

Invitation

to help develop the

Natural Resource Management Strategy

for

South East Queensland

This Discussion Paper provides reference material for your feedback on the enclosed forms.

The Regional Strategy Group

In developing the Natural Resource Management Strategy for South East Queensland, it is important to establish linkages with, and gain input from, key community stakeholders. A Regional Strategy Group representing resource management industries, local and state governments, conservation, indigenous and other key community groups has been formed to fulfil this role and to oversee the development of the strategy.

For more information or to make your comments, please contact:

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1. Introduction

1.1 Purpose of this Discussion Paper

This Discussion Paper provides a brief overview of resource management issues which have been identified to date from existing government, industry and community sources throughout the region. This paper should be seen only as a forerunner to the Draft Strategy, as its main purpose is to stimulate debate regarding key natural resource management issues, their location and priority within South East Queensland.

The purpose of this Discussion Paper is to:

- seek public involvement in the development of the Natural Resource Management Strategy for South East Queensland;
- provide information about the process of the strategy development;
- provide an overview of a number of the natural resource management issues that have been identified to date from existing government, industry and community sources throughout the region;
- develop and ensure a common understanding and acknowledgment of the key natural resource management issues to be addressed in the strategy;
- identify where the key issues occur in SEQ and in your local area, what actions are required to address these issues and the urgency of the actions.

1.2 Scope and objectives of the Natural Resource Management Strategy

The Strategy will provide a framework to help focus resource management and nature conservation projects and activities on priority areas and issues in the region. These activities will help sustain the region's natural biodiversity, its natural resources and the viability of activities that impact and depend on these resources.

1.3 Vision

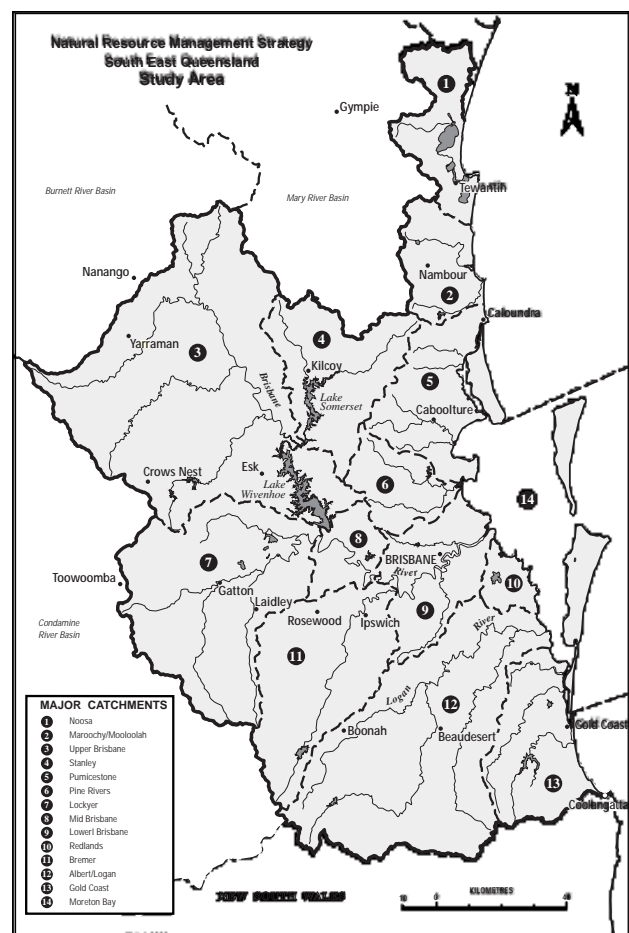
South East Queensland will be a caring community using, enjoying, understanding and sustaining the region's natural resources, beauty and biodiversity, now and for future generations.

1.4 Study area

The area addressed for the NRM Strategy (shown in Map at right) is similar to that of the SEQ2001 studies, although based on water catchment areas rather than local government boundaries. The area extends from the Noosa River catchment in the north, west to include all of the Brisbane River catchment and south to the Logan-Albert catchment. The Mary River Catchment is not included, as it fits more appropriately in the Cooloolah-Burnett Region, for which a separate Regional Strategy will be prepared.

Nineteen local government areas (or part areas) are included in the strategy area, from Noosa Shire in the north to Rosalie Shire in the west and south to Beaudesert Shire and Gold Coast City.

The Strategy Area has been divided into 14 Catchment Units for the purpose of locating specific resource management issues in the region.



2. How to have your say

2.1 Step One: Fill out feedback form

The next step is to provide **your** input to the strategy.

Accompanying this Discussion Paper is a series of Feedback Forms which summarise the key issues discussed in the paper. Please read through all the forms and add extra issues, their location, needed actions and their urgency, in the columns provided. **It is important that we hear about any other issues that have not been covered in this Discussion Paper.** We would like to know:

- where these issues, opportunities or problems are occurring in the region;
- what actions are needed to seize the opportunity, remedy the problem or improve the condition of the resource;
- how urgent you consider the matter to be.

Please return the feedback forms by **30 September 1998** to:

Mary-Jane Weld
Regional Strategy Coordinator
Department of Natural Resources
PO Box 864
IPSWICH QLD 4305
Fax: 3884 5322

2.2 Step Two: Attend Workshops

Four workshops are to be held throughout the region, to give all interested members of the SEQ community an opportunity to contribute to the development of the Natural Resource Management Strategy.

These workshops will be professionally facilitated and technical experts will be in attendance to respond to queries. Everyone will have an opportunity to raise local and regional issues of concern during small group forums based on the themes introduced in this Discussion Paper and the accompanying Feedback Forms.

The times and venues for the workshops will be:

Location	Time	Date	Venue
Brisbane	6.30-9.00 pm	Wednesday 9 September	Sherwood Room Brisbane City Hall, Ann St BRISBANE
Esk	9.30 am-2 pm	Tuesday 15 September	Lyceum Hall Highland St ESK
Nambour	9.30 am-2 pm	Wednesday 16 September	Salvation Army Hall Sydney St NAMBOUR
Nerang	6.30-9.00 pm	Thursday 17 September	Garden Room Pelemans on the River 53 Station St NERANG

Light refreshments will be served during each workshop.

Please book your place at a workshop by contacting the coordinator:

Mary-Jane Weld

Phone: 3884 5327

Fax: 3884 5322

Email: mary-jane.weld@dnr.qld.gov.au

by Friday 4 September.

