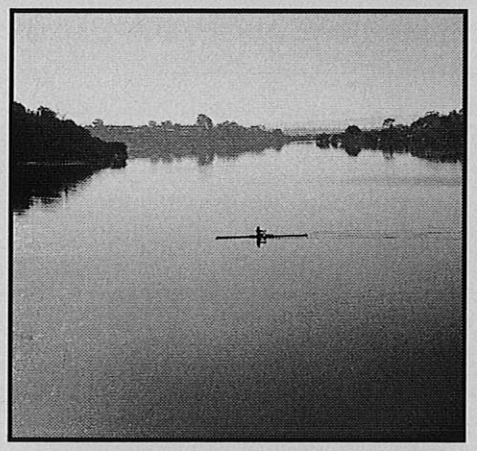

# RIVERPLAN

## An Environmental Management Framework for the Swan and Canning Rivers

**Comprehensive Management Plan**
**and**
**Implementation Strategy**
**for the *Environmental Protection (Swan and Canning Rivers) Policy 1998***
**for Public Consultation**

**July 2003**

**Government of Western Australia**

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July 2003

# Comments

I would like to know what you think about this Strategy. This is an opportunity to suggest any changes, express an opinion and provide information that should be included. The Strategy will be available for public comment until the **24th October 2003**. Your comments will be analysed and the Strategy will be amended where appropriate. A summary of submissions will be released with the final Strategy in early 2004.

Public forums will be held during the consultation period to provide information on the Strategy and facilitate comment on the document. The details will be advertised closer to the time of the sessions.

In your submission I ask you to address some key issues contained in the Strategy. These include:

- Is the environmental management framework proposed comprehensive enough?
- What are the environmental values of the Swan-Canning Rivers and where do they apply? i.e. for the rivers, foreshore and catchment.
- What key actions need to occur to protect these environmental values?

I also seek any general comments on the Strategy.

To aid in writing a submission the Department of Environment have provided a comments template that can be accessed via my web-site at: http://www.ministers.wa.gov.au/edwards. In your submission please:

- list the section, page and paragraph related to your specific comments;
- make your comments clear and concise;
- suggest alternatives or what you would like done.

Comments can be submitted on-line or sent to:

The Hon Dr Judy Edwards
Minister for the Environment
29th Floor, Allendale Square
77 St George's Terrace
PERTH WA 6000

Telephone: (08) 9220 5050
Fax: (08) 9221 4665
E-mail: judy-edwards@dpc.wa.gov.au

# Foreword

In 1998 the State Government gazetted the Environmental Protection (Swan and Canning Rivers) Policy. The Environmental Protection Policy was developed to preserve and protect the Swan and Canning Rivers, and called for a Comprehensive Management Plan to be developed. That plan was developed and provided to the Minister in December 1999 to fulfil that statutory requirement, but not released by the previous government.

Since then, the requirements of the Environmental Protection Policy have continued to be addressed by a range of important initiatives, principally the Swan-Canning Cleanup Program to reduce nutrient levels, Swan Estuary Marine Park and Adjacent Nature Reserves Management Plan to protect biodiversity, the Infill Sewerage Program to reduce nutrients and Riverbank to address foreshore restoration. Between 1999 and 2003 there has been increased levels of funding and on-ground works to implement the Environmental Protection Policy.

This new document, Riverplan, draws together existing initiatives within a framework for the environmental management of the Swan and Canning Rivers to ensure that the purpose of the Environmental Protection Policy is fulfilled.

Recent events such as recurring algal blooms and fish kills indicate that the system is under stress and therefore we must continue to improve our management of this complex system.

Riverplan proposes for the first time:

- A single body accountable to the Environmental Protection Authority for coordinating management and implementation of the Environmental Protection Policy – the Swan River Trust;
- Partnership Agreements and Memoranda of Understanding with public authorities to implement the EPP, recognising that land use is the principal determinant of water quality;
- A management framework for all projects and initiatives, which underpin the programme for protection for the Swan-Canning Rivers;
- To establish specific and measurable environmental values and quality criteria to incorporate into a stronger Swan-Canning Rivers Environmental Protection Policy.

A Swan River Trust Audit Team is being established to manage public consultation and implementation of Riverplan.

Joint ownership and improved management across the catchment is the key to improving the health of the river system. Everyone living in the catchment must be actively involved so we can all enjoy the benefits of a healthy and productive river system now and in the future. I encourage you to provide comment on Riverplan and continue to play your part in contributing to the management of the Swan-Canning Rivers.

Judy Edwards

Dr Judy Edwards
**MINISTER FOR THE ENVIRONMENT**

# Summary

This Strategy is the principal mechanism for implementation of the *Environmental Protection (Swan and Canning Rivers) Policy 1998*. The Environmental Protection Policy's (EPP) purpose is to ensure that the Swan and Canning Rivers are protected and restored by managing the activities that affect them. The Strategy establishes an overarching and comprehensive environmental management framework that ensures the values of the Swan and Canning Rivers are protected.

Management of the rivers is a complex, evolving process. Much is being done by a wide range of State Government agencies, local governments, community groups and industry that contribute to the protection and restoration of the rivers. Within the environmental management framework, this Strategy recognises existing activities and will largely operate through these initiatives. However, existing initiatives may need to be modified or new initiatives developed where there are currently gaps in river management. One of the key functions of this Strategy is to co-ordinate and integrate these activities.

It is proposed the Swan River Trust co-ordinate the activities required to implement this Strategy. Partnership agreements and memoranda of understanding will be the key mechanism for formalising the relationship between organisations responsible for individual management activities and the EPP. The agreements will set out specific commitments and activities that support the purpose of the EPP.

The EPP is due for review in mid 2005. The work of the Swan River Trust Audit Team and Riverplan will feed into this review. Due to the large number of existing activities, the likely development of new initiatives and the wide range of issues to be considered in the rivers management, this Strategy will be reviewed in conjunction with the EPP. The review will involve assessing the approach taken by the Strategy in co-ordinating and integrating these initiatives across the many organisations along with the implementation of the key elements of the environmental management framework.

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# 1 Background

## 1.1 What is significant about the Swan and Canning Rivers?

The Swan and Canning Rivers lie at the visual heart of Perth, a city of over 1.4 million people. It is the most intensively used river system in Western Australia and is highly valued by the community for its aesthetic, recreational, commercial and environmental importance. These many, and sometimes competing uses, are placing increasing pressure on the rivers. With our drying climate and anticipated population increases, the need to manage these complex, multiple uses and the associated environmental impacts has never been greater.

The Swan and Canning Rivers are a highly modified system and many of the changes made to the rivers are irreversible. While it may be possible to minimise our impact on the rivers, ultimately there remains a trade-off between our use and the health of the rivers. In managing the rivers sustainably, the community must balance environmental, social and economic needs in a responsible and open way, so the benefits of a healthy and productive river system can be enjoyed now and in the future.

**Key issues affecting the Swan and Canning River System**

- Algal blooms and eutrophication
- Riparian vegetation loss
- Loss of species diversity and abundance
- Sedimentation and erosion
- Salinisation
- Chemical and biological contamination
- Seasonal inundation
- Altered river flows
- Environmental water requirements
- Recognition of Aboriginal heritage
- Over-abstraction
- Competition and predation from exotic species
- Disturbance of fish habitat
- Visual and odour problems
- Bank damage
- Acid sulfate soils
- Litter
- Provision for public access
- Noise from recreational activities
- Boat wash and wake
- Landscape amenity

Management of the rivers is a large and complex task. The system itself is large and has historically been poorly understood. Up until the 1950s the rivers utility was of primary interest to the people of Perth. *The Swan River Improvement Act 1925*, provided the framework under which the Public Works Department carried out river works. Works done on the rivers and their banks were to 'improve' the river, essentially to enhance the rivers ability to deliver the things that people wanted - transport, waste disposal, flood control and roads. Little thought was given to any deleterious effects that these activities may have[1].

**Key pressures affecting the Swan and Canning River system**

- Urban stormwater runoff
- Irrigation drainage
- Industrial wastewater
- Soil loss from farmland, roadsides and stream banks
- Agricultural runoff
- Damaging or clearing native vegetation
- Private abstraction
- Use of pesticides
- Livestock grazing
- Introduction of exotic flora and fauna
- Mining operations or excavation
- Dredging
- Filling and reclamation of land
- Urban, industrial and agricultural development
- Recreational activities
- Fishing and aquaculture
- Discharge of ballast waste from vessels
- Boating and associated activities
- Septic tank contamination
- Antifouling

Concern for the deterioration of the Swan River and its foreshores led the State Government to form the Swan River Reference Committee in 1943. Initially a committee of five, it was constituted to co-ordinate works on the river and to deal with such problems as purity of the water and cleanliness of the foreshores. In 1959, following proclamation of the *Swan River Conservation Act 1958*, the committee was replaced by the Swan River Conservation Board. The Board, while continuing the works of the committee, also controlled building and reclamation on the river and foreshores[2].

By the late seventies, the *Waterways Conservation Act 1976* was in place and Swan River Management Authority had taken responsibility for planning and programming river works. Attitudes to dredging and reclamation works on the rivers were changing and policy began to place a greater emphasis on the

environmental aspects of river works. Under the *Swan River Trust Act 1988*, the Swan River Trust was established as an agency with strong planning and management powers with responsibilities in co-ordinating work to balance the use and protection of the waterways and shorelines, and to restore degraded environments. Today, that co-ordination involves many agencies, authorities and individuals with roles and responsibilities in various aspects of river management.

**Swan-Canning Cleanup Program**

In May 1994, the State Government launched a project to study the rivers and to find ways of reversing the deterioration in water quality. Known as the Swan-Canning Cleanup Program (SCCP), responsibility for the study rested with the Swan River Trust. In 1999, the Trust published the Swan-Canning Cleanup Program Action Plan, a comprehensive document outlining recommendations and action steps aimed at improving the health of the Swan-Canning River system. The Action Plan packages previous work and initiatives to ensure it is communicated effectively to the community and stakeholders. It is implemented through co-operation between the many parties with responsibility for planning and managing the Swan and Canning Rivers[3].

