

A Community Plan for Natural Resource Management in Townsville-Thuringowa

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INTRODUCTION

WHAT IS THIS COMMUNITY PLAN ALL ABOUT?

This Plan is about achieving sustainable use and management of natural resources in Townsville-Thuringowa. Natural resources include all types of physical resources (water, air, climate, soils and minerals) and biological resources (flora, fauna, agricultural produce, ecosystems and people). These resources are essential to our survival, well-being and quality of life. But their capacity to support human activity has limits. Unfortunately natural resources all around the world are under pressure from the unsustainable activities and demands of humans. It is imperative that we begin to use and manage natural resources in a sustainable way so that they will continue to support us and the generations to follow us.

Everyone who lives or works in Townsville-Thuringowa and every company, government or other organisation that operates here, is a user and a manager of the natural resources of the area. So, it is up to the whole community, every individual and every organisation, to ensure that our resources are not wasted, depleted or over-exploited.

Increased participation of the community in land, water and vegetation management, and environmental conservation is an effective way to change on-ground practices and guarantee that our natural resources are used in more sustainable ways. However, natural resource management is just as complex as it is important, so we need strategic direction - a Plan - to do the best job we can.

This Community Plan is a means for us to:

- ✓ Spell-out our intentions and objectives for the environment and communicate them in a constructive and positive way to politicians and government officers;
- ✓ Establish a framework for community action and involvement that addresses real priorities efficiently and effectively;
- ✓ Consolidate and optimise the resources available for community and government projects;
- ✓ Improve our communication and collaboration with government and industry in matters relating to land, water and biological resources; and
- ✓ Improve the co-ordination and co-operation of community, government and industry ventures.

HOW DID THIS COMMUNITY PLAN EVOLVE?

In 1997 the Commonwealth Government released the *Natural Heritage Trust* (NHT) for funding environmental projects by local communities all around Australia. In Queensland the Department of Natural Resources instigated a scheme to deliver NHT funding equitably to communities across the State to achieve the best on-ground outcomes. They divided the State into 13 regions and established Regional Strategy Groups to develop Regional Strategies in each region. Once endorsed by the Landcare and Catchment Management Council (LCMC), the Regional Strategies would be a framework for communities to access funds for natural resource management activities through the NHT.

Townsville-Thuringowa lies in the Burdekin Dry Tropics Region. This area covers approximately 95,000 square kilometres and includes Bowen, Ayr and Charters Towers. The Burdekin Dry Tropics Regional Strategy Group formed in 1998 to develop the Strategic Plan for the whole region. They soon recognised that the region is too large and diverse for one strategy, so they divided it into three distinct Sub-regions: Burdekin Rangelands, Burdekin-Bowen Floodplains and Townsville-Thuringowa.

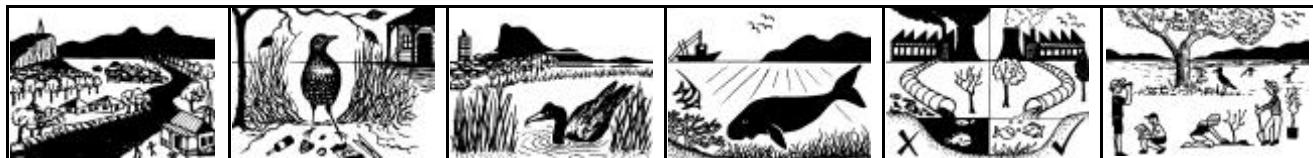
Coastal Plains. It is at this sub-regional level that on-ground natural resource management activities take place, so Sub-regional Strategies were developed under the Regional Strategy. This Plan is the Sub-regional Strategy for the Townsville-Thuringowa Coastal Plains. The Sub-region coincides closely with the Townsville and Thuringowa local government areas, extending from the back of the coastal ranges to the Great Barrier Reef, south to the Haughton River and north to Crystal Creek.

Townsville-Thuringowa Landcare Association (TThLA) began preparing this Community Plan in 1998. A broad cross-section of the Townsville-Thuringowa community (including individuals and representatives of indigenous groups, community groups, government agencies and the commercial sector) was invited to participate in the project. Five Working Groups were established to identify, debate and work-shop the issues confronting natural resource management in Townsville-Thuringowa during much of 1999 and 2000 (see Appendix D for the participants of the Working Groups). The Working Groups were each responsible for one of the five subject areas contained in Sections 2 to 6 of this document. The diversity of the participants in the Working Groups is reflected in the wide variety of issues and points of view included in the Plan.

The findings of the Working Groups were then compiled into draft versions of the Community Plan. The community had further opportunities to contribute to the definition of the issues, goals and desired outcomes by commenting on drafts that were circulated in June 1999 and June 2000.

WHAT DOES THIS COMMUNITY PLAN CONTAIN?

This Plan aims to articulate the concerns and priorities of our community in Townsville-Thuringowa for protecting and managing local natural resources. The findings of the consultation process are presented in six Sections, which correspond to the key focus areas of the Working Groups, as follows:



SECTION 1: A "WHOLE-OF-CATCHMENT" APPROACH. (1 strategy)	SECTION 2: LAND, VEGETATION AND WILDLIFE (10 strategies)	SECTION 3: WATER, WETLANDS AND WATERWAYS (4 strategies)	SECTION 4: COASTAL AND MARINE ENVIRONMENTS (7 strategies)	SECTION 5: ENVIRONMENTAL QUALITY (3 strategies)	SECTION 6: COMMUNITY INVOLVEMENT AND EDUCATION (6 strategies)
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Each of the six Sections begins with a broad overview of the relevant issues. This is followed by a series of Strategies for improving the management of specific types of natural resources. There are 31 Strategies in all, and each one is laid out on a single page with the following types of information:

What are the issues?: A background discussion examines some of the short-comings in the way we currently manage and use the particular resource(s) under consideration.

Why is this important?: A dot-point list of statements describes why the resources deserve protection.

What can we do about it?: The goals for the Strategy are set.

What can this strategy achieve?: The desired outcomes (achievements) for the Strategy are listed.

Each desired outcome has been given a priority for its achievement. The process used for determining the priorities is explained in Appendix C. The number of stars preceding each desired outcome in the Strategies denotes its priority:

★★★ Very high priority

★★ High priority

★ Medium priority

During the development of the Plan, the community also identified desired courses of action to improve our performance and achieve ecological sustainability. Action Plans corresponding to each Strategy have been prepared, following on from the desired outcomes listed in each Strategy. However, the Action Plans are more technical than this document, and they will require regular updating and modification as situations change. For these reasons, they are presented in a technical supplement to this Plan: ***Community Action Plans for Natural Resource Management in Townsville-Thuringowa***. An example (Action Plan 1.1, corresponding to Strategy 1.1) is given in Appendix H. If you would like to know more about the Action Plans, please contact the Landcare Centre.

SUMMARY OF KEY PRIORITIES

To secure commitment and participation in integrated catchment management of natural resources from all relevant interest-groups in Townsville-Thuringowa.

Section 1

To implement best-practice management for protecting native vegetation, controlling environmental weeds and maintaining habitat for native wildlife populations.

Section 2

To rehabilitate degraded areas, especially riparian areas and areas with high potential for soil erosion.

Section 2

To strengthen the role of local Landcare groups and other programs for promoting and supporting sustainable rural industries.

Section 2

To ensure protection of water quality and quantity for use by residents, the commercial sector and ecosystems, through integrated consultation, planning, management and monitoring.

Section 3

To encourage relevant agencies to develop a coastal zone management plan, and support community participation in the planning by providing appropriate participation opportunities and information and awareness activities.

Section 4

To progress the collaborative development of a long term plan for indigenous involvement in local natural resources management, in a spirit of reconciliation and of respect for traditional customs and legitimate Aboriginal aspirations.

Section 4

To encourage the local community and commercial sector to develop, implement and maintain best-practice standards in pollution control.

Section 5

To encourage support for clean production technologies to ensure ecological sustainability of industrial and urban activities.

Section 5

To raise the environmental understanding of our community and encourage informed debate and wider involvement in ecologically sustainable activities in Townsville-Thuringowa.

Section 6

A VISION FOR SUSTAINABILITY

This Community Plan is based upon the recognition of two complementary aspects of caring for our local natural resources:

Achieving ecologically sustainable use of our land, water and biological resources.

Societies need to use nature's resources, but there are ecological limits of the extent of which these resources can be exploited. We need to understand the consequences of our activities and manage them to ensure that long-term impacts will not compromise nature's capability for self-renewal and the ability of current and future generations to enjoy it.

Protecting nature irrespective of its functional values for human populations.

Nature, in its various manifestations, has intrinsic values that we have a responsibility to respect and protect, even though they may seem of little use to us. The perpetuation of life on our planet depends upon these values.

NATIONAL STRATEGY FOR ECOLOGICALLY SUSTAINABLE DEVELOPMENT

This Community Plan acknowledges the goal, objectives and principles of the National Strategy for Ecologically Sustainable Development (Australian Government 1992).

The goal is:

Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

The core objectives are:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations;
- To protect biological diversity and maintain essential ecological processes and life-support systems.

The guiding principles are:

- Decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations;
- Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as reason for postponing measures to prevent environmental degradation;
- The global dimension of environmental impacts of actions and policies should be recognised and considered;
- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised;
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised;
- Cost effective and flexible policy instruments should be adopted, such as improved valuation pricing and incentive measures;
- Decisions and actions should provide for broad community involvement on issues which affect them.

SECTION 1: A "Whole-of-Catchment" Approach

**KEY
PRIORITY**

To secure commitment and participation in integrated catchment management of natural resources from all relevant interest-groups in Townsville-Thuringowa



INTEGRATED CATCHMENT MANAGEMENT

It is becoming ever more apparent that natural processes are strongly interlinked. As a result, our activities often have side-effects on the environment that we cannot predict, sometimes with disastrous consequences. Traditional ways of managing natural resources have not adequately recognised the inter-relatedness of the environment's components. In fact, many of the problems that we face today stem from managing one resource in isolation from all others.

Catchments provide a useful and functionally appropriate geographical unit for managing natural resources in a more holistic way. A catchment is an area bounded by natural features, such as mountain ranges or hills, from which runoff drains to a common lower point (e.g. a river, wetland, lake or ocean). Areas within a catchment are "linked" by the flow of water downstream. Some examples of linked catchment processes include the downstream transport of sediments, nutrients, pollutants and seeds from the upper catchment areas; the recharge of groundwater; and the role of vegetation in controlling the quantity and quality of surface and groundwater flowing through the catchment.

The integrated catchment management (ICM) approach recognises the importance of understanding the links in catchment processes so that natural resources can be managed in sustainable and equitable ways. However, the successful transition from traditional approaches to the ICM approach may be hindered by the historical co-existence of diverse and incompatible interests, activities and demands on our natural resources, which previously have occurred independently of each other. The solution is to develop genuine communication and co-operation between all of the relevant interest-groups.

CATCHMENT MANAGEMENT UNITS

For ICM to be efficient, appropriate catchment units need to be adopted. This is not a simple task. There are approximately 40 separate catchments in the Townsville-Thuringowa sub-region. The southern parts include two large catchments with extensive floodplain areas (The Ross and Haughton Rivers and their tributaries). The northern districts are characterised by many small catchments, running off the Paluma Range across a narrow coastal plain to the sea. This geographical setting requires the identification of suitable Catchment Management Units (CMUs), which are groups of catchments that share similar natural resource management issues.

A proposed framework of Catchment Management Units in Townsville-Thuringowa is presented in Table 1 and Figure 1. This framework is based on existing data about surface water catchments (NRWG 1996), information on use of land and natural resources, and information contributed by experts participating in this Strategy's workshops. The catchment data are summarised in Appendix J. The proposed Catchment Management Units and the strategic priorities identified by this Strategy are intended to provide a sound basis from which to move towards a more sustainable management of our local resources.

Table 1. Proposed Catchment Management Units for Townsville-Thuringowa.

Catchment Management Unit	Main Catchments and Sub-catchments included
1 Crystal Creek	Crystal, Birthday, Ollera, Scrubby and Hencamp Creeks
2 Northern Coast	Rollingstone, Saltwater, Cassowary, Camp Oven, Lillypond and Leichardt, Creeks
3 Bluewater Creek	Sleeper Log, Two Mile and Christmas, Bluewater, Deep, Healy & Althaus Creeks
4 Black River	Black and Alice Rivers; and Log, Canal and Alick Creeks
5 Bohle River	Little Bohle and Bohle Rivers; and Stoney, Saunders, Middle Bohle and Mt Louisa Creeks
6 Ross River	Ross River (below dam), Mt Louisa Creek (high flow)
7 Stuart Creek	Stuart, Stoney and Sandfly Creeks
8 Ross River Dam	Ross River (above Dam) and tributaries; Sachs, Antill Plains, Four Mile and Six Mile Creeks
9 Alligator Creek	Alligator, Slippery Rock, White's, Killymoon, Crocodile and Cocoa Creeks
10 Reid River	Reid and upper Haughton Rivers
11 Woodstock	Spring, Double, Walkers, Double Barrel, Majors Creeks, Serpentine Lagoon, middle Haughton River
12 Magnetic Island	Gustav, Petersen, Alma, Gorge, Endeavour and Western Creeks
13 Bowling Green Bay	Reed Beds, Mackenzie, Emmet, St Margaret, Barrambush, Cromarty and Palm Creeks, lower Haughton River
14 Cape Cleveland	Cape Cleveland catchments and groundwater flowing off Mt Elliot

Two major priorities for this Section are:

- ✓ Finalisation of the proposed framework of Catchment Management Units, based on negotiation and consensus among interest-groups; and
- ✓ An increased awareness of the benefits of adopting a truly integrated and holistic approach to local natural resource management.

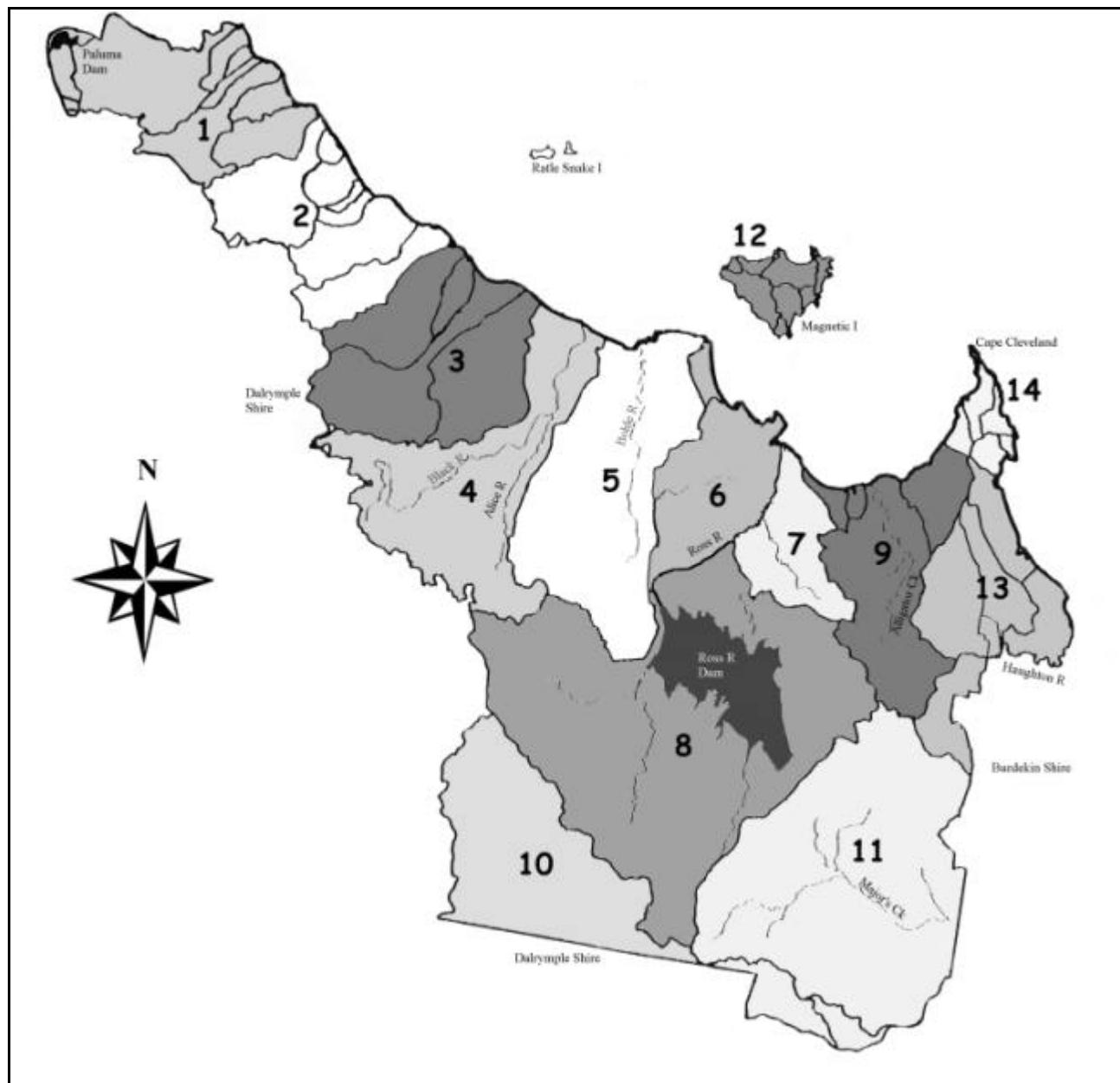


Figure 1: Draft Map of Proposed Catchment Management Units.

Key to Catchment Management Units

- | | | |
|-------------------|-------------------|----------------------|
| 1 Crystal Creek | 6 Ross River | 11 Woodstock |
| 2 Northern Coast | 7 Stuart Creek | 12 Magnetic Island |
| 3 Bluewater Creek | 8 Ross River Dam | 13 Bowling Green Bay |
| 4 Black River | 9 Alligator Creek | 14 Cape Cleveland |
| 5 Bohle River | 10 Reid River | |

STRATEGY 1.1 A "WHOLE-OF-CATCHMENT" APPROACH

❖ WHAT ARE THE ISSUES?

Integrated Catchment Management (ICM) is the co-ordinated management of land, water, vegetation, and wildlife within the natural boundaries of river catchments and/or coastal floodplains (the latter is the case in much of Townsville-Thuringowa). In 1997, a series of workshops in Townsville-Thuringowa and the broader Burdekin Dry Tropics region indicated widespread interest among the community in developing an ICM approach for management of natural resources in the region.

A number of local planning activities have already recognised that catchment processes require important consideration when management strategies are being developed (e.g. local storm-water quality management plans; Townsville-Thuringowa Water Supply Board catchment management plan). However, a "whole-of-catchment" approach requires:

- ✓ Genuine participation from all of the relevant interest-groups;
- ✓ A framework for planning and management that is agreed to by all concerned; and
- ✓ A willingness to commit resources towards common goals.

Local governments, communities and the commercial sector are the major users and managers of resources in catchments and they all need to play a leading role in ensuring coordination and integration of management at a local level. We need to build co-operation among these parties to achieve the widespread benefits that will flow from an integrated approach to natural resource management. Existing constraints will need to be identified and addressed. Current programs and initiatives can form a starting point on which to build by improving communication and co-operation among the groups and agencies involved.

Additionally, it is essential to increase the level of understanding among the general public about the implications of catchment processes for the future sustainability of our natural resources.

❖ WHY DO WE NEED A "WHOLE-OF-CATCHMENT" APPROACH?

The adoption of a "whole-of-catchment" approach to natural resource management:

- recognises and respects the natural interconnection between ecosystem and landscape processes;
- provides a framework in which informed decisions about use and management of resources can be made with due consideration offered to other relevant processes and interests;
- brings managers together to co-ordinate their efforts, which increases efficiency and effectiveness; and
- provides communities with a defined focus for involvement in natural resource management.

❖ WHAT CAN WE DO ABOUT IT?

We can ensure that planning and management of all activities on land and water in Townsville-Thuringowa are based on a clear recognition and understanding of the interconnection of natural processes on a catchment-wide scale.

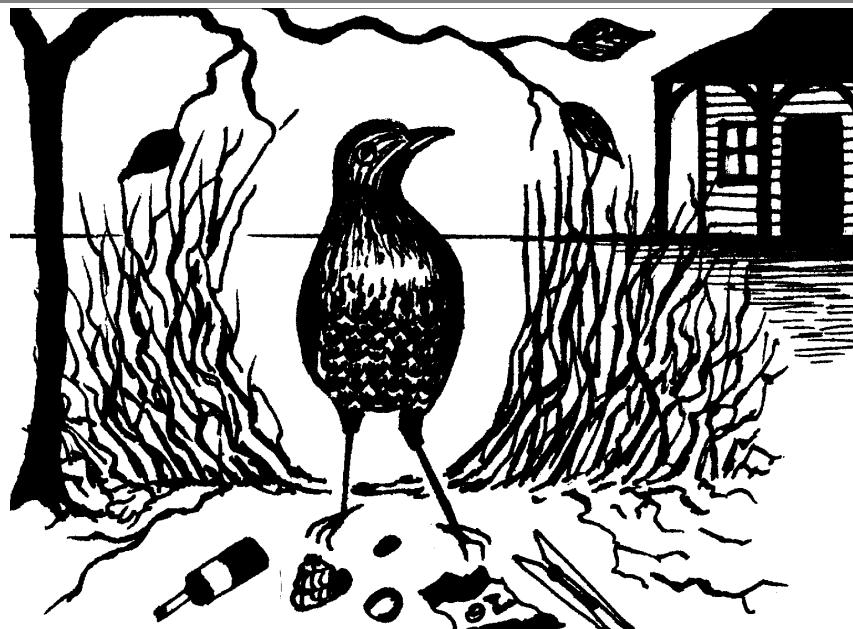
❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ The adoption of a framework of natural catchment units for integrated planning and sustainable management of natural resources.
- ★★ A catchment-based information system built on existing data, ongoing monitoring and further research.
- ★★★ The promotion, integration and coordination of involvement by all sectors of the community in catchment-care initiatives.