3. Key Regional Issues

The use of natural resources in the South East Queensland Region must be ecologically, socially and economically sustainable; treating the land, flora and fauna, fresh water, ocean and air as one interdependent system. However, the issues are so numerous and complex that there is a need for some division to allow them to be treated in a coherent fashion. For the purposes of this discussion paper they have been divided into the major themes of:

- understanding and involvement
- caring for biodiversity
- caring for our water resources
- caring for our land
- caring for our coast and seas
- sustainable natural resource management

Under each major theme, the issues that appear relevant are presented, along with some background information about the issue. A list of references is appended which provides the reader with an insight to the work that has already been done in particular areas.

3.1 Understanding and involvement

Achieving sustainable natural resource management within the region presently depends on the wisdom and voluntary action of natural resource users together with support and action from the local community. An important element of this process is an understanding of natural resource management issues which results from the sharing of information within and between stakeholder groups.

State and local government agencies, educational institutions, industry bodies, cultural groups, community groups and individuals all play a role in capturing, processing and communicating information such as: the condition of natural resources; trends in natural resource condition; natural processes and the impact of human activity on these processes; and best management practices related to natural resource management. The incorporation of such information at all levels of decision making and the acknowledgment of present levels of understanding amongst various sectors is essential.

Activities relevant to the promotion of understanding and involvement in natural resource management and biodiversity protection include:

- regional information collation and analysis
- development of tools, methods and understanding to improve natural resource planning and management and biodiversity protection
- identification of best management practices
- promotion and transfer of best management practices, tools, methods, information and understanding
- regional reporting and evaluation
- community education aimed at generating understanding, support and involvement in various natural resource management and biodiversity protection programs
- consultation with aboriginal groups and raising of cross-cultural awareness.

Providing communities with the opportunity to develop, learn, interact and become involved in natural resource management and biodiversity protection issues is critical to the successful implementation of this strategy.

3.1.1 Cultural awareness

“Aboriginal relationships to the land encompass the natural and spiritual environments ... this relationship is entire, complex, integrated and a critical component of the Aboriginal and Torres Strait Islander People’s survival” (FAIRA 1997).

Aboriginal people perceive the landscape as a complex integrated feature which cannot be broken into fragments. Thus management of natural resources of the region revolves around maintaining the general health of the landscape - the rivers, creeks and waterholes, the mountain skylines, the vegetation as habitat for all other creatures and preserving it in as natural a state as possible.

Certain cultural and spiritual practices of Aboriginal communities residing in the region revolve around Moreton Bay. There are a number of species that have been identified as important to indigenous communities, including oysters, shellfish, dugong and mullet. Fishing by indigenous people can be either for traditional (customary) purposes, recreational or commercial purposes. Traditional fishing occurs in communities where indigenous people use nets, lines and traps to take fisheries resources for use within their community. Indigenous fishing for traditional or customary purposes is not curtailed by fisheries legislation in Queensland, although Fishery Management Plans may be developed for those purposes in consultation with relevant parties (Sinnamon,1997; QFMA 1998).

3.2 Caring for biodiversity

Diversity of nature is expressed in various ways. The number of different vegetation types, and plant and animal species are obvious measures. Combinations of land form, geology, climate, and vegetation have been used to describe and map ecosystems which are another means of assessing biodiversity.

South East Queensland has a wide and diverse range of natural resources and ecosystems. The area contains a number of significant nature conservation values, including:

- endangered, vulnerable, rare or special interest species of plants and animals, and their habitats;
- endangered, of concern, or inadequately protected regional ecosystems;
- sites listed under international treaties or conventions (eg. Ramsar wetlands, World Heritage properties);
- international migratory birds and their habitats;
- sites of special biological importance such as areas of high endemism, species diversity or key breeding/feeding sites;
- ecosystems which have important ecological functions, such as mangroves, riparian areas, floodplains, saltmarshes and other tidal and non-tidal wetlands.

There is clear evidence that the above values, other nature conservation values, and the region's land, vegetation and water resources are under threat of degradation. Emerging issues that threaten biodiversity include:

- loss of bushland and fauna habitat
- fragmentation and isolation of remaining bushland
- increasing pressure on coastal ecosystems
- changes in the natural biodiversity from invasive plants and pests
- changes in catchment hydrology from changing land use
- deterioration in water quality from diffuse and point source pollution discharges
- changes in predation patterns on native animals

In particular, the threatening activities operating in South East Queensland include inappropriate land clearing and fire management, subdivision, mining, road and rail construction, and urban development.

An important factor in biodiversity protection in South East Queensland is the sustainable management of habitat. The following sections of this paper discuss remnant and riparian vegetation, threatened species, and the threatening processes of invasive plants and pests, and fire.

3.2.1 Remnant vegetation

South East Queensland contains a large diversity of vegetation types, including rainforests, different types of eucalypt-dominated forests and woodlands, melaleuca forests and woodlands, heathlands and mangrove and other tidal wetlands. However, only 35% of pre-european vegetation remains as intact remnants.

The more fertile and flatter parts of the region have a long history of clearing for cropping and grazing. As a result, vegetation types characteristic of the better lowland areas have been seriously depleted. Inland, along the river valleys, bushland has been reduced to less than 11%, most of it during early settlement. Forest red gum forests on alluvial flats have been reduced to 6.5% of their extent and only 0.2% are protected.

More recently, the population expansion in the region is impacting on the coastal lowlands with vegetation being cleared and fragmented to make way for urban expansion. Along the coast, melaleuca woodlands have been reduced to 22% of their former extent, dry eucalypt forest has been reduced to 32% and rainforest to 28%.

Heathlands have been reduced to 46% of their former extent. Much of this loss has happened over the last two decades.

The potential contribution of disturbed bushland to maintaining regional biodiversity should be recognised because, with careful management over time its value as native vegetation and fauna habitat will increase. Restoration techniques range from active regeneration (plantings, etc.) to lower cost alternatives such as reduction of stock numbers or exclusion fencing to encourage natural regrowth.

With the fragmentation and isolation of vegetation in South East Queensland it will become increasingly difficult to maintain core ecological processes and biodiversity in remaining bushland. Many of these remnants are at risk of further development and clearing, invasion by exotic species and increased edge effects. Plant and animals in these areas are susceptible to disease, fire and inbreeding, and animals are often unable to migrate easily between remnants. The management of remnant vegetation in south East Queensland requires a holistic approach that incorporates buffer zones, corridors, mosaics and other mechanisms to facilitate migration, genetic exchange, species replenishment, and other vital ecological interactions.

