eudyptula minor*) revealed a positive response to management actions (Pryor and Wells 2009). The study found that over the past four years a steady increase in breeding pairs has occurred along the Derwent Estuary and, where the most active intervention strategy was implemented, the colony has increased significantly. Monitoring, intervention and education around the little penguin and its habitats will need to be ongoing.
- Potential climate change related impacts on marine, coastal and estuarine resources. A study assessing the likely impacts on the Derwent Estuary (but with replicable impacts across other waterways) considered key future issues to be sea-level rise, and subsequent coastal erosion and habitat destruction; ocean acidification, resulting in a loss of shell forming organisms; and increased temperatures, providing an improved environment for invasive species in particular (Whitehead 2009).
- Research indicates that acid sulphate soils are an emerging issue. A map published in 2001 by Mineral Resources Tasmania (Gurung 2001), indicated no potential or actual acid sulphate soils in the southern region. Some coastal sediments with potential to host acid sulphate soils were cited in the Frederick Henry Bay and South West Cape areas. A more recent study conducted in 2006 by the CSIRO as part of the Australian Soil Resource Information System indicates that there are significant amounts of high probability coastal and inland acid sulphate soils in the Southwest region (extending through the Southwest National Park) and small coastal distributions surrounding the Primrose Sands area east of Hobart (CSIRO 2006).

This is considered a concern as, when excavated or drained, acid sulphate soils can become problematic, potentially forming sulphuric acid when exposed to oxygen in the air. Acid can then drain into waterways, or react with soils releasing iron, calcium, magnesium and other elements such as copper that may be detrimental to local ecosystems.

Availability of data

- A single project surveying the impacts of protection measures on little penguin breeding was available; however, this was only for the Derwent Estuary.
- The literature review found no discussion concerning coastal ecosystems outside those concerns surrounding little penguins. Other than the above survey on little penguin habitats, attention is not given to species and coastal habitats.
- Work by Sharples (2006) for DPIW on coastal mapping of vulnerability is a first pass at understanding the implications of climate change on the coastal zone to help inform adaptive

planning and management. More localised and site specific information is beginning to emerge as local governments start to pay attention to coastal planning and climate change.

5.4.4 Summary of findings

Marine, coastal and estuarine systems	Issues and pressures	Data availability and adequacy
Protecting aquatic ecology	<ul style="list-style-type: none"> Water quality in the Derwent Estuary appears to be improving; however, a high density of invasive species has been noted. Warming of seas off east coast due to global warming contributing to changing marine aquatic habitats, species distribution, fisheries harvests, emergence of new species and decline of others, invasive species. Extension of marine protected areas (six targeted by 2010). 	<ul style="list-style-type: none"> Fisheries monitoring appears up to date and adequate (reviewed by Commonwealth Government). Derwent Estuary reports are most recently provided for 2007, and for other estuaries 2000 is the most recent. Current baselines may need to be established in conjunction with ongoing monitoring programs. Ocean Planet partnership provides qualitative data on marine ecosystem health, but no quantitative data is available for the region.
Managing the interface between estuarine and coastal systems	<ul style="list-style-type: none"> Ongoing threats from increased urban growth resulting in associated runoff contaminants and domestic animal attacks on fauna. Urbanisation has been linked to higher levels of pollutants and sediments with stormwater flowing into surrounding waterways. Need for agricultural demands to be balanced with those of estuarine waters. 	<ul style="list-style-type: none"> Annual catchment monitoring reports provide data on the upstream flows and allocations for agricultural purposes, giving some indication of the potential downstream flows. Data was not available on specific impacts related to new urban developments and runoff impacts; there may be a need for baseline assessments and monitoring linked to developments of concern. Estuary monitoring is limited, with the Derwent Estuary appearing to have the only detailed program in place. Need to understand the impacts of proposed irrigation schemes on estuarine systems (e.g. the Pittwater–Oriental area).
Sustainable development in coastal areas	<ul style="list-style-type: none"> Review of identified key habitat areas for the little penguin (<i>Eudyptula minor</i>) revealed a positive response to management actions in areas. Potential climate change related impacts include sea-level rise resulting in coastal erosion and habitat destruction; ocean acidification resulting in loss of shell forming organisms; and increased temperatures resulting in an improved environment for invasive species. Growing issue of acid sulphate soils that does not appear to be addressed in natural resource management at present. 	<ul style="list-style-type: none"> Only a single project surveying the impacts of protection measures on little penguin breeding was available, and it is suggested similar surveys be expanded across other sites. No other data on coastal ecosystems could be located. Data on hotspots of concern where climate change impacts may require mitigation required.

5.5 Managing biodiversity

The 2005 Strategy seeks to address the ongoing sustainability of native flora and fauna resources. The primary areas of focus include the maintenance of ecological communities at the landscape level; protection of threatened or endangered species; and management of weeds, pests and diseases. The study team sought to assess the management objectives surrounding biodiversity and the degree of success and change in these areas since the implementation of the Strategy, and also identify key emerging issues. This information is presented in the following sections.

5.5.1 Maintenance of ecological communities

Objective

The 2005 Strategy seeks to maintain ecological communities, with the key component of healthy communities considered to be native vegetation. Sustainable management of ecological communities requires addressing the key challenges of clearance and conversion, loss of old growth forests, and the declining condition of native vegetation.

Current and emerging issues

The program provides information on the level of progress made in vegetation conservation in the state. Sources indicate a continuation of the felling of old growth forests, although a significant reduction in the clear-felling of old growth forests has occurred – from 1190 hectares in 2005 to 690 hectares in 2008 (Tasmania Together 2009). In addition, there has been a 10,000 hectare statewide increase in the area of non-forest native vegetation protected in the CAR (comprehensive, adequate and representative) reserve system, suggesting positive trends in the Southern Region. Since 2005 there has been an increase in the percentage of land protected either by legislation or by contract in conservation reserves, under covenant or heritage regimes (from 41% to 43.9%).

Based on the available data, it would appear that the majority of challenges are being addressed successfully. However, discussions with regional experts indicate a concern that the health and extent of native vegetation and ecological communities can be impacted on by the level of invasive species and encroaching urban developments (pers. com. knowledge experts interview). In addition, many forests are being replaced by plantations, reducing the diversity of vegetation and health of communities. Although total forest coverage between 2001 and 2006 remained stable across the state, the coverage is increasingly being made up of plantation forests with a 21.2% area increase over the five-year period (FPA 2007). A more up-to-date set of data was not available, and more detailed and ongoing monitoring will be required for developing impacts on native vegetation and ecological communities.

In addition, monitoring the impacts of climate change will be required. Alpine ecosystems in particular are likely to be affected, with increased temperatures diminishing the extent of alpine habitats available for native species (DCC n.d.). With a projected 10–40% reduction in snow cover by 2030 (DCC 2009) there is the potential for a significant change in the dynamics of alpine communities which may lead to serious population declines of some species and loss of ecosystems (DCC n.d.). Ultimately alpine ecosystems and species are limited in where they can move to under climate change

and therefore have limited adaptive capacity. Increased risk of bushfire under climate change is also recognised as a threat to the maintenance and management of ecological communities.

Availability of data

Although the Tasmania Together program provides information on selected benchmarked issues, this is limited in nature. For example, the program notes that data on the change in extent of native vegetation (forest and non-forest) is not available because a progress measure beyond the baseline measurement has not been produced. There is some baseline GIS output data available for the extent of native vegetation provided via the Tasmanian Land Information System; however this is highly complex, difficult to interpret and generally dated.

Baseline and monitoring data issues are likely to be addressed with the establishment of the Tasmanian vegetation assessment tool (TASVEG). The tool is currently being populated with data on native vegetation, and it is likely that this information will be available mid-2010, with a temporal change layer available to users.

5.5.2 Protection of threatened or endangered species

Objective

The 2005 Strategy seeks to protect those species that are listed as threatened or endangered under State and Commonwealth Acts, and to maintain important areas for biodiversity conservation. There is an aspiration to improve or maintain the listed status of any flora and fauna species on the Schedules of the *Environment Protection and Biodiversity Conservation Act* (EPBCA) 1999, and the *Tasmanian Threatened Species Protection Act* (TSPA) 1995.

Current and emerging issues

The study found that there was an increase in the number of threatened flora and fauna species listed on the commonwealth EPBCA and the state TSPA. Although a number of species were delisted or downlisted (indicating an improvement in conservation status) significantly more were uplisted or newly listed. A summary of the changes since 2005 are provided in Table 5.1.

