

The background of the entire page is a photograph of a wide, calm body of water, likely an estuary. In the distance, a dark, continuous line of trees and vegetation marks the far shore. The sky above is a clear, pale blue. The water in the foreground is dark and reflects the sky and the distant shore.

# Pathways to a Living Estuary

**Estuary Management Plan**

**CLARENCE  
ESTUARY**

**Report No. 1485/R04/V3**

**Prepared for:**

**CLARENCE RIVER COUNTY COUNCIL**

**PATHWAYS TO A LIVING ESTUARY**

**CLARENCE ESTUARY MANAGEMENT PLAN**



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**Note:**

At the time that this plan was prepared, estuary management in NSW was a responsibility of the Department of Land and Water Conservation, in association with local Councils. During 2003, the NSW government has restructured natural resource, environment and planning agencies. The current state agencies with roles and responsibilities in the management of the Clarence estuary are noted below:

- Department of Infrastructure, Planning and Natural Resources (DIPNR), which includes former Department of Land and Water Conservation, Planning NSW, Healthy Rivers Commission, Infrastructure Co-ordination Unit (from Premiers Department), Transport Planning (from Department of Transport) and the Forestry Industry Adjustment Unit.
- Department of Environment and Conservation (DEC), which includes the former Environment Protection Authority, National Parks and Wildlife Service, Resource NSW and Royal Botanical Gardens and Domain Trust, and is linked to the Sydney Catchment Authority.
- Lands Department (now separate from the former Department of Land and Water Conservation). Lands now has responsibility for Crown Lands, Minor Ports, Crown Roads, Soil Services, Land and Property Information, Native Title, Aboriginal Land Claims and Land Boards.

# Key aspects of the Clarence Estuary Management Plan

## Pathways to a Living Estuary

### COMMUNITY ASPIRATIONS – NATURALNESS AND SOCIO-ECONOMIC VERSATILITY

The aim of the Clarence Estuary Management Plan is:

*“To achieve a healthy, productive and attractive Clarence estuary where resources are used on a sustainable basis in harmony with environmental values, community and visitor needs.”*

Local people have suggested that achievement of this aim would be indicated by:

- a relatively robust natural system, including an unpolluted river, offering versatile management choices;
- water quality that supports healthy fish;
- natural vegetation, scenery and wildlife habitat;
- appropriate water quality and facilities for recreational opportunities for local residents and visitors;
- maintenance of traditional employment sectors such as the sugar industry, grazing, commercial fishing, recreational fishing and the port;
- protection of high conservation value areas in National Parks and Reserves.

These values demonstrate that local people recognise important links between the social and economic well being of residents.

There are major challenges to achieving sustainable management of the Clarence estuary. Many of these challenges derive from human interactions with sensitive natural estuarine processes that are highly variable and operate at scales that are difficult to understand. Some existing management responses, such as floodplain drainage systems, are high capital cost, structural solutions that have been inherited from a time when the community's objectives were different to now. Changing such existing management responses requires careful consideration of economic and social issues as well as good science. However, perhaps the greatest challenge for sustainable management is to achieve sufficient integration of community aspirations, state and local government policy, quality technical information, best practice solutions and adequate resources, for real and recognisable progress to be made. This challenge is about **how** we choose to manage, and what we set as our objectives, rather than **what** we manage.

The Clarence Estuary Management Plan recognises that the regional community has been exploring ways to meet this challenge for some time, and that local case studies illustrate outstanding and innovative approaches. The Estuary Management Plan seeks to build on the achievements to date, and to guide the management process so that the community's aspirations can be met and maintained in the long term.

The Clarence River, its estuary and coastal floodplain comprise the largest coastal river system in NSW. The river catchment supplies a high but variable freshwater flow to the estuarine reaches that extend more than 100 kilometres inland from the coast. The coastal floodplain is underlain by some 53000 hectares of high-risk acid sulfate soils. Once diverse floodplain habitats, including freshwater and estuarine wetlands, rainforest, heath and woodland, have been largely removed to make way for agricultural land uses.

The Clarence estuary supports the largest commercial estuary fishery in NSW, with production generally more than twice that of the next most important estuary. The coastal floodplain has been drained to enhance agricultural productivity for many years, but particularly since the mid twentieth century. Most of the floodplain is occupied by sugar cane (particularly in the lower estuary) or cattle grazing. The floodplain drains introduce major challenges to sustainable management, in regard to aquatic and terrestrial habitat values, water quality, restrictions to fish passage and the real costs and benefits of agricultural productivity.

The local Clarence community each year welcomes thousands of visitors, and income from tourism is now the main economic base of the area. In addition to visitors, there is considerable permanent population growth pressure in Yamba, at the mouth of the estuary. Other growth industries are related to the maritime heritage of the area, and include specialist boat building and fitout.