3.2.2 Riparian vegetation

Riparian vegetation is that bordering waterways and drainage lines and may include vegetation in floodplains, wetlands and tidal areas. In much of South East Queensland, riparian vegetation has been cleared or subjected to other types of disturbance. However, in the floodplain landscape, riparian vegetation is often the only vegetation remaining.

Riparian vegetation has the following important roles:

- Supports a high diversity of plants and animals, providing a wide variety of niches
- Represents key lowland communities threatened by clearing and urbanisation
- Provides habitat, food and movement corridors for birds, fish, frogs and other fauna living in the riparian zone
- Provides areas of refuge for animals in times of drought or fire
- Controls bank erosion by binding and holding the banks together and by absorbing the force of flowing water.
- Improves water quality by filtering sediments and pollutants in run-off from adjacent land uses.
- Provides shade and shelter which moderates water temperatures and enhances habitat value and water quality.

Some of the factors that affect the restoration of riparian vegetation include local Council requirements for flood mitigation, altered hydrological regimes as a result of urban development or clearing and land uses such as instream sand and gravel extraction. The rehabilitation of riparian vegetation involves the careful consideration of many issues in order to facilitate improved water quality, streambank stabilisation, enhanced habitat (both instream and bank), and maintain flood control.

3.2.3 Threatened species and endangered ecosystems

The highest number of endangered and vulnerable plant species in the Southeast Bioregion occur in rainforest (about 50 species), and coastal habitats (about 20 species). The greatest number of rare plant species are found in rocky/montane habitats (about 50 species) and rainforest (about 50 species).

Of the 33 species of threatened fauna in the region, 11 are in rainforest (5 are stream dwelling frogs), 9 are in open forest, 9 are in coastal areas, 3 are freshwater fish in streams and one is a rock wallaby. Rare species (38) are distributed mainly in rainforest (17), open forest (11), coastal lowlands (5) or wetlands (5).

A total of five endangered regional ecosystems have been identified. Two endangered ecosystems comprise beach ridge rainforest and dune heath, and another three comprise open forest and woodland on sedimentary rocks in the Moreton Basin.

Ecosystems of concern total 26. Three, gallery rainforest, manna gum, and forest red gum, are found on alluvial plains. Freshwater swamps are also of concern. On the basalts of the Scenic Rim are five ecosystems while in the Moreton Basin are located another four. They range from dry rainforest to ironbark, and spotted gum open forests.

In the coastal lowlands a further seven ecosystems of concern occur. These include open forests and woodlands of forest red gum and scribbly gum, together with rocky headlands. In the subcoastal hills and ranges and the upper Brisbane Valley are six ecosystems of concern. These comprise two types of dry rainforest, and open forests of ironbark (silverleaved and narrowleaved), and forest red gum.

The *Commonwealth Endangered Species Protection Act 1992* prescribes the Recovery Plan process as a key approach to securing the status in the wild of endangered and vulnerable native species and endangered ecological communities. A Recovery Plan is a comprehensive plan that details, schedules and costs all actions, including research, necessary to support the recovery of the species or ecological community. Recovery plans are already underway for some species in South East Queensland.

3.2.4 Fire management

Fire is a natural and integral part of the Australian landscape and plays a major role in determining the distribution of flora and fauna. The Australian environment of today is markedly different to that which existed prior to the arrival of humans some 50,000 years ago. Extensive use of fire by Aborigines and dramatic changes in climate have resulted in a much drier, more fire-adapted, fire-reliant and therefore fire-prone vegetation cover - as evidenced by the predominance of eucalypt forest over rainforest. The last 200 years following European settlement has seen further changes, including the introduction of exotic weeds, clearing and changed land management practices. Much of the biodiversity of South East Queensland evolved with fire and relies upon particular fire regimes for continued survival. However, the region also contains forest systems that are fire sensitive, such as rainforest and softwood scrub.

Fires of incorrect frequency or intensity can lead to loss of biodiversity. Too frequent fire may eliminate some plant and animal species in the region and may actually increase the risk of high intensity fires by changing the understorey to more flammable species.

3.2.5 Environmental pests

Invasive plants

Environmental weeds can have a serious impact on remnant bushland. Exotic and native weeds compete with natives, alter species composition, reduce the diversity of plants in the remnant, and can overwhelm small patches of bush. Ornamental escapees are of particular concern in urban bushland, often thriving as a result of altered drainage systems. Some of the factors that contribute to weed establishment are the dumping of garden refuse, commercial release of inappropriate species, the close proximity of urban or industrial areas to bushland, stormwater runoff from development and resulting high nutrient and moisture levels, the inappropriate use of fire and a lack of awareness of bushland management techniques.

Pest animals

Introduced animals can impact on natural areas. A prime example is the presence of large populations of feral pigs which disturb soils and stream banks to such an extent while feeding that erosion, siltation and loss of fauna habitat result.

The loss of native animals, particularly birds, to cats in urban bushland and further afield is a matter of concern and the effect of domestic dogs on koala populations is well documented. Foxes predate on a range of native fauna. Cane toads are widespread in lowland bushland and impact on some native fauna. Introduced insects and fish can also have a serious impact on the region's biodiversity.

3.3 Caring for our water resources

3.3.1 Water quality

Land use is the critical determinant of water quality in most Queensland catchments. The quality of our water resources is dependent on how well we look after our catchments, waterways and groundwater supplies.

Dams and weirs are useful in providing reliable supplies of water. However, such structures interrupt the natural flow of our river systems. If these interruptions are too severe, or prolonged, the health of the river will deteriorate, affecting ecosystems and in some cases, water quality.

Stormwater runoff can contain a range of contaminants which end up in streams and rivers, having a detrimental effect on water quality and native aquatic flora and fauna. These contaminants include: suspended solids and sediment; nutrient concentrations (especially of nitrogen and phosphorus); pesticides; micro-organisms from animal waste products and on-site sewage disposal systems (including faecal coliforms, other pathogens, antibiotics and hormones); trace metals, oil and grease; and increased water temperature. Available research findings indicate the levels of these contaminants tend to be much higher in urbanised environments where up to 50% of the area may be covered with impervious surfaces, causing a faster rate and greater volume of run-off compared with natural rural areas. (DNR & DOE, 1998). However, the total contribution from agriculture (ie cropping) is also of concern. In tidal areas the main issue is with nitrogen and sediments. Work now needs to focus on acid sulfate and its role, and other chemical residues.