Table 5.1 Change in status of threatened species in Tasmania since 2005

	EPBCA 1999	TSPA 1995
New listings	27	11
Uplisted	4	54
Downlisted	5	10
Delisted	3	14

It should be noted that although the above is representative of the state and not the Southern Region specifically, it may be considered representative of trends in the area. Of specific concern is the continued decline of the Tasmanian devil (*Sarcophilus harrisii*), which was newly listed as vulnerable on the EPBCA Threatened Species Schedules in 2006. In 2008 the species was listed as endangered on the TSPA, and in 2009 it was uplisted to endangered on the EPBCA Schedule. The rapid decline has been brought about by the facial tumour disease which threatens the ongoing survival of the species and is the subject of ongoing research.

An additional concern is the 2009 listing of the Southern Region's lowland native grasslands communities as critically endangered on the EPBCA schedules (DEWHA 2009c). By definition, this suggests that the grasslands are facing an extremely high risk of extinction in the wild in the immediate future. The native grasslands have been identified by the 2005 Strategy as an important area for biodiversity conservation, and their recent status as critically endangered indicates a priority issue for the region.

The Strategy also identifies the presence of foxes as potentially devastating to local biodiversity. To date, efforts to eradicate the fox from Tasmania have been unsuccessful, with twenty-six positive detections in 2008, and thirty-nine in 2009 to date (DPIPWE 2009b). A number of these positive scat (fox droppings) findings have been reported in the Southern Region.

The declining conservation status of many species and key conservation habitats, together with the ongoing presence of foxes, represents a significant challenge for the future of biodiversity in the region. Unfortunately the available data gives no indication of the specific pressures giving rise to the above challenges, and it is likely to be a range of issues, including climate change, that continue to threaten flora and fauna species.

Indeed climate change may represent one of the more significant threats to rare and endangered species in the region, with projected increases in temperature likely to reduce the extent of habitats such as those in alpine areas or temperate rainforests (DCC n.d.). This places a number of species at risk, such as those plant species restricted to alpine areas above the tree line or species endemic to the area (DCC n.d.). Conversely, climate change may also enhance the resilience of invasive species, which in turn may heighten pressures on native species.

Availability of data

Biodiversity in the Southern Region is monitored and measured via a number of state and commonwealth programs. The study referred to the Schedules of the EPBCA, and State Government logs of the TSPA, to determine the biodiversity status of the region since 2005. These information sources provided data on changes in the status of threatened flora and fauna species in the region, and an indication of improvements or reductions in biodiversity. The Tasmania Together program provides additional information through its online benchmark reports, drawn from various studies on the condition of flora and fauna resources.

Reasonably comprehensive and up-to-date data is available on the status of the State Government's fox eradication program, and this is expected to remain a reliable source of information for ongoing monitoring.

The above sources provide a sound grounding for considerations as a part of the future strategy, giving a very broad overall picture of the biodiversity status of the region. However, it should be noted that a more comprehensive source of information may be the Australian Terrestrial Biodiversity Assessment 2008. The report is due to be made available to the public in late 2009 (Ludwig 2009), at which stage it may be considered a useful resource for strategy guidance.

5.5.3 Management of pests, weeds and diseases

Objective

The 2005 Strategy identifies the presence of weeds, pests and diseases as a very real risk to the biodiversity conservation and production value of terrestrial, aquatic and marine systems. Therefore there is a need to manage pests, weeds and diseases with a view to sustaining the condition of native flora and fauna as well that of industries in the region.

Current and emerging issues

There has been some success in the control of pests and diseases in the state. The Tasmania Together online benchmarks (Tasmania Together 2009) suggest that since 2005 there has been a strong decline in the number of newly established weeds in the state. Furthermore, a single plant pathogen (and no new invertebrate pests) has become established in Tasmania since 2005.

These statistics may, however, present a false image of the current state of the region, given that they do not assess the extent or density of existing invasive species. Discussions with regional experts identified that the threats posed by invasive species (such as gorse) are a significant emerging issue and a concern for the conservation status of native vegetation (pers. com. knowledge experts interview). The control or eradication of high priority weeds and the reduction in spread of pests and diseases is a significant priority issue in the 2005 Strategy; however, the study was not able to locate up-to-date data mapping this information. It is difficult to gain an accurate picture of the emerging status of threats posed by weeds, pests and diseases in the region without an improved set of baseline and monitoring data.

The extent to which climate change will impact on the density and distribution of plant diseases, pests and weeds is uncertain as increases in carbon dioxide are beneficial to some woody weeds, and reduced rainfall is detrimental to some grasses. New pests and weeds may migrate to the Southern Region with changes in the temperatures of surrounding regions, and strategies to address such introductions will need to be considered (LWA 2008).

Availability of data

While TASVEG is currently being populated with data on invasive plant species, this information was not available at the time of the study. The key source of data relied upon was that provided by the Tasmania Together benchmark status reports. These provide some indication of progress relating to specific targets but give little indication of the broader extent or frequency of pests, weeds and diseases.

There is some indication that baseline and monitoring data for weeds in particular can be unreliable and misleading (pers. com. knowledge experts interview). The data collection methods are typically either via *ad hoc* surveys or targeted to identified hotspots. Each of these methods have drawbacks resulting in only a best guess set of data on the occurrence of pests, weeds or diseases. Concern has been expressed that efforts to monitor and refer to a baseline may result in false conclusions, particularly in an instance where new hotspots are discovered. Such a discovery may indicate an increased spread of a species (resulting in an apparent failure to progress to targets), when in fact it is an increased awareness of the existing spread that has occurred. As efforts to eradicate weeds increase, there is the possibility that awareness outstrips management progress, resulting in an apparent backwards trend.

In spite of the expressed drawbacks, ongoing monitoring is essential, and may best be undertaken with reference to current extensive local government weeds assessment programs. Data from these programs is being submitted to the state government weed database which is currently being populated. No past data is available to provide an indication of progress, and it is a comprehensive baseline that is being created to allow for future monitoring. Information from the programs is expected to be available in mid-2010, and a temporal change layer will be available to users allowing for comparative analyses.

5.5.4 Summary of findings

Biodiversity	Issues and pressures	Data availability and adequacy
Maintenance of ecological communities	<ul style="list-style-type: none"> Continuation of the felling of old growth forest, although at a slowed rate. The health and extent of native vegetation and ecological communities may be impacted on by the level of invasive species and encroaching urban developments (quantitative data relating to these impacts was not available). Forests are being replaced by plantations, with total forest coverage remaining stable but an increasing component being plantations creating limited species diversity. 	<ul style="list-style-type: none"> Very limited benchmarking and GIS mapping data available. Data gaps may potentially be filled with completion of TASVEG database in 2010, allowing for a baseline to be established and for ongoing monitoring. Effective benchmarking and monitoring of native forests has been limited by a lack of available data.

	<ul style="list-style-type: none"> ▪ Risks of ecosystem decline and reduction in extent associated with climate change, particularly in alpine areas. ▪ Increased risk of bushfire under climate change and destruction of vegetation/ecosystems. 	
Protection of threatened or endangered species	<ul style="list-style-type: none"> ▪ Significant increase in number of species newly listed or uplisted on schedules of EPBCA and TSPA. ▪ 2009 listing of lowland native grasslands as critically endangered. ▪ Foxes remain present. ▪ Climate change impacting on extent of habitat availability and enhancing vulnerability of already threatened and endangered species. 	<ul style="list-style-type: none"> ▪ Threatened species status is updated regularly and available via state government logs, as is fox data. ▪ Further information is likely to be provided by the Australian Terrestrial Biodiversity Assessment 2008, due in October 2009.
Management of pests, weeds and diseases	<ul style="list-style-type: none"> ▪ Since 2005, there has been a decline in the number of newly established weeds and only a single plant pathogen (and no new invertebrate pests) has become established. ▪ Qualitative data suggests concerns over the extent of invasive species (although quantitative data was not available). ▪ Potential increases in weeds or newly introduced species. ▪ Changes in the distribution and resilience of weed species associated with climate change. 	<ul style="list-style-type: none"> ▪ No data on the extent or density of existing invasive species. ▪ Data collection methods are limited by available resources and may be misleading. ▪ Local government weed assessments information is expected to be available via the state government weed database in mid-2010. ▪ Greater understanding required of the adaptive capacity of weed species under climate change scenarios.

5.6 Managing for sustainable communities and a sustainable economy

The 2005 Strategy discusses a range of issues around the impact of human activities on natural resources; the development of innovative and sustainable practice; opportunities and issues around the ‘clean green’ branding of Tasmania; and the impact of community organisations and planning on resources and energy use. Many of these issues are significant on their own; however, the 2005 Strategy does not adequately articulate a considered direction in this theme area. This is possibly partly due to the timing of the development of the 2005 Strategy relative to the growing prominence of some of the core issues mentioned at the time (particularly the growing awareness around climate change and interest in sustainable living practices, and the growth in more sustainable business and commercial interests such as ecotourism). The issues raised in the Strategy suggest that there was a lack of time in the strategy development process to get across these emerging issues, but that there was a recognition that a natural resource management strategy needed to engage with the issues as they developed as well as engage with a new group of stakeholders outside the traditional natural resource management field (government, non-governmental organisations and the private sector).