## KEY ISSUES AND CHALLENGES

The Estuary Management Plan includes actions to address nine key issues, grouped in four major themes. These themes and issues are noted below. The processes and condition of the coastal floodplain and estuary are closely interdependent, so there is considerable overlap between aspects of all issues and themes.

### 1. INTEGRATED WATER CYCLE MANAGEMENT

This theme includes several issues that are associated with control of river and tidal flows in the estuary.

- The disturbance/exposure of acid sulfate soils at shallow depths across large areas of agricultural land on the coastal floodplain, most often by floodplain drains and floodgates;
- The indirect and sometimes unexpected effects of flood protection and floodplain drainage structures on the health of tributary creeks and the main estuary. An integrated approach to floodplain management that addresses multiple interests, including flood risks, agricultural land use and management (including profitability), and the protection of ecological and water quality values is needed;
- Management of sedimentary processes and dredging to stabilise eroding banks, provide safe navigation, and identify sand and gravel resources for regional growth, consistent with the natural variability of the estuary sediment budget.

### 2. THREATS TO ECOLOGICAL VALUES

- Protection and restoration of riparian, wetland and aquatic habitats. This involves identifying the parts of the estuary and floodplain that should be managed for permanent conservation, and also those areas where investment in habitat enhancement can provide the greatest benefits, for the health of the estuary as a whole.

### 3. USER INTERACTIONS

- Management of port and marine industries that provide significant employment growth potential.
- Managing fishery resources – the interaction of the various fishery sectors, protection and restoration of fish habitat and fishery productivity.
- Managing urban growth, with particular attention to the information necessary to select growth sites that minimise risks to natural and cultural values, and provide for cost effective development processes. The provision of integrated and sustainable urban services such as potable water, sewerage and stormwater management is a major issue.
- Improved awareness and management of cultural heritage values, including further participation of the local Aboriginal community in natural resource management.

### 4. OVERCOMING UNCERTAINTY AND FACILITATING SYSTEMIC MANAGEMENT

- The development of an overall management process and structure to overcome fragmentation of decision making and action, lack of systemic focus, poor resourcing and poor accountability. Of particular interest are mechanisms that can deliver sufficient continuity in management programs to provide for consistent and sustainable management.

## AN APPROACH TO SUSTAINABLE MANAGEMENT

The Estuary Management Plan focuses on developing integrated management solutions that provide sustainable benefits at the whole of system scale. It also focuses on enabling managers and local people to evaluate progress and review strategies, as new information becomes available. In this sense, it is an adaptive plan, designed to be modified, and its success depends of ongoing commitment and engagement by all levels of government, local industry and different community groups.

The Estuary Management Plan presents actions in three time frames.

- Actions that should be initiated in the first two years after all stakeholders sign off on the Plan's objectives, and strategic approach. These actions include statutory provisions, on the ground works, incentives and detailed studies to address urgent threats to sensitive high value features of the estuary and floodplain. Many of these actions are in the lower estuary. Early actions also address new institutional arrangements to deliver more integrated management.
- Actions that should be initiated within three to five years of implementation commencing. These actions include a range of major capital works to deliver high quality water cycle management. Measures to restore floodplain, riparian and aquatic habitats are also proposed during this period. A review of the Estuary Management Plan is recommended after three years of implementation.
- Actions that should be initiated after more than five years. These include lower priority activities, and actions that require improved management information (studies, trials or education) derived from the two earlier phases, before on the ground activities can commence.

*The action addresses an issue of significant community concern*

*The action relates to a high value and high risk subcatchment*

*The action addresses a priority objective or principal outcome agreed by stakeholders*

*The action was identified as urgent by a focus group (in this case the Estuary Management Committee)*

*There is a high risk attached to a do nothing (business as usual) approach to the issue*

*A high return is expected from investment in this action – positive cumulative outcomes*

*Funds are available to implement this action*

*Other management resources such as staff time and skills are available within local institutions*

*The action can achieve recognisable outcomes in specified timeframes*

*The action is a step in a broader strategy, and is essential before other actions can be implemented*

## THE COSTS OF ESTUARY MANAGEMENT

The results of a survey of local Councils, agencies and industry groups during the preparation of this Plan suggest a conservative estimate of approximately \$15 million that is currently invested each year in activities that contribute to the health of the Clarence estuary each year. High capital investment in specific new infrastructure projects can significantly increase this amount (eg construction of new Sewage Treatment Plants).

The Estuary Management Plan explores ways to make most efficient use of the funds that are available locally, by maximising opportunities to leverage grant funds or to attract industry investment in ecologically sustainable management activities. The Floodplain Partnership Agreement, that was suggested by the Healthy Rivers Commission and adopted as a key strategy by the State Government, is one option that could help to make more efficient use of available funds and enhance funding continuity.