## 1.2 Swan and Canning Rivers Environmental Protection Policy

Despite past efforts to preserve the rivers water quality and ecosystems, the Swan and Canning Rivers were, by the early 1990s showing signs of a system under stress. In July 1998, the State Government gazetted an EPP for the Swan and Canning Rivers, the *Environmental Protection (Swan and Canning Rivers) Policy 1998*. The purpose of the EPP is to:

*restore, enhance, preserve and protect the environmental quality, ecological processes and ecological integrity of the Swan and Canning Rivers.*[4]

**Environmental Protection Policies**

EPPs are gazetted by the Minister for the Environment under the *Environmental Protection Act 1986*. As such, they have the force of law. Therefore, the EPP gives legal basis to the management of the rivers.

The EPP was prepared by the Swan River Trust and the Department of Environmental Protection for the Environmental Protection Authority. The EPP outlines:

- The purpose of the EPP;
- the EPP area including the protected waterways, watercourses and catchments;
- the beneficial uses to be protected in the protected waterways and watercourses;
- activities that can cause waterways and catchments to degrade;
- environmental quality objectives for the EPP area;
- a programme for protection of the beneficial uses including the preparation of a Comprehensive Management Plan; and
- measures to achieve the environmental quality objectives.

The protected waterway defined under the EPP is the Swan - Canning Estuary including the Swan River Trust management area and the Port of Fremantle. A protected watercourse is a watercourse within a protected catchment in the EPP area, a protected catchment being part of the policy area other than the waterways (see Figure 1).

## 1.3 About Riverplan

A Comprehensive Management Plan was prepared by the Swan River Trust under delegation from the Environmental Protection Authority in 1999. During this period the Swan River Trust undertook extensive consultation with key stakeholders. The Comprehensive Management Plan was presented to the Minister by 1st December 1999 to meet a statutory requirement under the EPP, however, the Environmental Protection Authority recommended that the Comprehensive Management Plan be revised prior to release for public comment. The Comprehensive Management Plan was not released for public comment.

Since then many important management initiatives have been developed. The Swan River Trust began implementing the Swan-Canning Cleanup Program and the Swan Catchment Council drafted a Natural Resource Management Strategy for the Swan Region. This document, Riverplan, builds on these activities and provides a framework for the coordinated environmental management of the Swan and Canning Rivers together with an Implementation Strategy for the EPP.

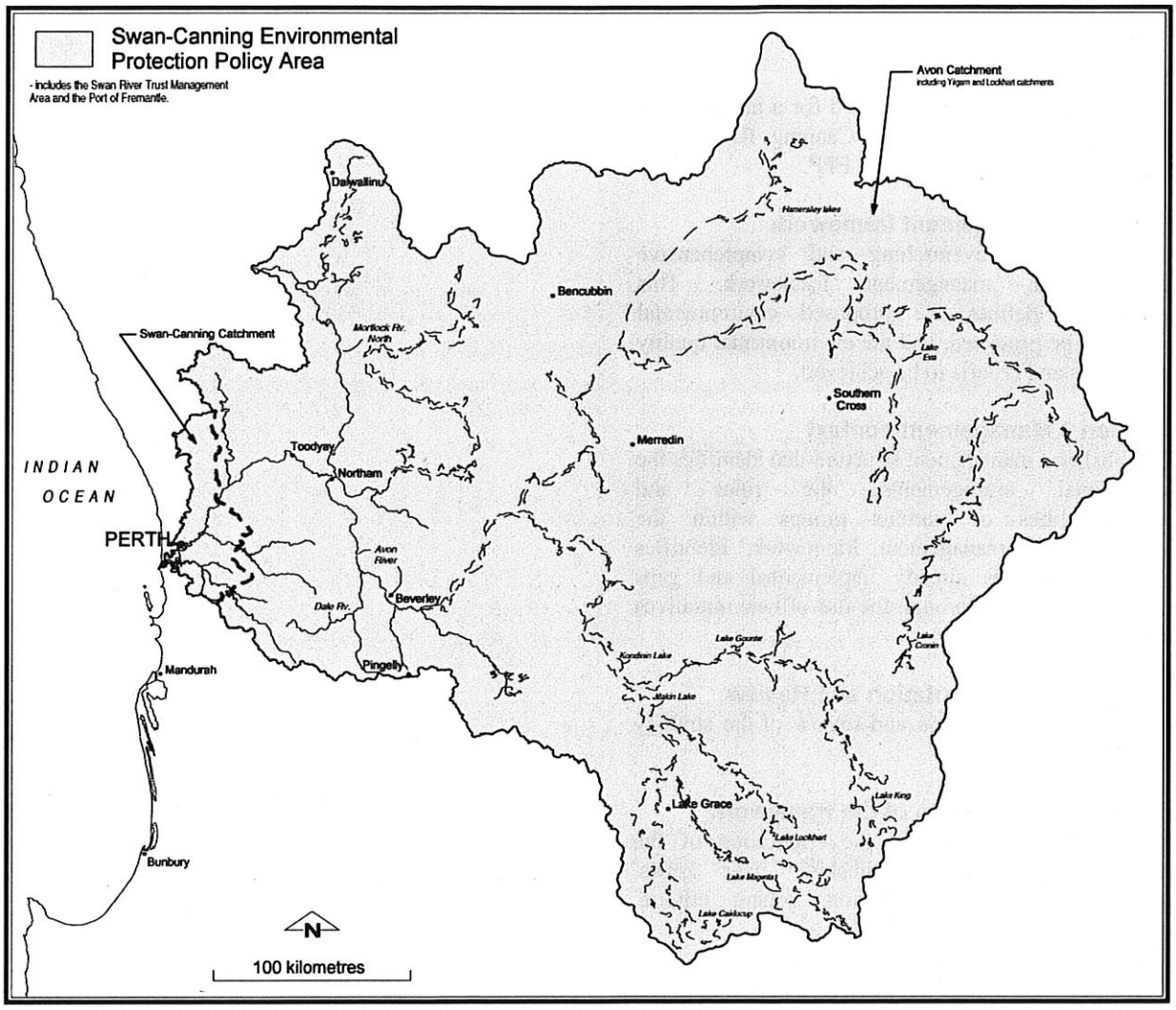


**Figure 1. The Swan – Canning EPP area**

The key elements of this Implementation Strategy are derived from the EPP. Appendix 3 lists the key elements of the Comprehensive Management Plan outlined in the EPP and contains a matrix with cross references to the relevant sections in this Strategy or other management initiatives where these requirements have been fulfilled. The matrix in Appendix 3 highlights that some of the detailed requirements listed in the EPP are already being fulfilled by other initiatives, principally the Swan-Canning Cleanup Program. The purpose of this Strategy is to set an environmental management framework within which comprehensive management of the rivers can occur.

The Swan River Trust, Government agencies, various local governments and community groups have important roles in preserving the integrity of the Swan and Canning Rivers. They have roles in co-ordinating conservation and management initiatives, exercising development controls, initiating planning policies and on-ground works. This Strategy identifies these responsibilities and activities and draws together the organisations into a framework designed to ensure that the purpose of the EPP is fulfilled.

As this Strategy will be principally operating through existing management mechanisms and due to the enormity of the task of managing all activities in the EPP area, the Strategy will focus on those activities and priority areas in the Swan – Canning Catchment. However, it is recognised that the rivers are part of the wider Avon Catchment system, in which activities occur that can significantly affect the health of rivers.

This Strategy contains 5 sections:

**Section 1 Background**
Provides background on the need for a management Strategy for the Swan and Canning Rivers and outlines the requirements of the EPP.

**Section 2 Management framework**
Establishes an overarching and comprehensive environmental management framework. This framework defines the proposed environmental values to be protected, and the environmental quality objectives and criteria to be achieved.

**Section 3 Management context**
Establishes a management structure that identifies the operational arrangements, the roles and responsibilities of various groups within the environmental management framework, identifies existing activities already implemented and gaps which need filling through the use of new initiatives and partnerships.

**Section 4 Implementation and Review**
Outlines implementation and review of the strategy and EPP.

**Section 5 Application of the framework**
Outlines key elements in the application of the framework including establishing river zones, gathering baseline information, setting criteria, reporting progress and prioritising action.

# 2 Management framework

The objective of establishing an environmental management framework is to protect the aesthetic, recreational, commercial and environmental importance of the Swan-Canning River system identified in the EPP. The environmental management framework is based on the National Water Quality Management Strategy[5]. A tiered approach has been used to develop the environmental management framework (Figure 2) that identifies the environmental values, environmental quality objectives, indicators and criteria and an appropriate management response.

## 2.1 Environmental values and environmental quality objectives

The beneficial uses and environmental quality objectives for the rivers have been defined under the EPP. The EPP identifies the beneficial uses of ecosystem health, biodiversity, natural landscape, recreation, water supply, navigation, fishing and aquaculture. The term environmental values is favoured over beneficial uses because of its less exploitative connotations[6].

| Environmental values |
| --- |
| Under proposed amendments to the *Environmental Protection Act (1986)* 'environmental value' will combine the terms 'beneficial use' and 'ecosystem health condition'. |

Environmental values are particular values or uses of the environment that are conducive to a healthy ecosystem and also provide public benefit[6]. It is recognised that there is a distinction and potential conflict between the ecologically-based values of ecosystem health, biodiversity and natural landscape and the human oriented uses of recreation, water supply, navigation, fishing and aquaculture. In this Strategy, management of the human oriented uses will be achieved by protecting the ecologically-based values. In addition, cultural values are not explicitly identified in the EPP, however it is important to identify the cultural importance of the rivers to gain an understanding of the community's requirements and ensure appropriate decisions are made in regard to the management of the rivers.

Environmental quality objectives for the Swan and Canning Rivers are the goals which, when achieved, will allow the environmental values to be supported. Developing environmental quality objectives enables river managers to provide direction on how the rivers should be managed and whether the environmental values are being preserved and protected or, where appropriate, restored and enhanced.

## 2.2 Environmental quality indicators and criteria

For each environmental quality objective a set of environmental quality indicators and corresponding environmental quality criteria will be established to provide the benchmarks against which the performance of environmental management can be measured over time. The key to successful environmental management is to protect or restore environmental quality within the bounds described by the environmental quality criteria, thereby achieving the environmental quality objectives and ensuring the environmental values continue to be supported.