5.6.1 Managing impacts of human activities

Objective

The 2005 Strategy specifically refers to the interconnectedness between industry and community impacts on natural resource management and industry and community needs for natural resource management and the need to manage natural resource management in this context. Agriculture, forestry, wild fisheries and aquaculture all depend directly on the sound management of natural resources such as soil, water and seawater. Similarly these industries are vulnerable to extreme weather events associated with normal climate variability and climate change (such as flood, bushfire, storm events and drought). Agriculture, aquaculture, fisheries and forestry also depend on the maintenance of natural biodiversity via the control of weeds, pests, and diseases, while tourism is dependent on the maintenance of healthy landscapes and ecosystems.

The 2005 Strategy also focuses briefly on three specific issues of impact on natural resources which were not raised as issues in other chapters. These are air quality, waste management and climate change.

Current and emerging issues

Air quality

Overall, air quality is considered a minimal issue for the region. However, in winter it can be a local issue in some built-up valleys, mostly due to the use of wood heaters. The air quality issue is unlikely to change significantly in the region into the future, although under climate change there is a likelihood of increased bushfire risk in south-eastern Australia, including Tasmania, and therefore smoke associated with bushfire during the warmer months. The Bushfire Cooperative Research Centre predicts that the number of very high and extreme fire weather days could increase between 4% and 25% by 2020 and between 15% and 70% by 2050 across parts of south-eastern Australia, although changes are likely to be less for Tasmania (Bushfire CRC 2006). Obviously there is still a great deal of uncertainty in these assessments, and even a moderate increase in bushfire incidence can have a significant impact on air quality across the region in spring, summer or autumn from local bushfires or

those further afield, and from prescribed burning for bushfire management. Air pollution, particularly particulates (PM₁₀ and PM_{2.5})⁸ is largely a human health concern (especially for those people with respiratory conditions), although it is also an issue for visibility and aesthetic values which impact on enjoyment by the region's community and visitors.

Waste management

Waste concerns revolve around the degradation of bushland, contamination of soils and waterways via authorised landfills and tips and, informally, via dumping on public and private land, particularly in the bush. The values of bushland reserves, private bushland and urban rivulets have been compromised by the dumping of rubbish or the build up of day-to-day incidental littering by the community. The 2005 Strategy recognises the comprehensive management of solid waste via the Southern Waste Strategy but points to opportunities to improve resource use and recycling and the need to manage hazardous wastes.

Since the 2005 Strategy, the Southern Waste Strategy Authority has worked with a range of sectors in the community and implemented a number of campaigns. Many of these have been focused on education around resource use efficiency and recycling (Southern Waste Strategy Authority 2009; pers. com. knowledge experts interview). For example:

- a television anti-litter campaign 'Don't Waste Tasmania Do the Right Thing';
- the Clean Schools Challenge which evolved into the nationally funded 'ResouRce Rite' program involving some eighty-one schools in waste management education and development of school environmental management plans;
- case-by-case projects with industry such as the hospitality sector hotels (Wrest Point Hotel pilot to look at ways hotels might decrease their waste footprints);
- working in partnership with other states and Tasmanian regions to develop responses to better managing household hazardous waste;
- establishment of the Waste Advisory Committee.

Knowledge expert interviews in September 2009 revealed that the waste management sector faces a number of emerging challenges that are likely to further change waste management systems and community waste practices into the future. These include:

- managing the greenhouse gas (methane) emissions associated with landfill sites as various levels of reporting about emissions are required now and in the future
- the requirement of landfill operators to know what is going into their landfills in order to investigate ways of reducing the carbon footprint of landfills
- the management of the growing problem of electronic waste (e-waste) and green waste.

⁸ PM₁₀ refers to a particle size 10 micrometres or less, while PM_{2.5} refers to a particle size 2.5 micrometres or less

Climate change

Climate change has been discussed in various sections of this document, demonstrating its relevance across natural resource management sectors; however, the 2005 Strategy mentions climate change only briefly alongside the air quality and waste management issues. There is also an element of uncertainty around the way climate change is discussed in the 2005 Strategy, while the role of the Southern Region in reducing greenhouse gas emissions is not fully acknowledged. The Strategy does recognise that significant biological resources and landscape values (alpine and sub-alpine ecosystems, and coastal systems) are at risk from climate change, while various industries (aquaculture, forestry, fishing and agriculture) may need to adjust to changing conditions to remain viable. For example, the warming of coastal waters has implications for the farming of existing salmon species, a highly valued and recognised industry of the region; and fishing which may suffer from reduced stocks but also benefit from the emergence of other species (e.g. snapper) moving south. Agriculture also faces variable change with positive prospects for the wine industry but uncertainty for the dairy industry which contributed about 22% to the total value of agriculture in Tasmania in 2006–07 (IRIS 2009). Engaging sectors such as aquaculture and agriculture in conversations and research about future prospects, resilience and adaptive capacity under climate change will consequently be an important endeavour involving natural resource management questions.

Since the release of the 2005 Strategy a lot of attention has been paid to the climate change issue – in a scientific sense, in the mainstream media and in national policy (mitigation and adaptation policy). This has increased awareness in the wider community about global warming, climate change implications and debates around mitigation and adaptation policy responses.

The global imperatives for acting on climate change, including the need for mitigation and adaptation, are now clear. The global consensus within the scientific community (Intergovernmental Panel on Climate Change) is that warming of the climate is unequivocal; numerous long-term changes in climate have already been observed around the world and there are likely to be many more changes during the 21st century (IPCC 2007a and 2007b). The economic imperative is that it will cost much more if we do nothing than if we begin to prepare for the impacts of climate change. The Stern Review for the British Cabinet (Stern 2007) and Australia's own Garnaut Report (Garnaut 2008) both established this.

In 2005, Tasmania was responsible for 2% of Australia's total emissions. The Tasmania Together 2020 Benchmark Report (Tasmania Together 2009) reports no progress towards the reduction of the state's greenhouse gas emissions despite a target to reduce emissions to at least 60% below 1990 levels by 2050. Early work to investigate the most effective way to work towards this target include a number of government projects focused on understanding Tasmania's emissions sources and identifying opportunities for emission cuts (i.e. the Tasmanian Greenhouse Gas Inventory Project and the Wedges Analysis of the Tasmania Economy Project). All sectors of the economy and the community will invariably have a role to play in reducing emissions or enhancing greenhouse gas sinks (i.e. through forests, offsetting opportunities or sequestration).

Mitigation responses will invariably be sought from sectors that are relevant to natural resource management, including forest industries, agriculture and numerous other industries that are dependent on natural resources and energy at different points in the production supply chain. Similarly the

implications of an emissions trading scheme in the form of the Federal Government's proposed carbon pollution reduction scheme and the need for larger energy users to monitor and report their emissions in response to national greenhouse and energy reporting legislation will present a range of restructuring and reorganisation implications for industry including commercial interests in the natural resource sector. The Southern Region will need to consider these changes to identify any emerging natural resource management implications.

Ultimately, however, the most significant climate change challenge for the Southern Region will be the management of the impacts of climate change on natural resources, particularly key natural resource values. As pointed out in the preceding sections there are numerous issues for the Southern Region to consider, from understanding which natural systems are most at risk and which natural systems we should facilitate adaptation for. Understanding the extent of the challenge spatially, sectorally and temporally will be crucial in the next regional planning period in order to begin to develop response strategies.

5.6.2 Land and resource use planning

The competition for land use between agriculture, native forestry, plantations, housing, urban development, rural sub-division, tourism and conservation creates ongoing tensions within the community at large. Many of the pressures on natural resources are due to the impact of development or the encroachment on natural environments. There is also competition between the commercial, industrial and recreational use of water resources (both fresh and marine). The more balanced management of these issues revolve around the need for land and resource planning that is guided by the principles of sustainable development and the natural resource values of the community at large now and into the future. Strong state policy and strategic regional planning (including a sustainable urban growth strategy) that reflect these overarching principles are essential if pressures associated with development are to be better managed, the future integrity of natural resources in the region protected, and the ecological and carbon footprints of the Southern Region's community limited.

Land use planning will also need to be considerate of future environmental change, cumulative development pressures and identified risks associated with climate change. For example, planning in coastal zones now and into the future is a particular issue that will need to manage coastal human settlement growth pressures alongside the management of future risks associated with sea-level rise and storm surge possibilities. This issue has already been addressed in more detail in Section 5.1. Likewise, land use planning and development control mechanisms will be important to managing the future connectivity and extent of natural habitat in reserves and on private land.