The Estuary Management Plan does not provide detailed estimates of the costs of individual actions, but does note whether the capital and maintenance (including education, training, staff time and plan preparation etc) fall into specified cost categories.

The majority of the actions proposed for the first two years of Plan implementation have minimal capital investment requirements. Exceptions are the provision of reticulated sewerage to Iluka and dredging of the main shipping channel. The planning, education and communication costs for new actions or enhanced continuing actions for this first implementation period are estimated at approximately \$5.5 million. Much of this cost is covered by the salaries of existing Council and agency staff. These actions complement, refine and redirect a variety of existing responsibilities of local Councils and agencies.

Capital and maintenance investment in the second stage of implementation, when more on the ground works (with high costs associated with upgrades of sewerage and stormwater infrastructure and maintenance of flood infrastructure) would take place, is estimated to be up to \$30 million.

All these costs will need careful review by the relevant state and local authorities as more detailed designs are prepared.

## **FIRST STEPS FOR SUSTAINABLE ESTUARY MANAGEMENT**

The actions that are recommended for the first two years of plan implementation are summarised below.

### **INTEGRATED WATER CYCLE MANAGEMENT**

#### **Systemic water cycle management**

Establish a water cycle management forum to set water and wastewater management priorities at a catchment and estuary scale – ie across local government area boundaries. This forum would address matters such as implementing a water demand reduction strategy for all local government areas in the lower Clarence valley, provision of reticulated sewerage services to unsewered towns such as Iluka, and planning controls to promote effective water management for settlements which have reticulated water supply, but only on site wastewater management.

#### **Acid sulfate soil management**

Complete and implement acid sulfate soil management plans for Stage 1 and subsequently Stage 2 Acid Sulfate Hotspots. These include Sportsmans Creek / Everlasting Swamp and Shark Creek, and the islands of the lower estuary. Also complete and implement plans of similar scope for other high-risk ASS areas that are not included in the Hotspot program (eg the Alummy Creek and Coldstream River catchments).

#### **Sediment transport**

Conduct the necessary studies to clearly understand sediment, erosion, transport and deposition patterns in the estuary. This action is linked to the preparation of a sand and gravel management strategy for the estuary. A preliminary action in this regard is to prohibit sand extraction (dredging) from Shallow Channel and Micalo Channel, unless supported by a detailed sustainability assessment. However, maintenance dredging of the main shipping channel should proceed provided all statutory requirements are met.

#### **Managing discharges**

Promote ongoing improvement to the environmental performance of licensed industries. This is also linked to the activities of the Water Cycle Forum, through strategic improvements to sewerage treatment plants.

Enforce nil wastewater discharge requirements for vessels using Lake Wooloweyah, Shallow Channel, Palmers Channel and Micalo Channel, as well as at Maclean, Yamba Bay, in the Yamba canal estates and Iluka Bay.

#### **Water quality and estuary health information**

Incorporate estuary health indicators in ongoing monitoring and reporting programs and ensure that information is available to the local community (eg through State of the Environment Reports) about progress towards these indicators. Provide information on how community members can contribute to the water quality and ecological aspects of improved estuary health.



## MANAGING THREATS TO ECOLOGICAL VALUES

### Integrated management approach

Expedite the development of a regionally applicable Floodplain Partnership Agreement, building on the achievements of the Clarence Floodplain Project. The Upper North Coast Catchment Management Board is currently exploring options for the Floodplain Partnership Agreement.

### Habitat protection and enhancement

Undertake a comprehensive assessment of estuarine and floodplain vegetation, water birds and other aquatic fauna and their habitats to clarify the locations and habitats with the highest conservation value, serious threats and strong restoration potential. Identify priority areas to be managed as conservation reserves (on public or Crown Lands) or as voluntary conservation areas on private property. Prepare Plans of Management for selected parcels of Crown Land, focusing on their contribution to the ecological values of the estuary, such as connectivity of river bank habitats, wader habitats and wetlands. Examples include the shores of Lake Wooloweyah and The Broadwater and enclosure permit areas along Sportsmans Creek. Enforce boat speed and no wash regulations in narrow channels where boat wakes contribute significantly to bank erosion and inhibit the recovery of riparian vegetation.

A high priority action for Councils is to commence the development of a consistent set of requirements for habitat protection in LEPs for all local government areas in the lower Clarence.

NPWS and NSW Fisheries will prepare Species Recovery Plans for threatened estuarine and terrestrial species.

Strict quarantine controls will be maintained on vessels entering the estuary and on oyster transfers from other estuaries.

### Fishery Management

NSW Fisheries will continue liaison with commercial and recreational fishers to Implement the Estuary General and Estuary Prawn Trawl Fishery Management Strategies, and complete the recreational fishery strategy and indigenous fishery strategy.