Environmental quality objectives for the Swan and Canning Rivers can be evaluated using representative indicators. Indicators are parameters used to help determine ecosystem health. For example, indicators for water quality may include parameters such as nitrogen, phosphorus, turbidity, pH, etc. Good water quality is an environmental attribute required for almost all of the environmental values in the Strategy, including ecosystem health, biodiversity, water supply, recreation, fishing and aquaculture, and to a lesser extent, culture, navigation and natural landscape. However, water quality indicators are only one type of indicators needed to assess whole ecosystem health. Other types of indicators may be found to help assess riparian condition, flora and fauna, hydrology and river morphology – which are also considered important for evaluating ecosystem health.

Environmental quality criteria represent the nominated acceptable levels for a specific indicator (eg. 1 mg/L of total nitrogen). They are nearly always numerical and represent a nominated level that has to be met for an environmental objective to be achieved. It is worth noting that criteria for a specific indicator may vary depending on the nature of environmental objective or values to be met.

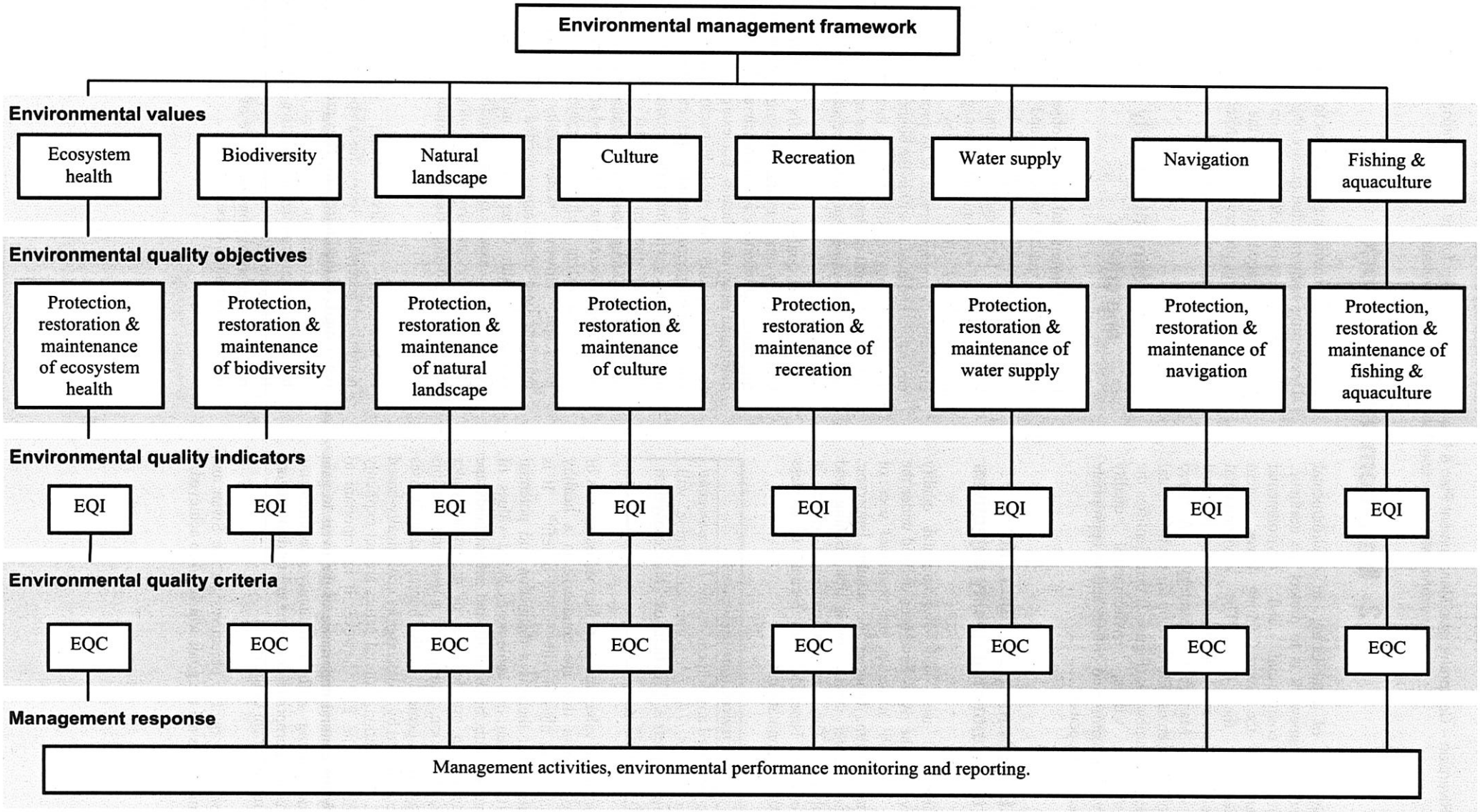


**Figure 2. The environmental management framework for the Swan and Canning Rivers**

Table 1. outlines proposed environmental values (EVs), environmental quality objectives (EQOs) and corresponding environmental quality indicators (EQIs) identified for the protected waterways and watercourses. The final environmental values and environmental quality objectives, indicators and associated criteria will be developed and reviewed by the relevant agencies and community representatives. The values of ecosystem health, biodiversity and natural landscape are identified in both the protected waterways, being the Swan and Canning Rivers, and other watercourses in the policy area, being tributaries of the Swan and Canning Rivers. The human-based values of recreation, water supply, navigation, fishing and aquaculture are identified only in the Swan and Canning Rivers as defined by the EPP.

**Table 1. The proposed environmental values, environmental objectives and environmental quality indicators for the protected waterways and watercourses**

| Values | Environmental Quality Objectives | Environmental Quality Indicators |
|---|---|---|
| **In the protected waterways (the Swan and Canning Rivers)** | | |
| **Ecosystem Health**  | ***Protection, restoration and maintenance of ecosystem health.*** Ecosystem health is considered in terms of ecological structure (the biodiversity, biomass and abundance of organisms), processes (interactions, changes and evolutionary development of the ecosystem) and function (food chains and nutrient cycles). | • **Water Quality** -Total phosphorous and nitrogen, dissolved oxygen, temperature, Chlorophyll-a, turbidity, clarity, salinity, pH, chemical contaminants.<br>• **Aquatic life** - macroinvertebrates, aquatic plants (including algae), fish species.<br>• **Hydrology** – flow volume and seasonality of flow, environmental water provisions.<br>• **Physical form** – stream bank and bed condition, stream form, presence of and access to physical habitat.<br>• **Riparian zone** – quality and quantity of riparian vegetation. |
| **Biodiversity**  | ***Protection, restoration and maintenance of biological diversity*** Biodiversity is considered in terms of diversity, abundance and habitat. | • **Aquatic life** – population numbers and species composition of macroinvertebrates, aquatic plants and fish species.<br>• **Riparian zone** – structure and health of riparian vegetation, presence of weed species. |
| **Natural Landscape**  | ***Protection, restoration and maintenance of natural landscape.*** The natural landscape will be protected. | • **Water quality** - Visual clarity and colour, surface films and debris, algal blooms.<br>• **Landscape inventory categories** - landform, vegetation, waterform and landuse in Precinct Planning Project |
| **Recreation**  | ***Protection, restoration and maintenance of recreation.*** Recreation (eg. swimming) will be safe to undertake. | • **Water quality** - Biological contaminants, pH, turbidity, temperature, chemical contaminants, visual clarity and colour, surface films, nuisance organisms, algae. |
| **Water supply**  | ***Protection, restoration and maintenance of water supply.*** Water will be of a suitable quality for water supply purposes. | • **Water quality** - Biological contaminants, chemical contaminants, salinity, pH.<br>• **Hydrology** – flow volume and seasonality of flow, environmental water provisions. |
| **Navigation**  | ***Protection, restoration and maintenance of navigation.*** Water is suitable for shipping and navigation. | • **Depth of water** |
| **Fishing and Aquaculture**  | ***Protection, restoration and maintenance of aquatic life for human consumption.*** Seafood will be safe for human consumption when collected or grown. | • **Water quality** - Biological contaminants, chemical contaminants, algae. |

| Values | Environmental Quality Objectives | Environmental Quality Indicators |
|---|---|---|
| **Culture**  | ***Protection, restoration and maintenance of culture.*** Cultural values include the values held by both indigenous and non-indigenous communities. | • **landuse landscape inventory category** - in Precinct Planning Project |
| In the protected watercourses (the tributaries of the Swan and Canning Rivers) | | |
| **Ecosystem Health**  | ***Protection, restoration and maintenance of ecosystem health.*** Ecosystem health is considered in terms of ecological structure (the biodiversity, biomass and abundance of organisms), processes (interactions, changes and evolutionary development of the ecosystem) and function (food chains and nutrient cycles). | • **Water Quality** -Total phosphorous and nitrogen, dissolved oxygen, temperature, Chlorophyll-a, turbidity, clarity, salinity, pH, chemical contaminants.<br>• **Aquatic life** - macroinvertebrates, aquatic plants (including algae), fish species.<br>• **Hydrology** – flow volume and seasonality of flow, environmental water provisions.<br>• **Physical form** – stream bank and bed condition, stream form, presence of and access to physical habitat.<br>• **Riparian zone** – quality and quantity of riparian vegetation. |
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| **Natural Landscape**  | ***Protection, restoration and maintenance of natural landscape.*** The natural landscape will be protected. | • **Water quality** - Visual clarity and colour, surface films and debris, algal blooms.<br>• **Landscape inventory categories** - landform, vegetation, waterform and landuse in Precinct Planning Project |

# 3 Management context

Implementing the environmental management framework requires identification of the framework principles, key initiatives, operational arrangements, roles and responsibilities, current activities and outstanding needs, partnerships and resourcing arrangements.

## 3.1 Framework principles

The principles listed in Table 2 will guide planning and implementing the environmental management framework. These principles include integrated catchment management, ecologically sustainable development, community involvement, shared responsibilities and partnerships, stewardship of natural resources, prioritising, accountability and adaptive management.

## 3.2 Key initiatives

Implementation of the environmental management framework within the context of key Federal, State, regional and subregional initiatives will ensure effective management of the Swan and Canning Rivers.