SECTION 2: Land, Vegetation and Wildlife

KEY PRIORITIES

- To implement best-practice management for protecting native vegetation, controlling environmental weeds and maintaining habitat for native wildlife populations
- To rehabilitate degraded areas, especially riparian areas and areas with high potential for soil erosion
- To strengthen the role of local Landcare groups and other activities for promoting and supporting sustainable rural industries



LAND RESOURCES

The effects of soil erosion and woody weed invasion are evident in many rural areas throughout Townsville-Thuringowa. However, there is little information on the extent and nature of land degradation in these non-urban areas. The sustainability of our current land-use practises needs urgent assessment. This will require an understanding of the changes that have occurred locally as a result of post-colonial settlement and more recent growth and development.

Change is an intrinsic feature of landscapes and ecological systems. However, the rate of change and the extent to which we have modified the soil and vegetation in Australia over the last 200 years appears to be causing permanent damage to basic ecosystem functions (i.e. the functions on which life depends). We do not know all of the ways in which human-induced changes to our local landscapes have compromised (or have the potential to compromise) the long-term sustainability of the natural environment. However, understanding this will be fundamental for successfully reducing the negative impacts of our activities before they result in irreversible damage.

NATIVE VEGETATION

Decline of native vegetation is acknowledged as Australia's number one environmental problem. It is not only the major cause of loss in biodiversity, but it also leads to degradation of soils and a decline in

quality of ground and surface waters. Reduced vegetation cover also plays a key role in the accelerated greenhouse effect upon the atmosphere. Recent clearing rates in Queensland, in response to the introduction of clearing controls on freehold land, reached world record levels. It has become imperative for all governments and the community at large to work together towards an equitable solution that may reverse the decline of native vegetation while respecting the right of individuals to benefit from their land and resources.

Three major priorities have been identified for management of native and exotic vegetation:

- 1) Townsville-Thuringowa has notable areas of native vegetation with high conservation value because of the occurrence of threatened or vulnerable species and ecosystems, or because of their role in connecting fragmented habitats. It is necessary to improve the protection and management of these valuable remnants. Regional planning policies have recently been developed to facilitate this process, but urgent action is required because of the current high rate of clearing and development in the sub-region.
- 2) Vegetation management must be improved, both on public and private land, particularly in relation to integrated weed control and management of fire regimes.
- 3) A coordinated and integrated approach to revegetation of key areas is needed to protect and enhance catchment processes and biodiversity, particularly, but not exclusively, in riparian zones. The adequate supply of local gene pool plant species is essential to revegetation projects and needs to be ensured through the establishment of a local gene-pool seed-bank and nursery and the adoption of best practices in the local nursery and revegetation industries.

NATIVE WILDLIFE

Although the benefits of maintaining biological diversity are not immediately obvious to most people, they are many and considerable. Biodiversity is the variety of life forms that have evolved over hundreds of millions of years. This variety underpins the essential functions of all ecosystems, from maintaining the quality of the air we breathe, to providing our food-chains, and maintaining our land and water productivity. The preservation of biological diversity is essential to the sustainability of our local natural resources.

Townsville-Thuringowa has a high diversity of native fauna species. This includes five endemic species: a Nursery Frog and a Leaf-tailed Gecko found only on Mt Elliot; The Townsville Rock Skink found on our granite mountains; the White-lipped Legless Lizard; a leaf-litter skink known only from Magnetic Island, and a leaf-tailed gecko only just discovered at Hervey's Range. Over sixty species occurring locally are listed under legislation as being at risk. At least eight of these are Endangered (Northern Bettong, Cassowary, Red Goshawk, Little Tern, Waterfall Frog, Australian Lace-lid Frog and three marine turtles). Protection and management of native wildlife and their habitats preserves and enhances our biodiversity.

Information on local native fauna distribution and habitat use is scarce. A considerable amount of information is scattered across different sources that are usually site specific. This does not allow for a comprehensive assessment of the adequacy, of current management of wildlife resources in area. Current trends in human population and industrial growth pose serious threats to the integrity of habitats and habitat connectivity in Townsville-Thuringowa, and highlight the urgency of integrating habitat values into planning for current and future land-use. A high level of local expertise is available due to the presence of a number of research institutions and specialised community organisations. This presents a valuable opportunity to consolidate our knowledge, further our understanding and improve our management of wildlife populations and habitats.

STRATEGY 2.1 PROTECTION & MANAGEMENT OF NATIVE VEGETATION

❖ WHAT ARE THE ISSUES?

Since settlement, substantial changes have occurred in the native vegetation of Townsville-Thuringowa. Lowland areas have been heavily modified, mainly as a result of past broad-scale clearing and grazing, recent urban expansion, altered fire regimes and the introduction of exotic pest species. Environmental weeds have replaced large areas of native vegetation in open woodlands and riparian habitats. Some vegetation communities in the area are threatened due to their altered condition, the limited areas that remain, and/or the presence of activities that threaten their future survival.

Although we have some information on our vegetation resources, there are many important things that remain unknown. We do not know enough about vegetation communities in the Ross River Dam catchment, and upland areas outside the Wet Tropics, like Hervey's Range, The Pinnacles and Mt Elliot. We also lack information on habitat and connectivity values of remnant vegetation patches, and site-specific information on conservation values and threatening processes. It is essential that we fill these gaps in order to protect and manage our vegetation resources in a cost-effective way.

Some local areas (like Clement State Forest, Cape Cleveland and Magnetic Island) have outstanding conservation values due to their size, uniqueness, healthy connectivity between highlands and coastal habitats, variety of vegetation communities, and the presence of threatened species. These outstanding natural areas provide an opportunity to conserve biodiversity of regional and national significance that we cannot afford to lose. We must also protect remaining natural areas in our urban and suburban landscapes, and manage urban bushland to retain and restore the habitat values uniquely associated with our dry tropical environment (see Strategy 2.4).

❖ WHY DOES NATIVE VEGETATION NEED PROTECTION?

In Townsville-Thuringowa, native vegetation communities:

- perform essential ecosystem functions, including primary productivity, storage and recycling of nutrients, soil stabilisation, maintenance of hydrology and climate, and absorption of greenhouse gases;
- sustain production of agricultural and forest products;
- provide habitats for native animals and corridors that allow them to move between habitats;
- represent important spiritual and cultural resources for indigenous and non-indigenous communities;
- perform natural water quality control;
- afford opportunities for recreation and experience of natural areas; and
- convey a sense of place and identity.

❖ WHAT CAN WE DO ABOUT IT?

We can protect and manage native vegetation communities, to ensure no loss of biodiversity.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ A sound understanding of the condition of native vegetation and the threats it faces across Townsville-Thuringowa.
- ★★ Improved management of native vegetation in urban and rural areas, on public and private land.
- ★★★ Restrictions on clearing and incentives for retaining and restoring vegetation to protect environmental values and prevent further degradation of productive land.
- ★★ A community that understands and appreciates the values of the local landscape.
- ★★★ Effective protection and management of high conservation areas, threatened ecosystems and threatened plant species, through the adequate management of protected areas, strategic local government planning and Voluntary Conservation Agreements.

STRATEGY 2.2 REHABILITATION OF DEGRADED AREAS

❖ WHAT ARE THE ISSUES?

Many areas in Townsville-Thuringowa bear the evidence of past mistakes in planning for land use and development. The limited respect given to retaining good quality natural areas in our living environments has led to actions (like unregulated access to sensitive areas and dumping of rubbish) that cause degradation via weed invasion, soil erosion and decline of native vegetation. We need to restore some of the values that we have lost, such as the scenic amenity of open spaces and the potential for nature-based recreation and education activities close to our homes. However, enjoyment of natural areas is not the only reason behind rehabilitation efforts. Impacts such as fragmentation of habitats and loss of riparian vegetation have profound consequences for the functioning of the ecosystem services we depend on. Revegetation around watercourses and wetlands is fundamental to restoring water quality, healthy streams and productive fisheries in coastal and marine environments.

In some cases, sound vegetation management (e.g. weed control, fire management, fencing of sensitive areas) may result in natural regeneration of disturbed sites. However in most cases, active planting of local provenance species is required to rehabilitate vegetation communities. Townsville City Council has a Revegetation Strategy to guide its program of rehabilitating vegetation in urban and non-urban areas, which relies on input from the community. It provides an inventory of sites with potential for rehabilitation and criteria to prioritise rehabilitation projects for maximum efficiency and gain. The Landcare Centre is developing a complementary Revegetation Manual to assist community groups and residents in revegetation activities.

We still need to identify sites for rehabilitation in Thuringowa, in order to progress strategic revegetation and rehabilitation in the sub-region. All projects across the entire sub-region will need to be prioritised based on the TCC model and the framework of catchment management units.

❖ WHY REHABILITATE DEGRADED AREAS?

Rehabilitation of degraded sites:

- restores and enhances biodiversity and habitat functions of native ecosystems;
- provides habitat connectivity in modified urban landscapes;
- restores scenic and amenity values;
- provides opportunities for the community to actively participate in environmental restoration projects;
- provides demonstration sites for community education; and
- protects stream banks and water quality, by reducing soil erosion, and nutrient runoff.

❖ WHAT CAN WE DO ABOUT IT?

We can rehabilitate disturbed and degraded environments to improve habitat integrity, biological diversity, ecosystem processes and scenic amenity values.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ A strategic approach to the selection and prioritisation of areas for revegetation and rehabilitation projects.
- ★★★ Coordinated implementation of rehabilitation projects through integration of government and community initiatives.
- ★★ Rehabilitation of residential and industrial development sites (including extractive industries) to restore native vegetation cover following clearing and construction works.
- ★★★ Programs encouraging community sectors to initiate and support local revegetation projects.

STRATEGY 2.3 STATE OF THE LAND IN RURAL AND RURAL-RESIDENTIAL AREAS

❖ WHAT ARE THE ISSUES?

We do not have a solid understanding of the condition of our rural land resources. Grazing is the predominant land-use in Townsville-Thuringowa outside urban areas. The lack of broad information about current land management practices (including weed management, fire regimes, soil erosion, soil compaction, salinity risk) makes it difficult to assess the sustainability of local grazing. Impacts may result from overgrazing and the disturbance of riparian areas by cattle (e.g. in the Ross River Dam and Bohle River catchments). The introduction of exotic pasture plants can cause serious problems, as seen in the current invasion by *Hymenachne* of internationally significant wetlands near Townsville.

Agricultural cropping in Townsville-Thuringowa consists predominantly of small intensive horticulture, predominantly fruit trees. Some sugarcane is grown in northern parts with pressure for expansion further south. Potential issues include sustainability of irrigation practices, potential for salinisation, pollution of soils and water, disturbance of acid sulfate soils (see Strategy 4.3), and increased pressure resulting from decreasing farm sizes.

We have little information to assess the long-term sustainability of current practices in rural residential areas. Residential expansion on rural land at the outskirts of urban centres has been ad-hoc, with little planning framework to protect habitats, catchment processes and good quality agricultural land. Recent land-use planning acknowledges this trend and aims to correct it. However, more understanding is needed about the effects of activities such as animal husbandry, overstocking, extraction of bore-water, and use of fertilisers for "hobby farms" (including turf farms). Poor vegetation management and clearing, major changes to natural drainage patterns, and the spread of exotic plants (e.g. for landscaping or pastures, and through seed contamination in animal feeds or on machinery) threaten essential catchment processes in Townsville-Thuringowa.

❖ WHY IS HEALTHY RURAL LAND IMPORTANT?

Land resources, including the landscape, the soils and the organisms they support:

- provide environments where we can live;
- support agricultural systems that feed us and are important for our economy and our community;
- support native ecosystems that are important for the preservation of Australia's biological diversity; and
- perform ecosystem processes (eg. recycling of carbon, nutrients and water) that are essential for all life.

❖ WHAT CAN WE DO ABOUT IT?

We can identify, understand and reverse land degradation processes in Townsville and Thuringowa through research, sound land-use planning, management interventions and education of landholders.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Comprehensive catchment-based assessment and monitoring of the state of the land in rural and rural-residential areas throughout Townsville-Thuringowa, building on existing information and local resources, wherever feasible.
- ★★ Sustainable use and development of rural resources, based on improved understanding of the nature and implications of current land-use practices.
- ★★ An increased understanding and wiser management of the impacts of activities in rural-residential areas including animal husbandry, hobby-farming, turf farming, groundwater use, waste disposal, vegetation management and changes to natural drainage patterns.
- ★ A community that is aware of and feels responsible for sustainable use of our land resources.

STRATEGY 2.4 PROTECTION OF SOIL RESOURCES

❖ WHAT ARE THE ISSUES?

Townsville-Thuringowa has many areas of highly dispersive and erosion-prone soils, which have poor structure and are sparsely vegetated. The high rainfall experienced seasonally and sporadically results in large amounts of soil being eroded and washed into streams and the ocean.

A number of activities that we undertake or may neglect result in increased soil erosion. These include removal of trees, shrubs and groundcover vegetation; inappropriate fire regimes; earthworks for subdivisions and infrastructure developments; disturbance of soil by cattle, particularly along watercourses; and inadequate control of environmental weeds. Some aspects of the recreational activities undertaken in watercourses, such as power boating and the use of illegal boat ramps, contribute to the erosion of stream banks.

Apart from the loss of vital topsoil, the downstream effects of run-off (siltation and sedimentation) can have severe ecological impacts. These include: changes in depth of waterways and natural drainage patterns; increased local flooding; smothering of in-stream plants and animals; loss of fishery habitats; and smothering of coastal marine ecosystems (seagrass beds, coral reefs). Even coastal processes can be affected, as indicated by recent evidence that some sandy beaches have turned into mudflats over the last 50 years, due to soil erosion in coastal catchments.

Many state agencies have guidelines to minimise soil erosion during infrastructure and development works (e.g. Main Roads). Recently, local attention to the risks of losing soil has increased, partly due to workshops initiated by the Townsville-Thuringowa Landcare Association. The Townsville City Council has a soil erosion policy. Detailed assessments of erosion-prone soils over most of the sub-region were undertaken during recent planning for industrial and urban development. However, the full implications of soil erosion are not widely appreciated by the broad community. The success of local policies and guidelines needs evaluating. Initiatives to increase understanding in the broader community of the effects of current land-use practices are required in an Integrated Catchment Management framework.

❖ WHY PROTECT SOIL RESOURCES?

Soil supports:

- micro-organisms that perform essential ecological processes;
- native plant populations (e.g. grasslands, woodlands and forests) and the ecosystems they form;
- pastures and crops that are economically important;
- man-made constructions (residential, public services and industrial) and infrastructure facilities; and
- aesthetically pleasing landscapes in open spaces, public parks and residential areas.

Eroded soil clogs streams, reefs, water supply dams and harbours.

❖ WHAT CAN WE DO ABOUT IT?

We can minimise the impacts of activities that result in loss of soil, and repair areas that have been damaged.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Sound information on the nature and extent of soil erosion throughout Townsville-Thuringowa, and at a catchment level.
- ★★ Implementation of management plans and procedures to minimise and repair soil erosion, particularly through effective vegetation management.
- ★★★ Minimisation of impacts of future land development on soil erosion.

STRATEGY 2.5 PLANTING OF LOCAL PROVENANCE SPECIES

❖ WHAT ARE THE ISSUES?

Local provenance plants originate from plant populations found in the local region, so they have genetic make-ups suited to local conditions. They have also evolved unique sets of interactions with other organisms, plants or animals that inhabit the local area. The introduction of plants from elsewhere in Australia or overseas, has the potential to weaken genetic make-up through hybridisation, and change the interactions between species in local ecosystems. The protection of local plant populations is fundamental for safeguarding our natural systems. Generally, there is too little appreciation in the community of the value of planting local provenance species. Adorning our streets and gardens with exotic species and native plants from other parts of the country signifies a lack of appreciation of the aesthetic values of the local Dry Tropics landscapes, and a lack of understanding of the need to protect our region's biological diversity.

Local provenance plants are essential for catchment-oriented revegetation projects. They are used for revegetation of disturbed and degraded areas; beautification of urban open spaces by councils and the community; stabilisation of sites experiencing erosion (e.g. beach dunes); and post-construction revegetation of urban developments. An adequate supply of local provenance plants requires the collection of seed from wild plants and nurseries to grow the seed. A recent Greening Australia initiative has resulted in the establishment of Wildseeds Townsville, a community group of local experts dedicated to collecting, storing and distributing seeds from indigenous plant communities. Their activities will make available an increasing variety and quantity of local provenance seed. However, more nursery facilities are needed to produce appropriate plants ready for use by management agencies, community groups, developers and residents.

❖ WHY PLANT LOCAL PROVENANCE SPECIES?

Local provenance plant species:

- contribute to the maintenance and enhancement of our region's biological diversity;
- protect the unique gene-pools of Townsville-Thuringowa's native plants;
- are adapted to local conditions; and
- reinforce the sense of place and identity of Townsville-Thuringowa.

❖ WHAT CAN WE DO ABOUT IT?

We can promote and support planting of local provenance species for revegetation and conservation purposes in Townsville-Thuringowa.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ The establishment of non-profit, local provenance seed-banks and nurseries, maintained in partnership by community groups, local and state governments and the commercial nursery industry.
- ★★ A community that understands the importance and benefits of planting local provenance species.
- ★★ Increased understanding of the factors that promote or prevent effective storage and propagation of local provenance species.

STRATEGY 2.6 MANAGEMENT OF WEEDS

❖ WHAT ARE THE ISSUES?

In Townsville-Thuringowa, exotic plants represent a major threat to biodiversity and land productivity. Weeds are usually divided into two major categories: (1) agricultural weeds that are detrimental to crops and livestock; and (2) environmental weeds that threaten native ecosystems and the health of land and water resources. This Strategy deals with environmental weeds only. Effects associated with the spread of environmental weeds include the exclusion of native plants, generation of large fuel loads (i.e. guinea grass), increased risks of landslides, and health risks for humans and wildlife.

Environmental weeds may include both exotic species and native Australian plants that do not occur naturally in the area. At least 76 environmental weeds occur in Townsville-Thuringowa and 15 are a "severe problem" in Townsville alone. Twelve weeds are declared under State law, which means that individual landholders must take actions to control them.

Townsville-Thuringowa is at risk of more weed invasions from new pastoral, horticultural and agricultural plants, and from seeds contaminating hay and other animal feeds. Many weeds are grown as garden ornamentals ("garden thugs"), which escape into bushlands and wetlands. Illegal dumping of garden waste in bushland, and seeds contaminating mulch and topsoil just add to the problems.

The scale of the weed problem requires a strategic response. For instance, weed seeds often wash downstream, so we should try to work from the top of the catchment down. As most weeds are good at dispersing, we will need to work with neighbouring sub-regions. Government agencies, landholders and the rural industries will need to collaborate to control key environmental weeds for long-lasting benefits.

The Queensland Department of Natural Resources and Mines and the two City Councils are currently preparing Pest Management Plans. These plans will provide policy directions and guidelines for control of environmental weeds by government officers, community groups and residents. Our community has a fundamental role to play in ensuring awareness and participation of individual landholders and volunteer groups in pest management efforts.

❖ WHY MANAGE AND CONTROL WEEDS?

Management and control of environmental weeds can:

- protect and restore healthy native vegetation communities and viable wildlife habitats;
- enhance sustainable production systems;
- protect our native wildlife;
- result in aesthetically pleasing landscapes; and
- promote ecologically sustainable and safe fire regimes.

❖ WHAT CAN WE DO ABOUT IT?

We can minimise the impacts of weeds on native ecosystems and their conservation and productivity values, as well as prevent the establishment of new weeds.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Identification, prioritisation and management of areas in need of weed eradication and control.
- ★★★ Adoption of integrated weed management methods that are environmentally sensitive.
- ★★★ Active participation of community groups and residents in developing Pest Management Plans.
- ★★ Increased understanding of weed ecology in Townsville-Thuringowa.
- ★★ Increased awareness of the potential hazards of ornamental, pasture and agricultural plants.

STRATEGY 2.7 FIRE MANAGEMENT

❖ WHAT ARE THE ISSUES?

Over the past 50-60,000 years, vegetation communities throughout Australia have been shaped and maintained by the fire management regime of Aboriginal Australians. With the interruption of traditional burning practices, less frequent but more intense fires have caused dramatic changes to vegetation communities.