Confirm the impacts of commercial trawlers on seagrass in Lake Wooloweyah and implement mitigation strategies as necessary.

Further develop and implement the Clarence Aquaculture Development Plan, consistent with the North Coast Sustainable Aquaculture Strategy.

The program of floodgate modification that is being managed through the Clarence Floodplain Project provides important fish passage and fish habitat benefits and will continue, within the strategic framework provided by the Catchment Blueprint and Floodplain Partnership Agreement. Priorities for floodgate modification should have regard to achieving multiple habitat and water quality objectives, with particular attention to remediation of high risk acid sulfate soil areas.

## MANAGING USER INTERACTIONS

### Land Use Planning

Prepare sustainability assessments prior to all rezonings to more intensive land use throughout the lower Clarence valley. Associated with this action, Councils will work together to develop a consistent zoning strategy across all local government areas in the lower Clarence Valley, in line with PlanFIRST initiatives.

Restrict future development at Lake Wooloweyah village to within the boundaries of the existing developed area, consistent with HRC recommendations for a significant protection orientation for the management of Lake Wooloweyah.

Prepare Plans of Management for selected Crown Lands on the estuary shoreline to address conservation and recreation management issues.

### **Maintenance of shipping channels**

Update the approvals, licences and permits for dredging of the main shipping channel including the rock reef and sand upstream. Continue to consult with the local Aboriginal community about managing the cultural heritage values of the rock reef. From a shipping safety perspective, it is unlikely that sand dredging would be undertaken unless the rock reef is also addressed. The entrance may be dredged in accordance with an approved and licensed strategy, providing there is clear economic justification and all social and cultural issues have also been addressed.

Sand dredging for land fill purposes would be subject to separate development assessment and licensing processes.

Subsequent maintenance dredging activities will be planned in the context of a sand and gravel management strategy for the whole estuary. A related sedimentary process action is to implement bank management plans for villages affected by bank erosion.

### **Boating management**

Prepare operational and environmental management plans for the boat harbours at Yamba and Iluka. Also relevant to sustainable boating are enforcement of boat wake and nil wastewater discharge regulations in specific sensitive reaches of the estuary.

### **Cultural heritage management**

Prepare an Aboriginal cultural heritage study and plan for NPWS holdings (in the first instance). An Aboriginal heritage study and strategy for the whole of the estuary and floodplain is a lower priority and would be prepared in association with a strategic cultural heritage management plan for the Clarence catchment. These studies and plans would be prepared with the full involvement of the Aboriginal community.

A further action relating to cultural heritage management is to encourage the involvement of the Aboriginal community in natural resource management planning in the Clarence valley, so that cultural perspectives on natural resource issues can be taken into account.

## **INTEGRATED MANAGEMENT AND MANAGING UNCERTAINTY**

### **Role and relationships of the Estuary Management Committee**

The Plan includes a set of actions that define the future role and membership of the Estuary Management Committee, as it moves from plan preparation to implementation. The Committee would be a joint committee of all local Councils in the lower Clarence Valley (sharing responsibility for administration funds etc). There will be clear cross-representation arrangements with other natural resource management committees.

The implementation of the Plan will be formally authorised by all relevant local authorities. The Plan is designed to integrate with the Catchment Blueprint, providing detail for estuary actions and justification for estuary priorities.

The Estuary Management Committee will provide advice to the Upper North Coast Catchment Board about monitoring and reporting of estuary health, and will co-ordinate estuary information to

be included in annual progress reports. These would provide progressive snapshots of progress to date.

The Estuary Management Plan will be reviewed after three years to ensure that objectives and actions continue to be appropriate.

### **The Clarence Floodplain Partnership Agreement**

DLWC, through a working group of the Upper North Coast Catchment Management Board is currently developing the framework for a formal Floodplain Partnership Agreement that will co-ordinate a range of floodplain property management, water quality and habitat conservation actions to benefit the floodplain and the estuary. The Floodplain Partnership Agreement will provide certainty and accountability for responsible organisations and individuals, and is also expected to enhance funding opportunities. The Estuary Management Committee may be responsible for some of the actions in the Floodplain Partnership Agreement. It will also be responsible for managing the implementation of actions that are important for sustainable management of the estuary, but are outside the scope of the Floodplain Partnership Agreement.

The Healthy Rivers Commission is responsible for auditing progress in relation to its recommendations for the Clarence catchment. An independent organisation will also have an auditing role in relation to auditing the Floodplain Partnership Agreement.

### **Integration of management – natural resources that cross Council boundaries**

As noted in relation to water cycle management, threats to ecological values and user interactions, several actions are proposed to provide a systemic perspective for management decisions. These include:

- the water cycle management forum; and
- a consistent approach to land use planning, through the use of sustainability assessments.

Standard approaches are also recommended in each Council Local Environment Plan in relation to:

- habitat assessment and management;
- cultural heritage assessment and management; and
- water sensitive design.