### Federal initiatives

Work undertaken for the National Action Plan for Salinity and Water Quality in Australia, the extension of Natural Heritage Trust funding and the National Land and Water Resources Audit will aid in the achievement of the EPP's purpose. The National Action Plan will implement targets and standards for the management of salinity and water quality, including associated water flows and stream and terrestrial biodiversity[7]. The extension of Natural Heritage Trust has shifted towards a more targeted approach to natural resource management through delivering important resource condition outcomes including improved water quality and improved estuarine health[8]. The National Land and Water Resources Audit also provides a framework to link regional target setting and evaluation[9].

### State initiatives

Western Australian State of the Environment reporting has established a State framework for reporting on key indicators that measure changes in the condition of the environment[10]. The Western Australia State of Water Resources reports on the key indicators for salinisation, loss of fringing vegetation, eutrophication, sedimentation and contamination of inland waters identified in the State of the Environment Report[11].

A State Monitoring and Evaluation Framework is currently being developed in line with the National Monitoring and Evaluation Framework. The key elements of the framework include the establishment of environmental values, environmental objectives, criteria and targets, implementation, monitoring and reporting, evaluation and review and improvement. The information derived will link into reporting and performance evaluation, for example, for the Natural Heritage Trust, National Land and Water Resources Audit and the Western Australian State of the Environment reporting[12].

A State framework for the implementation of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting is being developed. The framework will form part of the State Water Quality Management Strategy that implements the National Water Quality Management Strategy. To this end, the key elements of the State Monitoring and Evaluation Framework listed above will be developed for each of the State's significant water bodies, including the Swan and Canning Rivers[13].

The Waterways WA program is developing a Strategy for statewide management of waterways in Western Australia. The Strategy will outline the need for an overall framework to manage and guide the long-term protection of our waterways. The Strategy will link in with the existing natural resource management framework and will highlight the importance of identifying waterway values to be protected[14].

The Western Australian State Sustainability Strategy highlights the need to identify environmental values and designate environmental quality objectives and criteria for the State's aquatic systems. The Strategy also outlines the importance of developing management plans to ensure protection of these systems[15].

The *Statement of Planning Policy No. 2: Environment and Natural Resources Policy (2003)* sets out the broad environmental and resource management policies for sustainable development, including measures for the protection and use of

**Table 2. Principles for implementing the framework**

| Integrated Catchment Management |
|---|
| Decisions affecting the Swan and Canning Rivers must be made within an Integrated Catchment Management context:<br>• recognising the integral relationship between the rivers and their catchments, their position within broader landscapes, and their linkages with and importance for coastal systems;<br>• coordinating planning, use and management of water, land, vegetation and other natural resources on a catchment basis; and<br>• involving the whole community in catchment management including landholders, industries, community groups, local government and State agencies. |
| **Sustainability** |
| Decisions affecting the Swan and Canning Rivers must be made within the context of Sustainability:<br>• balancing social, economic and environmental needs;<br>• be in accordance with the *Precautionary Principle*;<br>• consider intergenerational equity;<br>• consider conservation of biological diversity and ecological integrity;<br>• be open and transparent, providing available information to all stakeholders and justifying decisions as they are made;<br>• use the best available scientific information; and<br>• use a risk-based approach. |
| **Community Involvement** |
| Communities and stakeholder groups will have the opportunity to be involved in all the major phases of planning and implementation of programs affecting the Swan and Canning Rivers. |
| **Shared Responsibility and Partnerships** |
| All members of the community derive benefits from the use of the Swan and Canning Rivers and share responsibility for managing the rivers sustainably. Ecologically sustainable management of the rivers can only be achieved through a long term partnership between all parties – Government, communities and industry each with clear agreed roles. |
| **Stewardship of Natural Resources** |
| In determining roles and responsibilities, all river users and managers will recognise their dependence on the health of the Swan and Canning Rivers and will have a duty of care to take all reasonable steps to protect the rivers. |
| **Prioritising** |
| Relative contributions to investment in the Swan and Canning River management and restoration will align with the long term private and public costs and benefits involved. |
| **Accountability** |
| Roles and responsibilities for Swan and Canning River management will be identified and progress towards meeting goals will be measured. Those involved will be clearly accountable to Government and the community for river management. |
| **Adaptive Management** |
| Recognising the variability of natural systems and our incomplete knowledge of river and catchment processes requires that management of the Swan and Canning Rivers should be adaptive, improving in response to knowledge gained through monitoring and research. |

water resources. It recognises that effective water quality and quantity management is essential as we work towards sustainability. Under the policy, it is expected that planning strategies, schemes and decision-making will identify, and where appropriate, include provisions to protect water resources[16]. A proposed Water Resources Statement of Planning Policy, consistent with and complementary to the Environment and Natural Resources Statement of Planning Policy, will further ensure water resource issues are considered in the land use planning decision making process.

### Regional initiatives

Integrated catchment management is an integral process for coordinating the many activities involved in achieving regional natural resource management. Integrated catchment management in the Swan-Avon catchment has involved establishing a range of actions to improve land-use planning and management and addressing specific environmental issues. The Swan Catchment Council and Avon Catchment Council coordinate natural resource management activities and support catchment groups in the Swan region and Avon region respectively.

Regional natural resource management strategies have been developed and are required to meet Federal accreditation standards to enable access to Natural Heritage Trust funding. The Swan Catchment Council's draft Swan Region Natural Resource Management Strategy (draft Swan Region NRM Strategy) is a 30-year plan developed to guide natural resource management activities in the Swan Region. The Strategy aims to ensure that the natural resources of the Swan Region will be protected and managed sustainably through formalising the partnership between community and Government in dealing with natural resource management and outlining key goals, priorities and strategies to meet the objectives[17].

### Sub-regional initiatives

The Swan River Management Strategy released in 1988 has guided management of the rivers and responsibility for implementation rested with the Swan River Trust. The Strategy identified the roles and responsibilities of various agencies in river management, highlighted major issues that needed to be addressed, outlined objectives for each of these issues, made general and area specific recommendations and outlined a means for implementing and monitoring the Strategy[18]. Two reviews of the Strategy have shown that most of the recommendations have been progressively implemented and those that have not are either still seen as a priority to be advanced or no longer relevant[19].

A proposed Swan-Canning River System Statement of Planning Policy will identify the key issues to be taken into account in land use planning in relation to the Swan-Canning Rivers. It will also provide the context for the preparation of precinct plans for the Precinct Planning Project undertaken by the Swan River Trust and Western Australian Planning Commission.

There are numerous other management tools developed by agencies, local governments and catchment groups addressing issues on a catchment level.

Appendix 4 identifies significant Federal, State, regional and subregional management tools.

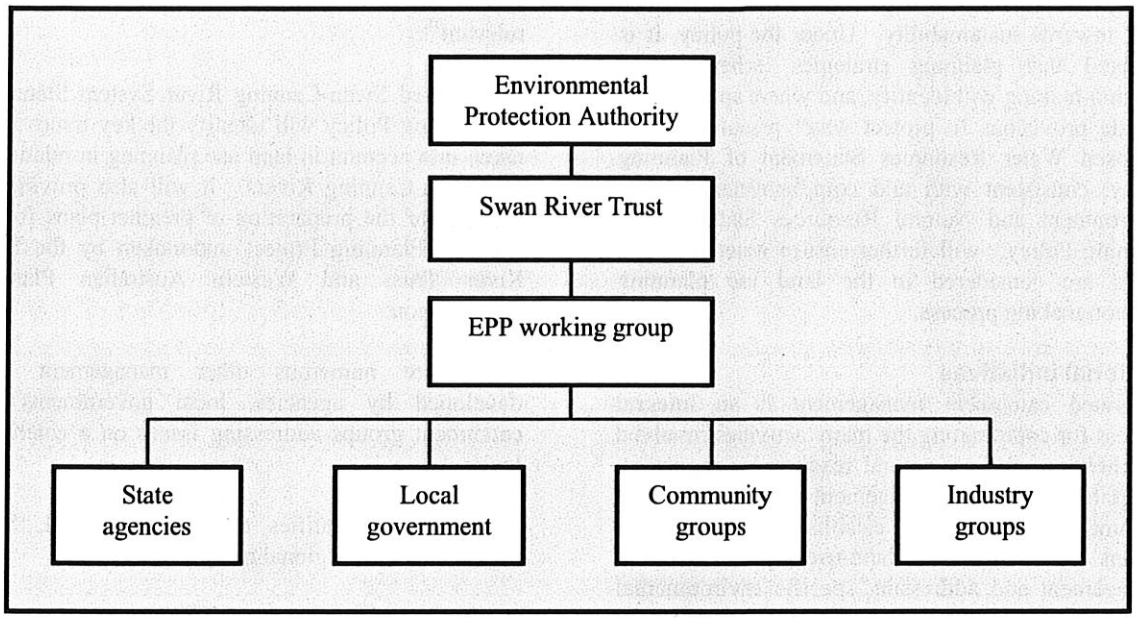
## 3.3 Operational arrangements

For the environmental management framework to be effective, a co-ordinating mechanism extending over all statutory and non-statutory organisations with relevant capabilities, instruments or responsibilities needs to be established (see Figure 3).

In this management structure the Environmental Protection Authority is responsible for the EPP and its implementation. It is proposed the Swan River Trust, under delegation from the Environmental Protection Authority, be responsible for the coordination of the Strategy and reporting to the Environmental Protection Authority on progress. State agencies, local governments, community and industry groups would be responsible for implementing management activities, addressing outstanding needs and reporting progress.

A Swan and Canning Rivers EPP working group is proposed to coordinate the management activities and would be made up of representatives from the management groups. It is anticipated that catchment and community groups and industry groups will be represented by peak bodies. It is proposed that catchment and community groups be represented by the Swan Catchment Council and Avon Catchment Council and industry groups be represented by the Swan-Canning Industry Working Group established under Swan-Canning Cleanup Program.

**Figure 3. The management structure**




To ensure greater coordination, engagement of State agency senior management and facilitation of ongoing commitment to implementation of the Strategy, it is proposed that the role of the Swan-Canning Cleanup Program Senior Officers Group be broadened to include matters concerning the EPP. Therefore, both the Swan and Canning Rivers EPP working group and the Swan-Canning Cleanup Program Project Managers Group will report to the Senior Officers Group.