5.6.3 Sustainable economic development and promoting innovative practices

A range of issues raised in the 2005 Strategy are relevant to the identification and development of opportunities for more sustainable economic development in the region and the sustainable use of natural resources in the region for economic gain. The 2005 Strategy talks about the benefits of ecotourism activities to communities and industries (e.g. the Tahune Forest Airwalk has brought benefits to the tourism and forest industries and to Geeveston and other Huon Valley communities).

Such opportunities will continue to be important to the Southern Region. Likewise, industry and other commercial activities impacting on, or using, natural resources will need to be continually engaged to help build capacity to implement sustainable practice. Indeed many other issues raised in the 2005 Strategy around promoting Tasmania's 'clean green' branding, ensure that this is done with integrity and supported by appropriate instruments such as triple bottom line reporting, accreditation or environmental management mechanisms.

An example where changes in natural resource condition through climate change will likely have implications for one important industry sector for the region is changes in Tasmania's marine industries. These industries provide valuable financial and employment opportunities in regional economies around Tasmania (valued at over \$500 million annually) (ARNMBR 2009). A major component of adaptation planning will consequently be the identification of new opportunities for Tasmania's marine industries and their dependent communities. Industry will adapt to changing circumstances but government will also play an important role to develop the appropriate management plans with industry and the community to ensure the sustainability of living marine systems and resources, and to develop policies that ensure that the Southern Region continues to receive social and economic benefits from the marine environment (ARNMBR 2009)

5.6.4 Summary of findings

Sustainable communities and a sustainable economy	Issues and pressures	Data availability and adequacy
Managing impacts of human activities	<ul style="list-style-type: none"> Air quality: increased risk of bushfire associated pollution (human health issue) under climate change. Waste: concern about the growth in electronic waste and the need to manage electronic and green waste. Climate change: continued emissions of greenhouse gases and the need to reduce statewide emissions across sectors. Understanding the regional impacts of climate change and vulnerabilities of natural resource systems. Risk assessment and the identification of priority natural resource climate change vulnerabilities and the preparation of climate change adaptation plans. 	<ul style="list-style-type: none"> Limited existing data around air quality. Information needed to assess what is going into landfill to help identify ways to reduce waste going to landfill. Significant need for data around climate change risk and vulnerability in natural resource management and specific scenarios of climate change in the region.
Land and resource use planning	<ul style="list-style-type: none"> Increasing pressure on natural resources from development and land use change particularly in the rural/urban fringe and in coastal settlements. Need to better manage human settlement growth through strategic regional planning and state policy. 	<ul style="list-style-type: none"> Need for planning around sustainability indicators (based on easily measurable indicators).
Promote innovative practices	<ul style="list-style-type: none"> Assessment of the impact of a move to a low carbon future in natural resource based 	<ul style="list-style-type: none"> Economic impact and risk assessment required.

	<p>industries.</p> <ul style="list-style-type: none">▪ Opportunities for ‘green’ business and commercial activities in the natural resource sector.▪ Continue to build capacity in sustainable living practices.	<ul style="list-style-type: none">▪ Need for the development of regional sustainability indicators for monitoring and communication of progress towards sustainability.
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5.7 Managing cultural landscapes

The 2005 Strategy defines cultural landscapes as ‘landscapes that result from the interaction of plants, animals and people over time’, and seeks to address natural resource management impacts on Aboriginal cultural values and the aesthetic and heritage values of landscapes. The following discusses the objectives of the management of cultural landscapes, the current resource condition, and the key current and emerging concerns facing the Southern Region.

5.7.1 Protecting Aboriginal cultural values

Objective

There are a number of sites and items with a significant cultural importance to the Aboriginal community in the Southern Region. Although there is a level of recognition of the value of Aboriginal heritage, the strategy seeks to ensure a more proactive consideration of Aboriginal values in the management of natural resources, and to take these values into account in decision making.

Current and emerging issues

The consideration of Aboriginal heritage within natural resource management appears to be a relatively new practice, with few programs or guidelines in place at the time of the 2005 Strategy development. Indeed a number of strategy goals target the development of these areas. While there appears in the past to have been a lack of engagement and consultation, paired with specific goals, there is the potential for significant progress to be made with the development of a Tasmanian Aboriginal Heritage Legislation (TAHL 2009). Announced in 2005, this legislation is a part of the State Government’s approach to managing Aboriginal cultural values, and it is expected to be taken to public consultation in 2009. The legislation seeks to make a number of key steps that are likely to address the targets set in the 2005 Strategy and aid in the integration of cultural landscapes with natural resource management. These include:

- identifying and assessing Tasmanian Aboriginal heritage places and management requirements;
- integrating Tasmanian Aboriginal heritage protection with sustainable development processes;
- working with the Tasmanian Aboriginal community on a wide range of matters related to heritage and culture;
- researching and conserving Tasmanian Aboriginal heritage;
- raising awareness and understanding of Tasmanian Aboriginal heritage.

Although this program sets in place the mechanisms for integration and consideration of cultural landscapes, benchmarks indicate that little actual progress has been made in related areas. For example, since 2005 there has been no increase in the amount of land owned or managed by the Aboriginal community, and no increase in the level of Aboriginal interpretation at visitor sites, falling well short of Tasmania Together’s 2010 targets (Tasmania Together 2009).

In addition to ongoing pressures (particularly associated with coastal and infrastructure development), the future erosion and destruction of the coastal zone and cultural values in it (i.e. aboriginal middens)

under climate change will need to be considered in the assessment of coastal risk and vulnerability and adaptation planning.

Furthermore, elements of the study revealed that there is a very real concern that cultural landscapes are not receiving sufficient attention and are being set aside in the pursuit of wider natural resource management agendas (pers. com. knowledge experts interview). It appears that best efforts at engagement and consultation have received little success in the past, and that Aboriginal values continue to be at risk of neglect. An increasing sense of urgency is being applied to other natural resource management issues, and this has implications for funding availability for work in the cultural landscapes area. Nevertheless, the legislation seeks to address such concerns, and the extent to which the issue demands priority consideration is likely to be governed by its success.

Availability of data

The interaction between natural resource management and Aboriginal cultural landscapes is difficult to benchmark and assess, and the study team subsequently found that there was little published information concerning the level of success in this area. There are some indications that engagement with the Aboriginal community as a component of natural resource management issues is becoming increasingly prevalent, and the State Government's Aboriginal Heritage Tasmania department, as well as private groups such as the Tasmanian Aboriginal Land and Sea Council, continue to work in this area. However there is a need for greater coordination of cultural heritage assessment across the region and greater clarity around information access.

5.7.2 Managing the aesthetic and heritage values of landscapes

Objective

The 2005 Strategy seeks to preserve the Southern Region's natural and man-made landscapes that hold a heritage value and provide a 'sense of place'. Heritage sites have incurred a general decline, and NRM South has identified a need to preserve Tasmania's core cultural and natural heritage attributes.

Current and emerging issues

The study was unable to locate any up-to-date information concerning current issues or threats to particular aesthetic or heritage value sites. The Strategy acknowledges that there has been a decline in the condition of many heritage sites, and visitor access in some areas has increased these stresses. Residential developments have reportedly led to a deterioration of landscape values, with urban growth placing pressures on coastal landscapes in particular. For example, from 2007 to 2008, there was a decrease (from 21% to 15%) in the proportion of works applications lodged that contained proposals leading to a positive impact or outcome on the value of heritage listed places (Tasmania Together 2009).

However, since 2005 the number of sites listed on the Tasmanian Heritage Register has increased from 5346 to 5431, and from 1997 to 2003 there was an increase from 71% to 95% in the number of local government planning schemes adopting best practice in cultural heritage protection (Tasmania Together 2009). Although the latter figure has since remained stable, it suggests that perhaps a limit

has been reached in terms of incorporating into planning schemes, and that the subsequent issue is improving the decision making processes based on these planning schemes.

The preservation of heritage values is aided by such groups as the Tasmanian Community Fund, which provides grants to groups seeking to preserve the heritage of a given item or region. The fund in part seeks to promote and conserve Tasmania's cultural heritage, and has made several grants to groups in the Southern region. In addition, private groups such as Hydro Tasmania may consider themselves custodians of heritage items that have played an important role in Tasmania's social and industrial history, and can contribute to the conservation of heritage values. For example, in 2007 the organisation produced conservation management plans to direct the heritage management of Tungatinah and Tarraleah power stations in the southern region (Hydro Tasmania 2009).

Availability of data

Little to no recently published data provided an indication of the state of cultural landscapes in the Southern Region. Although specific concerns are cited in the 2005 Strategy, it is difficult to provide an accurate update on the status of these concerns given the lack of specific baseline data. Such information may be best determined via a consultation process.