3.3.2 Water production, use and allocation

Water is a variable, intermittent and often slowly renewable resource. The demands on this resource frequently exceed its availability and rate of recharge. Allocation of this valuable resource needs to take account of this availability, both present and future; the water use efficiency and cost-benefit of activities utilising the resource; the essential nature of the activity; and issues of equity between potential users. In this context, the impacts of allocations on down-stream users (farmers, communities, industries, recreational users and natural ecosystems) must be considered, as must the issue of adequate groundwater recharge.

Water production can be affected by vegetation, geology and land use. Increased runoff from land can lead to more flash flooding but less flow between rainfall events. Some forests ensure more evaporation is recycled into local rainfall. Aquifer recharge areas require protection to ensure long term production of groundwater.

Considerable wastage of water occurs through inefficient use and management of the resource. Evaporation, run-off and inefficient or non-existent recycling contribute to this wastage. Activities which use the resource, whether they be industrial, agricultural, recreational, community or household, must do so in an efficient manner and opportunities for the re-use of water must be fully exploited.

The water needs of instream ecosystems must be catered for in order to keep our river systems and their dependent wildlife healthy, and to maintain the quality of water. For instance, the conservation of commercial and recreational fish stocks depends upon the maintenance of appropriate environmental flow patterns to support their specific breeding and development cycles. The volume, timing and replication of natural water flow cycles can be vital in this respect and the control and manipulation of stream flows in a seemingly harmless manner may have detrimental effects in the longer term.

Levels of groundwater are declining in several locations in the region, including the Lockyer Valley, and there is increasing demand to extract groundwater from other areas, such as Stradbroke Island.

To cater for the many competing uses of water, we must manage the water and catchment land area in such a way that everyone's interests are considered. We also have to plan for the future, so that this generation as well as the next will have access to quality water resources.

3.3.3 Flood management

Flooding can cause major damage and community disruption but at the same time it must be recognised as a natural and sometimes essential feature of our ecosystem. Flood management, therefore, is not synonymous with flood prevention. Rather, it is about minimising and negating the unnecessary occurrence and detrimental effects of flooding.

The costs of flooding include loss of life, property and agricultural products and environmental damage. The environmental impacts include erosion to stream beds and banks, heavy deposition of sediments, assisting the spread of weeds and loss or severe damage to aquatic and terrestrial ecosystems. The damage from flooding can cause significant social and economic hardship for individuals and the whole community.

Some factors implicated in the impacts of flooding include:

- development in the catchment reducing infiltration, leading to larger volumes of run-off and increased flood effects
- development within a floodplain, reducing floodplain storages and resulting in greater and more frequent inundation of properties
- backwater flooding into tributaries of major waterways

- coastal storm surges
- placement and management of flood mitigation structures, dams and other drainage structures.

Flood management requires an integrated approach to land planning and management. Factors to be considered when land use changes are proposed include: susceptibility of the area to flooding, potential impacts of the land use with regard to local and downstream flooding and ways to mitigate any adverse impacts (WBM Oceanics, 1997).

3.4 Caring for our land

3.4.1 Soil management

Preventing land and soil degradation involves understanding soil capability and managing the resource appropriately. Soil must remain in place and retain its physical, chemical and biological fertility to be used as a sustainable, functioning resource. Soil erosion removes the farmer's fundamental asset and the off-site impacts of erosion, such as siltation and nutrient enrichment of waterways can have long term detrimental effects on the wider community and the environment. Soil structure decline through compaction, loss of organic matter and salting will degrade soil fertility, affecting crop and pasture growth and necessitating ongoing repair and maintenance activities. Over-cultivation and overstocking are major causes of soil degradation. Other effects of soil structure decline are poor water infiltration, lower crop establishment, restricted root infiltration and lower water use efficiency. Soil fertility can also be compromised by increasing levels of soil acidity, salinity, sodicity, heavy metal accumulation and toxic levels of trace elements. Biological life in the soil is vital to ensure future fertility, through nutrient breakdown and recycling processes.

3.4.2 Farm management practices

Agriculture and its associated industries and services are a major contributor to the economy of South East Queensland and an important source of employment for many of its inhabitants. The continuing viability of agricultural related enterprises is therefore critical to the economic and social well-being of the region.

Achieving an appropriate balance between the economic and environmental concerns in this area is pivotal to any natural resource management strategy. The natural resource base of the region underpins its economic and social viability and essential agricultural industries cannot be sustained if farm management practices are detrimental to, or threaten, this natural resource base.

In terms of area managed, agricultural producers constitute the largest group of land-owners in South East Queensland, and as such, are the most significant group of natural resource custodians in the region. Natural resource management strategies must therefore be acceptable and conducive to agricultural activities in the region and farmers will need to have considerable involvement in and ownership of these strategies.

At the same time, on-ground activities designed to protect the natural resource base have implications and outcomes beyond individual property boundaries and, often, the cost of implementing such strategies cannot be justified in simple terms of on-farm benefits. Economic survival may preclude individual land owners from accepting full responsibility for strategy implementation and the greater community may sometimes need to accept a share of this responsibility through commodity pricing, incentive payment, subsidisation, or other cost sharing mechanisms.

Two key strategies for conserving water quantity and quality are the efficient use of water on farm and the minimisation of downstream impacts on water quality from farm use. Irrigation systems should deliver water efficiently and water supply schedules should be matched to crop demand. Downstream effects of water infiltration and run-off from a farm can include groundwater and surface water contamination and increased turbidity and siltation in waterways. Underground water supplies may also become more saline under poor irrigation management.

Urban encroachment on rural lands in the region and the ever increasing demand for production efficiency in the agricultural sector will continue the trend towards more intensive agricultural practices. Increasing the intensity of agricultural activity can exacerbate and accelerate the detrimental effects of poor farming practice on the soil and water resources. Intensive agricultural development must therefore be accompanied by a greater awareness of, and closer adherence to, strategies and practices which will minimise the risk and occurrence of soil and water degradation. A significant management issue for many intensive agricultural practices is the

avoidance or treatment of point source pollution which may have both onsite and offsite impacts on land and water condition.

3.4.3 Riparian management

In the context of this report, the term riparian refers to the area immediately adjacent to a waterway which is directly influenced by that waterway. It includes the tidal component to the level of Highest Astronomical Tide.