Amalgamations of Councils are not proposed, but joint initiatives to develop shared systemic priorities are essential. The Regional Strategy to be prepared under PlanFIRST will assist in this regard, as will the Comprehensive Coastal Assessment program. These are both new State government initiatives to assist regional communities to make strategic and sustainable planning decisions.

## **STRATEGIES FOR CONSOLIDATION AND ON THE GROUND WORKS – 3 TO 5 YEAR TIMEFRAMES**

The second stage of implementation of the Estuary Management Plan will include actions such as:

- Further modification of floodgate design and management, consistent with NSW Fisheries requirements, and agricultural landholder needs. This will occur within a strategic framework

provided by the Floodplain Partnership Agreement and priority setting already achieved in the Clarence Floodplain Project.

- Development and implementation of incentives to assist landholders to adopt new management approaches (such as through the DLWC Environmental Services Scheme).
- Major capital works for sewerage system upgrades, such as at Yamba, Maclean (also servicing Ilarwill and Lawrence) and Grafton.
- Implementation of critical parts of stormwater management plans for Grafton and Maclean in particular, that can be integrated with other land and water management initiatives, such as wetland restoration.
- Conduct an audit of environmental weeds, including terrestrial, aquatic and wetland habitats, to establish priority areas for weed control works.
- Prepare a waterway user strategy, focusing on public recreational user access to the foreshore and waterway, and addressing potential conflicts between user groups (eg personal water craft and non powered recreational users, and commercial users) and between users and protection of sensitive aquatic habitats. This strategy would be linked to Plans of Management for selected Crown Lands and Crown Waterways.

All actions would be subject to monitoring and reporting requirements, with program audits at set intervals.

## **THE ROLE OF THE COMMUNITY IN IMPLEMENTING THE ESTUARY MANAGEMENT PLAN**

The community has three main roles in the implementation of the Clarence Estuary Management Plan. Your views and your involvement will be much appreciated.

### **Feedback, review and strategic direction**

Comments and feedback on this Management Plan and during review processes, on the objectives of the Plan, the achievements of various actions, new issues that need to be addressed, and the quality of communication about estuary management issues.

### **Direct contributions to actions**

These will include landholders modifying the management of their properties (in some cases formalised through the Floodplain Partnership Agreement), and Landcare and Coastcare Groups - raising awareness, contributing to on the ground works, and potentially to monitoring programs.

### **Indirect contributions**

These will include contributions to rate income, purchase or use of estuary values or products, participation in estuary dependent enterprises, etc.

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## 1.0 PURPOSE AND PLANNING CONTEXT OF THE ESTUARY MANAGEMENT PLAN

This Estuary Management Plan for the estuarine reaches of the Clarence River presents actions to protect community, socio-economic and ecological values and to minimise risks to the future health of the estuary and its associated coastal floodplain. The area covered by the Plan is shown in **Figures 1.1** and **1.2**.

The Estuary Management Plan has been prepared on behalf of the Clarence Estuary Management Committee, a Committee of Maclean Council, whose membership includes representatives of local Councils, County Councils, State agencies, industry groups, recreational and commercial users of the estuary and conservation interests. In this sense, the Estuary Management Plan presents the integrated views of specialist estuary stakeholders.

The aim of estuary management (as stated in the NSW Estuary Management Manual 1992) is to encourage the integrated, balanced, responsible and ecologically sustainable use of the State's estuaries. The Clarence Estuary Management Committee has adopted as its goal:

*“to achieve a healthy, productive and attractive Clarence Estuary where resources are used on a sustainable basis in harmony with environmental values, community and visitor needs.”*

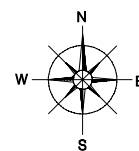
During the preparation of this estuary management plan, the nature and scope of the plan were also discussed with community representatives outside the Estuary Management Committee. The most frequently nominated characteristics of an effective plan for the Clarence estuary were:

- community ownership of the plan - the plan is developed through an open and transparent process that involves the community as partners;
- all voices heard and their level of representation recognised;
- the plan correctly identifies and is relevant to community concerns and values;
- the plan is based on good science (this was considered to be the most important feature); and
- the plan includes an agreed implementation strategy that addresses funding, responsibility and accountability.