Modified fire regimes are believed to be a major factor influencing changes to vegetation cover and community composition throughout the Australian continent. Fire affects vegetation communities in various ways; whilst it can trigger germination of fire-dependent plants it can also cause local extinction of fire sensitive species (usually rainforest, riparian and vine thicket species). Particularly in tropical savannas, fire is a key factor in determining relative abundance of grasses and woody plants. The effects that fire has on specific vegetation communities depend on factors including the plant species present; the intensity, frequency and type of fire; the topography of the country; the time of year or season, and the atmospheric conditions at the time.

Fire also represents a major threat to property and lives. Reducing the risk of wildfires near inhabited areas is the major purpose of controlled burning. Prescribed burning is also used by government agencies and landholders as a land management tool for a range of purposes including conservation, pasture improvement and weed control.

Although we have a relatively good understanding of the physical features of fire and its behaviour in different circumstances, we have limited knowledge of the effects of fire on different vegetation communities. In particular, we need to understand what the optimal timings, frequencies and intensities of fires ought to be for the range of vegetation types and other values we want to protect. The frequency of widespread bush fires highlights the need to reconcile risk-reduction and conservation objectives in our attempts to manage fire regimes in Townsville-Thuringowa. Local Councils and the Emergency Services must ensure that local fire hazard mapping and management planning make considerations for the protection of fire-dependent and fire-sensitive ecosystems.

❖ WHY IS FIRE MANAGEMENT IMPORTANT?

Sound management of fire:

- enhances biodiversity, by assisting fire-dependent species, protecting sensitive species from intense burning and controlling weed species;
- reduces risk of destructive fires for residents and property; and
- reduces the risk of wild fires destroying bush habitats.

❖ WHAT CAN WE DO ABOUT IT?

We can manage fire regimes in a way that enhances biodiversity conservation, protects fire-sensitive ecosystems and reduces the risk of hazardous fires.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★ Identification of fire-dependent and fire-sensitive ecosystems and improved understanding of the effects of fire on local biodiversity.
- ★★ Pro-active fire management based on sound scientific knowledge, aimed at reducing risks to lives, property and biodiversity, in and outside conservation reserves.
- ★★★ Increased awareness among the general public of the risks and effects of inappropriate and illegal burning on property and the natural environment.

STRATEGY 2.8 FOREST RESOURCES

❖ WHAT ARE THE ISSUES?

Moderate timber production is currently undertaken in Townsville-Thuringowa. In the past, woodlands and rainforest species were harvested for timber and fuel from upland and lowland forests. Rainforest areas are now protected within the Wet Tropics World Heritage Area. Some important forests in the region that lie outside the World Heritage Area, (e.g. Clement State Forest), have outstanding conservation values and are used (or could be) for a range of non-extractive recreational and conservation purposes. Some private forests may also fulfil this function.

It is likely that arrangements for the use of State Forests and timber products in Townsville-Thuringowa will be established in a Multiple Use Management Planning process, with wide community and industry consultation.

Our community must ensure that the conservation and recreational values of the local forests are fully acknowledged and protected under future management arrangements. We need to assess the potential for agro-forestry, the possible consequences of using exotic timber species, and our current use of timber products against national and international goals of resource sustainability and reduction of greenhouse gases.

Harvesting of old growth and tropical forests is one of the most pressing global environmental problems. We need to increase awareness in our local community of the global implications of using timber products imported from non-sustainable sources. We must also ensure the efficient use of timber by-products from local land clearing and the control of woody weed, because these valuable timbers are currently being wasted.

❖ WHY ARE FOREST RESOURCES IMPORTANT?

Our native forests and plantations provide opportunities for:

- long-term sustainable harvest of forest products for building and landscaping purposes;
- the conservation of our native vegetation communities, landscapes and wildlife habitats;
- nature-based recreation and environmental education for us and our children;
- protection and maintenance of catchment processes; and
- production of honey and other non-wood forest products.

❖ WHAT CAN WE DO ABOUT IT?

We can protect and manage forest and timber resources for their long-term sustainability.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Strategic planning processes to protect the natural values of Clement State Forest and adjacent unallocated state lands.
- ★★★ Comprehensive understanding and sustainable management of forest resources throughout Townsville-Thuringowa.
- ★★ Understanding and promotion for the potential of agro-forestry and other forms of forest management among private landholders in Townsville-Thuringowa.
- ★ Wider awareness of the local and global implications of unsustainable forestry practices.
- ★★ More efficient use of timber by-products in Townsville-Thuringowa.

STRATEGY 2.9 WILDLIFE POPULATIONS, HABITATS AND CORRIDORS

❖ WHAT ARE THE ISSUES?

Townsville-Thuringowa has a large and diverse fauna, which includes several species unique to the area and some listed under legislation as facing a risk of extinction. Habitat loss and modification are recognised as the greatest causes of species extinction and decline in biodiversity. Animals need habitats for shelter, food and reproduction, and habitats must be a fair size to maintain viable populations. Currently, we do not have a comprehensive understanding of the distribution, ecology and habitat preferences of local wildlife populations. Habitat requirements vary from species to species, and we need more information for many of the species occurring here. We need greater understanding of threatening processes and the interactions of species with people so that we can protect wildlife and habitat from the increasing pressures of development.

There is a lot of local expertise in research institutions and wildlife-study groups in our community, so a considerable amount of information on individual groups of animals is available. A major priority is to gather this information into a comprehensive picture of the condition of local wildlife populations and the threats they face.

Past and current land clearing and invasions by weeds have resulted in habitat fragmentation across large areas of Townsville-Thuringowa. However, areas of considerable size remain where there has been relatively little disturbance. Protection and management of these areas is essential to local and even global preservation of vulnerable species that cannot survive in small or disturbed areas.

To survive in urban areas native animals require adequate habitats and connections between habitat "pockets". Protection and management of riparian vegetation can maintain connectivity, with waterways functioning as natural "corridors" for animal movements. However, more information on the use of corridors by animals is required to identify important sites. We must ensure that the collaborative efforts of managers, scientists and expert residents result in a strategic and effective management of key species and habitats.

❖ WHY IS WILDLIFE IMPORTANT?

Native wildlife populations in Townsville-Thuringowa:

- perform ecological roles essential for conservation of biodiversity & sustainability of natural resources;
- include species that are threatened with local and/or global extinction;
- include species that are entirely unique to our area; and
- represent important cultural and spiritual resources for local indigenous and non-indigenous communities.

Wildlife corridors and refuges:

- enable movements of wildlife between key habitats, thus improving the viability of local populations;
- reduce the impacts of habitat loss and degradation resulting from development; and
- provide opportunities for co-existence of wildlife and people in highly modified urban landscapes.

❖ WHAT CAN WE DO ABOUT IT?

We can better understand the current condition of native wildlife in Townsville-Thuringowa and reduce the threats to it, so that we can protect key species and habitats now and into the future.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ An information base on the distribution, movements and habitat requirements of local native wildlife populations, building on existing knowledge and local expertise.
- ★★★ Integrated management and protection of wildlife habitats and corridors.
- ★★ Implementation of recovery plans for locally threatened species.
- ★★ Improved understanding and protection of urban and suburban wildlife.
- ★★★ Increased participation of the community in monitoring and protecting wildlife populations.

STRATEGY 2.10 MANAGEMENT AND CONTROL OF PEST ANIMALS

❖ WHAT ARE THE ISSUES?

At least twelve introduced pest animals occur in Townsville-Thuringowa that present a threat to human health, the conservation of local wildlife populations and agricultural productivity. Six of these 12 pests have high priority for control and management. There is some information available on the impacts that feral pests have on agricultural production, human health and domestic livestock, but we need more understanding of their impacts on native wildlife, ecosystems and biological diversity. Ecological impacts of feral animals vary with species but can include destruction of vegetation; disturbance of soil leading to erosion and decline in soil structure; direct predation on native species; competition for food, shelter and other resources, and transmission of diseases and parasites.

In urban and suburban areas, uncontrolled pet cats and dogs may have a dramatic impact on local bird, reptile and mammal populations. In southern states, registration of cats is compulsory and regulations are in place to control roaming of domestic cats. Unrestrained and dumped domestic cats and dogs also contribute to growing feral populations.

The Townsville and Thuringowa Pest Management Plans (in preparation by DNRM and the City Councils) will outline a strategic approach to control of pest animals. We need to increase our understanding of the impacts of roaming feral, stray and domestic animals on local wildlife and ecosystems, and implement effective control measures. We also need to ensure that control of undesirable animals is undertaken in a way that minimises stress and pain to individual animals.

Pest animals also include exotic fish species introduced into our waterways, which are treated separately in Strategy 4.5. Introduced marine species are becoming a major threat to Australia's marine biodiversity, in both temperate and tropical waters, but are not dealt with in this Strategy. The Townsville Port Authority is in the process of developing a local response strategy to deal with this issue.

❖ WHY CONTROL PEST ANIMALS?

Management and control of pest animals:

- protects local wildlife populations and habitat integrity, thus maintaining and enhancing biological diversity;
- protects and enhances agricultural productivity; and
- protects residents from health risks associated with populations of pest animals.

❖ WHAT CAN WE DO ABOUT IT?

We can control and manage local populations of pest animals in order to minimise impacts on conservation and agricultural productivity values, while ensuring humane treatment of all individual animals.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★ Increased understanding of the distribution and impacts of feral animals and roaming pets on native flora, fauna, agricultural production and health.
- ★★ Pro-active and integrated implementation of the Townsville and Thuringowa Pest Management Plans involving humane and environmentally sensitive procedures for controlling pest animals.
- ★★ Increased public awareness and control of the impacts of domestic pets on native fauna in urban, suburban and rural residential environments.

SECTION 3: Water, Wetlands and Waterways

**KEY
PRIORITY**

To ensure protection of water quality and quantity for use by residents, the commercial sector and ecosystems, through integrated consultation, planning, management and monitoring



RIVERINE AND WETLAND SYSTEMS

The landscape of the Townsville-Thuringowa Coastal Plains is characterised by the larger tropical floodplains of the Ross and Black Rivers in the southern section, and many short and narrow catchments in the northern section, where the Paluma Range runs close and parallel to the coast.

On the coastal plains, the many ephemeral, intermittent and perennial wetlands represent crucial habitats for native and migratory birds, frogs, fish and other aquatic animals. They also provide natural systems for water quality control and aquifer recharge. Some wetlands of the Townsville-Thuringowa area are Internationally significant. Bowling Green Bay is one of only four sites in Queensland listed under the Ramsar Convention (an International Convention for the protection of important wetlands). The popularity of recreational fishing and other water related recreational activities confers considerable economic and social values on our wetlands and waterways. As an integral and characteristic component of the local landscape, these areas are also essential cultural resources for local indigenous communities.

Human activities threatening waterways and wetlands in Townsville-Thuringowa are summarised in Appendix 1. Major priorities in this Section include the integration of current knowledge about

ecological and catchment processes with local management policies, and the development of innovative and strategic approaches to land and water management.

WATER QUALITY AND WATER SUPPLY

Water quality and water supply are major issues for natural resource management in Townsville-Thuringowa. It is fundamental to minimise impacts on water quality and to use our water supplies in efficient and ecologically sustainable ways, due to the urban and industrial nature of the area, and the rate of growth of our population and industrial activity. Table I1 (in Appendix I) summarises natural resource management issues affecting waterways in Townsville-Thuringowa.

Major priorities identified by this Section include:

- ✓ the need to integrate management and monitoring across Townsville-Thuringowa in catchment management units;
- ✓ the need to minimise impacts of urban storm-water quality on wetlands and the marine environments;
- ✓ the need for effective community participation in setting environmental objectives and targets for water quality management; and
- ✓ the need to improve community awareness of the causes and implications of decreased water quality in Townsville-Thuringowa.

STRATEGY 3.1 PROTECTION AND MANAGEMENT OF WETLANDS

❖ WHAT ARE THE ISSUES?

About 80 percent of Queensland's wetlands are already lost. Two major problems that threaten our wetlands are:

- Low appreciation of their significance for sustainable natural resource management and biodiversity conservation.
- A lack of formal protection and adequate management for different wetland types.

At present, our wetlands are threatened by a host of factors including: land reclamation and clearing; invasion by weeds and pest animals; changes to hydrology and natural drainage patterns; decreased water quality from pollution and siltation; detrimental recreational activities (e.g. littering and uncontrolled access); inappropriate fire regimes; and conflicting uses.

Public perceptions of wetlands as smelly and worthless do not help the problems. Although some wetlands currently have some legal protection (e.g. Town Common Conservation Park; Bowling Green Bay National Park), protection is mainly limited to tidal wetlands. No deep freshwater lagoon systems or paperbark swamps are currently protected in the area. These systems are remnants of threatened ecological communities and are vital refuges for water birds and wildlife during droughts.

The *Strategy for the Conservation and Management of Queensland Wetlands* (1999) acknowledges the need for a network of wetland protected areas containing an adequate representation of wetland types. To ensure the protection of wetlands, our community needs an improved understanding of the important environmental functions performed by wetlands. Greater support is needed for government and community group initiatives for the long-term, wise-use of these important natural resources.

❖ WHY PROTECT AND MANAGE WETLANDS?

Wetlands provide:

- habitats for wildlife and important refuges during drought;
- ecosystems important for the conservation of biodiversity;
- ecosystems that support fisheries productivity for sustainable traditional, recreational and commercial use;
- major assets for local tourism;
- culturally and spiritually important sites for local indigenous and non-indigenous people;
- opportunities for environmental education for the whole of the community;
- visually attractive open space areas;
- natural water filters and buffers for storm-water and runoff to the coast and sea; and
- natural drainage and flood controls and important recharge areas for groundwater resources.

❖ WHAT CAN WE DO ABOUT IT?

We can ensure that there is adequate protection for a representative network of wetlands, and minimise degrading impacts from urban, industrial and rural land uses.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ A sound knowledge base of values and conditions of wetlands in Townsville-Thuringowa.
- ★★ Integrated management of all wetland sites for their environmental values, to avoid further loss and degradation and to ensure that ecological connectivity to other habitats is maintained.
- ★★ Establishment of a government-endorsed network of significant and representative wetlands.
- ★★ Rehabilitation and ongoing management of degraded wetlands, including improved aesthetics.
- ★★ Increased community understanding of wetland values and active involvement in their care (this outcome is addressed in Strategy 6.3).

STRATEGY 3.2 PROTECTION AND MANAGEMENT OF RIVERINE SYSTEMS

❖ WHAT ARE THE ISSUES?

Townsville-Thuringowa contains a large number of perennial, intermittent and ephemeral waterways and drainage lines. Current degradation of these waterways seriously threatens the values of fisheries, recreation, biodiversity, habitat connectivity, aesthetics and water resources. Stream degradation can aggravate localised flooding problems. Degradation of riparian vegetation is a major problem for many of our rivers and streams.

Trees and shrubs on the banks help to keep rivers clean and healthy, while clearing riparian vegetation results in stream bank erosion and decreased water quality. Decline in water quality across Townsville-Thuringowa is an increasingly pressing issue. Poor water quality affects the biological functions of plants and animals that live in the streams, and ultimately results in the loss of aquatic fauna and the pollution of coastal marine waters. Major risks to human health associated with micro-organism pollution (such as blue-green algae) may also result from the decrease in water quality.

Changes in the course of streams occur naturally. However, human-induced modifications of streambeds and banks due to inappropriate land management damage the health and integrity of watercourses and aquatic ecosystems. Changes to natural drainage patterns in urban, suburban and rural-residential areas, as a result of inappropriate drainage infrastructure, construction of artificial impoundments and filling of natural wetlands, also place severe pressures on streams. Other issues that impact on riverine systems include invasion by aquatic weeds, habitat loss for fish, and over exploitation of water for irrigation and domestic supply.

These issues are difficult to remediate and control. Responsibilities for the management of riverine systems and wetlands overlap several authorities. Our community must actively support and participate in co-ordinated efforts to protect the integrity and quality of waterways in our catchments.

❖ WHY PROTECT WATERWAYS?

Waterways and drainage lines provide:

- pristine riverine systems with high conservation values;
- habitats for aquatic animals and plants, including economically and recreationally important fish species;
- wildlife corridors and habitat connectivity, linking the ranges to the coast;
- culturally and spiritually important sites for local indigenous and non-indigenous people;
- catchment drainage into the marine environment and the Great Barrier Reef World Heritage Area;
- water supply for human, agricultural and industrial consumption;
- recharge areas for groundwater resources;
- opportunities for a range of recreational uses; and
- an accessible focus for community involvement and action.

❖ WHAT CAN WE DO ABOUT IT?

We can ensure that our waterways and associated habitats are protected, restored and used wisely, and minimise impacts from urban, industrial and rural land uses.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ A sound knowledge of environmental values and health of waterways in Townsville-Thuringowa.
- ★★★ Integrated framework for waterways management based on “whole-of-catchment” principles.
- ★★★ Protection of riparian vegetation from clearing and other disturbances, and rehabilitation of degraded riparian watercourses.
- ★★ Protection of the biological integrity and ecological functions of aquatic ecosystems, natural drainage patterns and environmental flows.
- ★★★ Increased understanding among the wider community of the multiple values of waterways.

STRATEGY 3.3 WATER QUALITY

❖ WHAT ARE THE ISSUES?

Surface and groundwater quality are primary issues in Townsville-Thuringowa, the largest population centre in Northern Australia. A number of processes associated with urban and industrial land uses impact on water quality in many local catchments and adjacent marine environments, including the Great Barrier Reef World Heritage Area.

Most point sources of pollution in Townsville-Thuringowa have been designated as “environmentally relevant activities” under law and must be licensed because they may harm the environment. Non-point sources of pollution also represent a major threat to local water quality. For instance, drainage of urban storm-water into watercourses and the marine environment can seriously harm regional water quality. Urban storm-water is often a cocktail of pollution containing litter, decaying organic matter, bacteria, domestic animal droppings, heavy metals, motor oil, detergents, pesticides, herbicides and other toxic substances. Because urban storm-water flows off hard surfaces, it flows at high speeds, which increases the rate that it erodes exposed soils. A number of activities in rural and rural-residential areas also contribute to non-point source water pollution in Townsville-Thuringowa.

In rural areas, runoff containing herbicides, pesticides and fertilisers from sugar cane and horticulture pose threats to water quality in some catchments. Heavy grazing pressures in some parts of Townsville-Thuringowa has resulted in land degradation and soil erosion, which has increased the sediment loads and nutrient levels of some waterways.

In order to keep enjoying clean and healthy water and rivers, we need to understand how our daily activities influence water quality. We need to minimise our impact on this vital resource. Our community must ensure that the values we need and want to protect in our catchments and waterbodies are clearly recognised by all relevant management authorities. Ultimately, the sustainability of our natural resources, depends on the ecological health of waterbodies and waterways.

❖ WHY IS WATER QUALITY IMPORTANT?

The cleanliness and quality of natural and artificial waterbodies is important because they:

- drain into ecosystems of global significance, including the Bowling Green Bay Ramsar site, the Great Barrier Reef World Heritage Area, the Wet Tropics, and adjacent wetlands;
- support biological systems, including endangered ecological communities, endangered and vulnerable species and commercially important fish populations;
- provide potable water supply for human consumption;
- provide tourism and recreational opportunities, including swimming and fishing; and
- provide water supply for agricultural and industrial purposes.

❖ WHAT CAN WE DO ABOUT IT?

We can protect, manage, conserve and restore surface and ground water quality in a way that ensures a long-term healthy environment.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Integrated assessment, management and monitoring of water quality in Townsville-Thuringowa.
- ★★★ Improved understanding and minimisation of impacts of runoff from contaminated sites, sewage treatment plants and industrial activities.
- ★★ Improved public awareness of the impacts of urban storm-water quality and other threatening processes.

STRATEGY 3.4 WATER SUPPLY

❖ WHAT ARE THE ISSUES?

In Townsville-Thuringowa the bulk of our water supply comes from four different surface water sources (Ross River Dam, Paluma Dam and, to a lesser extent, Crystal Creek, the Burdekin Dam/Clare Weir) and some aquifers (e.g. Alligator Creek). Our water consumption is currently within the capacity of the supply system. However, recent state planning for urban and industrial growth in the region indicates that future demand for water may increase beyond environmentally sustainable levels. Our community needs to understand the importance of long-term planning for water supply to ensure that allocations remain equitable and consistent with the priority of human consumption requirements over other uses. We also need to minimise environmental damage resulting from our use of water supplies.

Major changes are occurring in global approaches to water resources management. There is an increasing trend towards corporatisation and reliance on market forces for allocation of water resources. These changes will have major impacts on the long-term sustainability of water resources, particularly the protection of water quality and water-dependent ecosystems. Informed and constructive public debate is needed on the implications of different approaches to clarify long-term directions in the management of essential water resources.

All individuals need to take responsibility for the wise and efficient use of water resources. Currently, there are no real incentives for local residents to apply the principles of Ecologically Sustainable Development to their use of water. We take water from the tap for granted, as we presently do not pay the true costs associated with water supply. Sustainable management and use of water resources will require the involvement of the wider community and a "household" approach. Our community must encourage state and local authorities to investigate and support more sustainable practices for water use, including re-cycling of waste water on private and public land.

We also need to consider the environmental impacts of our water use. Supply and allocation of water has traditionally been managed for human consumption and production systems. However, it has had potentially severe impacts on a number of ecosystems and habitats. In our region, these include barriers to fish movements; changes in hydrology due to watercourse regulation; and "starving" of ecosystems.