## 3.4 Roles and responsibilities

The general roles of the various groups within this management structure are outlined in Table 3. These organisations have been grouped according to their role outlined under the programme for protection in the EPP. State agencies and local governments are responsible for cooperating and taking decisions and actions consistent with the EPP. State agencies include those with direct and indirect responsibility for achievement of the EPP and local governments with land area within the boundaries of protected waterways and watercourses and elsewhere within the EPP area. Community and industry groups with a strategic role in the implementation of the EPP are encouraged to cooperate.

The roles outlined in Table 3 are generic and individual organisations within a group may not be responsible for fulfilling all the roles identified for that group. For example, the Swan River Trust and Department of Environment have a greater role in river management than other agencies where river management is not their core business.

## 3.5 Current management activities and outstanding needs

Much is being done by State Government agencies, local governments, community groups and industry groups to help protect and restore the Swan and Canning Rivers. The key legislation, policies and broad activities of these groups are summarised in Appendix 5. This Strategy will largely operate through the existing initiatives of these organisations, however these activities may require modification and development of new initiatives where gaps have been identified. Many of the mechanisms to fill the gaps are in place, however resourcing and commitment to management may need to increase.

Table 4 highlights the issues threatening the environmental values of the rivers, the existing management tools that address these issues and key stakeholders. One management tool may address numerous issues threatening the values. For example, the Swan-Canning Cleanup Program principally addresses excessive nutrients in the rivers, however the program also addresses other issues such as chemical contamination and other values such as biodiversity and ecological health.

**Table 3. General roles and responsibilities of organisations in the EPP area**

| Group | General Roles |
|---|---|
| **To cooperate and take decisions and actions consistent with the EPP** | |
| **State government/Regulators**<br>– Swan River Trust<br>– Department of Environment/Environmental Protection Authority<br>– Department of Conservation and Land Management<br>– Department of Agriculture WA<br>– Department for Planning and Infrastructure/Western Australian Planning Commission<br>– Department of Fisheries<br>– Department of Industry and Resources<br>– Department of Health | • set policy and strategic directions for river and catchment management<br>• establish legislative frameworks<br>• establish effective catchment/regional institutional arrangements<br>• incorporate river and catchment management objectives, priorities and actions into statutory planning processes<br>• provide funding to achieve State and regional priorities<br>• provide relevant advice, and undertake research and monitoring, planning, extension, on-ground works and some referral and enforcement functions to support regional communities<br>• participate in effective intergovernment processes and national approaches where necessary, and implement State responsibilities under nationally agreed strategies<br>• establish environmental quality objectives, indicators and criteria for protected waterways and protected watercourses.<br>• implement measures to achieve environmental quality objectives |
| **Local government/Utility providers**<br>– Local Governments<br>– Western Australian Local Government Association<br>– Water Corporation<br>– Western Power Corporation<br>– Main Roads WA<br>– Fremantle Ports | • incorporate river and catchment management objectives, priorities and actions into statutory planning processes<br>• develop and implement urban stormwater plans in an ICM context<br>• manage drainage where appropriate<br>• facilitate local industry adoption of best management practices and involvement in river and catchment management activities<br>• provide support for community groups<br>• modify all activities which can potentially impact on rivers to best management practice standard, in accordance with 'duty of care' responsibilities and good corporate citizenship |
| **To cooperate with the implementation of the EPP** | |
| **Community groups**<br>– Swan Catchment Council / Avon Catchment Council<br>– Regional Natural Resource Management groups<br>– Catchment groups<br>– Land Conservation District Committees<br>– Bushcare groups<br>– Friends groups<br>– Conservation groups<br>– Environmental interest groups | • provide advice to the State Government on both Federal and State resourcing priorities at a regional level<br>• assist community involvement in river and catchment management<br>• develop partnerships with river and catchment managers, and coordinate activities to help improve river health<br>• provide a focus for regional investment in river and catchment management<br>• monitor the condition and management of the land and water resources in their region and report changes<br>• facilitate community education<br>• act as a communication conduit between regional communities and Government on issues relating to land and water management<br>• participate in regional planning, priority setting and the implementation of work programs related to river and catchment management and restoration<br>• participate with monitoring river health or undertaking restoration projects in priority areas<br>• manage their own enterprises in ways that acknowledge their 'duty of care' and their role in the stewardship of natural resources |
| **Industry Groups**<br>– Industry associations | • manage in accordance with the principles of ecologically sustainable development and 'cleaner production' principles<br>• minimise their impact on the environment by the implementation of best management practices, in accordance with 'duty of care' responsibilities and good corporate citizenship |

**Table 4. Principal existing management tools that ensure the protection and maintenance the environmental values of the protected waterways**

| Issues threatening values | Principal existing management tools | Key Stakeholders |
|---|---|---|
| **Ecosystem health** | | |
| – Algal blooms<br>– Nutrients<br>– Salinisation<br>– Turbidity<br>– Chemical and biological contamination<br>– Altered flow regimes<br>– Environmental water requirements<br>– Seasonal inundation<br>– Sedimentation and bank erosion<br>– Boat wash and wake<br>– Loss of species diversity and abundance<br>– Riparian vegetation loss<br>– Competition and predation from exotics<br>– Fire | **Land and river management**<br>Swan-Canning Cleanup Program<br>– Swan-Canning industry project<br>– Caring for the Canning<br>– LG NRM Policy Project<br>– Property planning project (Heavenly Hectares)<br>– Water quality monitoring and targets<br>ICM/NRM<br>– Catchment management plans<br>– Land management plans<br>– Draft Swan Region NRM Strategy<br>Waterways WA<br>– Ribbons of Blue<br>– Rivercare<br>State Salinity Strategy | SRT, DoE, DAWA, DCLM, WAPC, LGs, SCC/ACC, Community groups, Industry groups, Land holders |
| | **Land use planning**<br>Metropolitan Region Scheme<br>Town Planning Schemes<br>Statements of Planning Policy<br>Development controls<br>Precinct Planning Project | WAPC, SRT, DoE, LGs, Land holders |
| | **Source management**<br>Prescribed premise licensing<br>Cleaner Production Assistance Program<br>Infill Sewerage Program<br>Waterwise<br>Riverwise<br>Swan-Canning Cleanup Program<br>– Swan-Canning industry project<br>– LG NRM Policy Project | DoE, SRT, WC, LGs, CECP, Industry groups, Land holders |
| | **Drain management**<br>Drainage services<br>Drainage Reform Group<br>Water Sensitive Urban Design | WC, DoE, DPI, DAWA, DCLM, SRT, WALGA, LGs, Land holders, Industry groups |
| **Biodiversity** | | |
| – Loss of species diversity and abundance<br>– Riparian vegetation loss<br>– Competition and predation from exotics<br>– Fire | **Fauna and flora management**<br>Bushcare<br>Land for Wildlife<br>Western Shield | DCLM, SCC/ACC, Community groups, Land holders |

| Issues threatening values | Principal existing management tools | Key Stakeholders |
|---|---|---|
| | **Land and river planning and management** | |
| | Bush Forever<br>SCULP<br>Riverbank<br>Urban Nature<br>Ecoplan<br>State Weed Strategy<br>Perth Biodiversity Project<br>Draft Swan Region NRM Strategy<br>Development controls<br>Swan Estuary Marine Park and Adjacent Nature Reserves Management Plan | WAPC/DPI, DoE, DCLM, SRT, LGs, SCC/ACC, Community groups, Land holders |
| **Natural landscape** | | |
| | **Land use planning** | |
| – Landscape amenity | Metropolitan Region Scheme<br>Town Planning Schemes<br>Statements of Planning Policy<br>Development controls<br>Precinct Planning Project | WAPC, SRT, LGs |
| **Recreation** | | |
| | **Foreshore and river planning and management** | |
| – Visual and odour problems<br>– Litter<br>– Biological contamination<br>– Provision for public access<br>– Noise from recreational activities<br>– Boat wash and wake | LG NRM Policy Project<br>Precinct Planning Project<br>Bacterial sampling | SRT, DoE, WAPC, DCLM, DoH, LGs, Community groups, Industry groups, Land holders |
| | **Litter management** | |
| | Waterways cleaning<br>Waste Wise<br>Cleanup programs<br>Cleanup Australia day | SRT, DoE, KABC, LGs, Community groups, Land holders |
| **Water supply** | | |
| | **Water allocation** | |
| – Altered flow regimes<br>– Overabstraction<br>– Environmental water requirements | Surface water licensing<br>Water allocation planning<br>Environmental water requirements and provision | DoE, WC, Industry groups, Land holders |
| **Navigation** | | |
| | **Port and river management** | |
| – Sedimentation and erosion<br>– Chemical contamination | Waterways cleaning<br>Marine Safety<br>Environmental Management Systems | SRT, DPI, Fremantle Ports, Yacht Clubs and Marinas |
| **Fishing and Aquaculture** | | |
| | **Fisheries management** | |
| – Loss of species diversity and abundance<br>– Competition and predation from exotics<br>– Disturbance of fish habitat<br>– Nutrients<br>– Turbidity<br>– Biological contamination | Licensing and compliance with Fisheries regulations<br>EIA process<br>Codes of practice | DoF, AQIS, DoE/EPA |

To protect, maintain and restore each environmental value, a number of priority actions are outlined in Table 5. In addressing the actions, the proposed lead organisation and partners, status and priority are also presented. Much of the information contained in the table is based on priority actions identified in key documents such as the draft Swan Region NRM Strategy, Swan-Canning Cleanup Program Action Plan and Caring for the Canning, a supporting document to the Swan-Canning Cleanup Program Action Plan. The actions identified are preliminary and are open for public discussion. In addition, these actions will require modification as further gaps, resources and priorities emerge through implementation of these documents and others that contribute to management of the rivers.

In both Tables 4 and 5 the management tools and actions for a specific environmental value have been grouped according to the management theme. For example land-use planning tools and actions have been grouped within ecosystem health. It should also be noted that the management of the human oriented values of recreation, water supply, navigation, fishing and aquaculture will be achieved by protecting the ecologically-based values of ecosystem health, biodiversity and natural landscape. For example, to minimise the impact of overabstaction for water supply there is a need for the Waters and Rivers Commission's licensing to incorporate environmental water provisions.