The Estuary Management Plan is not the only strategic planning tool in place to guide the sustainable management of the Clarence estuary. Others include:

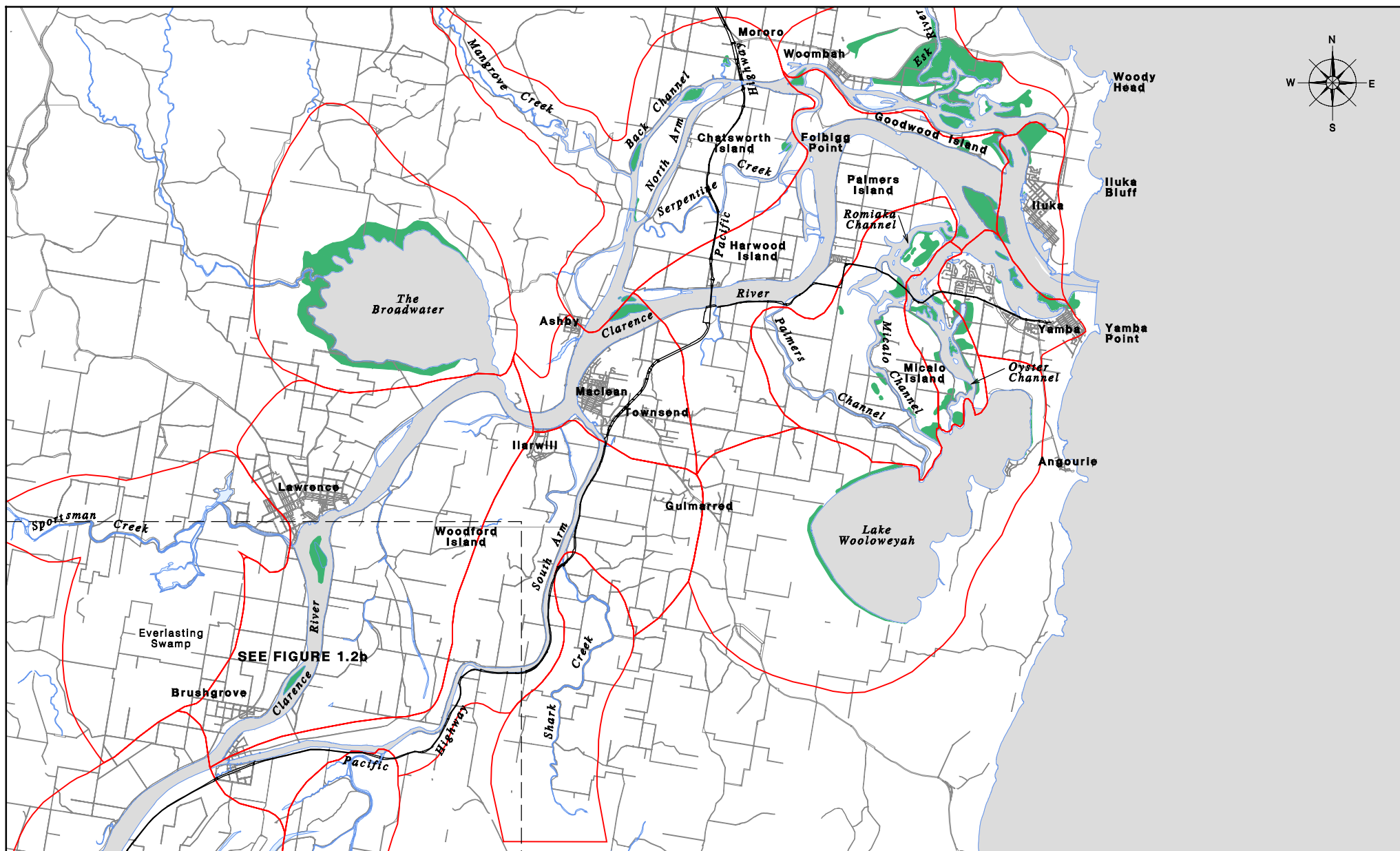
- the NSW Coastal Policy and associated Coastal Package initiatives such as Comprehensive Coastal Assessment;
- the Catchment Blueprint prepared by the Upper North Coast Catchment Management Board;
- a Statement of Intent issued by the State Government in relation to the recommendations of the Healthy Rivers Commission;
- the North Coast Regional Plan and Local Environmental Plans prepared by individual Local Councils; and





**FIGURE 1.1**  
The Clarence Estuary and Floodplain





#### Legend

- Extent of Mangroves
- Tidal Reaches, tidal limit of Copmanhurst
- Subcatchment Boundary