❖ WHY IS WATER SUPPLY IMPORTANT?

Surface and ground-water resources:

- represent essential renewable resources on which all living systems are dependent;
- support ecological processes and the biodiversity of aquatic and terrestrial ecosystems;
- provide potable and domestic water supply for human consumption; and
- support natural and man-made production systems of economic and traditional importance, including fisheries, stock and crop irrigation and manufacturing industries.

❖ WHAT CAN WE DO ABOUT IT?

We can ensure long-term equitable and sustainable water supply and protect water-dependent ecosystems from impacts deriving from the use of water resources.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

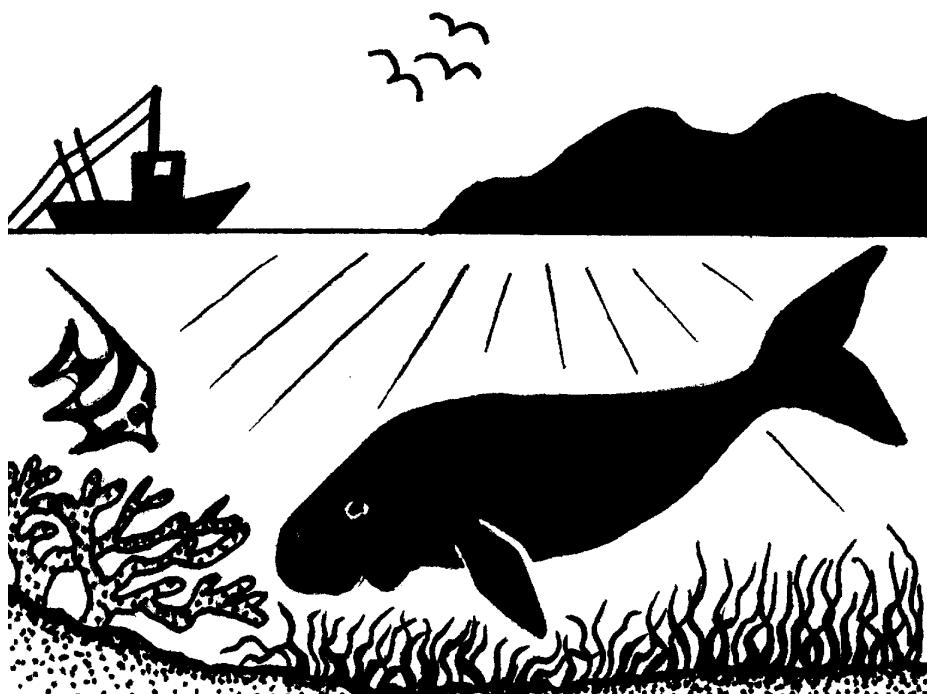
- ★★★ Integrated quality and quantity planning of water supplies in Townsville-Thuringowa.
- ★★★ Efficient long-term water use for domestic, agricultural and industrial purposes, including water recycling.
- ★★ Protection of aquatic and other ecosystems affected by regulation of flows and extraction.

SECTION 4: Coastal and Marine Environments

KEY PRIORITIES

To encourage relevant agencies to develop a coastal zone management plan, and support community participation in the planning by providing appropriate participation opportunities and information and awareness activities; and

To progress the collaborative development of a long term plan for indigenous involvement in local natural resources management, in a spirit of reconciliation and of respect for traditional customs and legitimate Aboriginal aspirations.



COASTAL ZONE USE AND DEVELOPMENT

Townsville-Thuringowa is a fast growing urban and industrial centre, with the population expected to reach approximately 200,000 by the year 2020. The sub-region has the second largest port in Queensland and has been earmarked for future development of heavy industry. Human activities already impact on a large variety of marine and coastal habitats and ecosystems locally. The rate and nature of development pose even more serious threats to marine and coastal resources, habitats and ecosystems. Unsound and uncontrolled land use practices in urban, rural and rural-residential areas (e.g. inappropriate land clearing practices) may cause severe downstream problems. The large number of short coastal catchments in the area provides the potential for impacts to be widely distributed along the coast. Coastal development and downstream effects of land-based practices are already resulting in degradation of habitats, including economically important fisheries habitats and habitats used by endangered species.

By providing a framework to address marine and coastal issues, this Section aims to set the groundwork for development of a Coastal Zone Management Plan for this region, as required under the *Coastal Protection and Management Act (1995)*.

COASTAL PROCESSES

Coastal erosion and human-induced changes to the natural dynamics of coastal sediments are major issues threatening marine and coastal environments. In Townsville-Thuringowa, problems have resulted from inadequate planning of past developments in the coastal zone. This highlights the need for a strategic approach to the future use of our coastline.

The disturbance of acid sulfate soils in the coastal zone is emerging as an issue with the potential for severe long-term implications for ecosystem health and productivity. It is important to have strategic planning and control by authorities, but the whole community has a responsibility for environmental care. Under the general duty of care, anyone who engages in earthworks in an acid sulfate risk area is legally liable for any negative impacts that may result. However, this Strategy recognises that improved community awareness and understanding of the environmental implications of activities is an important means of changing behaviour.

CONSERVATION OF COASTAL AND MARINE RESOURCES

The coastline of Townsville-Thuringowa has areas of exceptionally high conservation values with international, national, regional and local significance. The integrity of these environments, which include the Great Barrier Reef World Heritage Area and part of a Ramsar Wetland Site, is fundamental to the preservation of Australia's biological diversity. Two Dugong Protection Areas (seagrass beds in Cleveland and Bowling Green Bays) are very important for protecting declining Dugong populations and other threatened marine fauna. Some coastal wetlands in Townsville-Thuringowa have been identified as nationally important for the conservation of migratory shorebirds.

Some local beach ridge systems are unique for their diversity and species composition but are currently considered at risk of disappearing because of pressures from coastal development. There are also habitats of extreme importance for regional and local fisheries, including two Fish Habitat Areas. Seagrass beds and mangroves are nursery and feeding habitats for a range of economically and recreationally important species, including barramundi, mangrove jack and prawns.

This Section addresses issues for coastal and marine environments, including wetlands, seagrass beds, dunes and beach ridge systems and fringing reefs. It also looks at issues for individual species of particular significance for biodiversity conservation (endangered species); the interactions of such species (e.g. estuarine crocodiles) with human populations; and education and community understanding through activities such as involvement in the protection of charismatic mega-fauna.

TRADITIONAL MANAGEMENT OF SEA COUNTRY

Traditionally, indigenous communities have used marine and coastal resources based on a system of rights and responsibilities that pre-dates colonisation. This system makes consideration for protection and maintenance of significant sites and continued survival of flora and fauna. The increasing number of interests and uses placing pressure on coastal and marine resources in Townsville-Thuringowa may come into conflict with this traditional system, the protection of sites, and the use of resources by traditional owners. This Section aims to address these issues in collaboration with local indigenous communities.

STRATEGY 4.1 COASTAL ZONE USE AND DEVELOPMENT

❖ WHAT ARE THE ISSUES?

Townsville-Thuringowa is a fast growing, coastal centre, with the population expected to reach 200,000 in the year 2020. The sub-region has been earmarked for future development of heavy industry and currently has the second largest port in Queensland. The rate and nature of development poses serious threats to the integrity of marine and coastal habitats, while an increasing number of interests and uses are increasing pressure on limited coastal and marine resources.

Townsville-Thuringowa is located largely along a coastline with areas of exceptionally high values for conservation and sustainable natural resource use. These include the Great Barrier Reef World Heritage Area; two Dugong Protection Areas; two habitats of international significance for migratory shorebirds; diverse habitats for fisheries, including two declared Fish Habitat Areas and a Ramsar Site (a Ramsar Site is a wetland of international significance for the protection of water birds).

Unsound land-use practices in urban and rural areas (e.g. inappropriate land clearing practices) may result in severe downstream impacts. The large number of short coastal catchments in Townsville-Thuringowa may spread these impacts widely along the coast. Degradation of habitat values will have serious long-term economic and ecological implications. Our community needs to protect our coasts and maintain the sustainable use of our resources. We need to prepare a framework for coastal zone use and development that minimises conflicts and integrates planning and management programs. This can be best achieved by encouraging the effective participation of all the community in planning for the future use of coastal resources and then putting these plans into actions.

❖ WHY IS THE COASTAL ZONE IMPORTANT?

The coastal and marine environments in Townsville-Thuringowa:

- include diverse ecosystems with high conservation values, supporting a great variety of wildlife species;
- include habitats important for the productivity of recreational, commercial and traditional fisheries;
- contribute to the unique landscape and provide a "sense of place";
- provide opportunities for a wide range of nature-based recreational activities;
- represent an attraction and an important asset for the local tourism industry; and
- provide economically important opportunities for maritime transport and port facilities.

❖ WHAT CAN WE DO ABOUT IT?

We can plan and manage development in the coastal zone, whether for urban, industrial or rural purposes, in a way that ensures the protection of the coast's conservation and amenity values and the sustainable use of its biological resources.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Informed community input in a long-term Coastal Zone Management Plan for the Dry Tropics based on effective participation, with opportunities for open public debate on broad directions for the use and development of our coasts.
- ★★ Effective protection mechanisms for key coastal and marine sites, resources and values, including World Heritage Area values.
- ★★ Development and implementation of management approaches to reduce inappropriate uses of the coast and minimise the impacts of current and future urban, industrial, agricultural and tourist activities.
- ★★ Increased community awareness and stewardship of our marine and coastal resources.

STRATEGY 4.2 COASTAL EROSION

❖ WHAT ARE THE ISSUES?

Coastal erosion is the receding of the shoreline due to loss of sediments from shore areas, including beaches, beach ridges, foredunes, mangroves, mudflats, estuaries, saltmarshes and headlands. Changes in the coastline occur naturally, but erosion has been greatly accelerated by human activities.

In the past, we have not given sufficient consideration to the consequences of human-induced changes to coastal sediment dynamics and shoreline habitat stability. Many of the problems we currently face (such as erosion at Rowes Bay, for example) have resulted from inadequate planning of development in the coastal zone. Major long-term human causes of coastal erosion include changes to long-shore drift due to construction of hard structures (eg, breakwaters); habitat reclamation and degradation in mangroves, saltpans and beach fronts; and trapping of sediment in rivers behind dams and weirs.

Our community must encourage the relevant authorities to acknowledge and understand the consequences of major coastal modifications on sediment movements and ensure that lessons from past mistakes are incorporated into long-term regional planning for the coastal zone. Residents too must take responsibility for reducing the detrimental impacts of our activities along the coastline. These activities include the inappropriate clearing of coastal vegetation; introduction of exotic plants; use of concrete and other materials to "stabilise" the shore; and some recreational activities, such as four-wheel driving and the removal of drift wood and natural debris.

❖ WHY MANAGE COASTAL EROSION?

Shore areas:

- provide transition zones between terrestrial and marine habitats, and as such they are important for ecosystem functioning and biodiversity;
- provide natural controls for storm surge, flood and salt water retention;
- contain areas important for fisheries and the local and regional economies;
- afford popular opportunities for recreation;
- are important components of the regional landscape; and
- are important to indigenous communities.

❖ WHAT CAN WE DO ABOUT IT?

We can minimise human impacts on the ecological and physical values of shorelines, and the natural coastal sediment dynamics of Townsville-Thuringowa.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★ Improved understanding and management of the long-term impacts of human-induced catchment and coastline modifications on natural processes and sediment dynamics, and integration of the information into regional coastal zone planning.
- ★★ Improved management of coastal areas for physical values, including appropriate restoration of degraded areas and effective protection of areas vulnerable to erosion.

STRATEGY 4.3 ACID SULFATE SOILS

❖ WHAT ARE THE ISSUES?

Acid sulfate soils are common in northern Australia along low-lying coasts less than 5 m above sea level. These soils formed naturally over thousands of years in coastal areas such as mangroves, salt pans and brackish swamps. When these soils are water-logged, they are not acidic, so they are termed Potential Acid Sulfate Soils. However, draining water-logged coastal soils can be disastrous, because when they are exposed to air they can produce sulfuric acid (the same as battery acid), soluble aluminium and iron flocs. These chemical pollutants can impact on soil and vegetation, drain into waterways and cause fish kills, and threaten aquatic ecosystems and sometimes human health.

Disturbance of acid sulfate soils may have long term implications by increasing the environment's concentrations of aluminium and heavy metals, which are highly toxic to animals and humans and cause increased susceptibility of organisms to diseases (notably "red-spot" disease in fish). Moreover, vegetation will not grow on disturbed and untreated acid soils. In Townsville-Thuringowa, excavations and earthmoving activities for construction often disturb acid sulfate soils. Acid run-off corrodes concrete, steel and plastic infrastructure and has been known to cause significant damage, including the collapse of bridges and the destabilisation of roads and rail lines. In the coastal rural parts of Townsville-Thuringowa, excavation of agricultural dams and drains, construction of levees and land clearing for development (e.g. sugarcane, aquaculture) are likely to disturb acid sulfate soils.

This problem has only recently received attention from environmental managers in local and state government agencies. As a consequence, knowledge of the extent of the problem in Townsville-Thuringowa is limited and public awareness of the issues is quite low.

❖ WHY MANAGE ACID SULFATE SOILS?

Acid Sulfate Soils are naturally occurring soils that, when disturbed, release toxic pollutants with potentially serious implications for:

- aquatic ecosystems, including marine environments;
- human health;
- economically and traditionally important wild fish populations;
- viability of aquaculture ventures; and
- expensive public and private infrastructure, such as house stumps and bridge pylons.

❖ WHAT CAN WE DO ABOUT IT?

We can minimise disturbance of acid sulfate soils, and if disturbance does occur, we can ensure that ecological impacts do not result.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Minimisation of disturbance of potential acid sulfate soils through development controls, planning and site management.
- ★★★ Increased awareness and understanding of the problem among landholders, developers, managers and the general public in Townsville-Thuringowa.
- ★★★ Systems for early detection of acid sulfate soil impacts, to allow prompt solutions.

STRATEGY 4.4 BEACH AND DUNE SYSTEMS

❖ WHAT ARE THE ISSUES?

Beach dunes and ridges that retain their natural vegetation provide protection for the coastline from storm surges by stabilising the sediments. They also support important native flora and fauna species. The destruction of dune vegetation increases wind erosion and weakens the dune against water inundation. Once native vegetation is removed, introduced species take over dunes and are hard to control.

Significant beach ridge forest communities with high value for conservation of native vegetation and habitats occur behind the beaches north and south of the City. Important areas occur between Ollera Creek and Toomulla, at Saunders Beach, along the Cleveland Bay shoreline south of Ross River, and at Long Beach on Cape Cleveland.

Native coastal vegetation in foreshore areas is protected in Queensland, and local councils have the responsibility for enforcing the relevant legislation. Despite this, many of our beaches bear the signs of detrimental changes to the natural vegetation. Much damage is caused by nearby residents "improving" the landscape and access. A recent report for The City of Thuringowa found that many of the Thuringowa's beaches are covered by inappropriate exotic species and much of the native vegetation has been cleared.

Current arrangements under the *Beach Protection Act* do not provide adequate protection of natural values in beach and dune areas. There is a need to revise the legislation and management arrangements in light of problems experienced by local authorities and the concerned public, and in light of the obvious decline in cover and condition of native vegetation in foreshore areas.

❖ WHY PROTECT BEACH DUNES?

Vegetation communities associated with beach ridges, dunes and swales:

- include regionally important ecosystems that are under threat from coastal development pressures;
- maintain natural sediment dynamics by stabilising beach dunes and protecting the sand from wind erosion;
- provide habitats for native flora and fauna species; and
- buffer the coast from storms.

❖ WHAT CAN WE DO ABOUT IT?

We can protect beach dunes and restore disturbed and degraded beach fronts to secure the long-term integrity of beach dune vegetation systems.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★ A review of the adequacy of current legislation for the protection of beach dune landforms and native vegetation.
- ★★ Mechanisms to increase government resources for the protection of vegetation communities on foreshore reserves and Unallocated State Lands.
- ★★ A comprehensive revegetation and site management program for coastal and estuarine sites.
- ★★ Formal protection of the diversity of coastal vegetation systems.
- ★★ A community of coastal residents that understand and feel responsible for the integrity of natural beach systems.

STRATEGY 4.5 FISH HABITATS

❖ WHAT ARE THE ISSUES?

Fish habitats are defined as lands, waters and vegetation essential to the life cycle of fish (including crustacean) populations. Fish habitats are protected by legislation, through protection of marine plants and through the declaration of Fish Habitat Areas. There are declared Fish Habitat Areas in the Bohle River and Bowling Green Bay, both of which are inshore marine environments. Declaration of a third one in Cleveland Bay is currently under consideration. A number of other areas have been identified as worthy of protection for their fish habitat values. These include the State Land reserve adjacent to Lorna Creek; the Esplanade areas of Crystal Creek; the State Land between the mouths of Hencamp and Rollingstone Creeks; the State Land esplanade between the mouths of Leichardt and Sleeper Log Creeks; and the mangroves and swamps on the western side of the Black River mouth.

The major processes threatening fish habitats in Townsville-Thuringowa include: degradation and loss of habitat, via wetlands reclamation; changes to the natural catchment hydrology and physical barriers to fish movements; decreased water quality; and the introduction of exotic fish species that compete for resources or directly feed on early life stages of native fish populations.

At present, we have little information on the local freshwater fish resources, populations and habitat conditions. This gap makes it hard to manage land use practices to minimise impacts on fish habitats. Our community must ensure that the real values of fish habitats, for both fisheries and conservation, are adequately acknowledged in regional management policies, and in the assessment of individual development proposals.

An emerging problem is the dumping of aquarium pets in urban waterways, especially the Ross River. There is a need for greater understanding in the community about the consequences of this practice for the health of the habitats that support our native fish populations.

❖ WHY PROTECT FISH HABITATS?

Fish habitats, including marine, estuarine and freshwater environments:

- function as essential nursery areas and support wild populations of native fish species that perform important functions in the aquatic ecosystems and contribute to the region's biological diversity; and
- support the productivity of fisheries that are important to commercial and recreational fishers, the tourism industry and local indigenous communities.

❖ WHAT CAN WE DO ABOUT IT?

We can ensure that freshwater, estuarine and marine fish habitats are protected and managed sustainably for ecological, economic and traditional uses.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Integrated catchment management for fish habitats, including formal protection of locally and regionally valuable marine and freshwater fish habitats.
- ★★★ Understanding and reduction of threats to fish habitats and aquatic ecosystems (including changes in water quality; exotic fish species; changes in natural hydrology; and loss of instream habitat connectivity).
- ★★★ Education programs to reduce impacts of human activities on fish habitats.

STRATEGY 4.6 MARINE RESOURCES AND BIODIVERSITY

❖ WHAT ARE THE ISSUES?

The coastline of Townsville-Thuringowa is rich in natural resources. Important marine ecosystems for endangered wildlife and commercially important fish populations include coral reefs and seagrass beds. Fringing coral reefs occurring around Magnetic Island and smaller, uninhabited continental islands are part of the Great Barrier Reef World Heritage Area. A variety of reefs characterised by many different coral species grow around the protected headlands of Magnetic Island. These reefs are easily accessible places for high-quality snorkelling, diving and fishing, for both local residents and the tourism industry alike.

Our coastal shores and waters are home to a rich and diverse marine and coastal wildlife. Dugongs, Green and Flat-back Turtles, Little Terns, Beach Stone-Curlews, Estuarine Crocodiles, Jungle Perch, Irrawaddy and Humpback Dolphins are just a few of the most vulnerable species. They live here because of the variety of significant habitats including turtle nesting areas, Dugong feeding grounds, fish nurseries, and mangroves.

Increasing pressures on the coast, resulting from urban development and global warming, pose serious threats to the health and integrity of our coastal environment. Coral reefs are seriously threatened by human-induced disturbances, particularly increases in suspended sediments and nutrients, and changes in salinity. Major threats to reefs come from coastal development; a growing population; increased pollution; increasing tourism and recreation in the bays of Magnetic Island; increasing shipping; and maintenance of the port. Localised impacts also result from activities such as trampling at low tide and anchor damage. Other coastal habitats suffer as a result of urban and industrial growth, decreased quality of coastal waters and destructive fishing practices. Irresponsible boating, littering and illegal netting can result directly in the death of animals.

We must ensure that the conservation, fishing and tourism values of local reefs are protected through appropriate planning and management of developments in the coastal zone. We must also address the potential consequences of greenhouse gases emissions on the future of our coasts. Effective communication, accurate information, continuing research and responsible attitudes are required to protect key marine habitats and local marine wildlife populations.

❖ WHY PROTECT MARINE RESOURCES AND BIODIVERSITY?

Marine ecosystems in Townsville-Thuringowa:

- are highly diverse and have high value for marine conservation;
- represent key habitats for traditionally, commercially and recreationally important fisheries;
- provide opportunities for underwater recreation, tourism and wildlife observation;
- contain populations of endangered species and species with important roles in ecosystem functions;
- support charismatic animals like turtles, dolphins and dugongs, that are treasured by the community; and
- have strong cultural and dietary significance for indigenous communities.

❖ WHAT CAN WE DO ABOUT IT?