The banks of waterways and the adjacent flats are often highly productive agricultural lands. The riparian zone is also more sensitive than the rest of the property and so needs special management. However, riparian lands are very much part of the whole property and so should be included in regular maintenance schedules.

Riparian lands have a valuable role in maintaining stream bank stability, good quality water supplies, the general health of aquatic environments and providing habitat and corridors for terrestrial and aquatic native plants and animals. Riparian management practices should aim at maintaining and enhancing all of these functions and values.

To maintain the desirable values, features and functions of the riparian zone it needs to be:

- fenced to control stock and human impact, eg trampling and grazing
- managed for fire by keeping fuel loads down (light grazing is acceptable)
- managed for weeds (light grazing together with systematic revegetation to create an environment that deters weed colonization)
- allowed to regenerate naturally if possible with native species endemic to the area (stock exclusion for a few years and hand maintenance, or revegetation and stock guards).

The following management techniques will enhance the effectiveness of some significant functions of riparian areas:

- to be an effective trap for sediments and nutrients, 10m of grass outside of the high bank is needed;
- to be effective in stabilising the banks, suitable trees and shrubs on the banks and terraces are needed;
- to be effective as habitat, a range of storeys should be established/maintained, ie sedges, shrubs and trees.

A key issue in riparian management in the region is the ownership and definition of the beds and banks of waterways, affecting a range of environmental and management concerns.

Well managed watercourses and riparian areas are valuable assets for both the community and for individual landholders.

3.4.4 Salinity

Rising levels of soil salinity are occurring in some areas of South East Queensland, such as the Lockyer and Bremer valleys. Rising soil salinity is often caused by the removal of deep-rooted native vegetation and it can take up to 20-30 years before the detrimental effects are visible.

Trees use water from the soil and if they are removed, more water moves downslope through the subsoil which can lead to rising groundwater levels. Salts taken into solution by the percolating waters are transported into the valley floors. When the accumulated groundwater rises close to the surface, evaporation will result in concentration of any salts present.

Irrigation using water containing appreciable amounts of salts will usually result in a gradual accumulation of salt in the soil. Salts accumulate more quickly in soils with poor drainage, such as heavy clay soils. High concentrations of salt adversely affect germination and plant growth and high sodium levels can lead to a deterioration in soil structure which affects plant nutrition, particularly the availability of trace elements.

3.4.5 Waste disposal

Waste is a by-product of our human social and economic activity that is unwanted by our society or our economy. Waste is a facet of human systems only; in natural systems, the waste products from one species form the basis of a resource for another. However, there is a limit to the capacity of natural systems to process and convert and assimilate our wastes.

With increasing population pressures and industrial development in the region, waste disposal is becoming a major resource management issue with significant costs to the community. The disposal of solid waste presents problems both with regard to safely accommodating the large bulk of material and in managing toxic elements to avoid contamination of natural systems. Pressures are now being placed on the capacity of current landfill sites to accommodate this growing problem.

Solutions may lie in learning from natural systems, that is, turn wastes into resources that bring economic benefit to the region. For example, complete purification of wastewater to a quality suitable for drinking may be a more cost effective and environmentally sensitive method of supplying water than the construction of new storage dams.

Another option would be to remove as much compostible material from the solid waste stream as possible, which would significantly extend the lifespan of existing landfills and the compost produced would be a resource in itself. Similarly, increased emphasis on recycling will further reduce the waste stream and increase the resource of recycled materials (Gold Coast City Council, 1997).

3.4.6 Weeds and pest animals

Weeds

Weeds are among the most serious threats to Australia's primary production and natural environment. In South East Queensland, weed species threaten agricultural production, native ecosystems and social values in the region. For example, weeds reduce crop and pasture productivity by competing for light, water and nutrients; weeds can detrimentally affect human health and impact on visual amenity and recreational opportunities. Weeds can degrade or destroy ecosystems; for example, cat's claw rapidly smothers vegetation, while lantana prevents natural succession through shading. Water weeds can reduce water quality, affecting human health; clog water bodies, restricting fishing and boating activities; and alter aquatic ecosystems, affecting organisms such as fish and frogs.

The impact of weeds is of particular concern in the riparian zone, where better soils and moisture provide an ideal habitat for weed establishment and expansion. Waterways also provide a good medium for the spread of weeds by transporting seeds and plant material which will germinate or propagate in a new site. Some serious impacts of weeds in waterways and riparian zones include the physical blocking of waterways and the replacement of native habitat.

Pest animals

In South East Queensland, pest animals impact on agriculture, our natural environment, and in some situations, our social activities. These animals have the ability to change the environment in which they live, destroy crops, attack livestock, compete with native fauna, and are a vector for parasites and disease, include exotic diseases, should they enter Australia.

Some pest animals which occur in South East Queensland are listed below:

- dingo/wild dogs may attack and kill livestock and have the potential to spread the exotic disease rabies, should it enter the country.
- fox
- feral pigs attack and kill livestock, raid grain and vegetable crops and root up the ground, particularly along creek banks, leaving the ground susceptible to erosion and weed invasion.
- cane toad
- feral cat
- rabbits and hares
- rats and mice
- indian mynah birds displace native birds from their environment, take over nesting sites and compete for food.
- carp are an aggressive fish which compete with native fish for food, cause bank instability (which in turn causes siltation and high turbidity in waterways), and impact on recreational fishing.

The management of most pest animals is addressed in legislation managed by either the Department of Natural Resources, the Department of Primary Industries or the Department of Environment and Heritage. These pieces of legislation provide the tools needed to assist in the control of pest animals and to help prevent further spread or introduction.

It is important to develop a community-wide awareness of the importance of pest animal control and the need to prevent the spread and introduction of existing and new pest animals into South East Queensland.

3.4.7 Fire management

Fire is regularly used by humans as a land management tool for purposes such as nature conservation, agricultural production and asset protection. However, in an uncontrolled state, or where it occurs in areas of increased human habitation, fire can present a significant risk to human life, property and the environment (Gold Coast City Bushfire Management Strategy Taskforce, 1997).

As a land management tool, fire is used to control regrowth and woody weeds, control disease and vermin in crops, and manage stock feed supply by stimulating pasture growth with the release of certain nutrients from burnt organic matter. However, fire may also have adverse environmental impacts such as invasion of weed species, loss of other important soil nutrients, soil erosion and poor water quality.