## 3.6 Partnerships

In order to define roles and responsibilities and evaluate current management activities, various groups within the management structure are required to evaluate their current activities, identify gaps, form partnerships where necessary and establish agreements. Management groups must then be responsible for the development and implementation of action plans.

Preliminary assessments undertaken by organisations will allow them to identify how they are contributing to the fulfilment of the EPP's purpose. In the assessments the organisations will:

- Identify the environmental values they are responsible for;
- Outline the current state of environmental values, threats and vulnerabilities;
- Define the spatial extent of the environmental values and threats;
- Define the actions required to protect or restore the environmental values;
- Identify other relevant agency, local government, community and industry organisation roles in implementing actions;
- Identify current activities in relation to the EPP's purpose;
- Outline the resource and skill implications for implementing actions;
- Establish arrangements for implementation of the required additional actions; and
- Establish performance auditing and reporting arrangements.

Partnership agreements and memoranda of understanding will formally acknowledge and recognise the contributions being made by relevant groups to the achievement of the EPP. It will involve a commitment to reviewing and enhancing existing activities so that actions identified in Table 5 are addressed.

Agreements will be between the Environmental Protection Authority as 'custodian' of the EPP and organisations listed in Table 3. Separate levels of agreement are required for:

- State agencies with direct responsibility for achievement of EPP, eg. Department of Environment;
- State agencies that contribute through indirect actions to the achievement of EPP, eg. Department of Health;
- local governments with land area adjoining the boundaries of protected waterways and watercourses, eg. City of Swan;
- local governments elsewhere within the EPP area; and
- major community and industry groups with a strategic role in the achievement of the EPP, eg. Swan Catchment Council.

Agreements will be underpinned by action plans developed by the organisations to detail the tasks identified and work required to fulfil the purpose of the EPP.

**Table 5. Proposed priority actions to protect and maintain the environmental values of the protected waterways**

| | Key actions | Proposed lead organisation and partners | Status | Proposed priority |
|---|---|---|---|---|
| **Ecosystem health** | | | | |
| **Land and river management** | | | | |
| 1.1 | Property management plans, integrated pest/weed management plans, BMPs and auditing measures in place for rural land | DAWA, LGs, WAPC, SRT, DoE, SCC/ACC, Land holders | Build on current actions | 1 |
| 1.2 | Catchment management plans prepared by each catchment group for their management area | SCC, Community groups, LGs. | Build up current activity | 4 |
| 1.3 | Facilitate support for community groups managing the rivers and riparian zone | SCC, Community groups, DoE, DCLM, LGs | Continue and enhance current support | 1 |
| 1.4 | Determine the current and predicted impact of rising salinity and salinity management on the upper reaches of the protected waterways | DAWA, DoE, DCLM, SRT, LGs, SCC | Continue current activity | 2 |
| 1.5 | Develop EWPs for the protected waterways | DoE, WC, LGs | Program is underway | 1 |
| 1.6 | Monitor, assess and report chemical contaminants (other than nutrients), aquatic flora and fauna, riparian condition for measuring biodiversity and ecosystem health values | SRT, DoE, DCLM, DoF | Build up current activity | 1 |
| **Land use planning** | | | | |
| 1.7 | Land use planning recognises land capability information for broadacre development where appropriate | LGs, DAWA, WAPC, DoE, DCLM, SCC, Community groups, Land holders | Activities required identified | 2 |
| 1.8 | LG development controls to fully incorporate environmental protection provisions and audit compliance | LGs, WAPC, DoE, Land holders | Increased action is required | 1 |
| 1.9 | Provide consistent advice to LGs and developers on BMPs in land development | DAWA, DoE, WAPC, LGs, SCC, WC, Main Roads, Western Power | Build on current actions | 1 |
| **Source management** | | | | |
| 1.10 | Continue the development of BMP/cleaner production standards and encourage businesses to implement them through adoption of an EMS | DoE, SRT, WC, CECP, LGs, Industry groups, Community groups | Actions occurring now need to be increased over the short term | 1 |

| | Key actions | Proposed lead organisation and partners | Status | Proposed priority |
|---|---|---|---|---|
| 1.11 | Continue the In-fill sewerage program | WC, LGs, DoE, SRT, Land holders, Industry groups | In-fill program is underway | 1 |
| 1.12 | Assess need to extend In-fill sewerage to industrial areas and other priority areas | DoE, WC, LGs, SRT, Land holders, Industry groups | There is no program in place to extend the in-fill program to industrial areas | 1 |
| 1.13 | R&D programs that address minimization of water use, water harvesting, recycling and BMP | DoE, WC, CSIRO, LGs, Industry groups, Community groups | Need to build on existing actions | 1 |
| 1.14 | Water conservation programs in place for domestic and commercial users | DoE, WC, LGs, SCC, Industry groups, Community groups | Need to build on existing actions | 1 |
| **Drain management** | | | | |
| 1.15 | Confirm policy in relation to implementation of WSUD in new developments | DoE, WAPC, LGs, WC, WALGA, SCC/ACC, Industry groups, Land holders | Current effort needs to be enhanced over medium term | 1 |
| 1.16 | Review the overall drainage system and provide incentive and enforcement to progressively install (and retro-fit) BMP treatment trains utilising proven technology, to constructed drainage systems | DoE, WC, WAPC, LGs, Industry groups | Action is required - there is no program in place for this | 1 |
| 1.17 | Clarification of institutional arrangements in the management of drainage and ensure water quality considerations are recognised | DoE, WC, CSIRO, DPI, DAWA, DCLM, SRT, WALGA, LGs, Industry groups | Drainage Reform Group established and work is underway | 1 |
| **Biodiversity** | | | | |
| **Fauna and flora management** | | | | |
| 2.1 | Facilitate increased investment in river and riparian zone flora and fauna research programs, through partnerships with key players | DoE, DCLM, DPI, NGOs, SCC, CSIRO | Continue and expand current activities | 1 |
| 2.2 | Promote management needs of river and riparian zone fauna and flora with partners and seek external funding support | DCLM, DoE, LGs, SCC/ACC, Community groups, Industry groups | Build up current activity | 4 |
| **Land and river planning and management** | | | | |
| 2.3 | Complete research and vegetation surveys for Bush Forever sites on the protected waterways and acquire funds for foreshore reserve acquisition and management | WAPC, DCLM, DoE, LGs, WC, SCC, NT, NGOs, Land holders | Action underway to implement Bush Forever | 1 |

| | Key actions | Proposed lead organisation and partners | Status | Proposed priority |
|---|---|---|---|---|
| 2.4 | Formal partnership arrangements between community groups managing riparian vegetation and State and local governments | SCC, DCLM, DoE, DAWA, LGs, Community groups | Continue and enhance current support | 1 |
| 2.5 | Develop and implement exotic species control strategies | DCLM, DAWA, DoE, CSIRO, SCC, Community groups, NGOs | Continue current activity | 1 |
| 2.6 | Implement a system of clearing controls to retain riparian vegetation | DoE, WAPC, DAWA, LGs | Build up current activity | 3 |
| 2.7 | The development of local biodiversity inventories and management plans to protect riparian vegetation managed by LGs through Perth Biodiversity Project | WALGA, LGs, DPI, DCLM, NGOs, DoE, SCC | Continue and expand current effort | 1 |
| 2.8 | Undertake condition assessment of the Swan and Canning Rivers foreshores | SRT, DCLM, SCC | Additional action required | 2 |
| 2.9 | The use of incentive schemes to manage riparian vegetation | DCLM, DAWA, NT, DoE, DPI, SCC, WALGA, LGs | Current activities to be continued | 3 |
| 2.10 | Increased corridor planting with local species that enlarges the area allocated for off-reserve conservation | SCC, WALGA, DCLM, SRT, LGs, Main Roads, Western Power, WC, Community groups | Build up current activity | 4 |
| **Natural landscape** | | | | |
| 3.1 | Facilitate implementation of Precinct Planning Project | SRT, WAPC, LGs | Increased action is required | 1 |
| **Recreation** | | | | |
| 4.1 | Develop a river use/recreation strategy | SRT, DPI, LGs, Community groups | Action is required | 2 |
| 4.2 | Develop drainage and nutrient management plans or guidelines for grassed recreational areas on the protected waterways | LGs, DoE, SRT, Community groups | Build up current activity | 2 |
| 4.3 | Develop a litter strategy | SRT, DoE, KABC, LGs, Community groups | A litter abatement strategy is currently being developed | 1 |
| 4.4 | Investigate risk associated with historical landfills along the protected waterways | SRT, LGs | Additional action required | 4 |

| | Key actions | Proposed lead organisation and partners | Status | Proposed priority |
|---|---|---|---|---|
| 4.5 | Assessment of the microbiological status of the rivers | DoH, SRT | Additional action required | 4 |
| **Water supply** | | | | |
| 5.1 | Licence conditions recognise EWPs, BMPs and water efficiency measures | DoE, WC, Industry groups, Land holders | Program is underway | 1 |
| 5.2 | Develop water resource allocation plans | DoE, WC, Industry groups, Land holders | Build on current actions | 1 |
| **Navigation** | | | | |
| 6.1 | Complete and implement EMS for yacht clubs and marinas | SRT, Fremantle Ports, Yacht Clubs and Marinas | Continue current activity | 2 |
| 6.2 | Monitor the effects of boat wash and wake, noise and speed | DPI, SRT , DoE | Build on current actions | 2 |
| **Fishing and Aquaculture** | | | | |
| 7.1 | Determine sustainable catch levels and ecological impact of recreational and commercial fishing | DoF | Continue and build up current activities | 1 |
| 7.2 | Provide education on impacts of recreational and commercial fishing | DoF, SRT | Build up current activity | 1 |

Key for priorities:

| | | | |
|---|---|---|---|
| 1 | Essential and immediate need (or occurring now) | 3 | Highly desirable and immediate need (or occurring now) |
| 2 | Essential over medium term | 4 | Highly desirable over medium term |

## 3.7 Resourcing arrangements

It is recognised that while the strategy will largely operate through existing activities, the implementation of specific actions by organisations may require additional funding in which alternative funding sources will need to be sought.