5.7.3 Summary of findings

Cultural landscapes	Issues and pressures	Data availability and adequacy
Protect Aboriginal cultural values	<ul style="list-style-type: none"> Concern that cultural landscapes are not receiving sufficient attention and are being set aside in the pursuit of wider natural resource management agendas. Little priority is given to cultural issues. May be addressed by Tasmanian Aboriginal Heritage legislation creating a legislative context for consideration. 	<ul style="list-style-type: none"> Difficult issue to benchmark and assess. There is little published information concerning a quantitative or qualitative level of success in this area. Risk and vulnerability assessment of coastal values (i.e. middens) in the coastal zone under climate change for adaptation planning.
Managing the aesthetic and heritage values of landscapes	<ul style="list-style-type: none"> The 2005 Strategy indicates that visitors and residential developments may lead to a deterioration of landscape values, with urban sprawl placing pressures on coastal landscapes in particular. There are a mix of positive and negative indicators concerning the stewardship of heritage sites in Tasmania, with no clear trend. Private custodians may play an increasingly important role in preserving heritage values. 	<ul style="list-style-type: none"> Little to no recently published data that provides an indication of the state of cultural landscapes in the Southern Region. May be best determined via a consultation process.

6 Overarching and emerging issues of significance

The systematic scan of all strategic sub-streams of the 2005 Strategy exposes a number of overarching issues, and issues of emerging significance. They include:

- significant issues that will impact on a range of natural resources and commercial activities associated with the use of natural issues into the future;
- fundamental issues related to the management of natural resources.

The identification of these presents an opportunity to consider how a new regional strategy will be structured. This is addressed in Section 7.

6.1 Significant region-wide issues impacting on natural resources

6.1.1 Climate change

The global imperatives for acting on climate change, including the need for mitigation and adaptation, are now clear. The Australian Government is now a party to the Kyoto Protocol and is implementing a program of mitigation actions. It also has a National Adaptation Program which is rolling out and facilitating priority adaptation research, collaboration and engagement of stakeholders. Similarly the Tasmanian Government has recently committed to a greenhouse gas emissions reduction target to reduce emissions to at least 60% below 1990 levels by 2050 (DPAC 2009), while it also recognises that there are many climate change risk and adaptation issues that need to be understood.

The Tasmanian Government, alongside the Australian Government's Commonwealth Environment Research Facilities Program, and Hydro Tasmania, is cooperatively funding the Climate Futures for Tasmania Project through the Antarctic Climate and Ecosystems Cooperative Research Centre. A key objective of this project is to interpret climate projections at a local scale, so that Tasmanian communities, industries and individuals can use information in their local planning and adaptation actions (ACECRC 2007). This type of 'end-user' relevant research is a crucial starting point for building an understanding of the implications of climate change for Tasmania and its regions.

Mitigation of global warming (via measures to reduce greenhouse gas emissions and to enhance sinks) engages natural resource management through considerations around the role of natural resources in carbon sequestration and the need to limit the removal of carbon sinks through the management of forests, land use change into the future and private landholder commercial carbon offsetting or soil sequestration opportunities.

Mitigation responses will also need to pervade other sectors throughout the community, including the way we manage urban growth and development, individual lifestyles, and industry, government and commercial activities. Some of these may have implications for natural resource management, such as the way we design and develop our urban environments into the future, particularly the incorporation of open space and natural vegetation through urban landscape design (Lyth *et al.* 2007).

The most significant climate change challenge for natural resource management in the Southern Region, however, will be the management of the impacts of climate change on natural resources, particularly key natural resource values. As pointed out in the preceding sections, there are numerous issues for the Southern Region to consider, including understanding which natural systems and natural resource commercial activities are most at risk, and which natural systems we should facilitate adaptation for. Understanding the extent of the challenge spatially, sectorally and temporally will be crucial in the next regional planning period in order to begin to develop response strategies through collaborative efforts and stakeholder engagement. This was recognised by a number of experts in the knowledge expert interviews.

Management of the impacts will revolve around questions of values, prioritisations and capacity to respond. It may be that the Southern Region and Tasmania will face the potential loss of highly valued ecosystems and species in some areas if adaptation responses are deemed unviable, while it is also likely that the natural resource management community will need to develop constructive dialogues around the possibility of changing natural landscapes in the region as some ecosystems and species prove to be more resilient than others. The management of invasive species (weeds and other terrestrial and aquatic pests) will continue to be an ongoing issue under climate change; however, approaches to the management of such issues may need to be modified.

6.1.2 Land use change and development pressures

The study affirms the continuing significance of development and land use change associated with human activities as core pressures on natural resource condition in the region. Such pressures include:

- the impact on natural resources and natural resource management approaches of changing land use. For instance, from *woodland* to *agriculture* presents risks of rural tree removal, habitat loss and erosion; while *rural* to *urban residential* may result in further vegetation removal and habitat loss and changes to stormwater runoff quantity and management;
- the risk of fragmenting natural ecosystems, restricting ecosystem connectivity and the capacity to facilitate refuges for vulnerable species, due to the development of land for urban and infrastructure use, agriculture or forest plantations;
- encroachment on public reserves and privately owned natural habitats by forest plantations, urban development or agriculture,
- the cumulative impact of urban expansion on natural resources including habitat loss, pollution of waterways and degradation of urban reserves and other ecosystems of value;

- the pressure to focus development in coastal and estuarine zones due to the relative attractiveness of these environments for human settlement, tourist activities and recreation. The sea change phenomenon, which involves the migration from large centres to coastal settlements for lifestyle reasons (Burnley and Murphy 2004), has presented significant pressures on coastal communities and natural resources in most mainland states. While the extent of this phenomenon has not been as profound in Tasmania, pressures along the eastern coast of Tasmania have begun to emerge and are likely to continue to do so as the population ages and seeks retirement lifestyles outside major urban centres but within reach of them. Development pressures in coastal and estuary zones are also likely to be increasingly associated with recognition by developers (local and interstate) of the natural resource qualities of such places for commercial gain, while the potential increase in incidence of uncomfortably hot summers in southern mainland states under climate change may also encourage future migration of populations from these states to Tasmania, increasing the state's population and adding to existing growth pressures in coastal and estuary zones;
- major infrastructure projects – for example, the Tasmanian Irrigation Development Schemes, and major transport infrastructure projects.

This latter pressure presents a particularly new challenge for the region and will be particularly relevant for natural resource management into the next strategy period. With the expansion of agricultural production in parts of the Southern Region, and concerns about future water security, particularly in times of drought, has come an increased demand for water. The Tasmanian Irrigation Development Board (TIDB) was established by the Tasmanian Government to partner with farmers and communities in the development of regionally significant irrigation schemes. Of the ten proposed irrigation schemes in Tasmania there are three of particular significance to the Southern Region: the South-East Irrigation Scheme (to supply 12,500 ML per year to the Coal River Valley area), the Shannon Clyde Irrigation Scheme (to deliver 7000 ML per year into the Clyde Catchment), and the Midlands Water Scheme (to supply 47,500 ML per year to support the expansion of agriculture in the Midlands) (TIDB 2009). Each scheme is at various stages of early development involving consultation, particularly around agriculture water demand and preferred options. While these schemes have intended benefits to rural communities and industries they will invariably present a range of natural resource management challenges which will need to be considered, understood and managed.

For example, the South-East scheme draws on water sources within the Lower Jordan and Pittwater–Coal catchments. Such a scheme will likely change the character or level of flows impacting on downstream ecosystems including Ramsar values. There is a possibility that river flows will be reduced but also that such a scheme could result in increased flows thereby contributing to improved conditions downstream.

Drawing on catchment flows for irrigation purposes in these areas raises some concerns about the impacts on water quality and the condition of aquatic ecosystems. As discussed in Section 5.2, low flows appear to have a direct correlation with poor river health and taxonomic diversity, and it would appear that increasing allocations for irrigation purposes in the region would only exacerbate these issues.

Salinity is an additional issue of concern. The 2001 National Salinity Audit identified areas of moderate salinity within the south-eastern area, and it would be reasonable to assume that the extent or degree of the problem has worsened since then, with an estimated 1.5% per annum increase in Tasmanian salinity over the period (Bastick and Walker 2000). Irrigation of salinity-affected areas is known to aggravate the problem (ET 2009), and there is a need to consider such consequences that may partner the proposed irrigation scheme.

Balancing the needs of a significant agricultural industry with the natural resource health of the region is an issue spanning multiple aspects of natural resource management. The South-East Irrigation Scheme is likely to influence natural resource management across a number of the strategy focus areas, and will require integrated management and ongoing monitoring to mitigate against negative impacts.