Fire risk is perceived to have increased in recent years because of the following factors:

- changes in land use, in some areas, from large holdings to smaller hobby farms and rural retreats
- new residents on small holdings having a poor knowledge of fire risk and fire management techniques
- increased number of absentee landholders in rural areas
- experienced land managers having to change their fire management practices because of neighbouring land use changes.

Fire management includes components such as creating fire breaks, ensuring access tracks are maintained, fuel reduction and controlled burning. Another essential component of fire management is the development of a community education and awareness program to raise awareness of bushfire issues and inform people that they can develop effective strategies for protecting themselves and their property against fires.

3.5 Caring for our coast and seas

The coastal zone of South East Queensland is one of the most heavily impacted areas of the state but it contains some of the most diverse natural habitats in Queensland. These include major sand islands with a variety of land uses including urban development, sandmining and nature conservation. A variety of smaller islands range from near pristine to heavily developed.

Moreton Bay has a variety of unique habitat values that include wetlands and foreshores listed under the internationally significant Ramsar agreement, and limited banks of corals characteristic of inshore reefs. The Bay also supports large populations of dugong and turtle which is unusual for an area in such close proximity to a major urban centre such as Brisbane (QFMA, 1997).

Moreton Bay is one of Queensland's most important coastal resources. In addition to its natural attributes, the Bay contributes significantly to the economy of the region and the State through a wide range of commercial and recreational uses. These include shipping, extractive industries, commercial and recreational fishing, tourism and a variety of recreation activities.

As well as the major river catchments in South East Queensland, there are a large number of small streams flowing directly to the sea. Many of these are in urban areas and have a separate range of issues to larger catchments, as well as many issues in common. Some of the important issues in these catchments are: storm floods; urban weeds; loss of biodiversity; disruption of riparian corridors; runoff from domestic chemicals and fertilizers, roads and shopping centres; and, acid leachate from acid sulfate soil disturbance. The Brisbane City Council has prepared (or has in preparation) Catchment Management Plans for many of the small coastal streams within its boundaries.

Studies are currently being carried out by the Brisbane River Management Group and the Brisbane River/Moreton Bay Wastewater Study. Preliminary results indicate that the ecological health of the Bay and associated waterways is moderately good compared to other parts of the world. However, a number of environmental warning signs have already been flagged. These include:

- gradual decline of water quality and habitats of western and southern Moreton Bay and adjacent shores, particularly in terms of sediment (turbidity) and nitrogen accumulation;
- algal blooms in Deception Bay, Bramble Bay and Hayes Inlet;
- the lower Brisbane River estuary does not meet national guidelines for primary contact recreation, such as swimming;
- loss of biological diversity;
- loss of seagrass in Bramble Bay, Deception Bay and near the mouth of the Logan River;
- reports of fewer fish in Moreton Bay;
- loss of, and impacts on, fish spawning grounds through human activities such as boating and jet-skiing in areas such as Maroochy, Mooloolah and Pumicestone
- excessive pollution in Pumicestone Passage caused by changed land use and management practices.

These signs indicate that the Bay environment will need careful monitoring and intervention if sustainability is to be maintained and highlight the integral link between freshwater and coastal marine environments. A number of high impact areas with respect to the above environmental warning signs in Moreton Bay include:

- western Moreton Bay (Bramble Bay, Hayes Inlet and Deception Bay);
- southern Bay areas; and
- tidal Bremer River to lower Brisbane River estuary (Abal et al, 1998).

Moreton Bay and Pumicestone Passage are recognised on a global scale for their unique aquatic environs which cover a range from seagrass meadows to coral beds, for fish and crustaceans, turtles and dugongs. Increased exploitation of the area by all users and interaction between these users will inevitably result in a range of conflicts. Appropriate management strategies are required to ensure the effects and implications of this conflict are minimised.

3.5.1 Marine species protection

The Moreton Bay Marine Park Zoning Plan (1997) has established Protection Zones where high conservation values exist. In addition it also nominates a range of species for enhanced protection.

A number of species that occur in Moreton Bay and near coastal areas are listed as being endangered, threatened or rare protected species. They include the green, hawksbill and loggerhead turtles and the Irrawaddy River and Indo-Pacific humpback dolphins (*Commonwealth Endangered Species Act 1992; Queensland Nature Conservation Act 1992*).

The fishing industry has also been proactive in this area. The highest potential for interaction between these species and fishing operations occurs with marine turtles, in particular green and loggerhead turtles with trawlers. In response to concerns that the population of loggerhead turtles was declining, a program to monitor turtle captures in the east coast otter trawl fishery was established in 1991. Researchers estimate that up to 300 turtles die in trawl nets annually. Most captures occur in shallow waters close to the coast or in inshore feeding grounds such as Moreton Bay.

Industry and government have worked together to develop strategies to minimise the capture and mortality of marine turtles, such as: fitting Turtle Excluder Devices to trawl nets; an educational program regarding endangered species; and development of Codes of Practice to minimise the effects of trawling on endangered species.

Moreton Bay contains a significant dugong population which is thought to have increased due to emigration from Hervey Bay and possibly other areas. However, habitat impacts and human disturbance has seen their distribution in the Bay restricted to the Moreton and Amity Banks, adjacent channels in the eastern part of the Bay, Deception Bay and Pumicestone Passage. These areas have extensive seagrass beds, on which dugong depend as a food source.

Dugong populations are threatened by a number of causes, the most significant being the loss of habitat through trawling and dredging, incidental boat strike, drowning in gill and shark nets, and the disruption of feeding by boating activity. Longer term threats to dugong include degradation of habitat and seagrass beds, urban runoff, sewage and other pollutants. Dugong are totally protected in Moreton Bay, although Aboriginal groups from the Moreton Bay Region may catch limited numbers, under permit (QFMA,1997).

3.5.2 Protecting the fisheries resource

Moreton Bay is one of Queensland's most productive fisheries. The Bay represents only 3% of the Queensland coastline yet produces 13% of Queensland's commercial catch and supports approximately 30% of Queensland's recreational effort.

Moreton Bay, with its extensive foreshores and tributaries, is vital to the productivity of fisheries resources inside and outside the Bay (that is, the offshore commercial and recreational fisheries). More than 80% of crustacea and fin fish species spend some part of their lifecycle in estuarine and riverine areas such as those found in Moreton Bay and associated river systems. Appropriate management of these areas is critical to the maintenance of adequate populations of most commercial and recreational fish species in South East Queensland. As such, it is inappropriate to look at the economic significance of Moreton Bay's fishery resources in anything other than a regional context. The number of people residing around Moreton Bay accounts for about 50% of Queensland's total population. Increasing population pressures account for further habitat destruction to allow for urban and port development, and increased levels of pollution. The inevitability of growing population pressures raises concern for the sustainability of the resources within Moreton Bay and highlights the potential for conflict due to competition for these resources (QFMA, 1997).