# 4 Implementation and Review

The specific actions required for implementation of the Strategy and review of both the Strategy and the EPP are outlined in Table 6. These activities will be implemented over the next five years and the table will require modification as further actions emerge through implementation of the Strategy. As it is proposed that the Swan River Trust implement the Strategy, many of these activities will be undertaken by the Swan River Trust. However, the Swan River Trust's role is to occur within the context of further resourcing to coordinate the activities identified and recognising that the Swan River Trust's management of the rivers extends beyond the implementation of this Strategy.

There is a statutory requirement for the EPP to be reviewed by mid 2005. The review of the EPP will be undertaken and a Draft EPP developed by the end of 2004. This will enable public comment on the Draft EPP and a Revised Draft EPP being presented to the Minister for Environment by mid 2005. The review will focus on strengthening the EPP and will involve further defining environmental values identified in the current EPP and consider the appropriateness of legislating the environmental quality criteria.

It is intended that the Strategy will be reviewed in conjunction with the EPP in 2005, with a report on progress made and the effectiveness of implementation. Specific measures for the evaluation of the Strategy's implementation will be established and will address the following aspects:

- satisfactory working group function and co-ordination;

**Table 6. Implementation table**

| Implementation activity | Responsible organisations | Reporting to | Completion date |
|---|---|---|---|
| Establishment of the EPP working group | SRT | EPA | Oct 2003 |
| Strategy amended and finalised | DoE | SRT, EPA | Jan 2004 |
| Assessments by organisations on how they are fulfilling the requirements of the EPP | State agencies, LGs, Community & Industry groups | SRT | March 2004 |
| Further prioritisation of actions/needs derived from assessments | SRT | EPA | June 2004 |
| Further identification of resources, responsibilities and timelines for implementation of key actions derived from assessments | SRT | EPA | June 2004 |
| Develop agreements to outline responsibilities | SRT/DoE, State agencies, LGs, Community & Industry groups | EPA | June 2004 |
| Develop action plans to achieve implementation | State agencies, LGs, Community & Industry groups | SRT | Dec 2004 |
| Further development of environmental values, environmental quality objectives, indicators and criteria | SRT/DoE | EPA | Dec 2004 |
| Review EPP / Draft EPP | DoE | EPA | Dec 2004 |
| Revised Draft EPP | EPA | Minister | July 2005 |
| Review the Strategy | SRT/DoE | EPA | 2005 |
| Review agreements | SRT, State agencies, LGs, Community & Industry groups | EPA | 2006 |
| Annual reporting by organisations | State agencies, LGs, Community & Industry groups | SRT | Ongoing |
| Annual reporting by SRT | SRT | EPA | Ongoing |
| Annual reporting by EPA | EPA | Public | Ongoing |
| Periodic audits of organisations | SRT | EPA | Ongoing |

- satisfactory performance of member organisations;
- satisfactory program achievement;
- adequacy of budgetary provisions;
- adequacy of available resources to achieve intended programs in a timely manner;
- acceptable outcomes resulting from agreements;
- satisfactory progress on programs to address gaps in the management of the rivers; and
- acceptable achievements in the overall protection, restoration and maintenance of the environmental values of the rivers.

Given the formative nature of the EPP and Strategy, initial agreements will require review after a period of time. Periodic audits of organisations will also be conducted to enable the Environmental Protection Authority to assess how organisations are fulfilling the requirements of the EPP. The Environmental Protection Authority will report publicly on these findings.

# 5 Application of the framework

Key tasks in applying the environmental management framework include establishing river and catchment zones, gathering baseline data, determining environmental values and setting indicators and criteria, progress reporting and prioritising action. As highlighted previously, initial application of the framework will be through existing management activities, principally the Swan-Canning Cleanup Program and will focus on those activities and priority areas that impact on the protected waterways. However, it is recognised that there are gaps in these activities and the rivers are part of a wider catchment, therefore future management options are also considered.

## 5.1 Establishing river and catchment zones

River channel, riparian and catchment zones will be established to identify environmental values, objectives and criteria in each zone. Zones are useful for identifying parts of the EPP area that have common features in terms of environmental conditions, types of ecosystems and range of current and future environmental values.

The initial river zones for the protected waterways will be based on the zones identified for the Swan-Canning Cleanup Program water quality sampling. These zones include Lower, Middle and Upper Reaches of the Swan River and Middle and Upper Reaches of the Canning River (Figure 4).

Future river and riparian zones will be consistent with the Swan and Canning Rivers Precinct Planning Project with the localities; Blackwall Reach, Melville Water, Lower Canning, Upper Canning and Southern River, Perth Water, Middle Swan, Helena Valley and Upper Swan[20]. The determination of these localities was based on the Swan River System Landscape Description that defined the landscape by geology, topography, waterbodies, vegetation, and the built and social environment[21]. The boundaries of these localities may need adjustments and actions may apply outside the boundaries to meet more fully the EPP's purpose.

The catchment zones would be consistent with existing catchment boundaries. The Swan-Canning Cleanup Program Action Plan identifies 31 major sub-catchments in the coastal portion of the Swan-Canning system[3]. Many of the sub-catchments are based on urban drainage systems and have a number of small drainage catchments and drains that flow into the rivers.

## 5.2 Gathering baseline information

Once zones have been established, the ecological condition of the rivers needs to be assessed. Baseline information is required to identify environmental values, environmental quality objectives and criteria, determine priorities for action and measure the effectiveness of these actions. Ensuring ongoing baseline monitoring is undertaken is fundamental to determining the success of management activities.

The Department of Environment's Statewide Assessment of River Water Quality provides a summary of water quality in all currently monitored waterways in Western Australia. This includes a baseline assessment of water quality for the Swan and Canning Rivers and monitored rivers and drains discharging to the rivers. It provides an indication of current baseline condition (status and trend direction) for 8 key water quality parameters; salinity, nitrogen, phosphorus, turbidity, colour, pH, suspended solids and dissolved organic carbon.

For future indicators beyond water quality, the Department of Environment has become the lead agency for the Australian River Assessment Scheme in Western Australia. Over the next 5-years, the Waters and Rivers Commission will develop its expertise on the Scheme, initially assessing macroinvertebrates and expanding this to other flora and faunal groups such as diatoms, fish, riparian vegetation and possibly riparian vertebrates and invertebrates.

The Waterways WA program has established a foreshore condition assessment methodology that includes assessment of bank stability, foreshore vegetation, stream cover and habitat diversity. The Stream Condition Index can be derived from the assessment of the four parameters[22]. The focus of the assessment is on the riparian zone, however stream flow, water quality and aquatic organisms are considered to a limited extent in the river channel. As much of the assessment is based on observation, the survey methodology may need to be adapted slightly if more quantitative data on stream flow,

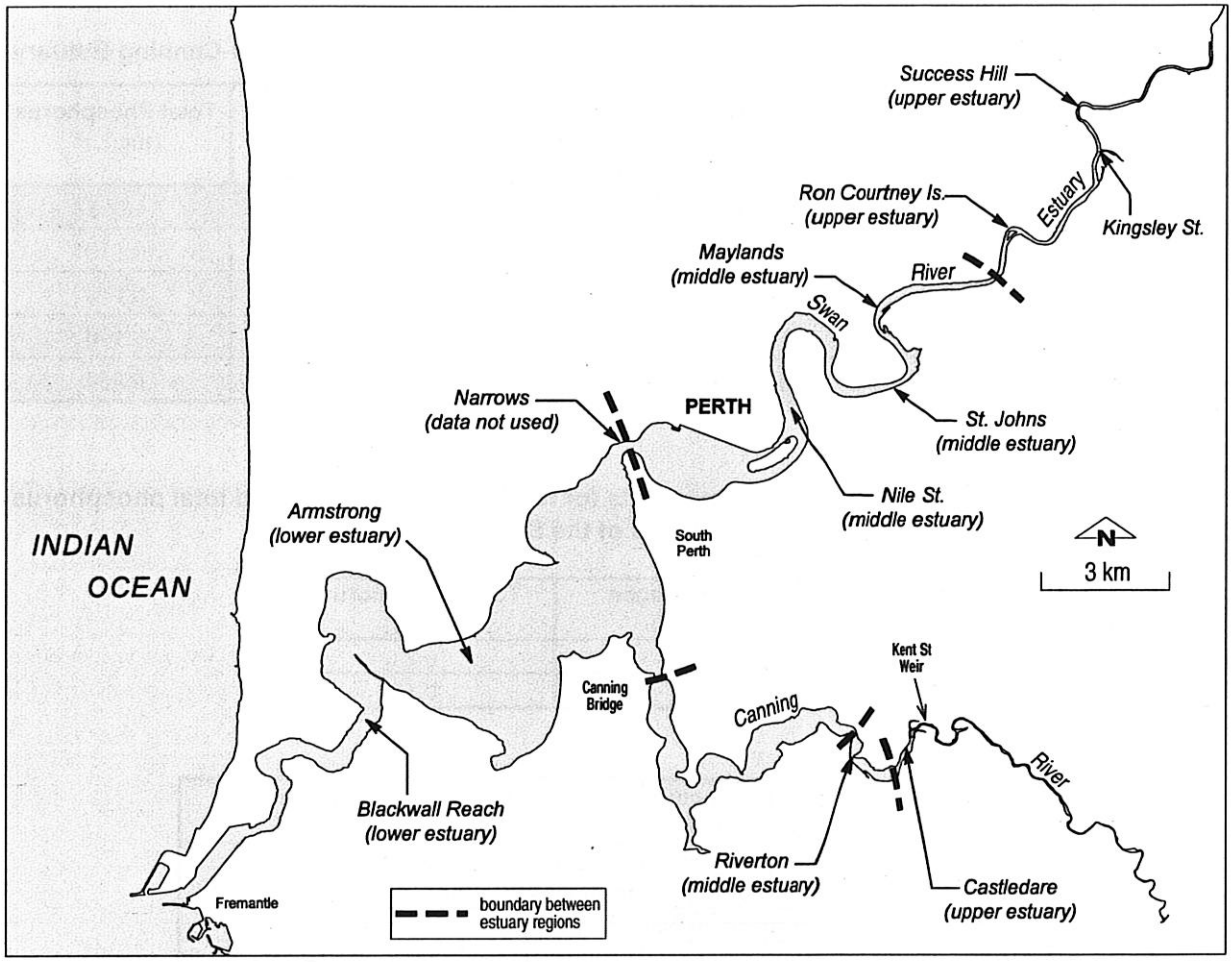



**Figure 4. Swan-Canning Cleanup Program sample sites in the Swan – Canning River**

water quality and aquatic organisms is to be included. The advantage of using this methodology is that it enables community groups and individuals to conduct foreshore surveys.