Concerns have been voiced about the relative capacity of the agricultural sector to effectively engage with natural resource management challenges given the limited financial resources to do so and other economic pressures on the agricultural sector. Ultimately it is clear that during the project planning phase of these schemes it will be essential for natural resource managers to engage effectively with the planning process, encourage appropriate integrated impact assessment and the engagement of farmers receiving the benefits from the irrigation schemes to practise sustainable farming and land management so as to reduce the risk of increased salinity and water management.

6.2 Issues related to the management of natural resources

This study concludes that there are four overarching and fundamental issues for the effective management of natural resources in the Southern Region which should form the foundations for natural resource management programs in the region. They are:

- the need for baseline data
- continued monitoring, evaluation, reporting and improvement systems and mechanisms
- development of systems and mechanisms for better policy, planning and decision making
- engagement of the community in (and around) natural resource management.

6.2.1 Need for baseline data

A significant component of the study comprised a scan of available literature with a view to determining the current resource condition of the Southern Region. The information would serve to benchmark the achievements of the region since the implementation of the 2005 Strategy, and to establish an up-to-date baseline dataset. However, there was an apparent paucity of available quantitative data that was relevant to the current state of the region, with much of the research having been completed five years or more earlier.

In order to better inform decision making, there is a strong need for baseline data surrounding the issues of concern cited by the Strategy. Not only does up-to-date data provide a means of assessing the effectiveness of prior actions, it significantly serves to guide future strategies by allowing the region to:

- quantify the extent of issues
- prioritise issues appropriately
- structure ongoing monitoring and evaluation appropriately.

For example, data on the degree and extent of salinity in the region dates back to that compiled as a part of the 2001 National Salinity Audit. It is difficult to establish priority actions and identify priority regions based on data that is likely to have changed to a high degree. In a similar manner, information on the extent and density of weeds in the region has not been established since 2004. Qualitative research indicates that there are likely to have been significant changes since this time; therefore using this data to represent the current baseline would be misleading. Data gaps in other focus areas emphasise the need for new research (and coordination with this research) in establishing baseline data to inform future actions.

6.2.2 Continued monitoring, evaluation, reporting and improvement

Monitoring, evaluation, reporting and improvement (known as MERI) are essential components of natural resource management, and these processes for adaptive management are now established requirements in nationally funded natural resource management programs.⁹ Ultimately, MERI activities are intended to help assess the impact, appropriateness, effectiveness, efficiency and legacy of policies, programs and projects. From an Australian Government funding perspective they provide accountability; however, they are also essential activities for facilitating the implementation of adaptive natural resource management approaches (the planning, doing, monitoring, evaluating and learning cycle).

Organisations responsible for the delivery of funded programs (such as NRM South) have a responsibility to implement MERI systems and mechanisms and to work with stakeholders and natural resource managers to develop good MERI activities, whether they are data collection activities (as part of monitoring) or evaluation processes (through independent review and multi-stakeholder participation). Progress in the development of sound MERI systems is good in the region (e.g. NRM South has a dedicated MERI coordinator and program), but there is much to do in the area of monitoring for the purpose of improving evaluation capacity in assessing resource condition and change, prioritisation of natural resource management projects and measurement of progress towards the Strategy's goals.

Key challenges will be to identify what monitoring and evaluation activities are a priority (i.e. what needs to be monitored and how urgently), how to effectively and efficiently apply resources for this purpose, and how to undertake monitoring activities in a cost-effective way. This will require continued innovative and collaborative efforts – for example, building on research partnerships with

⁹ The natural resource management MERI Framework (Australian Government Caring for Our Country website) <http://www.nrm.gov.au/publications/frameworks/meri-framework.html> (accessed 13/10/09)

university and private research organisations, and working with on-ground volunteer groups to facilitate improved and expanded monitoring.

6.2.3 Better policy, planning and decision making

Another reoccurring theme throughout this study has been the important role of policy, planning and decision making mechanisms in improved natural resource management outcomes. As pointed out in Section 5.1.1, policy and planning that is structured around sustainability principles and does not undermine natural resource integrity is an essential component of natural resource management. Since the condition of natural resources is invariably linked to a range of environmental factors, particularly the impact of human activities, it is vital to consider these impacts (both independent impacts and cumulative impacts) in a range of policy and planning instruments. There have been some developments to improve the Tasmanian planning system recently, therefore the next regional natural resource management strategy period will need to focus on continued improvement in embedding sustainability and natural resource management considerations into both strategic (regional and local) and statutory planning instruments for improved decision making and natural resource management outcomes.

Likewise it is essential for the natural resource management community to engage with government on the initiation and development of more and improved high-order state policies to better guide decision making across scales for improved natural resource management outcomes. Without sound policy and planning, decision making for the delivery of sustainable outcomes and natural resource management is compromised and the delivery of improved natural resource management outcomes is difficult.

6.2.4 Engagement of the community in and around natural resource management

As discussed in Section 5.1.2, effective participation and engagement across the community (including government, industry, commercial interests, individual resource managers and the broader community) is a fundamental part of natural resource management as is the integration of policy and planning. Engagement may include raising awareness about natural resource management issues and solutions in sectors of the community; comprehensive education programs and the provision of technical information for the implementation of more sustainable practices across a range of sectors (e.g. practices related to commercial activities in the marine environment, farming and land management practices, and recreational and household lifestyles); engagement of stakeholders in monitoring, evaluating and prioritising natural resource management issues; and collaboration with diverse stakeholders on natural resource management projects.

Community engagement for the purpose of building community-wide capacity in natural resource management and sustainability will therefore remain pivotal in the next regional natural resource management strategy period. Key challenges will include the need to engage with both traditional and new stakeholders as new issues such as climate change come to the fore; to engage the community effectively and constructively, especially when working on difficult natural resource management problems or on issues where there are diverse values; and to identify the most effective engagement and communication opportunities.

The use of quality data will become an important mechanism through which to engage with a range of stakeholders on a number of issues, including irrigation and other significant infrastructure projects, and settlement and water resource planning. In this respect, quality data (particularly spatial data) becomes an essential communication and engagement tool just as much as a decision making tool.

7 Towards the development of the next regional natural resource management strategy

In this section, the findings from Sections 4, 5 and 6 are used to inform the development of recommendations for a framework for the new regional natural resource management strategy. The section focuses on two primary questions:

1. How can the Southern Region go about agreeing on its future goals and priority action themes based on these study findings?
2. What format should a new strategic plan take?

7.1 Summarising issues for a new regional natural resource management strategy

It is clearly evident from this scan of environmental issues that natural resource management is complex and challenging for a variety of reasons, merely by the breadth of natural resource assets and issues, the diversity in values associated with natural resources and the integrated nature of the task of natural resource management itself. Progress in natural resource management in the Southern Region has been made on a number of fronts by measure of the considerable number of projects and activities carried out throughout the region since 2005 (Rare 2009); this is despite progress being distributed unevenly across the natural resource themes, and a number of important issues and actions identified in the 2005 Strategy not being adequately addressed in the subsequent period.

A few examples include the urgent need to improve and integrate state policy in a number of areas that are relevant to natural resource assets and outcomes; the implementation of well integrated and strategic and statutory instruments across scales for the sustainable management of land use and settlement growth (informed by sound state policy); and the need to better incorporate cultural landscape values into natural resource management.

As the Southern Region moves into the next strategy period, it is apparent that many of the issues associated with natural resource management have remained unchanged – for example, the need to continue to manage invasive weed species is an ongoing challenge for a variety of stakeholders; the better management of impacts associated with urban development and land use change (particularly consideration of the cumulative impacts of urban growth on natural resources); the management of rivers and catchments and estuaries to improve water quality and ecosystem condition; and protection of species for biodiversity.

Other issues have emerged in the community as new priorities – for example, understanding, and preparing for, the implications of climate change on natural resource assets; pursuing more sustainable behaviours and practices across a range of community sectors (including households, industry and

commerce, government, business); and managing natural resource management issues associated with new major infrastructure projects (such as the Tasmanian Irrigation Development Scheme).

In all of this, collection and access to data and information remain significant challenges and are crucial to the effective identification of emerging natural resource condition problems; understanding the extent of natural resource problems; periodic monitoring of change in natural resource condition; communicating natural resource problems to relevant stakeholders and decision makers (such as communities, landholders, industry groups and government agencies); and the design and implementation of natural resource management responses. Within the data and information theme is the need to continue to improve monitoring and evaluation capacity and systems efficiently, ultimately to be able to effectively and easily review, reflect and improve on natural resource management programs and projects as well as to report on progress towards natural resource management goals.

Finally, the challenge of effectively engaging with the right stakeholders in the most constructive way remains a pervasive issue for natural resource management generally and is core to much of what will need to happen into the future. Engagement will need to continue to occur in the Southern Region across geographic and decision making scales and community sectors, from the starting point of awareness raising through to capacity building. Collaboration via partnerships and mechanisms for working together on natural resource problem solving remains an essential approach.