Umwelt (Australia) Pty Limited  
Source: DLWC

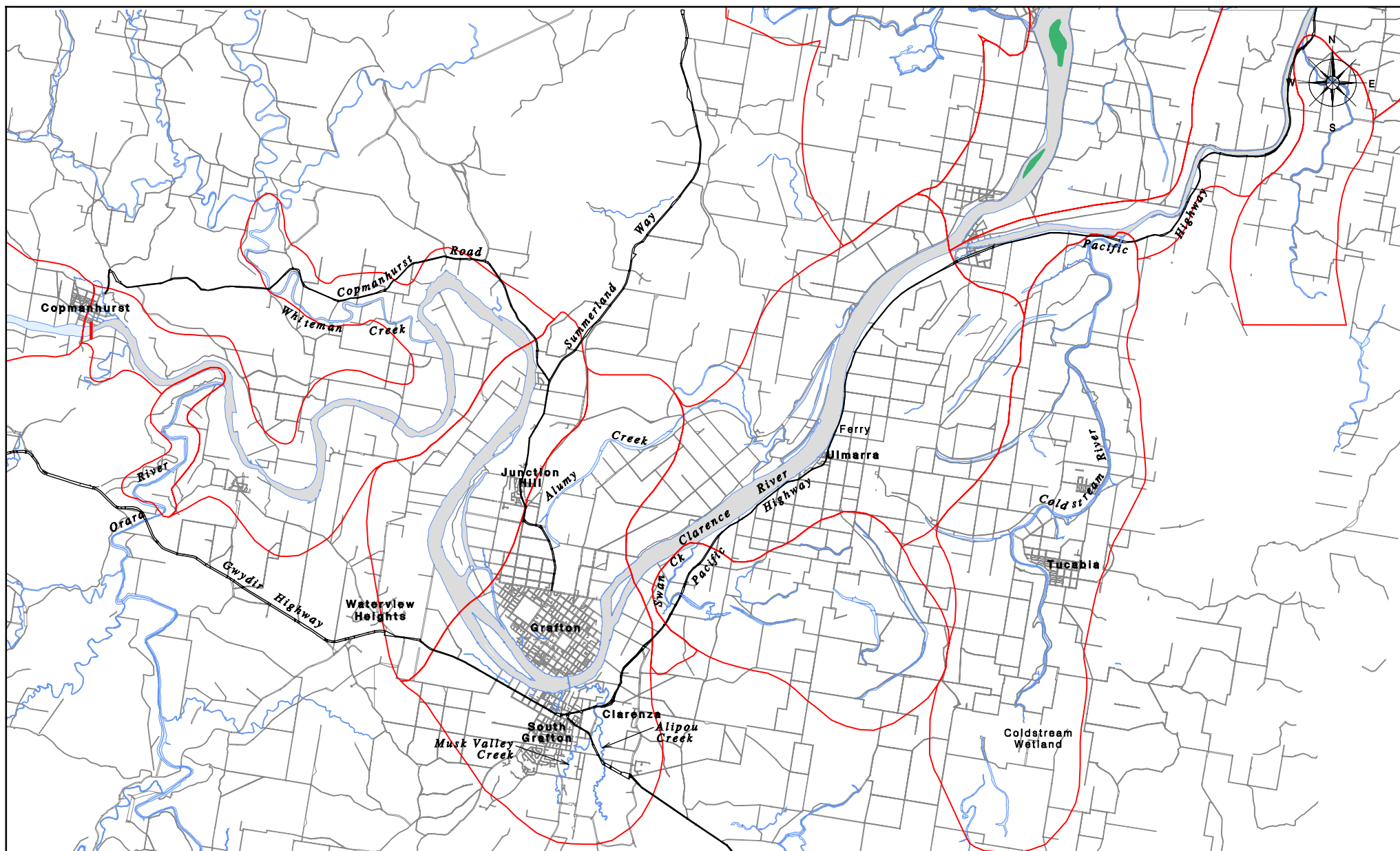
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#### FIGURE 1.2a

Extent of Study Area and  
Subcatchment Boundaries

A4 Scale 1:170 000

Ref No.: R04\_V1/1485\_145.dgn



#### Legend

- Extent of Mangroves
- Tidal Reaches, tidal limit of Copmanhurst
- Subcatchment Boundary