It is also necessary to allocate a share of fisheries resources to meet the needs of marine species and ecosystems and maintain nature for its own sake.

3.5.3 Coastal and foreshore development

There has been enormous development on the coastal strip from Noosa to the NSW border which has impacted on fisheries habitats, destroyed most of the mainland high dune ecosystems south of Noosa, and in many cases, impacted on buffer areas which are important in flood and storm surge events.

It is well documented that in the 1970s and 80s considerable pressure from development caused a loss of approximately 1 200 ha of mangroves and 600 ha of saltmarsh-claypan habitat in Moreton Bay (including the Gold Coast). The remaining intertidal habitat is under the most pressure from encroaching development such as foreshore developments, marinas and canal estates. Apart from habitat loss one of the most insidious effects of coastal development is when potential acid sulfate soils are exposed (QFMA, 1997). Despite environmental guidelines, major developments such as the Port of Brisbane may inevitably have negative consequences on the coastal natural environment.

3.5.4 Acid Sulfate Soils

Acid sulfate soils is the common name given to soils which contain iron sulfides. In South East Queensland they are located largely along the coastal lowlands at elevations less than 5m ATLD.

The acid sulfate soils of most concern are those which formed within the past 10 000 years, after the last major sea level rise. When the sea level rose and inundated land, sulfate in the sea water mixed with land sediments being deposited which contained iron oxides and organic matter. The resulting chemical reaction produced large quantities of iron sulfides in the waterlogged sediments. When exposed to air, these sulfides oxidise quickly to produce sulfuric acid, and potentially one of the most acidic of all natural geochemical processes. It can restrict plant growth and increase the acidity of waterways, killing aquatic organisms and corroding infrastructure. The acid sulfate properties of the soil become evident only when the soil is exposed to oxygen (Canegrowers, 1998). In addition, the actual release of iron during this oxidation process may have detrimental offsite impacts. There appears to be a possible link between blooms of *Lyngbya* (a blue-green algae) and iron concentration in the Deception Bay/Pumicestone Passage area (Abal et al, 1998). Other associated features include the presence of aluminium and other heavy metals.

3.6 Sustainable natural resource management

3.6.1 Extractive industry and mining

Sand and gravel supply

Extractive resources include sand, gravel, and quarry rock. Although they are not as rare as mineral deposits, extractive resource deposits are by no means ubiquitous as their occurrence is controlled by uncommon

geological factors. In addition, transport distance to markets imposes a significant constraint on the supply of these materials because of their high bulk: low value nature.

Current extractive operations and associated haul routes, as well as future resources and potential haul routes are fast being alienated by urban and rural-residential encroachment in growth areas of South East Queensland. This has the potential to alienate regionally significant resources of extractive materials, as well as creating environmental, social and infrastructure servicing problems.

Extractive materials play a critical role in our lives, and hence regionally important resources need to be protected from inappropriate planning decisions. The need for a regional perspective is due to the increasing need to ensure future supplies of extractive materials are available for infrastructure development and the building industry with minimal effect on the environment and communities along haul routes.

There is no coordinated program to plan the future sources of coarse and fine sand for South East Queensland. The replacement of the lower reaches of the Brisbane River as a source of sand, in addition to the general shortage of various grades of construction sand in SEQ, has significant immediate implications for planning in terms of increased haulage on local roads, as well as increased costs for concrete and ultimately for construction. Urgent action is required to identify remaining resources and appropriate haul routes, and to ensure their protection from encroaching residential development. At present, there is no adequate process to allocate these resources which also considers the needs of competing land uses.

The Extractive Industry Unit has been established in the Department of Mines and Energy with a mission to ensure long term access to strategically located extractive resources for the benefit of the Queensland community (DME Extractive Industries Unit).

Manufactured sand may provide an alternative to extracting sand from instream and offstream deposits. Currently, a small amount of quarry rock is used for the production of manufactured sand for use in concrete, and indications are that this use will increase significantly over the next five years. Although the production of manufactured sand has high start up costs, the quarry company has greater resource security on the hard rock source and with manufactured sand plants located closer to the major Brisbane market, transport costs will be significantly lower than the more remote in situ deposits (Dames & Moore, 1997).

Impacts and rehabilitation

An extractive industry or works in a river exposes sediment making it vulnerable to erosion and available to be transported by water. The action of the water over the unprotected sediment may initiate erosion. Access tracks and crossings along with processing sites may disturb the bed and/or banks. Acid sulfate soil disturbance in low elevation sites needs to be consistently addressed and may be having some off-site impacts on water quality.

Vegetation provides stability, habitat and protects many instream values such as water quality. Lower bank stability is associated with the soil binding properties of the roots and direct protection of smaller shrubs. Shade, food and other habitat values are provided by the range of vegetation along the riparian zone.

The protective cover of vegetation or the surface layer of sediment (referred to as the armour layer) is often removed during an extractive operation or river works. Lack of vegetation is linked to bank erosion (and associated loss of agricultural land and impact on infrastructure etc.), input of nutrients and sediments into the system and a decrease in bank stability. Removal of vegetation also reduces shade and riparian habitat. Therefore, if vegetation must be removed as part of an extractive operation or other river works, restoration of the area should be undertaken.

Stream restoration both during an operation and afterwards is essential. Restoration will restrict the possibility of bank erosion and maintain the biodiversity, stability and habitat values of the riparian zone. Operational plans should include those measures necessary to leave the extraction site in the best condition for a predetermined end use. This may include rehabilitation as wetland or bushland for open space purposes.

Rehabilitation should be undertaken in a staged manner. This will minimise the area exposed or disturbed at any one time. Rehabilitation efforts should be monitored and may need to continue for a period of time following the cessation of the operation. To ensure establishment, survival and success of any revegetation or restoration works, maintenance may need to continue for up to 2 years.

3.6.2 Protection of good quality agricultural land

The protection of agricultural land from unnecessary development is essential to maintain the future productivity and efficiency of rural industries. As a general aim, planning instruments should be used to protect such land from those developments that lead to its alienation or diminished productivity. State Planning Policy 1/92: *Development and the Conservation of Agricultural Land* sets out principles to guide the protection of this important natural resource.