The 2005 Strategy has been an important starting point for the Southern Region and its stakeholders and it has served to establish a more focused and coordinated regional approach to natural resource management. The task from here on is to build on this, and to strengthen the region's coordination and collaborative focus on key priority issues. The following presents recommendations for the progression of the development of a new natural resource strategy for the Southern Region and overarching principles and considerations that should underpin the 2010 Strategy.

7.2 Overarching guiding principles for the 2010 Natural Resource Strategy for Southern Tasmania

Figure 7.1 presents a diagrammatic framework of the considerations involved in developing goals and priority actions for the Southern Region for the next five years. In the collective discussion of the headline goals for the region aligned to the key issues of concern, stakeholders will need to consider a range of priority actions that will tend to focus on four action categories as identified in the environmental scan:

- data and information
- policy, planning and decision making
- strategic and holistic on-ground natural resource management
- community engagement (capacity building activities).



Figure 7.1

Framework for the development of headline goals and priority actions

In developing priority actions, consideration will also need to be taken of some overarching principles and considerations which pervade across most natural resource management challenges. These are:

1. the application of sustainability thinking based on the statutory objectives of the Tasmanian Resource Management and Planning System (Table 7.1);
2. the application of natural resource management best practice principles (Table 7.1);
3. the application of thinking around the need to understand, and prepare for, climate change in the region.

It is important to point out that this paper does not recommend the attention to climate change in a separate theme. Instead it is recommending that ‘climate change thinking’ be embedded across themes. This way it can be addressed and managed consistently, and in the context of sustainability and the myriad of other pressures.

Table 7.1 Principles of sustainable development and natural resource management

Sustainable development – Statutory objectives of the Tasmanian Resource Management and Planning System ¹	Principles of natural resource management ²
<ul style="list-style-type: none"> a) To promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity. b) To provide for the fair, orderly and sustainable use and development of air, land and water. c) To encourage public involvement in resource management and planning. d) To facilitate economic development in accordance with the objectives set out in the above paragraphs. e) To promote the sharing of responsibility for resource management and planning between the different spheres of government, the community and industry in the state. 	<ul style="list-style-type: none"> a) Ecosystem approach – Natural resource management should be based on an understanding of the relationship between natural resources and the ecosystems they support, and upon careful monitoring of change over time. b) Balanced decisions – Natural resource management decisions should take proper account of the range of environmental, social and economic benefits, values and costs in accordance with the objectives of the Tasmanian Resource Management and Planning System. c) Integrated management – The management of natural resources should be integrated within regions and catchments, as well as across industry sectors, government agencies and specific issues. d) Priority based – Natural resource management actions are to be undertaken according to priorities that are based on the best available science and information, and relevant experience, as well as on assessment of the relative cost-effectiveness of various options. e) Prevention is better than cure – It is often more efficient to prevent damage rather than repair it. Therefore, where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. f) Partnerships – To be effective, natural resource management requires the establishment of partnerships between all levels of government and the community, including the Aboriginal community, industry, landholders and individuals, with agreed roles and responsibilities. g) We are all responsible – All Tasmanians receive benefits from the use, development and conservation of natural resources: we share responsibility for managing natural resources sustainably, and for providing economic resources to do so.

¹ Tasmanian Planning Commission, <http://www.planning.tas.gov.au/about/legislativeframework>

² NRM South *Annual Report 2008-09*, p. 6

7.3 A framework for the identification of regional strategy goals and priority action themes

The 2010 Strategy will need to consider priority directions for the next five years. As it is essential that these directions reflect the region's collective aspirations, a process to facilitate this is required. There are a number of necessary steps in the development of the 2010 Strategy. These are summarised in Figure 7.2 and are outlined below.

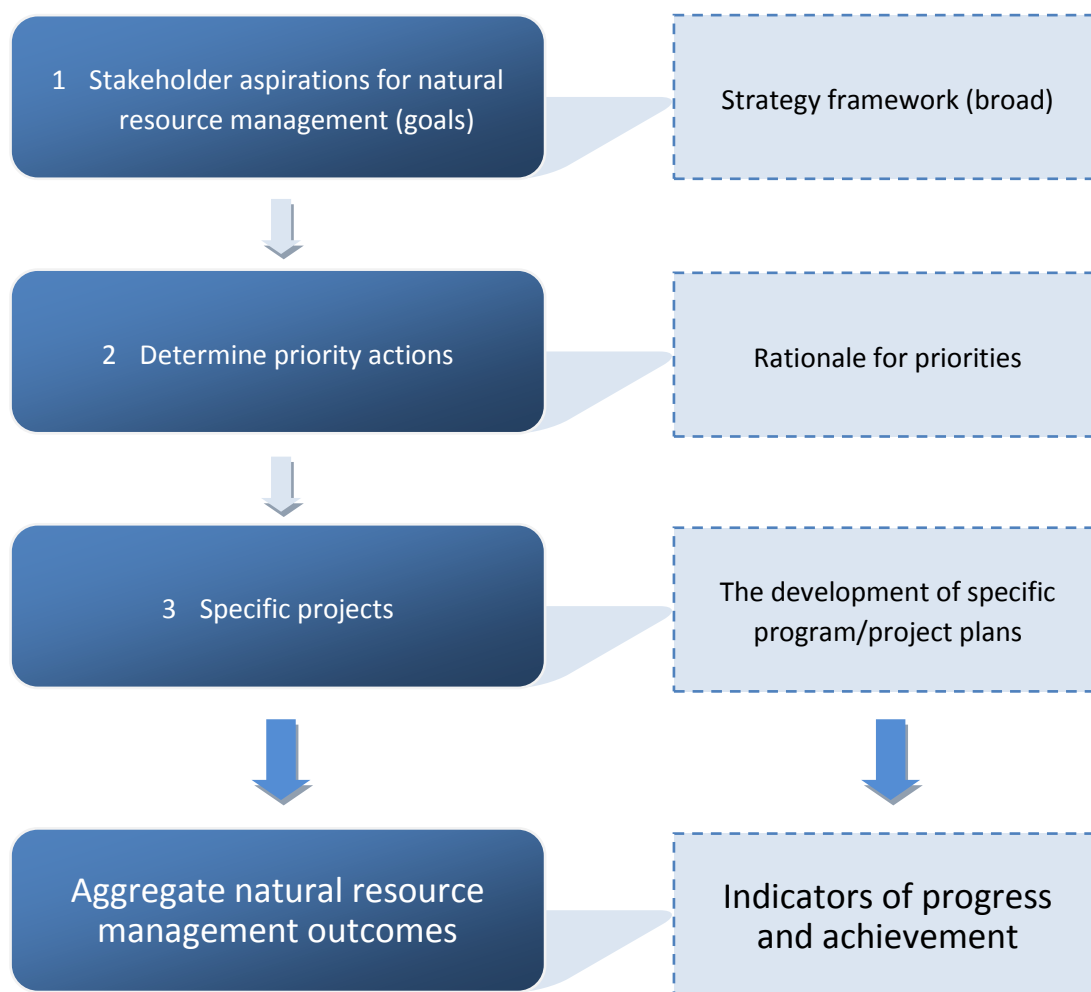


Figure 7.2

Regional strategy development process

7.3.1 Step 1: Identification of the Southern Region's aspirational goals for the next five years

Through consultation forums involving the region's key stakeholders in natural resource management and any other interested broader community members, stakeholder aspirations for the next five years are identified in the form of headline goals. These headline goals will form the strategic framework for the identification of priority actions and subsequent program and project planning.

First, it is important that the identification of the aspirational goals for the region occurs through collaborative participatory mechanisms. By bringing different stakeholders together, the community collectively builds an understanding not only of the diversity in values and interests, but also of the range of constraints that different stakeholder groups are operating under (such as government resources and jurisdictional roles, the economic operating environments of industry and commercial activities, and natural resource funding constraints and opportunities). This way, stakeholders are able to better reconcile disparate positions and can work to identify common interests. These common interests becomes the 'glue' that focuses the strategy for the region.

Secondly, it will be constructive to encourage stakeholders to think about their common aspirational goals and subsequently prioritisation of actions in the context of some overarching principles and issues (primarily those discussed in Section 7.2 and outlined in Figure 7.1):

- the application of sustainability thinking
- the application of natural resource management best practice principles
- the application of thinking around the need to understand, and prepare for, climate change in the region.

The encouragement of stakeholders to think in the context of these principles is an essential step towards the development of a sustainable regional strategy and, ultimately, the delivery of sustainable outcomes.

Finally, stakeholders should have a starting point from which to base their discussions around aspirational goals. The 2005 Strategy identified seven theme areas under which targets and management actions were outlined. The findings from the environmental scan suggest that the number of theme areas may not differ much for the 2010 Strategy, but the way in which natural resource themes are presented, may. The themes outlined in the 2005 Strategy did not present any headline statements about what the region was wanting to work towards in the next five years; rather the theme headings were focused on ‘doing’ natural resource management, such as ‘managing water resources’, and ‘managing native flora and fauna’.