Umwelt (Australia) Pty Limited  
Source: DLWC

0 2 4 8km

#### FIGURE 1.2b

Extent of Study Area and  
Subcatchment Boundaries

A4 Scale 1:170 000

Ref No.:R04\_V1/1485\_146.dgn

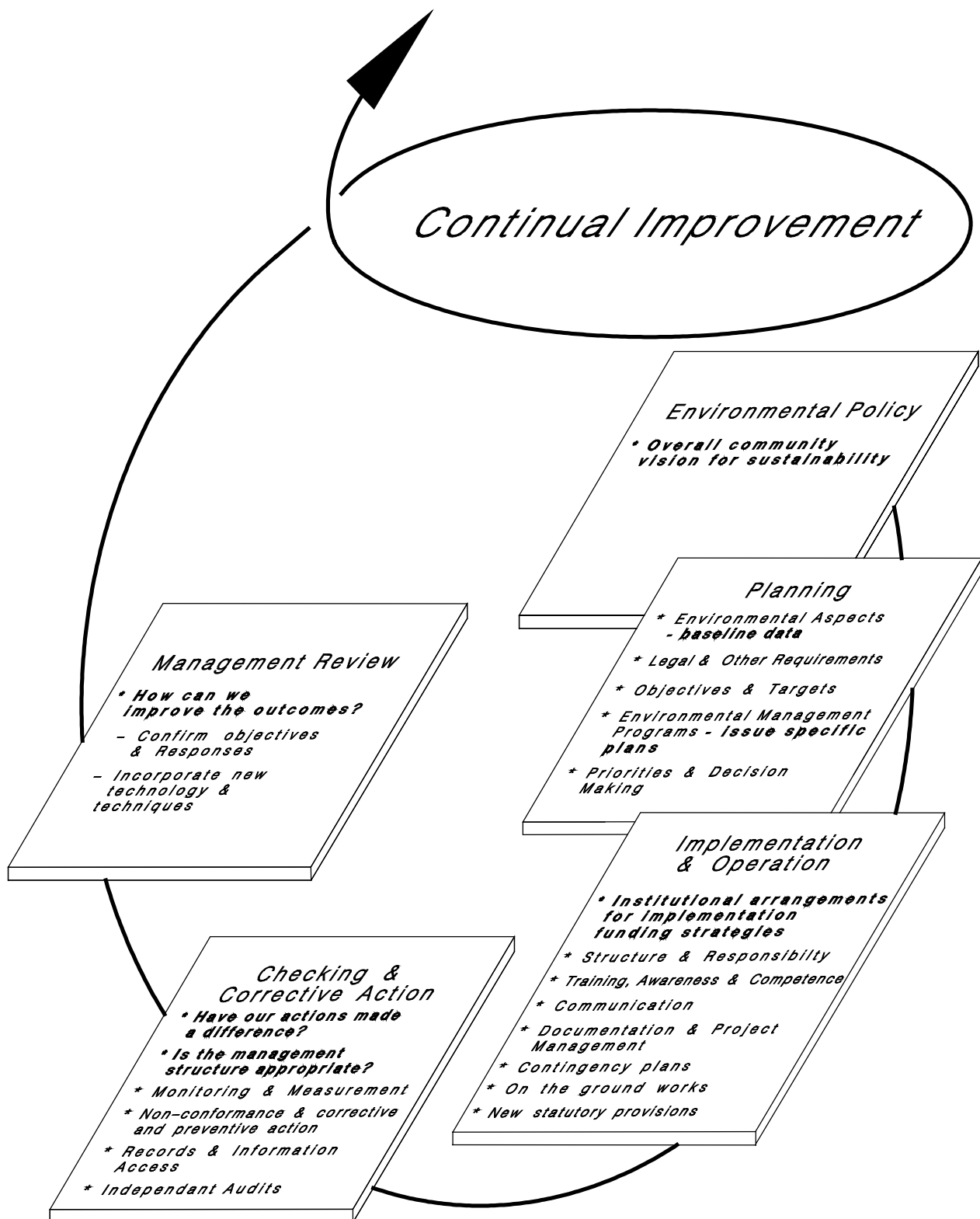
- a range of specific issue studies, strategies and plans prepared by state agencies and local government, including fishery management, water resource management, floodplain management and vegetation management.

This Plan recognises the roles and achievements of these associated plans and is designed to complement, reinforce and extend their approaches. For instance, the Estuary Management Plan recognises the high priority identified in the Catchment Blueprint for restoration of riparian vegetation, and sets out a program for restoring and rehabilitating riparian vegetation along the banks of the estuary and its floodplain tributaries. The Plan also recognises the recent recommendations of the Healthy Rivers Commission (HRC) in relation to protection of the ecological values of Lake Wooloweyah and The Broadwater.

The Plan draws on the scientific process information presented in an Estuary Process Study prepared for the Clarence (Manly Hydraulics Laboratory 2000), and management information presented in an Estuary Management Study (Umwelt (Australia) Pty Limited 2002). Both of these reference documents are available from Maclean Council.

The Estuary Management Plan presents clearly justified and prioritised actions for a healthy Clarence estuary. It identifies the organisations responsible for implementing those actions and sets out a framework for monitoring and reporting progress towards agreed outcomes. In this way, it aims to make organisations not only responsible, but also accountable for trends and achievements in estuary health. This adaptive, system based approach to estuary management is illustrated in **Figure 1.3**. Some organisations and some existing management programs in the lower Clarence Valley already illustrate various aspects of this management approach. The Estuary Management Plan (and the Catchment Blueprint) applies the approach more rigorously. Existing management responses have been reviewed and their strengths and weaknesses identified. The community's values and vision for the estuary have been confirmed. The status of baseline information on key issues has been reviewed and gaps targeted for further investigation. Clear objectives have been set, together with measures of performance.

Priority actions to improve the current responses to estuary management issues are identified in this document. It is proposed to review the Estuary Management Plan after three years of implementation.



**FIGURE 1.3**  
Systems Approach to  
Adaptive Management