We can plan and manage current and future activities on the land, along our coast and in marine environments to ensure the long-term health of marine ecosystems and the protection and/or sustainable harvesting of wildlife populations.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★ Sound knowledge base of the ecology and condition of local marine ecosystems and their values for conservation, fishing, tourism and indigenous culture.
- ★★ Effective integrated planning and management programs to minimise impacts of land-based activities on marine resources and ecosystems.
- ★★★ Improved protection measures for local Dugong and turtle populations.
- ★★ Increased participation in management and ecologically sustainable use of marine natural resources by the broader community.

STRATEGY 4.7 TRADITIONAL USE OF THE COAST AND THE SEA

This Strategy has been prepared by the Wulgurukaba Traditional Owners. It may not necessarily reflect the values and objectives of other indigenous groups in the region.

❖ A WULGURUKABA PERSPECTIVE

Traditional use of marine resources by indigenous communities in coastal Australia is based on traditional rights and responsibilities that pre-date colonisation. Those rights and responsibilities include the protection and maintenance of coastal and marine sites of significance and the continued survival of the flora and fauna that form part of that environment, all of which play a pivotal role in the survival of coastal indigenous groups and their way of life. The continuing problem is the failure to have those rights and responsibilities fully recognised, firstly through the legislative process and secondly through the everyday management and survival of those coastal and marine environments and the resources contained in them. Areas of particular concern include: the long-term effects of commercial and recreational fishing; the potential impacts of development of tourism on the environment; conservation (protected areas, zoning, management plans, protected species etc.); the potential impact of existing and future shipping and port operations; industrial development in the coastal zone and potential impacts on the marine and coastal environment; potential impacts of military training operations in marine environments; and the continued survival and protection of marine and coastal flora and fauna, especially the mangrove ecosystems which play an intrinsic role in the continued survival and replenishment of marine resources.

❖ SOME KEY ASPIRATIONS OF THE WULGURUKABA ARE:

- the recognition of cultural practice and its continued survival;
- sustainable resource use management;
- generating sustained social and economic benefits;
- education; and
- respect for Wulgurukaba aspirations in natural resource planning and management.

❖ WHAT DO WE WANT?

We want greater control and involvement in the management of the marine and coastal environment to which we are and always have been linked.

❖ WHAT DO WE WANT TO ACHIEVE?

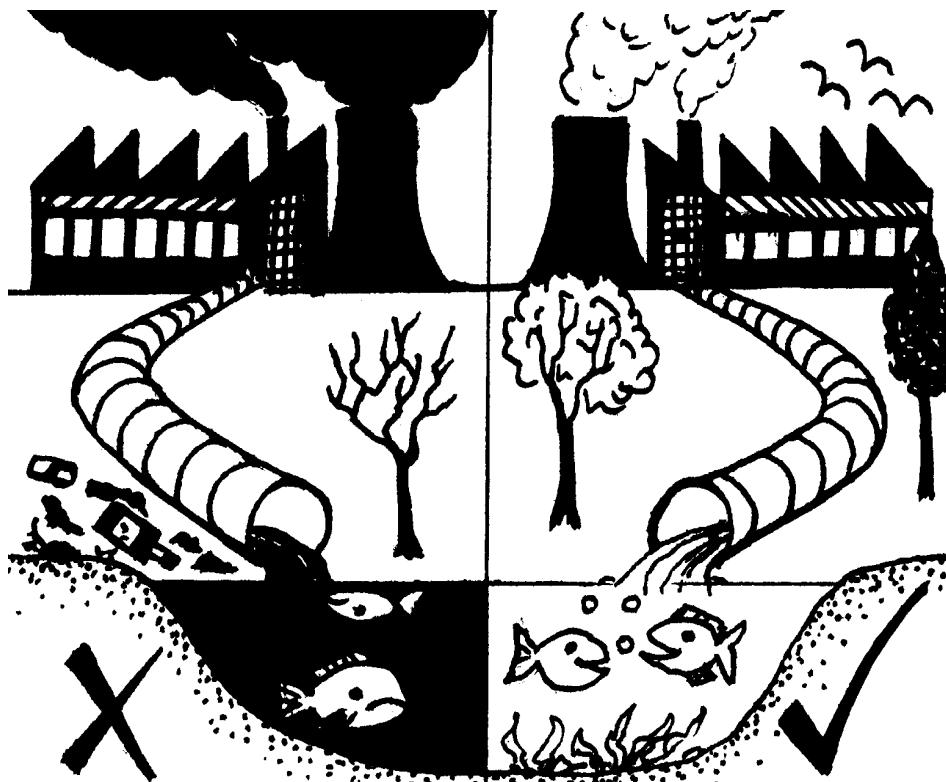
- 1 The recognition of the hunting and collection of traditional foods.
- 2 The protection of cultural sites of significance.
- 3 The involvement and employment of our people, particularly at the decision making level, in the management of the marine and coastal environment, i.e. the recognition of traditional knowledge for sustainable management.

SECTION 5: Environmental Quality

**KEY
PRIORITIES**

To encourage the local community and commercial sector to develop, implement and maintain best-practice standards in pollution control; and

To encourage support for clean production technologies to ensure ecological sustainability of industrial and urban activities



WASTE MANAGEMENT

Australians produce waste at the rate of approximately 800kg per person per year. Much of this waste ends up in landfill sites, taking up space and creating localised areas of highly contaminated land. Burning at landfills releases large amounts of greenhouse gases into the atmosphere. Some waste is illegally dumped or thrown out as litter. Leaching from dumps and inappropriate disposal contaminates the environment, killing wildlife, reducing water quality and threatening human health.

Priorities to address these problems include waste reduction, improved waste disposal facilities and rehabilitation of contaminated sites. Individuals, households, industry and government will need to share responsibility for the overall problem.

ENERGY CONSERVATION

Efficient use and conservation of energy are fundamental to our sustainable use of resources. Current energy generating technologies have serious impacts on the global and local environments. Use of fossil fuels (i.e. oil, coal and gas) for transport and electricity production results in diminished air quality and increased greenhouse emissions.

Priorities for this section include the development of renewable energy generation systems in Townsville-Thuringowa; reduced reliance on fossil fuels for transport; reduced consumption and more efficient use of energy in all sectors; and future buildings designed for the tropical climate to reduce reliance on air-conditioning.

PROTECTION OF AIR AND ATMOSPHERE

Many substances that we produce deplete the ozone layer, increase the warming greenhouse effect and diminish air quality. Thanks to everyday activities from backyard burning of rubbish to coal mining, Australia has the third highest per capita rate of greenhouse gas emissions in the world. Scientists predict that rising global temperatures caused by greenhouse gases will not only change our local climates, but will melt the polar ice caps and cause the seas to rise. Depletion of the ozone layer has been blamed for the increasing rate of skin cancer in Australia.

Townsville-Thuringowa currently enjoys good air quality compared to bigger cities. However, increases in population, traffic and possibly industrial emissions are expected. Consequently, levels of atmospheric pollutants may become a risk in the near future, both for human health and for sensitive ecosystems.

Priorities for this Section are to minimise activities that result in the release of greenhouse gases, ozone-depleting gases and other gases that impact on air quality. We also need more information on ecosystems that are sensitive to air pollution, so that they can be considered in land-use planning processes.

STRATEGY 5.1 WASTE MANAGEMENT

❖ WHAT ARE THE ISSUES?

Australia has one of the highest rates of waste generation in the world. Each of us produces approximately 800 kg of solid waste per year. Globally, we are now generating waste at a rate too fast for the environment to absorb it.

Most of our waste goes to landfills, taking up precious space and creating localised patches of highly contaminated land. Decomposition of garbage at landfill sites produces large amounts of methane, the most potent greenhouse gas being released into the atmosphere. A large proportion of waste finds its way into the environment through inappropriate disposal or leaching from dumps. This pollution can contaminate waterways and other habitats, choke wildlife, and threaten human health.

In Townsville-Thuringowa, illegal dumping and littering is evident along main roads, in wetland areas, and in the bush. The rubbish that "decorates" our beaches comes from illegal disposal at sea and litter washed down urban storm-water drains and waterways. A major cause of death in marine animals is by choking on plastic bags.

Reducing unnecessary generation of waste is increasingly urgent. Solid waste disposal is expensive, especially with new laws to minimise environmental pollution. Local councils are moving to recognise the true costs of waste management and pass them onto those who produce the waste, which is all of us. It is up to everyone to take a responsible attitude, by purchasing items with minimal packaging, saying no to plastic bags, reusing and recycling items and composting our kitchen scraps and garden waste.

❖ WHY IS WASTE MANAGEMENT IMPORTANT?

Reduction of waste and appropriate disposal, recycling and reuse will:

- reduce landfill space, contamination of soils and water, and greenhouse gas emissions;
- reduce health hazards for human and wildlife populations;
- protect ecosystem health and habitat integrity;
- improve the aesthetics and amenity of our open spaces;
- contribute to energy conservation; and
- promote more sustainable and efficient production.

❖ WHAT CAN WE DO ABOUT IT?

We can minimise the amount of waste we generate by reusing, recycling, composting and promoting production of sustainable goods. We can ensure that disposal of unavoidable waste does not impact on our health, ecosystem processes and habitat integrity.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★ Implementation of best practice initiatives towards waste reduction.
- ★★★ Establishment of efficient and sustainable regional waste disposal facilities.
- ★★ Local communities of responsible consumers who select goods on the basis of "clean production" merits and recycling principles.
- ★★ A reduction in the disposal of solid waste at legal and illegal sites and at sites where contamination may occur.
- ★★ Active involvement of local communities in initiatives to clean-up priority environments.

STRATEGY 5.2 ENERGY CONSERVATION

❖ WHAT ARE THE ISSUES?

Conservation and efficient use of energy are fundamental components of the sustainable use of our resources. Current technologies for generating energy have serious impacts on the environment. Reliance on fossil fuels (oil, coal and gas) for transport and electricity generation results in major local and global environmental impacts.

At a local level, energy generation and fossil fuel consumption may compromise the quality of the air we breathe. World-wide, it is the primary source of increase in greenhouse gases, which is a cause of accelerated global climate change. Although the future remains uncertain, modelling suggests that climate change in Australia will increase the frequency and severity of extreme weather events, such as cyclones, storms and heatwaves. Some controversial studies even suggest that global warming may have devastating effects on the Great Barrier Reef over the next 20 to 50 years.

Making more efficient use of energy and adopting “clean energy” technologies will drastically reduce greenhouse gas emissions. The hot climate of Townsville-Thuringowa means that we use a lot of energy for air-conditioning systems and refrigeration. Old refrigerators and most air-conditioning devices not only consume energy, but are the major source of ozone-depleting gases released to the atmosphere. We can easily reduce this problem by insulating buildings and using building designs and materials suitable for a tropical climate. We can take full advantage of our dry tropical climate by converting to solar hot water systems for our houses.

❖ WHY IS ENERGY CONSERVATION IMPORTANT?

Adoption of renewable energy sources, conservation and efficient use of energy and a responsible attitude towards dealing with our tropical climate will:

- reduce emissions of greenhouse gases to the atmosphere;
- improve the quality of the air we breathe; and
- protect sensitive environments.

❖ WHAT CAN WE DO ABOUT IT?

We can promote the conservation and efficient use of energy and the adoption of renewable energy sources.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★ Improved understanding by the residents of Townsville-Thuringowa about the implications of current power generation and supply for local and global environments.
- ★★ Development of renewable energy systems in Townsville-Thuringowa.
- ★★ Reduction in our reliance on fossil fuels for transport.
- ★★ Increased adoption by the community and the building industry of innovative designs and materials suited to tropical climates, to reduce reliance on air-conditioning.

STRATEGY 5.3 PROTECTION OF THE AIR AND ATMOSPHERE

❖ WHAT ARE THE ISSUES?

It is increasingly apparent that the substances released as a result of our technologies and lifestyles are dramatically changing the composition of the Earth's atmosphere. This has serious implications for local air quality, as well as global climate and atmospheric processes.

Townsville-Thuringowa enjoys good air quality compared to bigger cities. However, the expected increases in population, traffic and industrial emissions may result in increased threats from atmospheric pollutants in the near future. This could impact upon both human health and sensitive ecosystems such as mangroves.

Apart from being noxious to human health and natural ecosystems, many substances that we produce increase the atmosphere's greenhouse effect or deplete the ozone layer. Australia has the world's third highest rate of greenhouse gas emissions per person. These emissions result from everyday activities including: burning of fossil fuels for transport and electricity generation; burning rubbish at landfill sites and in backyards; digestion processes of livestock; coal mining; burning of vegetation during land clearance; disturbance of soil for agriculture and forestry; and the use of artificial fertilisers.

Our community needs to understand the local and global implications of our activities on the atmosphere. All consumers have the power to change current production systems and technologies, by increasing the demand for a market of "clean" and sustainable products.

❖ WHY PROTECT THE AIR AND ATMOSPHERE?

Clean air, free of toxic substances and particulate matter:

- supports life on our planet;
- contributes to healthy environments for human populations and natural ecosystems;
- minimises human-induced changes in the composition of the atmosphere;
- prevents or mitigates the occurrence of a number of respiratory diseases; and
- provides clean skies that add to the visual amenity of our landscapes.

❖ WHAT CAN WE DO ABOUT IT?

We can ensure that future urban and industrial development and our lifestyles have minimal impacts on the quality of the air we breathe and the overall chemical composition of the atmosphere.

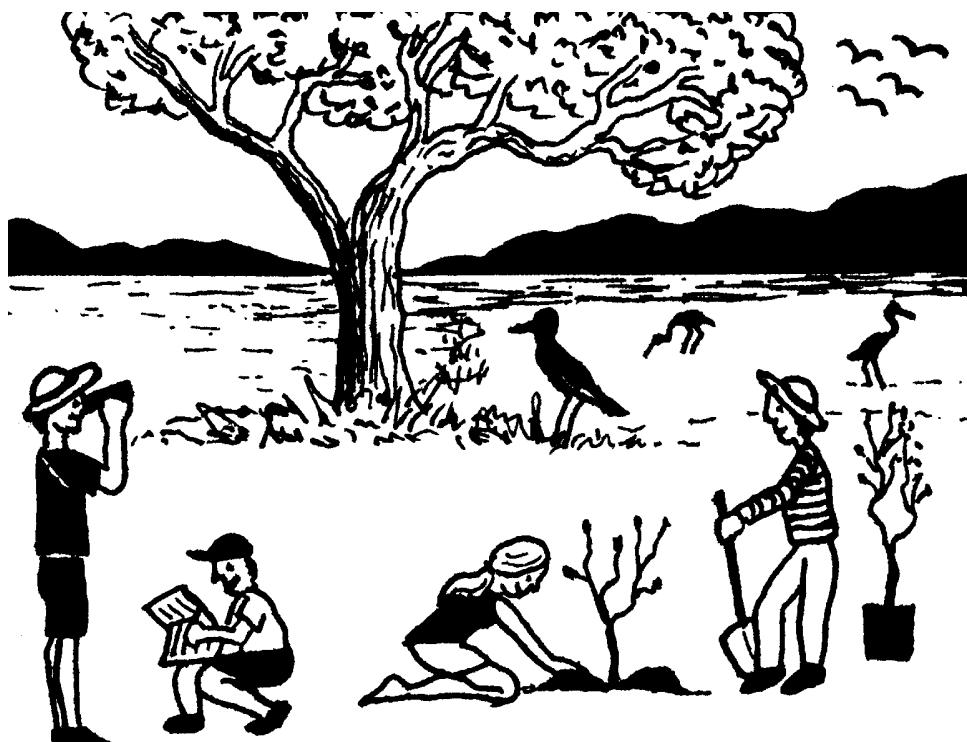
❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★ Minimisation of activities that impact on air quality.
- ★★ Minimisation of activities that result in the release of both greenhouse gases and ozone-depleting gases.
- ★ The identification and protection of organisms and ecosystems sensitive to changes in air quality.
- ★★★ Adoption and further development by all industries in Townsville Thuringowa of best-practice measures for the reduction of air emissions.

SECTION 6: Community Involvement and Education

**KEY
PRIORITY**

To raise the environmental understanding of our community and encourage informed debate and wider involvement in ecologically sustainable activities in Townsville-Thuringowa



COMMUNITY PARTICIPATION

Governments realise that managing natural resources through regulation and enforcement are ineffective without understanding, support and participation from the community's resource users and managers. Commonwealth and State governments fund a range of programs for community-based initiatives to promote and implement sustainable use of natural resources.

In Townsville-Thuringowa, environment and nature-based community groups vary widely in their focus and activities. Limited opportunities exist for these groups to communicate and collaborate with each other and with government agencies, which leads to inefficient use of sparse community resources, reduced participation in decision-making and policy, and ultimately a fragmented approach to natural resource management. This is detrimental to the common goals of sustainability and environmental conservation.

The formation and endorsement of a Natural Resources and Environment Forum (NaREF) is the first priority of this Section. The NaREF would provide opportunities for representatives of community organisations, government agencies, business and private citizens to meet, debate to resolve issues, and collaborate to further the sustainable use and management of natural resources in Townsville-Thuringowa.

FROM AWARENESS TO UNDERSTANDING

Biological diversity benefits humans in many ways. Protection of biodiversity is necessary for long-term coexistence with our natural environment. This can only occur when communities and governments take care of local biological resources.

The negative environmental consequences of many actions in the community are not always obvious. Often, the "cause-and-effect" relationship between actions and impacts are not clear. It is not easy to explain the hidden consequences of actions in a way that is meaningful to local communities. It is particularly difficult when the impacts are on a large-scale, have long-term effects, or appear after some delay. This makes it quite difficult for users and managers of natural resources to fully appreciate why we need to change some of the currently accepted practices known to be damaging the environment. Therefore, improving awareness and understanding of the environmental effects of our actions is a priority.

Sometimes, negative perceptions of wetlands lead to harmful activities at sensitive sites. Because wetlands and riparian areas are widely used for recreation on public and private property, increasing the understanding of all residents about wetland and riparian values will help ensure that these resources are protected and used wisely.

This Section is about biodiversity and local native species, wetlands and waterways and threats to our natural resources and environment. It promotes programs to improve awareness, and to move towards a greater understanding of the ecological processes occurring all around us. A vision is set for translating this understanding into actions that will benefit natural resource management and conservation for the whole community. The emphases are on involving all relevant sections of the community, supplying both broad and locally specific knowledge where needed, and promoting local action to solve both local and global problems.

INVOLVING CHILDREN AND SCHOOLS

We need to ensure that children grow up with a feeling of stewardship towards nature and a sound understanding of environmental problems and potential solutions. Providing children with environmental information may spark a future willingness to use natural resources sustainably but may not enable them to do so. We need to equip them with problem solving and conflict resolution skills to address multidimensional and complex environmental issues. A priority of this Section is to promote and support local school programs and other initiatives that encourage children in hands-on projects which address local environmental issues.

INVOLVING BUSINESS AND INDUSTRY

Business and industry are fundamental to the local economy and provide major employment opportunities. However, industrial and residential developments can be major threats to environmental quality and sustainability of resources. Many industries have addressed this problem by modifying their practices to minimise impacts on natural resources.

A major priority in this Section is to establish the Natural Resource and Environment Forum (NaREF) to improve communication and understanding between the community and business sectors so that all developments are undertaken with respect for environmental values and the concerns of the community. The NaREF will also assist the community to join in projects with local business and industry groups to restore degraded environments, safeguard conservation values, and achieve sustainable management of our resources.

STRATEGY 6.1 CONSOLIDATING COMMUNITY PARTICIPATION

❖ WHAT ARE THE ISSUES?

Over the last two decades, the Australian community has become progressively more involved in the management of natural resources. Governments have come to realise that regulation and enforcement in managing human uses of natural resources are not effective without the understanding, support and participation of the resource users and managers in the community.

A range of Commonwealth and State government programs provides funding to community-based initiatives for promoting and implementing the sustainable use of natural resources.

Recent policy discussion papers highlight the important roles that regional communities will play in the future management of natural resources. Regional communities will be expected to manage funding for implementing strategic projects, and play key roles in developing policies for allocation and management of natural resources. These increased responsibilities will be rewarded with a more active and stronger role in the decision-making process, which should result in more equitable and sustainable management of our natural assets. Our community needs to get ready for this role by building on existing community enthusiasm, resources and expertise.

In Townsville-Thuringowa, nature-based community groups vary widely in the focus they have and the types of activities they undertake. Communication and collaboration among these groups could be improved to help achieve the overall common goals of sustainability and environmental conservation. There is a need to consolidate the structure of community involvement to improve the efficiency of limited community resources, increase community influence in policy-making, and achieve more holistic management of natural resources.

❖ WHY CONSOLIDATE COMMUNITY PARTICIPATION?

Effective communication and collaboration between groups, individuals and agencies concerned with the use and management of natural resources will:

- ensure coordination among management initiatives, thus making efficient use of available resources;
- allow for a wider range of values and interests to be considered and debated, and facilitate resolution of conflicts when these arise; and
- provide a more effective mechanism for the community to contribute to local decision and policy making at all levels of government and the commercial sector.

❖ WHAT CAN WE DO ABOUT IT?