In order to focus immediate attention on the natural resource management outcomes the region wants to achieve, the headline goals need to indicate an improvement or progressive aspirations (such as towards the improvement of a natural resource’s condition, or progression towards more sustainable commercial practices).

As an example, a headline goal around a vegetation connectivity and condition theme may look like (suggestive only):

Maintain the connectivity of vegetative landscapes and ecosystems.

The final strategic document would present the headline goal and then provide a summary explanation of its purpose. For this example, the purpose may include the need to enhance the adaptive capacity of terrestrial ecosystems to adapt to climate change by increasing the extent and connectivity of natural reserves so that vegetation species and ecosystems have somewhere to move under climate change (this includes their ability to move upwards); as well as to maintain or improve biodiversity and protect highly valued threatened species.

7.3.2 Step 2: Identify and prioritise achievable actions that will help to work towards the goals identified

Stakeholders collectively identify a range of actions that they believe should be implemented within the next five years to help achieve the goals identified. This may begin as a brainstorm ‘wish list’ of outcome-focused activities, but should result in the identification of the most significant and urgent actions – that is, the priority actions for the region. From these priority actions specific program and project details can be built. It is suggested that priority actions should not be more than five in order to focus the region and ensure that regional stakeholders are not spreading their priorities too thinly. This should improve the capacity of the regional strategy to deliver on the goals.

7.3.3 Step 3: Construct headline indicators by which to measure natural resource management outcomes based on the headline goals identified

As part of the stakeholder consultation process, stakeholders should contribute to thinking about the sorts of headline indicators that could be used for measuring progress towards and achievement of the headline goals. Stakeholders might contribute simply by being asked the question :

How will we (the region) know we have reached our goal?

This simple question encourages reflection on what ultimately needs to be measured.

The task for the strategy development team following the stakeholder consultations, and with input from regional data and monitoring experts, will be to identify indicators that are measurable and communicable based on data and information that can be readily collected and reported. It is important that indicators are communicable so that the regional community can periodically be re-engaged with the strategic directions of the region and the progress it is making towards the goals. Indicators for each headline goal are likely to vary according to the availability and quality of data. It may be that there is monitoring of resource condition on some natural resource assets (e.g. water quality) providing lead indicators but, in other areas where there is little data on resource condition, lag indicators may need to be used, such as the number of community awareness raising activities undertaken annually (based on the assumption that awareness leads to action and action leads to improvement). An indicator of vegetative connectivity may be the number of hectares of natural reserves secured.

7.3.4 Step 4: Documentation of the 2010 Strategy

It is proposed that the format of the 2010 Strategy comprise the following sections:

- Purpose of the regional strategy (legislated requirements, whole-of-region approach).
- Role of NRM South in strategy development and facilitation.
- Geographic context of the Southern Region.

- Overarching principles and guiding considerations of the strategy:
 - sustainability principles
 - seven principles of natural resource management
 - climate change considerations.
- Presentation of the headline goal theme areas and indicators and summary explanations of their purpose.
- Summary explanations of the principal action categories (succinct paragraph on each):
 - data and information
 - policy, planning and decision making
 - strategic and holistic on-ground natural resource management
 - community engagement (capacity building).
- Presentation of goals, priority actions in easy to read tabular summaries outlining responsibility, targeted outcomes and approximate timing of actions. An example format is presented in Figure 7.3.
- NRM South contact details.

Ultimately the draft strategy should be succinct and easy to read, and should refer to well designed visual presentation. It is recommended that, based on the suggested format above, the 2010 Strategy be approximately 25 pages in length – a much shorter and more focused document than the 2005 Strategy.

Goal theme	Goals (with accompanying headline indicators)	Priority actions (outcomes-focused)	Responsibility (lead agency and key stakeholders)	Timing (urgency and flow of tasks)	Target outcome
Vegetation connectivity and condition for biodiversity and adaptive capacity	Goal 1				
	Maintain the connectivity of vegetative landscapes and ecosystems				
	Indicator				
		Example 1 A baseline data and information action		by year 1	Database completed by end of year 2
		Example 2 An on-ground reserve management action		by year 2	Development of reserve management plans that incorporate adaptation strategies
		Example 3 A land use planning action		year 3	Hectares of natural habitat reserves (private and public) secured in regional land use plan

Figure 7.3 Example format of goal and action summary tables

Appendix A

Telephone interview methodology: Knowledge experts interviews (September 2009)

Aim

1. To identify activities undertaken by key stakeholders that relate to the delivery of priority management actions in the 2005 Strategy for southern Tasmania.
2. To collate summary and performance information about these actions.
3. To collect opinions on issues for the region to 2010 and beyond.

Proposed approach

Consult, via a semi-structured telephone interview, 15-20 stakeholders engaged in consultation with NRM South (i.e. business partners, state and local government, and community care groups. Collate information about stakeholder natural resource management actions.

Reporting

Information collected via the interviews will assist NRM South to identify key achievements and gaps in the delivery of management actions and the collective progress against management targets, and will be summarised in the Achievements Review report as part of the regional strategy review process.

Interview process

Opening statement

My name is...and I'm from Rare Consulting. We have been engaged by NRM South to assist them review the 2005 Natural Resource Management Strategy for southern Tasmania. As part of this process we are seeking information about any actions natural resource managers in southern Tasmania have undertaken since 2005 that are relevant to the delivery of the management actions identified in the 2005 Strategy. We are particularly interested to hear about any significant achievements and key learnings from your knowledge of natural resource management activities in the region.

[refer to email sent by NRM South CEO informing them of this process]

We would like to ask you a few semi-structured questions about your knowledge of key achievements and opinions about future issues for the region if you can give some of your time.

[agree to conduct interview at that time or make an alternative telephone appointment]

Questions

1. In the area that you are familiar with, can you summarise some of the significant achievements in natural resource management in the region in the last 5 years? The achievements might be any projects related to natural resource management in the region, and not solely those funded by NRM South.
2. Can you identify those activities that delivered the most powerful results or had significant outcomes? In what way do you believe these projects or activities to have been successful?
3. In your opinion what do you think was learned through undertaking these projects?
4. Finally, we are also seeking opinions on the key issues, both emerging and recent, that are facing natural resource management in the region. These will assist us to identify the strategic issues in the new Strategy.

Appendix B

Glossary

ABS	Australian Bureau of Statistics
ACECRC	Antarctic Climate and Ecosystems Cooperative Research Centre
ANRA	Australian Natural Resource Atlas
ARNMBR	Adaptation Research Network for Marine Biodiversity and Resources
Bushfire CRC	Bushfire Cooperative Research Centre
CAR	comprehensive, adequate and representative
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCC	Department of Climate Change (Commonwealth)
DECC	Department of Environment and Climate Change (New South Wales)
DEP	Derwent Estuary Program
DEWHA	Department of the Environment, Water, Heritage and the Arts
DPAC	Department of Premier and Cabinet (Tasmania)
DPIPWE	Tasmanian Department of Primary Industries, Parks, Water and the Environment
DPIWE	Tasmanian Department of Primary Industries Water and the Environment
EPBCA	<i>Environment Protection and Biodiversity Conservation Act, 1999</i>
ET	Environment Tasmania
GIS	geographic information systems
IPCC	Intergovernmental Panel on Climate Change
LWA	Land and Water Australia
MERI	monitoring, evaluation, reporting and improvement
ML	megalitre
NRM (South)	Natural Resource Management
NWC	National Water Commission (Commonwealth)
pers. com.	personal communication

pH	a measure of the acidity or alkalinity of a solution, numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity. The pH scale commonly in use ranges from 0 to 14
PIA	The Planning Institute of Australia
PM	particulate matter
PM ₁₀ & PM _{2.5}	particulate matter classified as having an aerodynamic diameter less than 10 microns (PM ₁₀) or an aerodynamic diameter less than 2.5 microns (PM _{2.5})
Ramsar	The Convention on Wetlands, signed in Ramsar, Iran, in 1971 (more commonly known as the Ramsar Convention) is an intergovernmental treaty dedicated to the conservation and 'wise use' of wetlands
SKM	Sinclair Knight Mertz
STCA	Southern Tasmanian Councils Authority
TAHL	Tasmanian Aboriginal Heritage Legislation
TAPG	Tasmanian Agricultural Productivity Group
TASVEG	Tasmanian vegetation assessment tool
TIDB	Tasmanian Irrigation Development Board
TPC	Tasmanian Planning Commission
TSPA	<i>Threatened Species Protection Act (Tasmania), 1995</i>

Appendix C

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