The survival of rural communities depends upon a healthy rural economy. There will continue to be a need to build on previously undeveloped land and some loss of agricultural land to development will therefore be inevitable, not just close to the major towns and cities but also in rural areas. However, development without regard to the need for land conservation and the continuing importance of agriculture would be unacceptable. The best and most versatile farming land has a special importance and should not be built on unless there is an overriding need for the development in terms of public benefit and no other site is suitable for the particular purpose.

An assessment of land quality in terms of its suitability for agriculture is clearly essential if land conservation policies are to be implemented. Some land resource information has been gathered by the DNR which provides an important source for strategic planning purposes. Local governments are encouraged to require that applicants undertake land/soil studies where adequate information is lacking. *The Planning Guidelines: The Identification of Good Quality Agricultural Land* provides advice on identifying areas of good quality agricultural land and sets out processes for protecting such land through planning schemes and development assessment.

3.6.3 Air quality

South East Queensland has a history of relatively low air pollution levels, due to its small industrial base and comparatively low population. However, the region's topography, amount of sunshine and prevailing wind patterns are such that it has a high potential for pollution. As a result, air pollution, particularly photochemical smog, could become a significant problem in the future as the region's population and economic activities continue to grow rapidly. The Department of Environment and Heritage's regional network of air quality monitoring stations typically records exceedences of the national standard for ozone (or photochemical smog) on several occasions each year.

The South East Queensland Regional Air Quality Strategy (SEQRAQS) is currently being finalised following public consultation (Department of Environment, 1998). It intends to address those aspects of air quality which have regionally significant effects on the environmental values of human health and well being, ecological sustainability and amenity, including visibility. The focus of SEQRAQS is on those pollutants which contribute to regional pollution levels, although the need to develop strategies to deal with particular local issues is also recognised.

More than 70% of regional emissions originate from motor vehicles. The SEQRAQS and Integrated Regional Transport Plan (IRTP) aim to encourage travel by less polluting transport modes - cycling, walking and public transport - and to improve regional air quality.

The South East Queensland community has also identified controlled burning, including bushfire prevention, as a key issue for regional air quality management.

Traditionally, government land management agencies and private landholders have used controlled burning practices as a regular part of fire management and agricultural activities such as enhancement of pasture production, cane trash burning, clearing of land for development, reduction of forest understorey fuel loads to mitigate the undesirable effects of wildfires, and to maintain the natural condition of plant and animal communities.

It is considered that if controlled burning is not carried out, a greater number of serious wildfires would occur in natural and rural vegetation communities. This would result in a greater loss of human life and damage to property, reduced rural production, and reduced natural biodiversity of native plant and animal communities. It may also result in very high particle levels for an extended period. The consequences of discontinuing controlled burning would therefore be potentially disastrous with no net annual improvement in regional air quality and possibly even a worsening. At the same time, there is widespread acknowledgment that the impact of smoke on the community needs to be kept to a minimum. Besides the initial impacts of smoke from bushfires on safety and visual amenity, the health risks associated with smoke concentration are well accepted even if precise details of the effects of smoke on humans are still not fully understood.

The Department of Environment and Heritage's emissions inventory contains data for emissions from domestic waste combustion but not from controlled burning of vegetation. However, significant emission sources clearly contribute to regular incidents of poor air quality.

The overall strategy for controlled burning is to better manage the impact of bushfire management practices on regional air quality consistent with other fire management objectives. Vegetation biomass burning releases gaseous and particulate air pollutants which controlled burning practices should strive to limit.

It is likely that SEQRAQS controlled burning strategies will aim to:

- improve the use of existing information relating to controlled burning practices and local meteorology; and
- minimise the impact on regional air quality levels from hazard reduction burning, clearing of land for development, native forest fire management practices and the use of fire in rural production activities.

The actions required to improve air quality will be the subject of ongoing consideration by the SEQRAQS implementation group.

3.6.4 Integrated planning activities

Until recently, the basic approach to planning and development had changed little since the 1930s. However, in recent years, community consciousness of a broader range of environmental and social considerations has increased. This has been coupled with greater demands for public accountability and public involvement in the decision making process. Corresponding pressure on Governments has resulted in layer upon layer of State and local government regulation being added to deal with each new issue, with little thought given to the impact on the system as a whole. As a result, more than 400 separate approval processes in 60 different Acts of Parliament related to development alone. (*Draft Integrated Planning Bill – Fact Sheet 1; August 1997; Queensland Department of Local Government and Planning*). There was clearly a need for streamlining and integration of the development approval process.

Consequently, in March 1998, a new Integrated Planning Act (IPA) was passed, the purpose of which is to achieve ecological sustainability by:

- coordinating and integrating planning at the local, regional and State levels;
- managing the process by which development occurs; and
- managing the effects of development on the environment.

(Integrated Planning Act 1997)

The implications of IPA from a natural resource management perspective are monumental and complement NRM strategy development in that it seeks to:

- ensure decision-making processes are accountable, coordinated and efficient; take account of short and long term environmental effects of development; and seek to provide equity between present and future generations.
- encourage a seamless connection between local, regional and state planning strategies;
- ensure the sustainable use of renewable natural resources and the prudent use of non-renewable natural resources;
- avoid, if practicable, adverse environmental effects of development;
- supply infrastructure in a coordinated, efficient and orderly way;
- apply standards of amenity, conservation, energy, health and safety in the built environment that are cost effective and of public benefit; and
- provide opportunities for community involvement in decision making.

The Act states that core matters to be dealt with in a local government's planning scheme include 'valuable features' which are described as:

- (a) resources or areas that are of ecological significance (such as habitats, wildlife corridors, buffer zones, places supporting biological diversity or resilience, and features contributing to the quality of air, water (including catchments or recharge areas) and soil);
- (b) areas contributing significantly to amenity

- (c) areas or places of cultural heritage significance
 - (d) resources or areas of economic value (such as extractive deposits, forestry resources, water resource, sources of renewable and non-renewable energy and good quality agricultural land).
- (Office of the Queensland Parliamentary Counsel, 1997; 268-269)

The need to consider these valuable features increases the responsibilities of local governments with regard to the protection and sustainable management of those features. It will be important to coordinate and integrate regional and catchment level natural resource management strategies with local government planning schemes and associated documents. This presents opportunities for state and local government and community groups to coordinate the implementation of their various strategic and management plans.

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