We can increase the willingness and ability of Townsville-Thuringowa residents to share responsibilities and decisions for natural resource management and biodiversity conservation.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ The formation and endorsement of a Natural Resources and Environment Forum for Townsville-Thuringowa, where representatives of community organisations, government agencies and the commercial sector can meet, debate and resolve differences for the sustainable use and development of our natural resources.
- ★★★ Pro-active implementation and coordination of the action plans recommended by this and other regional Strategies and integration of these with government and industry projects.
- ★★★ Improved communication between the community and decision-makers on matters concerning natural resource management and environmental conservation.
- ★★★ Improved coordination and support of community initiatives and groups working on the ground.

STRATEGY 6.2 INVOLVING BUSINESS AND INDUSTRY

❖ WHAT ARE THE ISSUES?

Business and industry are fundamental to the local economy and provide vital employment opportunities in Townsville-Thuringowa. However, industrial and residential developments can represent some of the biggest threats to the environmental sustainability of land and water resources. Over the last decade, many industries have done a lot to regulate their environmental practices and minimise their impacts on natural resources. Governments are also contributing to this trend through the introduction of incentives for cleaner production systems and the adoption of best-practice policies. However, there is still room to improve communication between local communities and the commercial sector, to ensure that future developments are undertaken with the support of residents and with respect for the health and quality of the environment. Many opportunities exist for the community to join in projects with business and industry groups to restore local environments and safeguard natural resources. The commercial sector presents many opportunities to find further support for a growing number of local projects. Such collaborations should build on a recognition of the social, economic and environmental benefits that would flow from the sustainable use of all local resources.

❖ WHY INVOLVE BUSINESS AND INDUSTRY?

Communication and collaboration between community groups concerned with natural resources and the commercial sector will:

- decrease the likelihood of open conflicts in cases of controversial development proposals;
- provide opportunities of support for local community-based projects for the environment; and
- be essential for balanced and sustainable use and development of local natural resources.

❖ WHAT CAN WE DO ABOUT IT?

We can improve communication between local communities and the commercial sector to ensure mutual understanding and collaboration in achieving the long-term sustainable use of our natural resources.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ An open forum for communication between community, industry groups and governments on issues of local relevance for the sustainable development of Townsville-Thuringowa.
- ★★ Joint projects supported by the commercial sector and implemented by the community for the protection of local biodiversity and environmental quality.
- ★★ Improved consultation protocols by industry in all stages of proposed projects, including impact assessment and monitoring.
- ★★ Improved accessibility for the public to information on environmental aspects of industrial activities.
- ★★★ Recognition of positive environmental processes through industry awards.

STRATEGY 6.3 INVOLVING CHILDREN AND SCHOOLS

❖ WHAT ARE THE ISSUES?

The concept of ecologically sustainable development has emerged as a global imperative. It appears that future generations will inherit the challenge of redefining human interactions with nature.

We need to ensure that all children grow up with a feeling of stewardship towards nature and a sound understanding of current environmental problems and potential solutions. Giving children information on the environment may contribute to their future willingness to use natural resources in a sustainable way, but it may not be enough to help them take actions. We need to equip them with the problem solving and conflict resolution skills required to address the complexity of environmental issues.

Parents need to engender in children a responsible attitude toward the use of natural resources and the conservation of biological diversity. Members of our community must promote and support local school programs that encourage children in hands-on projects which address local environmental issues.

❖ WHY INVOLVE CHILDREN AND SCHOOLS?

Children who understand the values of our natural resources and the implications of unsustainable use are more likely to:

- embrace responsible attitudes towards the use and management of natural resources;
- take the message home; and
- enjoy healthy environments and a good quality of life in adulthood.

❖ WHAT CAN WE DO ABOUT IT?

We can foster our children's respect for nature and prepare them for the challenge of finding a sustainable coexistence with the natural environment over the long-term.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Increased involvement of local schools in caring for the environment, through incorporation of local issues and initiatives in curricula.
- ★★★ Greater emphasis placed on the potential of existing community-based projects as learning activities for children.
- ★★ Involvement of target groups (parents associations, sporting groups and playgroups) in hands-on environmental projects.
- ★★★ Increased recognition of the contribution that children make to conservation activities.

STRATEGY 6.4 PROMOTING LOCAL BIODIVERSITY

❖ WHAT ARE THE ISSUES?

Although most people have encountered the term “biodiversity” (short for biological diversity), not everyone understands what it means and why it is relevant to us.

Biological diversity refers to the variety of life forms that have evolved on the planet over hundreds of millions of years. This includes all the animal and plant species and micro-organisms that live on our planet, and all the genetic materials that allow them to survive. Biodiversity also comprises the diversity of habitats and communities of plants and animals that influence the continuing evolution of genes and species on Earth.

This diversity underpins the productivity of natural and agricultural systems (supplying food, timber, wildlife); maintains the quality of water; renews the air we breathe; stabilises our climate; provides us with cures for a range of diseases; and improves the quality and enjoyment of our lives in numerous ways.

Australia is one of the twelve most diverse countries in the world, mainly because of the richness of species unique to the continent. However, Australia has experienced very high rates of extinction over the last two hundred years, due to the activities of humans. Worse still, the rates of decline in biological diversity appear to have accelerated over the last 50 years, driven mainly by the destruction of habitats and the introduction of exotic species.

Protection of biodiversity must form the basis of any attempt to coexist in the long-term with our planet's natural environment. This cannot occur without local communities and governments taking care of local environments. We need to improve our understanding and respect of how biodiversity benefits us, through communication in locally relevant contexts.

❖ WHY PROMOTE LOCAL BIODIVERSITY?

When people fully appreciate what it will mean to them if biodiversity is lost and landscapes are degraded, they will be more likely to care for their local environment and protect local native flora and fauna.

❖ WHAT CAN WE DO ABOUT IT?

We can spark wider appreciation of our local native flora, fauna and ecosystems, and encourage the sustainable use of our land, water and biological resources.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Clear and accessible information on local biological diversity.
- ★★★ Development of locally relevant “action guides” and programs tailored to suit groups active in Townsville-Thuringowa.
- ★★ Increased appreciation and acceptance of the abundance and diversity of our fauna and flora, and greater willingness to coexist with our natural environment, rather than modify it.
- ★★★ Support for education programs developed and delivered by community groups.
- ★★ Adoption by local communities and governments of a “local provenance species” policy for public landscaping and rehabilitation projects.
- ★★★ Improved promotion by the local media of the need for protecting our local biological resources

STRATEGY 6.5 BUILDING STEWARDSHIP FOR WETLANDS AND WATERWAYS

❖ WHAT ARE THE ISSUES?

The community is starting to recognise the ecological significance and environmental values of wetlands and waterways. However, negative perceptions of wetlands and drainage areas still persist, including the views that they are convenient dumping grounds for rubbish and watering points for stock. These attitudes often result in detrimental activities being undertaken at sensitive sites. Wetlands and riparian areas are widely used for recreational purposes, but unregulated access often results in environmental damage.

Increasing the understanding of residents in Townsville-Thuringowa about wetland and riparian values will help to ensure the protection and wise use of these resources. Community education programs should target recreational users of wetlands and waterways. Many wetlands and riparian areas are on private property, so programs are needed that encourage and effectively assist all landholders in the adoption of appropriate land management practices to minimise impacts on wetlands and riverine ecosystems.

We should also build community education programs around the local wetlands that are accessible to the general public. Examples of sites potentially suited to general awareness programs include Ross River, Townsville Town Common and the freshwater swamp at Blakey's Crossing.

❖ WHY BUILD STEWARDSHIP FOR WETLANDS?

A community that appreciates the conservation significance of wetlands and watercourses and understands the benefits of wise use and management of these natural resources will enjoy healthy environments with better quality water and more visually pleasant landscapes.

❖ WHAT CAN WE DO ABOUT IT?

We can encourage a sense of ownership and responsibility in the community towards the wetlands and waterways of Townsville-Thuringowa, which will result in the protection of habitat values and wise, sustainable use of natural resources values.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★★ Increased community understanding of the values of inland, coastal and marine wetlands and riverine systems and the benefits of protecting and managing them.
- ★★ Active involvement of the community, via individual and group actions, in the protection and wise use of wetlands and riparian ecosystems and resources.
- ★★★ Support for education programs developed and delivered by community groups.
- ★★★ Involvement of private landholders in management of wetlands and riparian zones, according to priorities in Strategies 3.1 and 3.2.

STRATEGY 6.6 COMMUNICATING SUSTAINABILITY

❖ WHAT ARE THE ISSUES?

The environmental consequences of our actions are not always obvious. Many of the activities we undertake, as part of our work, gardening, house maintenance or recreation may have detrimental effects on the natural environment.

This Strategy has identified several processes that pose serious threats to the sustainability of our natural resources. The "cause and effect" relationship between our actions and their impacts on natural resources is not always clearly identifiable, even by the best scientific research. This makes it difficult to discuss the issues in terms that are meaningful to local communities. It is particularly difficult when the effects occur on a large scale, over a long-term, or after some delay in time, such as the cases of accelerated global warming and increased salinity in the soil. It can therefore be difficult for resource users to fully appreciate the consequences of currently accepted practices that are known or believed to be detrimental and unsustainable.

It is a priority to improve the awareness and understanding among resource users and managers of the known consequences of current practices. Communication of issues and impacts through the local media could be improved. Development of more education programs targeted at relevant sections of the community, industry and government agencies should be encouraged and promoted. But unfortunately, it is not certain that information alone will result in the adoption of more sustainable practices by the community. However, there is evidence that active involvement of the community in rehabilitation and environmental research promotes more responsible actions. We should value local community-based projects for rehabilitation and research (eg. the RIVER Group) as valuable educational opportunities for fostering sustainable actions. It will take time to challenge established ways and change how we use and manage resources. While it is essential to monitor and evaluate the effectiveness of education programs for sustainability, we must recognise that long-term commitments to support these programs are needed by the community, government and industry.

❖ WHY IS COMMUNICATING SUSTAINABILITY IMPORTANT?

A better understanding of our impacts on the environment may reduce detrimental activities and increase practices that are more sustainable for the use and management of natural resources.

❖ WHAT CAN WE DO ABOUT IT?

We can understand what activities are detrimental to the health and functioning of our ecosystems and learn how to modify our practices to be more sustainable.

❖ WHAT CAN THIS STRATEGY ACHIEVE?

- ★★ Better understanding of the broad concept of ecologically sustainable development.
- ★★★ Easy access to information on specific practices and their effects on the local environment.
- ★★ Long-term education and communication programs targeted at relevant sections of the community, industry and government, aimed at promoting sustainable practices.

Future Steps

The Community Plan for Natural Resource Management identifies directions for improving the health and prosperity of Townsville-Thuringowa. It is essential that the Plan is acted upon. We have identified that the many existing local initiatives and efforts for the environment need to be strengthened and integrated. Some new environmental activities need to be initiated. Links are required between this Plan and other regional planning processes, such as the Townsville-Thuringowa Strategy Plan and the two Local Government Planning Schemes.

THE NATURAL RESOURCES AND ENVIRONMENT FORUM (NaREF)

A number of Local and State Government departments, industry associations and voluntary organisations have a role in looking after the environment and natural resources in Townsville-Thuringowa. Appendix E is a snapshot of "who does what" for the environment in Townsville-Thuringowa. It is clear that more communication is needed between these bodies. The Natural Resources and Environment Forum (NaREF) was formed in 1999 as a forum and an umbrella organisation for these groups and bodies. NaREF is intended to:

- ✓ bring all these organisations together to improve communication between them;
- ✓ allow them to co-ordinate activities to deliver their efforts more efficiently;
- ✓ keep track of progress of the various environmental activities underway in Townsville-Thuringowa;
- ✓ continue strategic planning and oversee updates to this Plan.

Membership to NaREF is open to anyone or any organisation with an interest in natural resource management in Townsville-Thuringowa. For more information, contact the Landcare Centre or email NaREF at: naref@start.com.au

This Plan is a "living" document. As time goes by, it will need to accommodate new priorities, opportunities, and changes brought about by implementation and completion of some actions. An ongoing process of assessment and revision is required. A key role of NaREF is to assess the progress of local activities against the targets that are set in the *Action Plans*. Based on this process, NaREF will initiate new projects and undertake appropriate revisions of the Plan.

FUTURE COMMUNITY ACTIVITIES AND FUNDING

The Commonwealth and State Governments have administered a series of funding programs over recent years to support community and agency projects for natural resource management and environmental conservation. They include: the Natural Heritage Trust and its sub-components (e.g. Bushcare, Coastcare, Landcare, Rivercare and Waterwatch); and the National Action Plan for Salinity and Water Quality. These programs have supported local projects like the revegetation of Ross River and Stuart Creek, and the rehabilitation of Louisa Creek. This Plan will be used by funding bodies to assess project proposals and deliver future funding to the community of Townsville-Thuringowa in an equitable and effective manner for the best natural resource outcomes. Community groups should use this Plan as a guide to develop and implement on-ground projects that address priorities for local natural resource management.

Appendix A: Glossary

ACID SULFATE SOILS

Soils which, when exposed to air, produce sulfuric acid. They also produce soluble aluminium and, sometimes, precipitation of iron flocs.

ANIMAL PESTS

Animals which are not native and have detrimental impacts, either to the natural environment or to human activities. Many of these animals are not native to Australia and are the descendants of escaped domestic animals. Problems caused include killing or displacing native animals, destroying native vegetation or crops or breaking down riverbanks.

ANTHROPOGENIC

Caused by humans

BIODIVERSITY

The variety of nature's biological manifestations, including the genetic make-ups of plants, animals and micro-organisms, and the communities and ecosystems that they form.

BIOLOGICAL DIVERSITY

See Biodiversity.

CATCHMENT

The area of land delimited by natural boundaries, such as hills and ranges, that drain rainfall into one lower point, such as a watercourse, dam or ocean. Also see "Sub-catchment".

CFC CHLORO-FLUOROCARBON

A gas used in old refrigerators and many air-conditioning systems. When released into the atmosphere, it reduces the amount of ozone. Ozone is crucial for life on Earth, as it absorbs harmful radiation from the sun.

CHARISMATIC MEGAFAUNA

Animal species that evoke an emotional response in the public, such as dolphins, Dugongs, turtles and whales.

COASTAL EROSION

Erosion of beaches, sand dunes and cliffs in coastal areas.

COASTAL ZONE MANAGEMENT

Management of the diverse activities undertaken by human populations along the coastal strip and in inshore marine environments.

COMMUNITY

A naturally occurring group of organisms of different species that occupy a common environment.

CONNECTIVITY

The habitat links between larger patches of habitat or different kinds of habitats. Connectivity is important for biological functions like survival of local populations of wildlife.

ECOLOGICALLY SUSTAINABLE DEVELOPMENT

Development which uses natural resources without depleting them, that is, it occurs within the capacity for self-renewal of resources, species and ecosystems.

ECOSYSTEM

A system of plants, animals and micro-organisms and the non-living features of their environment. In an ecosystem, all forms of life interact with each other and their non-living environment as an ecological unit. We can talk about ecosystems at different levels, such as a dune ecosystem or the whole world as one ecosystem.

ENVIRONMENTAL WEED

A plant growing in an area where it is not naturally found and which is displacing or destroying the native vegetation and habitats. A number of garden plants, have escaped to become environmental weeds. These may also be called exotic weeds. Some Australian native plants can be environmental weeds when introduced to a locality outside their natural distribution. Also see weeds.

FERAL ANIMALS

Animal species that are foreign to the area, but are living and reproducing in the wild. Unlike domestic animals, their needs (food and shelter) are not dependent on humans.

FIRE REGIMES

The timing and types of fires in vegetated ecosystems, that maintain ecosystems in a given state. Altering the fire regime in an area can change the vegetation over time and alter the ability of particular animals to survive there.

FISH HABITAT

Lands, waters and vegetation associated with, and essential to, the life cycle of fish (including crustacean) populations. Examples include seagrass beds, mangroves and estuarine environments.

FRINGING REEFS

Coral reefs that grow very close to the shore, along the mainland and around continental islands.

GROUND WATER

Water that is below the ground and occupies pores and crevices in rocks and sediments.

HABITAT

The living environment of a species or a community that consists of a particular set of environmental conditions. A species may need more than one habitat to perform different functions.

HC HYDROCARBON

A gas used in cooling systems and as a propellant in aerosol cans. When released into the atmosphere, it reduces the ozone layer. Ozone is crucial for life on Earth, as it absorbs harmful radiation from the sun.

INTEGRATED CATCHMENT MANAGEMENT

Management of land-use and water-use based on the principle that the uplands and lowlands are connected through waterways and drainage lines, and activities carried out in the upper catchment have consequences downstream.

LOCAL PROVENANCE PLANTS

Plants, seedlings and seeds, that come from local populations.

MORPHOLOGICAL PROCESSES

Natural processes that shape and change the Earth's physical features, e.g. weathering of rocks, cliffs, dunes, mudflats, etc, by wind or water, to produce or shift soil, sand or sediments.

NON-POINT SOURCES (OF POLLUTION)

Activities that release pollutants into the environment in a diffused way, e.g. use of pesticides in agriculture that are transported to waterways and the ocean via runoff.

POINT SOURCES (OF POLLUTION)

Activities with an identifiable point of discharge of pollutants, e.g. the outlet of a sewerage treatment plant.

RAMSAR SITES

Wetlands declared as internationally important for conservation of waterbirds under the Ramsar International Convention.

REHABILITATION

Returning an area to the condition it was in before it was degraded or developed, e.g. replanting native vegetation after logging or mining.

REMNANT VEGETATION

Remaining areas of native plant communities in a landscape that has been mostly cleared. It does not refer to individual trees or shrubs scattered in paddocks or urban areas.

RIPARIAN

Occurring along a waterway or a lake, e.g. riparian vegetation refers to the plant communities lining a stream.

SALINITY

The concentration of salt in the water or the soil.

SOIL EROSION

Loss of top soil.

SUB-CATCHMENT

See "Catchment". A sub-catchment is a sub-section of a larger catchment area. For example, a river may have several streams feeding into it, and the catchment of each stream is a sub-catchment in the larger river catchment.

SURFACE WATER

Water that is above, or close to, the ground surface.

SUSTAINABILITY

The capability of human activities, development or resource use to occur in a way that ensures the ability for renewal or regeneration of species, ecosystems and resources.

VEGETATION REMNANTS

See Remnant vegetation

VOLUNTARY CONSERVATION AGREEMENT

An agreement voluntarily entered into by a landholder with the state government in which the landholder agrees to conserve an area of private property in its natural state. Nature refuges are made under these Agreements.

WATER QUALITY

The condition of water, as indicated by how clear it is, how much salt is in it, how acid or alkaline it is, how much oxygen is in it, whether or not it contains toxic substances, etc. Standards for water quality vary depending on what the water is required for, for example, whether it is for human consumption, irrigating crops, or discharging to the environment.

WEEDS

Plants that have the potential to damage native ecosystems (environmental weeds), primary production (production weeds) and human health (health weeds). See also Environmental weeds.

WETLAND

An area covered with fresh- or saltwater, which can be still or running, and which can be permanent, seasonal or intermittent (e.g. flooded by the tide).

WILDLIFE CORRIDORS

Areas of native vegetation that link habitats, thus allowing movement of wildlife between different habitats.

Appendix B: List of Acronyms

AgForce - Peak agricultural body representing farmers	NHT - Natural Heritage Trust
ACTFR - Australian Centre for Tropical Freshwater Research	NP - National Park
AHD - Australian Height Datum	NQCC - North Queensland Conservation Council
ASS - Acid Sulfate Soil	NQEBC - North Queensland Electricity Board (now Ergon)
ATCV - Australian Trust for Conservation Volunteers	NQMCCN - North Queensland Marine and Coastal Communities Network
BDTRSG - Burdekin Dry Tropics Regional Strategy Group	NRM - Natural Resource Management
BPA - Beach Protection Authority	NRWG - Natural Resources Working Group (TTSP)
CBC - Cleveland Bay Consortium	PA - Protected Area
CFC - Chloro-fluorocarbon	PASS - Potential Acid Sulfate Soil
CMU - Catchment Management Unit	PMP - Property Management Plan
CoT - City of Thuringowa	QCFO - Queensland Commercial Fishermen's Organization
CRC - Cooperative Research Centre	QNI - Queensland Nickel Industries
CRRP -Community Rainforest Reaforestation Program	QPWS - Queensland Parks and Wildlife Service
CSIRO - Commonwealth Scientific and Industrial Research Organisation	QRail - Queensland Rail
CZM - Coastal Zone Management	R & D - Research and Development
DCILGP - Department of Communication, Information and Local Government Planning	R & D & E - Research, Development and Education
DME - Department of Mines and Energy Queensland	RE -Regional Ecosystem
DNR - Department of Natural Resources Queensland	Reef HQ - Aquarium business area of GBRMPA
DNRM - Department of Natural Resources and Mines, Queensland	RFS - Rural Fire Service
DPI - Department of Primary Industries Queensland	RIVER - Ross Island Volunteers for Estuarine Research
EPA - Environmental Protection Agency-	SGAP - Society for Growing Australian Plants
ESD - Ecologically Sustainable Development	TAFE - Technical and Further Education
FHA - Fish Habitat Area	TAG -Traditional Owner Group
GA - Greening Australia	TCC - Townsville City Council
GBRMPA - Great Barrier Reef Marine Park Authority	TEAG (NQCC) - Townsville Energy Action Group (Nth Qld Conservation Council)
GBRWHA - Great Barrier Reef World Heritage Area	TEL - Townsville Enterprise Limited
GIS - Geographic Information System	TESAG - Tropical Environmental Studies and Geography
HC - Hydrocarbon	TRMRAC - Townsville Region Marine Resources Advisory Committee
ICM - Integrated Catchment Management	TMBC - Townsville Motor Boat Club
IEMP - Integrated Environmental Management Program	TPA - Townsville Port Authority
IPA - Integrated Planning Act	TRBOC - Townsville Region Bird Observers' Club
IQQP - Integrated Quality and Quantity Planning	TSCRC - Tropical Savannas Cooperative Research Centre
JCU - James Cook University	TThLA Townsville Thuringowa Landcare Association
L & C - Landcare and Catchment	TTSP - Townsville-Thuringowa Strategy Plan
LCMC – Landcare and Catchment Management Council	TTWSB - Townsville-Thuringowa Water Supply Board
LG - Local Government	TUPALG - Tropical Urban Production and Landcare Group
LGA - Local Government Area	USL - Unallocated State Land
LGPCA - Local Green Production and Consumers' Association	VMO - Vegetation Management Officer
LWRRDC - Land and Water Resources Research and Development Corporation	VTG - Vegetation Task Group
MINCA - Magnetic Island Nature Care Association	WAG - Woodstock Action Group
LMAC - Local Marine Advisory Committee	WPSQ - Wildlife Preservation Society of Queensland
MCCN - Marine and Coastal Communities Network	WTG - Weeds Task Group
NAR - Natural Assets Register	WHEN -World Home Environment Network
NaREF - Natural Resources and Environment Forum	WTMA - Wet Tropics Management Authority
	WTWHA - Wet Tropics World Heritage Area
	WWTG Wetlands and Waterways Task Group

Appendix C: Rationale for Prioritising Desired Outcomes in the Community Plan

Prioritising the Desired Outcomes in the Strategies and Action plans was conducted by the Strategy Sub-committee of TThLA in a series of workshops during September and October 2000. The Desired Outcomes were deemed the most appropriate level at which to assign priorities, as the Strategies themselves are too broad to chose between and the individual actions are in a natural chronological order (ie. one often has to be completed before the next can begin). The process was made as objective and quantitative as possible. However, it was recognised that an inflexible quantitative approach might produce some undesirable results. Priorities were assigned using three steps.

Step 1: All 115 Desired Outcomes in the Strategies were given a preliminary priority on a three-point classification scheme (VERY HIGH, HIGH or MEDIUM) during committee workshops. (No desired outcomes were deemed low priorities since they already had been included in the Plan). This preliminary classification was establish a qualitative prioritisation that could be compared with the more quantitative Step 2. In effect it was a safety net. From the outset, two limitations were anticipated with this step:

- (a) in giving priorities according to only one, "all-encompassing" criterion, a number of independently varying factors were being considered at once (ie, environmental significance, financial issues, time frames and other issues could not be considered separately), and consequently a bias towards environmental significance was expected regardless of more practical issues; and
- (b) the resulting range of scores (1 to 3) was too narrow to clearly separate the large number of desired outcomes.

Step 2: all 115 Desired Outcomes were reassessed according to five prioritisation criteria: (i) environmental significance; (ii) likelihood of achievement; (iii) financial and other resources likely to be available; (iv) commitment of relevant sectors within the community; and (v) time-frame (which includes both the issue of prerequisite actions and the likely duration of the outcome).

For each Desired Outcome, each of the above five criteria were independently given a score between one and three. The five scores were summed so that each Desired Outcome had a score of between 5 and 15. Those scoring less than 7 were labelled MEDIUM, those between 7 and 10 were labelled HIGH, and those 11 and above were labelled VERY HIGH.

Step 3: The Desired Outcomes were sorted in order of their priority scores from Step 2, and compared to priorities from Step 1. Incongruous results were then re-examined by the Sub-committee. Consideration was given to adjusting Step 2 priorities where the particular circumstances justified extra weighting for one or more of the criteria. Pleasingly, intervention occurred in no more than 5% of the Desired Outcomes.

This process has resulted in a prioritisation of Desired Outcomes for the Plan that considers a range of idealistic and realistic issues, and is essentially objective and quantitative, but which has allowed the Strategy Sub-committee some leeway to moderate the results with its in-depth knowledge of the Sub-Region's environmental and economic resources, social framework and politics.

Below is an example of the score sheet used for Step 2.

Part	Desired Outcomes	Desirability	Achievability	Commitment	Resources	Timeframe	Priority
1.1.1	Adoption of a framework of catchment units for the integrated planning and management of natural resources.	3	3	2	2	3	13 (VH) ★★★
1.1.2	Integrated catchment-based information management system which builds on existing data, further research and on-going monitoring.	3	2	3	1	2	11 (H) ★★
1.1.3	Promotion, integration and coordination of community involvement in catchment-care initiatives.	3	2	3	2	2	12 (VH) ★★★
2.1.1	A sound broad-based understanding of the condition of and threats to native vegetation across the sub-region.	3	2	3	3	1	12 (VH) ★★★
2.1.2	Improved management of all native vegetation within urban and rural areas on both public and private lands.	3	2	1	2	1	9 (H) ★★
2.1.3	Restriction on clearing and incentives for retaining and/or restoring vegetation to protect biodiversity, water quality, catchment processes and to prevent further land degradation.	3	1	3	2	2	11 (VH) ★★★
2.1.4	A community that understands and appreciates the values of the landscape.	3	1	2	1	1	8 (H) ★★
2.1.5	Effective protection and management of high conservation areas, and threatened ecosystems & plant species through adequate management, local gov. planning and Voluntary Conservation Agreements.	3	3	3	2	2	13 (VH) ★★★
2.2.1	A strategic approach to selection & prioritisation of areas for revegetation & rehabilitation projects.	3	3	3	2	2	13 (VH) ★★★

Appendix D: Contributors to this Plan

This document was prepared for Townsville-Thuringowa Landcare Association (TThLA) by Barbara Musso. The project was funded under the Natural Heritage Trust program and was managed and overseen for TThLA by the Strategy Sub-committee. Many people, representing a variety of organisations and interests, participated in this process. Four Working Groups were formed from an initial stakeholder Workshop, to consider key areas of interest for natural resource management in Townsville-Thuringowa. The Working Groups met regularly to discuss priorities and objectives, and their findings became the foundations of this document. The members of these committees are listed below

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COMMUNITY EDUCATION WORKING GROUP

Barbara Muso, David James, Con Lokkers, Jane Nixon & Mark Simmons (TTLA), Sue Gardiner (EPA), Sue O'Brien (TCC), Jim Turnour (DPI), Tanya Korn (RIVER).

Many people not formally participating in the Working Groups, have provided contributions, useful comments and support to this document. Stefanie Roth (now at the Department of Defence) contributed to the planning and development of this project. Significant contributions were made by: Angela Williams (GA and Burdekin Dry Tropics Group); Daniel Walker and Stuart Cowell (CSIRO Tropical Agriculture); Jeremy Tager (NQCC); Karen Robinson (previously GBRMPA); Annie Reynolds (previously MCCN); Ross Hynes (CRC Savannas); Jim Tait (previously ACTFR); Gethin Morgan and Jeremy Taylor (EPA); Colton Perna (Earthworks); Alf Hogan and Chud Lunow (DPI); Ian Boyce, Peter Gilbey, Helen Dawson, Kim Hillier (DNR); Peter Sakkas (Main Roads); Peter Phillips and Peter Langford (QRail); Marina Lafratta; Hugh Yorkston (GBRMPA); Graham Ward (RIVER); Colin Bunker (Dept. State Development); Tania Ashworth (Coastcare); David Reid; Glenda Jefferies; the TRMRAC; and the Burdekin Dry Tropics Group.

The Draft Policy Papers for the Townsville Thuringowa Strategy Plan (1996), were used extensively as a basis for discussions by the Working Groups.

TThLA is extremely grateful to all individuals and organisations that contributed to this community process.

Appendix E: Organisations Involved with the Environment in Townsville-Thuringowa

STATUTORY AGENCIES

- **Department of Communication and Information, Local Government, Planning and Sport (DCILGPS):** Through its Planning Services section, the department implements and manages best practice planning and development assessment systems, principally through the Integrated Planning Act 1997 (IPA). The system is designed to bring all relevant State and local government approvals into one common process called the Integrated Development Assessment System (IDAS), which focuses on achieving ecologically sustainable development through integrated planning that balances social, economic and environmental considerations. The department maintains the legislative and regulatory framework for the conduct of planning and development. With key clients and stakeholders, it supports the preparation and implementation of regional planning strategies and provides an extensive range of essential planning information to meet client needs and help users of the planning system. On request, the Department also assists local governments and others to resolve land use and development issues.
- **Department of Main Roads (MR) Queensland:** has a mission to plan, deliver and operate a road system that promotes environmentally sustainable transport solutions and has implemented an environmental management system for planning, design, construction and maintenance operations to ensure that environmental considerations are incorporated at every stage and in a way to suit local conditions.
- **Department of Mines and Energy (DME) Queensland:** manages Queensland's mineral and energy resources including electricity and gas, coal, gold, copper, bauxite, zinc, silver, lead, gemstones. Major roles are management of tenure and provision of geo-scientific information for exploration. The Department also protects Queensland's environment through responsible management of mineral and energy exploration and development. A policy for Environmental Management of Mining in Queensland was developed in 1991 with assistance of other Departments and the mining industry. Currently an Environmental Protection Policy is being developed for the industry.
- **Department of Natural Resources (DNR) Queensland:** has a mission to support the economic growth of Queensland through the sustainable use, development and management of land, water and native vegetation resources, while protecting the rights and interests of both the individual and the community and has, therefore, developed a range of products and services for its clients.
- **Department of Primary Industries (DPI) Queensland:** the key priority of the department is that its service delivery meets the needs of its clients. Staff, including extension officers, industry development officers, veterinarians, scientific research officers and stock inspectors, directly deliver services to clients in diverse primary industry enterprises in all areas of the State.
- **Environmental Protection Agency Queensland:** key functions are environmental planning, environmental policy and economics, environmental operations, sustainable production, environmental and technical services, public affairs, corporate development, and corporate performance and risk. clean air and water, minimal noise and waste, conserving all forms of life on land and in the water, nature-based recreation and business, and cultural heritage.
- **Great Barrier Reef Marine Park Authority (GBRMPA):** has the goal of providing for the protection, wise use, understanding and enjoyment of the Great Barrier Reef in perpetuity through the care and development of the Great Barrier Reef Marine Park. and is the lead agency for Great Barrier Reef World Heritage Area issues. The Authority is the principal adviser to the Commonwealth Government on the care and development of the Great Barrier Reef Marine Park. The Authority undertakes a variety of activities including: developing and implementing zoning and management plans; environmental impact assessment and permitting of use; research, monitoring and interpreting data; and providing information, educational services and marine environmental management advice. Day-to-day management of the Great Barrier Reef Marine Park is carried out by Queensland agencies subject to the Authority's mandate.
- **Townsville Port Authority (TPA):** manages the Townsville Port and other land owned by the Port. It has an environmental working group which aims to facilitate the continued development and implementation of integrated and coordinated environmental management objectives to ensure protection and maintenance of the port environment.

- **Department of Defence:** Manages and owns large areas of land in the Townsville District used for defence activities, including the High Range Field Training Area inland from Townsville. The Department of Defence takes environmental management of its land and activities very seriously.
- **Townsville Thuringowa Water Supply Board (TTWSB):** has the role of ensuring a sustainable supply of high quality water at the best economic price for the cities of Townsville and Thuringowa. In September 1999 it adopted an environmental policy which committed it to "Ensure that the harvesting, treating and distribution of water is achieved in an ecologically sustainable manner so as to protect and enhance the water supply catchment for future use and enjoyment". It has implemented an environmental management system designed to conform to the International Standard for Environmental Management Systems ISO AS/NZS 14001:1996 and has been recommended for certification to this standard.

COUNCILS

- **Townsville City Council:** is responsible for the Townsville Local Government Area which covers (approximately) the areas south of Ross River, as well as the coastal area north of the river that surrounds the city area (i.e. approximately from Gleeson's Weir to the Bohle)
- **City of Thuringowa:** is responsible for the Thuringowa Local Government Area that is north of Ross River, extending up to Paluma.

COMMUNITY GROUPS

- **Australians for an Ecologically Sustainable Population Inc. (AESP) - North Qld Branch:** AESP is a national organisation, formed in 1988, with branches in every state. The north Queensland branch, based in Townsville, was formed in 1990. We have six objectives, the main ones being to contribute to the public awareness of the limits of Australia's population growth from ecological and social viewpoints and to promote policies that will lead to the stabilisation of global population.
- **Australian Trust for Conservation Volunteers (ATCV):** is a national, non-profit, practical, conservation volunteer organisation. Its mission statement is "To attract and manage a force of volunteers in practical conservation projects for the betterment of the Australian environment". It undertakes a range of projects, on both a residential and a non-residential basis, including tree planting and seed collection; erosion and salinity control; construction and maintenance of walking tracks; endangered flora and fauna surveys; weed control; habitat restoration; and heritage restoration. It also conducts special school programs.
- **Coastcare:** a Commonwealth, State and local Government program whose objective are to promote within local communities, including industries a sense of stewardship for coastal and marine areas; to provide opportunities and resources for residents, volunteers, business and interest groups to participate in coastal management; to support community identification of natural and cultural heritage resources and to facilitate interaction between the community and various departments with a responsibility for managing coastal areas. A facilitator, who can assist community groups with Coastcare funding applications and projects designed to meet the program's objectives is located at the Environmental Protection Agency at Pallarenda.
- **Greening Australia (GA):** works with the community to achieve sustainable land and water resources, primarily through improving vegetation management practices. With the support of the Natural Heritage Trust Bushcare program, runs the Burdekin Bushcare Support Centre, which assists community groups, that have received Bushcare funding or are involved in native vegetation management. Bushcare Support Officers from Greening Australia provide technical assistance project development, training and educational assistance to these groups
- **Magnetic Island Nature Care Association (MINCA):** is concerned predominantly with habitat protection and revegetation on Magnetic Island.
- **Marine and Coastal Community Network (MCCN):** a non-profit, government funded community based organisation which strives to ensure community input into marine and coastal management. Involved in a number of activities, directly and indirectly, e.g. Ocean Care Day.
- **North Queensland Conservation Council Inc.(NQCC):** a non-profit, non-government organisation, with an area of primary concern stretching from Tully to Proserpine and the Northern Territory border to the Great Barrier Reef. Acts as a coordinating body for those who are concerned with the threats to the natural environment in urban, rural and wilderness contexts and who wish to do something about it. Its main foci are the Great Barrier Reef, tropical rainforest, coastal woodlands and other wilderness areas. Its primary aim is the attainment of a socially and ecologically acceptable balance between development, resource consumption and lifestyle. It is involved in campaigning, lobbying, researching and educating on behalf of the environment.

- **North Queensland Wildlife Care Inc. (NQWC):** aims to care for sick, injured and orphaned wildlife, to educate the community, to provide mutual assistance, support and information between members, to provide access to veterinary services at minimum cost and to provide access to release sites approved by the Environmental Protection Agency. Runs wildlife care training courses and produces a resource book and individual animal manuals. Has speakers available for groups and operates a 24 hour phone advisory service.
- **Ross Island Volunteers for Estuarine Rehabilitation (RIVER):** a, volunteer, environmental monitoring group which aims to raise community awareness of the importance for biodiversity and productivity and the vulnerability of our river systems. Its main objective is to involve the community in collection of background data on these systems. Volunteers can participate in various activities ranging from assisting with school programs and conducting guided walks and talks for the public, to collecting monitoring information.
- **Sunfish (Queensland) Inc.:** a group whose mission statement is to ensure a quality recreational fishing experience. Its goals are to: establish itself as the representative of Queensland fishers; obtain meaningful participation in the management of the state's fisheries resources to obtain ecological sustainability; maintain and improve recreational access to fishing grounds; support and influence research and its directions; support an equitable share of fisheries resources; achieve responsible recreational fishing practices; promote fishing as a desirable recreational and sporting activity of economic, social and cultural importance and achieve financial viability. Its beliefs and values are that: recreational fishing is an activity of economic, social and sporting value; the maintenance of environmental values is intrinsic to the recreational fishing experience; the wise use of this state's fishing resources is the responsibility of all individuals; and SUNFISH will represent the interests of all recreational fishers with vigour, equity and accountability.
- **Townsville Bird Observers Club (TBOC):** actively engages in birdwatching and through observation, adds to the knowledge of the regions birds. Aims to increase awareness of general environmental issues relating to maintaining a diversity of native bird habitats, through regular monitoring and involvement with other environmental groups and government agencies.
- **Townsville Independent Wildlife Carers Inc.:** a volunteer group involved in raising, rehabilitating and releasing orphaned and injured wildlife. It trains volunteer carers, supplies care information to the public, mounts community displays and supplies speakers for school education programs. It also runs an animal sponsorship program called Foster a Bush Baby.
- **Townsville - Thuringowa Landcare Association Inc. (TThLA):** concerned with broad NRM and ICM issues and promoting them amongst the community. Examples of the Association's past activities include workshops and reports on fire management, soil erosion and integrated catchment management. However, in recent years the membership of the association has reflected a more "urban landcare" approach.
- **Tropical Urban Production and Landcare Group(TUPALG):** community Landcare group known best for their Bush Garden established on the banks of the Ross River. They also have a small nursery where they propagate and grow local native species for their own revegetation activities and for use in other community revegetation projects.
- **Wildlife Preservation Society of Queensland Inc. Townsville (WPSQ):** aims to increase public awareness of the rich natural assets of our region and to foster greater understanding of the importance of the natural environment to our community. Environmental education is a major objective. Offers financial, physical and lobbying support for projects and issues related to sustaining the environment and its biodiversity. Conducts a program of monthly meetings with a guest speaker and monthly outings to local areas of environmental significance.
- **Wildseeds:** established in 1999, Wildseeds is a not for profit community group dedicated to the collection and storage of indigenous plant seed and to the promotion, use, appreciation and conservation of local indigenous plants and ecosystems.

RESEARCH ORGANISATIONS

- **Australian Centre for Tropical Freshwater Research (ACTFR):** a research and consultancy centre established within James Cook University of North Queensland to promote water research, technology and information transfer to industry. The ACTFR has shifted from being solely a centre for water research, to one with an interdisciplinary and holistic approach to environmental projects. The current focus for natural resource research and management is ecological sustainability and the successful integration of conservation and development. As a result of its technical expertise which now includes aquatic fauna, mangrove ecosystems, water quality and water resources, hydrology, wetlands and stream ecology, artificial wetlands, terrestrial and aquatic flora and terrestrial fauna, ACTFR has successfully developed, undertaken and completed a large number of integrated environmental research and consulting projects.

- **Australian Institute of Marine Science (AIMS):** established by the Commonwealth government in 1972, the mission of AIMS is to generate the knowledge to support the sustainable use and protection of the marine environment through innovative, world-class scientific and technological research. It has greatly advanced knowledge of the world's tropical seas and its animal and plant life. It has mapped the length and breadth of the Great Barrier Reef and its physical and chemical cycles, described all of the coral species, and built a knowledge-base that has been the cornerstone of the Reef's management. Its monitoring program covers 60 reefs per year.
- **Commonwealth Scientific and Industrial Research Organisation (CSIRO):** is involved in multi-disciplinary scientific research and development in all industry sectors, offering a range of services including research and development, advice and testing. It works with industry and other potential research users to exploit opportunities created by research and development. Types of commercial arrangements include collaborative research, contract research, commercial licensing agreements and consulting and technical services.
- **Cooperative Research Centre for the Sustainable Development of Tropical Savannas (TSCRC):** a joint venture, established and supported by the Commonwealth Cooperative Research Centres Program, of three universities, CSIRO, Environment Australia, and government departments from Western Australia, Northern Territory and Queensland, it has a mission to achieve sustainable use and conservation of Australia's tropical savannas through excellence in collaborative research, communication and education. Its research themes are the North Australia landscape - looking at mapping, description and conditions, landscape processes, ecosystem management - looking at the effects of various activities and human capability development - looking at building the knowledge and skills of stakeholders in tropical savannas.
- **Cooperative Research Centre for Sustainable Sugar Production:** a joint venture between a number of sugar industry companies, Canegrowers, the Sugar Research and Development Corporation, Bureau of Sugar Experiment Stations, CSIRO, DNR and three universities with the support of the Cooperative Research Centres Program, it aims to deliver outcomes based on collaborative, multi-disciplinary research and development that build the skills and technology for a competitive and environmentally responsible sugar industry.
- **CRC Reef Research Centre (CRC Reef):** a joint venture between the Association of Marine Park Tourism Operators, AIMS, DPI, GBRMPA, James Cook University, QCFO and Sunfish with the Cooperative Research Centre Program, it has the mission statement "Science for the ecologically sustainable development of the Great Barrier Reef World Heritage Area". It undertakes an integrated program of applied research and development, training and extension aimed at enhancing the viability of and expanding sustainable Reef-based industries and economic activity, with particular emphasis on tourism, and providing an improved scientific basis for Reef management and regulatory decision making.
- **Tropical Environmental Studies and Geography (TESAG):** an academic department of James Cook University which focuses on natural resource management, environmental studies and geography in tropical environments.

INDUSTRY GROUPS

- **Agforce:** peak agricultural body representing primary producers in the region.
- **Queensland Commercial Fishermen's Organization (QCFO):** has a mission to provide industry leadership and quality representation on behalf of Queensland commercial fishermen. It is committed to both ecologically sustainable development and facilitating future economic development in the industry. It has a Resource Access and Sustainability Program with the overall goal of ensuring Queensland commercial fishermen have secure access to sustainable fisheries resources and an Industry Sustainability and Development Program which has an overall goal of sustainable development of the Queensland commercial fishing industry.

Appendix F: Relevant Policies and Plans

Strategies, Guidelines And Policy Statements	Links To The Townsville-Thuringowa Community Plan
International:	
China-Australia Migratory Birds Agreement 1976 (CAMBA)	Obliges Australia to protect habitats of listed birds that migrate between the two countries.
Japan-Australia Migratory Birds Agreement 1974 (JAMBA)	As above.
International Convention for protection of waterfowl and their habitat 1971 (Ramsar Convention)	Obliges Australia to use all wetlands wisely and conserve them through land use planning, reservation, research and management
Convention for the Protection of Migratory Species (Bonn Convention)	Obliges Australia to protect the listed migratory species of animals
National:	
National Strategy for Ecological Sustainable Development (1992)	Provides for development that improves the total quality of life, now and in the future, in a way that maintains the ecological processes on which life depends.
National Strategy for the Conservation of Australia's Biological Diversity (1996)	Provides for protection of biological diversity and maintenance of ecological processes and systems.
Inter-governmental Agreement on the Environment (1992)	Establishes the 'ground rules' under which all tiers of governments will interact on the environment and includes a broad set of principles to guide the development of environment policies in Australia.
National Water Quality Management Strategy (1998)	Aims at achieving sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development.
Vertebrate Pest Strategy (1993)	Aims at reducing the detrimental impact of feral pest animals on natural ecosystems, native wildlife and sustainable production
National Weeds Strategy (1997)	Aims at reducing the detrimental impact of weeds on natural ecosystems and sustainable production
Wetlands Policy of the Commonwealth Government of Australia (1997)	Provides for wetlands conservation via partnership with the States.
National Principles For The Provision Of Water To Ecosystems (1996)	Aims at sustaining and where necessary restoring ecological processes and biodiversity of water dependent ecosystems
Draft National Strategy for Rangeland Management (1996)	Provides guidance for achieving the ecologically sustainable development of Australia's rangelands
National Local Government Biodiversity Strategy (1998)	Outlines the role of Local Government in progressing the implementation of the National Strategy for the Conservation of Australia's Biological Diversity
National Greenhouse Response Strategy (1998)	Provides the strategic framework for advancing Australia's response to the global issue of increased greenhouse effect
Keeping it Great: a 25 Year Strategic Plan for the Great Barrier Reef World Heritage Area (1994)	Aims at ensuring persistence of GBRWHA while retaining opportunity for use consistent with Australia's international obligations (World Heritage Convention).
Queensland:	
Queensland Decade of Landcare Plan (1992)	Sets out a 10-year plan for achieving viable agricultural and pastoral systems while conserving natural resources and protecting the environment
Queensland Integrated Catchment Management Strategy (1991)	Aims at achieving sustainable and balanced use of land, water and related biological resources.
Strategy for the Conservation and Management of Queensland Wetlands (1999)	Aims at managing wetlands in accordance with the National Strategy for Ecologically Sustainable Development
Land Use Practices for Wet Tropical Floodplains (1998)	Provides guidelines for agricultural land development on the wet tropical coast that is sustainable and with minimal adverse impacts.
Queensland Wastewater Reuse Strategy (1998)	Provides a framework to maximise reuse of urban, rural and industrial effluents in an efficient, economic and ecologically sustainable way.
Vegetation Management Act (1999)	New legislation governing clearing of native vegetation on

Strategies, Guidelines And Policy Statements	Links To The Townsville-Thuringowa Community Plan
	freehold land, makes it assessable under the Integrated Planning Act (1997)
Land Act (1994)	Governs vegetation management on leasehold and other state lands
Broadscale Tree Clearing Policy (1997)	Seeks to balance environmental objectives in vegetation management with sustainable agricultural and pastoral production
Integrated Planning Act (1997)	Requires that local governments must develop a new planning structure
Development and the conservation of good quality agricultural land (1992)	Provides for the protection of good quality agricultural land from other uses.
Draft State Coastal Management Strategy (2000)	Provides for the management of coastal areas, particularly management of development
The Environmental Code of Practice for Agriculture	Provides guidance for agricultural practices to comply with the General Environmental Duty of Care (<i>Environmental Protection Act 1994</i>)
Regional:	
Townsville Thuringowa Strategy Plan Draft Policy Papers (1996)	Provide background information, strategic direction and recommendation for the development of the TTSP
Townsville Thuringowa Strategy Plan (TTSP) (2000)	Provides a regional policy framework for the future development and growth of the region, which aims at balancing economic, social and environmental objectives.
Townsville Industrial Land Project (1998)	(State driven) Aims at identifying the best area for future industrial development of the Townsville region.
Local:	
Townsville City Council Soil Erosion and Sediment Control Policy and Guidelines (1999)	Aims at minimising land degradation as a result of urban development.
Townsville City Council Planning Scheme (1994 - currently under review)	Aims at facilitating the proper use and management of land and resources in the Local Government Area while promoting, among others, environmental welfare
Thuringowa City Council Planning Scheme (1996)	As above
Townsville City Council Revegetation Strategy Draft (1998)	Provides guidelines for prioritising sites for revegetation and implementing revegetation projects
Townsville Urban Storm-water Quality Management Plan (1999)	Aims at protecting the environmental values in streams, drainage lines and wetlands in the Local Government Area
Thuringowa Urban Storm-water Quality Management Plan (1998?)	As above
Ross River South Bank Conservation Management Plan (1992).	Aims at managing activities in the South Bank for the protection of conservation values
Castle Hill Management Plan (1993)	Provides a plan for protect, restore and maintain the integrity of Castle Hill as an ecological entity within the open space system of Townsville
Magnetic Island Management Plan (1990)	Provides a broad framework for the future use and development of Magnetic Island
Bays of magnetic Island Draft Management Plan (1994)	Provides clear directions for conservation, recreation and resource use of Magnetic Island's bays and fringing reefs

This is not meant as an exhaustive list. Other plans and policies exist that are relevant to management and protection of specific sites and resources in the sub-region.

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Appendix H: Example Action Plan

Action Plan 1.1 "Whole-of-catchment" Approach		
Desired Outcomes (& priority)	1. Adoption of a framework of catchment units for the integrated planning and management of natural resources (very high)	2. Integrated catchment-based information management system that builds on existing data, further research and ongoing monitoring (high) 3. Promotion, integration and coordination of community involvement in catchment-care initiatives (very high)
Actions (& lead agencies/groups)	a. Conduct a stakeholder workshop to finalise proposed framework of CMUs (NaREF) b. Establish links between neighboring sub-regions to address overlapping catchments (BDTG, DNR) c. Identify & address constraints to long-term stakeholder participation in the development of a "whole-of-catchment" approach (NaREF, BDTG, DNR) d. Based on existing information, identify important catchment processes within and between proposed CMUs (NaREF, DNR)	a. Establish a regional multi-agency GIS database for soil, water, vegetation & biodiversity (BDTG; TCC CoT; DNR, EPA, TThLA) b. Consolidate existing information relevant to NRM at CMU level and produce maps at CMU scale of existing data of land use, vegetation, soil erosion, riverine and wetland systems, habitat corridors & high conservation areas, and identify information gaps (NaREF, TThLA, TCC CoT, DNR, EPA) c. Develop an Integrated Environmental Monitoring Program which integrates current monitoring & addresses priorities for new monitoring as identified in Strategies, with direct links to multi-agency database (NaREF, TCC CoT) d. Identify appropriate catchment health indicators for individual CMUs (DNR, TThLA, NaREF) e. Ensure easy access to information on local NRM for community groups and landholders via the resourcing & maintenance of a Landcare & Catchment Centre (TCC, CoT, DNR, EPA, DPI)
Recommendations to Government:	<ul style="list-style-type: none"> • Promote the adoption of "whole-of-catchment" approach and sub-regional CMU framework within institutions • Incorporate CMU framework in local and regional plans & programs 	<ul style="list-style-type: none"> • Provide resources & support for the establishment of a regional multi-agency GIS database for NRM information • Raise the awareness and profile of community involvement and initiatives within Government institutions
2005 Targets:	<ul style="list-style-type: none"> • A sub-regional framework for "whole-of-catchment" approach in planning and management, with clear regional links where relevant, is endorsed by local and state authorities and by all relevant stakeholders 	<ul style="list-style-type: none"> • The Regional multi-agency GIS database facility is established • The Integrated Environmental Monitoring Program is operational & incorporates new monitoring of strategic priorities • The Landcare & Catchment Centre is funded on an ongoing basis and maintained by a network of community volunteers • Public meetings and related activities have been undertaken in all CMUs • "<i>Local directory of initiatives for the environment</i>" is produced biannually • At least two catchment-care groups have been established within the sub-region

Appendix I: Wetlands and Waterways Issues Tables

Table I 1. Natural Resource Management Issues Affecting Waterways in Townsville-Thuringowa

Waterway	Riparian vegetation	Water quality	Stream-banks and bed disturbance	Altered drainage patterns	Water harvesting	Aquatic weeds	Impacts on fish populations	Current community involvement
Crystal Creek	of concern		X		X			?
Birthday Creek								
Ollera Creek	of concern	?	X		X			?
Hencamp Creek	of concern	?			X			X
Rollingstone Creek	X	?			X			?
Saltwater Creek			X	X			X	
Lillypond Creek		X (sedim.)		X				
Cassowary Creek		X (sedim.)						
Camp Oven Creek		X (sedim.)						
Leichardt Creek								
Christmas Creek	?							
Sleeper Log Creek	X				X	X		
Bluewater Creek	X		X		X		X (tilapia)	
Black River	X	X	X			X		?
Alice River & Log Canal Creek	X	X	X		X			
Stony Creek	of concern	X	X	X				
Saunders Creek	of concern	X (nutr.)	X					?
Bohle River	X	X (nutr.)	X		X			
Little Bohle	?	?	?					
Mt Louisa Creek	X	X	X		X			X
Mundi Creek (?)	X	X						X
Ross R Dam & Tributaries	of concern		of concern		X			
Sachs Creek	X		? cattle					X
Anthill Plains Creek	X	of concern						
Lawnsdone Creek	X		? cattle					
Stoney Creek(?)	X		X					
Ross River (ab. weir)	X	X	X			X		X
Ross River (tidal)	X	X	X				X	?
Ross Creek	X	X	X		X		X	?
Sandfly Creek (?)		X	?					
Stuart Creek	X					X	X (Tilapia)	X
Reid River	? cattle		? cattle					
Alligator Creek	X	of concern			X	X	X	?
Slippery Rock Creek.	X		X cattle					
Whites Creek	of concern	of concern						?
Killymoon Creek	of concern							?
St Margaret Creek			<u>X (localised)</u>				X	
Spring Creek							X	
Double Creek							X	
Majors Creek	X		X		X			?
Haughton River	X	X	X				X	?
Gustav Creek	?	?	X	?	?	?	?	?
Duck Creek	?	?	?	?	?	?	?	?
Endeavour & Gorge Creeks	?	?	?	?	?	?	?	?

Table 12. Natural Resource Management Issues Affecting Intertidal Wetlands in Townsville-Thuringowa

Key Intertidal Wetlands	Values					Threats						
	Fisheries	Wildlife Habitat & Conservation	Open space Recreation	Cultural	Port & Harbour	Water quality	Unregulated access	Pest Plants and Animals	Litter & illegal dumping	Urban & Industrial Encroachment	Changes to hydrology	Fishing pressure
Crystal-Lorna Creeks Estuaries	✓	✓	✓	?		?	x		x	Potential		
Ollera Cr. Estuary & Swale Swamps	✓	✓	✓				x		x	Potential		
Hencamp-Rollingstone Cr. Estuaries & Coastal Swamps	✓	✓	✓				x	x	x	Potential	Of concern	
Saltwater-Leichardt-Sleeper Log Cr. Estuaries & Coastal Swamps	✓	✓	✓				x			Potential		
Saunders Cr. Black River Estuaries & Coastal Swamps	✓	✓	✓							x	Of concern	
Bohle-Pallarenda Estuaries & Coastal Swamps	✓	✓	✓			x	x	x	x	x	Of concern	Of concern
Cockle Bay-Bolger Bay Marine Wetlands	✓	✓				Of concern				Potential	x	
Ross River & Creek Estuaries	✓	✓	✓		✓	x		x	x	x	x	
South Bank Coastal Wetlands	✓	✓	✓	✓	✓	x	x	x	x	x		
Alligator-Cocoa Cr. Estuaries	✓	✓	✓			Of concern						Of concern
Chunda Bay-Salmon Creek	✓	✓	✓			x (saltwater)				x	x	
Burrambush Cr. Haughton River Estuary	✓	✓	✓			Of concern			x	Potential		Of concern

Appendix J: Proposed Catchment Management Units

(See Appendix B for Acronyms)

Catchment Management Unit (CMU)	Main Catchments and Sub-catchments	Land and Resource Uses Uplands	Land and Resource Uses Lowlands	Downstream Values	Catchment Values	LANDSCAPE CONDITIONS	PRIORITIES FOR NATURAL RESOURCE MANAGEMENT AND CONSERVATION	Main Jurisdictions	Existing Community Processes
1 Crystal Creek	Crystal, Birthday, Ollera, Scrubby & Hencamp Cks.	• Conservation • State forest • Tourism	• State Forest, grazing • Horticulture, cane • Small settlements	GBRWHA Endangered ecosystem Seagrass beds Recreational	WTWHA, Recreation Water supply Freshwater swamps	Uplands: low modification Lowlands: weeds, cleared areas	• Assessing land conditions & capability • Protection of native vegetation • Protection of ecological connectivity	• CoT • DNR(Forestry) • EPA/WTMA/EA • TTWSB	• CRRP • Progress Assn
2 Northern Coast	Rollingstone, Saltwater, Cassowary, Camp Oven, Lillypond, Leichardt, Cks	• Conservation • State forest • Grazing	• State Forest • Horticult., cane, grazing • Recreation • Settlement • Aquaculture (restricted)	GBRWHA Endangered ecosystem	Mt to coast connectivity, Recreation Forest resources	Uplands: low modification Lowlands: weeds, cleared areas, plantation	• Protection of high connectivity values • Impacts from aquaculture • Management of multiple-use forest	• CoT • DNR(Forestry) • WTMA • EA	• CRRP • Progress Assn
3 Bluewater Creek	Sleeper Log, Two Mile & Christmas, Bluewater, Deep, Healy & Althaus Creeks	• Forest • Grazing	• Grazing • Settlements • Cane farming	GBRWHA Fish habitats Wetlands	Ecosystem 'of concern' Good agricultural land	Weeds, erosion (banks), cleared areas	• Assessing land conditions & capability • Weeds • Protect aquatic systems; control exotic fish • Rural-residential land use	• CoT • DNR(Water) • DNR(Forestry) • EA	• Coastcare • Bird Observers • Progress Assns
4 Black River	Black & Alice Rivers Log, Canal & Alick Cks	• Conservation (Black R.) • Grazing (Alice R.)	• Grazing • Rural residential • Heavy industry	GBRWHA Fish habitats Seagrass beds	Freshwater habitats Connectivity Wet Tropics areas Seagrass beds Lowland rainforest	Riparian degraded Streambank erosion Weeds & feral pests Water quality	• Protection of aquatic systems • Weeds	• CoT • DNR(Water) • EA	• Coastcare • Bird Observers • Progress Assns
5 Bohle River	Little Bohle & Bohle Rivers, Stoney, Saunders, Middle Bohle, Mt Louisa Creeks	• Grazing • Rural residential	• Urban • Rural residential • Sewage treatment plant • Light to heavy industry	Fish habitats Town Common Seagrass beds Fisheries	Habitat connectivity Pinnacles Open space/recreation Town Common	Riparian very degraded Erosion (upper) Weeds Water quality Illegal dumping	• Water Quality • Protection of riverine systems	• CoT • TCC • EPA • DPI	• RI VER (discont.) • Bird Observers
6 Ross River	Ross River (below dam), Mt Louisa Creek (high flow)	• Urban, rural residential • Sand extraction • Defence training • Grazing	• Urban • Light & heavy industry • Open space • Port	Town Common Dugong Sanctuary Seagrass beds GBRWHA Wetlands mosaic	Residential Open space Scenic Town Common	Highly modified Degraded areas Weeds	• Urban & industrial development • Urban stormwater / Water quality • Coastal Zone Use & Development • Waste management • Riparian vegetation & open space management	• TCC • TPA • GBRMPA/EA • Defence	• Landcare • RI VER/TBOC • Wildlife Carers • Coastcare • Cleveland Bay Cons.
7 Stuart Creek	Stuart, Stoney & Sandfly Creeks	• Rural residential • Grazing • Defence	• Residential • Industry (expanding) • Grazing • Aquaculture (disused)	South Bank Complex GBRWHA Dugong Sanctuary Indigenous sites	Riparian gallery rainforest Instream connectivity	Woody weeds Cleared Built areas	• Riparian vegetation • Industrial & urban development • Water quality protection	• TCC • TPA • EA	• Stuart Creek Revegetation
8 Ross River Dam	Ross River (above Dam) & tributaries, Sachs, Antill Plains, Four Miles & Six Miles Creeks	• Defence training • Grazing • State forest	• Grazing • Water supply	Potable water supply	Endangered species high diversity of macropods Defence training	Some erosion Woody weeds	• Water quality • Weeds • Protection of riverine systems	• TTWSB • TCC • CoT • Defence	• Oak Valley Landcare
9 Alligator Creek	Alligator, Slippery Rock, Whites, Killymoon, Crocodile & Cocoa Creeks	• Conservation • Grazing • Rural residential	• Rural residential • Horticulture/ grazing • Heavy industry (restr.)	Dugong Sanctuary Wetlands mosaic Indigenous sites	Bowling Green Bay N.P. Killymoon Creek Good agricultural land	Agricultural Woody weeds Uplands undisturbed (NP)	• Plans for further heavy industry • Protection of seagrass beds & wetlands • Horticulture irrigation - salinity risk	• TCC • EPA • TPA	• Landcare • Wildlife Carers • Cleveland Bay Consortium
10 Reid River	Reid & upper Haughton Rivers	• Defence training • Grazing	• Forest/conservation • Grazing • Extractive (disused)	see CMU # 11 & 13	Endangered species Open woodland Mt Flagstone .	Some erosion Woody weeds	• Assessing land conditions & capability • Weeds • Vegetation management	• TCC • Dalrymple Shire • DNR(Forestry) • Defence	• -
11 Woodstock	Spring, Double, Walkers, Double Barrel, Majors Cks, Serpentine Lag., middle Haughton R.	• Conservation	• Horticulture/cane • Grazing • Rural residential	Undisturbed freshwater habitats see CMU # 13	Serpentine Lagoon Water resources Mount Elliot N.P.	Weeds Uplands undisturbed (NP)	• Plans for heavy industry & cane • Land capability assessment • Wetlands/drought refuge protection	• TCC	• WAG • Bird Observers
12 Magnetic Island	Gustav, Petersen, Alma, Gorge, Endeavour & Western Creeks	• Conservation	• Conservation • Residential • Recreation/tourism	GBRWHA	Indigenous culture conservation/tourism /lifestyle/recreation	Settled areas: weeds & drainage modification	• Water quality • Coastal Zone Use & Development • Protection of riverine systems	• TCC • EPA • GBRMPA/EA	• MINCA • Cleveland Bay Consortium
13 Bowling Green Bay	Reed Beds, Mackenzie, Emmet, StMargaret, Barrambush, Cromarty & Palm Cks, lower Haughton River	• Conservation	• Sugar cane/grazing • Sand extraction • Beach settlement • Conservation	Ramsar site Cromarty Wetlands Dugong Sanctuary Fish nursery GBRWHA	Cromarty Wetlands Bowling Green Bay N.P. Agriculture	Wetlands Grasslands Weeds (<i>Hymenacne</i>)	• Protection of wetland systems • Assessing land conditions & capability	• TCC • EPA • EA	• Cungulla Prog. Assn • Coastcare • Canegrowers
14 Cape Cleveland	Cape Cleveland catchments	• Conservation	• Conservation, Research • Beach settlement • Defence training	Dugong Sanctuaries Cleveland Bay Bowling Green Bay	Bowling Green Bay N.P.	Mostly undisturbed	• Management of protected area • Fire regime	• EPA • TCC • TPA	• -Cungulla Prog. Assn

DIVIDER BETWEEN 9 AND 13 GOES FROM SADDLE MT TO CAPE CLEVELAND ALONG THE AIMS ROAD; DIVIDER BETWEEN 11 AND 13 GOES FROM MT ELLIOT TO MAJORS CREEK MOUNTAINS