## 5.3 Determining environmental values and selecting indicators and criteria

Once baseline information has been gathered, environmental values and associated environmental quality indicators and environmental quality criteria for river protection and restoration can be developed and used to measure progress over time.

In the selection of indicators and criteria for environmental values, the work undertaken for the Swan-Canning Cleanup Program can be used as a first step. The Swan-Canning Cleanup Program has carried out routine water quality monitoring of the physical, chemical and biological parameters of the Swan and Canning Rivers since 1996. Under the program, water quality targets have been set for the Swan – Canning Estuary and for tributaries discharging from priority catchments. The water quality targets are currently used as a measure of progress for the program in achieving its goals. For the purpose of this Strategy these targets are considered to be consistent with environmental quality criteria.

The targets set for the Swan-Canning Estuary include the following water quality indicators; total phosphorous, total nitrogen, dissolved oxygen and chlorophyll 'a' as a measure of phytoplankton levels (Table 7). The target levels for chlorophyll-*a* concentration are in micrograms per litre (µg/L) and milligrams per litre (mg/L) for total nitrogen and total phosphorus. The target levels for dissolved oxygen in surface waters are for percent saturation (% sat) [23]. Catchment targets have been developed that specify the median concentration of total nitrogen and total phosphorus allowable in 15 tributaries of the Swan-Canning catchment (Table 8).

**Table 7. Swan-Canning Cleanup Program water quality targets set for the Swan-Canning Estuary**

| Estuary Basin | Chlorophyll-*a* (µg/L)* | Surface Dissolved Oxygen (% sat)** | Total Nitrogen (mg/L)* | Total Phosphorus (mg/L)* |
|---|---|---|---|---|
| Lower Swan-Canning | 3.55 | 82.1 | 0.509 | 0.058 |
| Middle Swan | 8.75 | 75.1 | 0.790 | 0.110 |
| Upper Swan | 19.98 | 81.2 | 1.009 | 0.119 |
| Middle Canning | 11.67 | 49.1 | 0.790 | 0.190 |
| Upper Canning | 39.00 | 15.4 | 1.330 | 0.300 |

**Table 8. Swan-Canning Cleanup Program targets for median total nitrogen and total phosphorus concentration in tributaries of the Swan-Canning Estuary**

| Target | Total Nitrogen (mg/L) | Total Phosphorus (mg/L) |
|---|---|---|
| Short-term | 2.0 | 0.2 |
| Long-term | 1.0 | 0.1 |

Key:

| | |
|---|---|
| | Water quality currently acceptable - target provides early warning of decline |
| | Water quality currently unacceptable - target represents evidence of improvement in the system |
| Lower Swan | Downstream of Narrows Bridge |
| Middle Swan | Narrows Bridge to Garratt Road Bridge |
| Upper Swan | Garratt Road Bridge to Guildford |
| Middle Canning | Canning Bridge to Bannister Creek |
| Upper Canning | Bannister Creek to Kent Street Weir |
| % sat | Percent saturation |
| µg/L | Micrograms per litre |
| mg/L | Milligrams per litre |
| * | Target is for 90$^{th}$ percentile concentration |
| ** | Target is for 5$^{th}$ percentile concentration |

Both short-term and long-term targets have been developed due to the long timeframes required for catchment management to affect nutrient levels in the tributaries[23].

The target levels for the Swan-Canning Estuary and tributaries are based on the number of times nutrient concentrations exceed set levels. Maximum concentrations are seen to be the most effective measure of whether catchment nutrient reduction activities are successful[24]. The selection of levels for the targets is closely linked with the Swan-Canning Cleanup Program management objectives. The targets are not necessarily set at ecologically significant levels, although any detectable decrease in phytoplankton levels has some ecological significance[25].

Assessing compliance with the water quality targets involves examining the rate of excursion from target levels. A rate of excursion is the period in which quality is worse than the limit established by the target. The maximum allowable rate of excursion from the target is specified by the percentile target statistic used. The target for total nitrogen, total phosphorus and chlorophyll-*a*, are based on the 90-percentile target statistic. Therefore, the maximum allowed rate of excursion from a 90-percentile target is 10 percent of the monitoring period which is between January and May. If the rate of excursion

from a 90-percentile target level is higher than 10 percent the target has been breached. The dissolved oxygen targets relate to the 5th-percentile saturation of surface and bottom waters, therefore, the maximum rate of excursion below the targets can be no more than five percent of the monitoring period[25].

In the future, indicators and criteria for other pollutants entering the river system may be based on the Australian and New Zealand Environment and Conservation Council (ANZECC) Australian Water Quality Guidelines for Fresh and Marine Waters[5]. The ANZECC guidelines provide a comprehensive set of indicators and numerical criteria, however there is the need for guidelines to be adapted to reflect natural variation in water quality between systems and within large dynamic systems like the Swan-Canning Estuary. Localised water quality criteria must take into account these natural variations and those areas requiring priority action[25].

| Key action |
| --- |
| The broad environmental values of ecosystem health, biodiversity, natural landscape, recreation, water supply, navigation, fishing and aquaculture have been set for the Swan – Canning Rivers by the EPP. There is a need for further identification of environmental values for each river and catchment zone and the determination of these environmental values is to be a community derived process. |

## 5.4 Reporting and reviewing progress

Comparing environmental quality criteria to current data available for the rivers and reporting this information allows managers and the community to see the success of management responses and modify these responses if necessary.

Currently the routine Swan-Canning Cleanup Program water quality monitoring data is reported weekly to key program stakeholders and monthly to the Swan River Trust Board. Compliance with Swan-Canning Cleanup Program water quality targets and wider program achievements are reported annually to the community through the Swan River Trust Annual Report, Swan-Canning Cleanup Program Community Forum and Action Plan Implementation document. In addition, the evaluation of the Swan-Canning Cleanup Program will give further scope in reviewing and reporting on progress.

Under the Swan-Canning Cleanup Program a series of Catchment Report Cards for the 15 priority catchments of the Swan-Canning Estuary are currently being developed. These report cards will be available over the Internet and allow the community to access catchment maps, a summary of nutrient levels, management activities in the catchment and other background information.

Future report cards could be developed for each environmental value identified in a specific river zone. As an example, Table 9 outlines the report card for ecosystem health in the broader area of the Cockburn Sound[26]. A similar method of summarising and presenting information is a catchment map showing to what level selected environmental quality criteria for each environmental value are met in each river zone.

| Key action |
| --- |
| All reported information will be transmitted to the Environmental Protection Authority and the Environmental Protection Authority will report publicly on these findings |

## 5.5 Prioritising action

When the ecological condition of the rivers has been assessed and progress reviewed and reported, the management actions must be prioritised. Priorities for management will be set on the basis of protection of existing high value areas or areas in good condition and restoration of those areas where there is the highest environmental and community gain for the resources invested.

Under the Swan-Canning Cleanup Program areas identified as requiring priority protection and remediation in the Swan – Canning system are identified as First and Second priority catchments (Figure 5). The priority of these catchments was based on their relative contribution to nutrient levels in the Swan and Canning Rivers[3].

To develop further priorities in the future, the means of prioritising action could be based on the Waterways WA Program's Statewide Waterways Needs Assessment methodology[27]. The methodology describes the concepts, principles and planning process for prioritising investment to maximise environmental benefit.

| Key action |
| --- |
| Priority environmental issues requiring action have been identified. The priority issues include:<br>• biodiversity;<br>• chemical contaminants;<br>• land use planning;<br>• drainage management;<br>• fisheries. |

# *Interim* Report Card 2001

**Subject:** Ecosystem Health in Areas of a High Level of Protection (broader area of Cockburn Sound)

| | Environmental Quality Indicators | *Management Response | Comments |
|---|---|---|---|
| Physical & Chemical Measures | • Chlorophyll 'a'<br>• Light Attenuation | | Continue investigations and precautionary actions (see Recommendations 8–12). |
| | • Dissolved Oxygen<br>• Temperature | | Criteria for dissolved oxygen and temperature currently under review. |
| Indirect Biological Measures | *Algal Growth Potential*<br>• Periphyton | | Continue monitoring. |
| Direct Biological Measures | *Phytoplankton Blooms*<br>• Chlorophyll 'a' | | Overall Chlorophyll 'a' levels in Cockburn Sound meet guideline, except in the Mangles Bay area. |
| | *Seagrass*<br>• Shoot density<br>• Depth limits | | Seagrass generally meet standard, except at sample locations in Mangles Bay and Kwinana (see Recommendations 13–16). |
| Toxicants in Water | *Metals and Metalloids*<br>*Non-metallic Inorganics*<br>*Organics*<br>*Pesticides*<br>*Herbicides and Fungicides*<br>*Surfactants*<br>*Hydrocarbons*<br>*Miscellaneous / Others* | | For the range of water toxicants monitored to date, levels are either below ANZECC guidelines or below normal laboratory detection limits. |
| Toxicants in Sediments | *Metals and Metalloids* | | For the range of sediment toxicants monitored to date, levels are either below ANZECC guidelines or below normal laboratory detection limits. Additional sampling for TBT required. |
| | *Organometallics (e.g. TBT)* | | |
| | *Organics* | | |

LEGEND

* Management Response:

Monitor – Below guideline; continue monitoring. – Below normal laboratory detection limits.

Investigate – Above guideline; investigate and, where necessary, take precautionary action.

Action Required – Above standard; initiate management response.

Research – Additional information required to establish state of the Sound and/or criteria.

**Table 9. An example of a ecosystem health report card for Cockburn Sound**

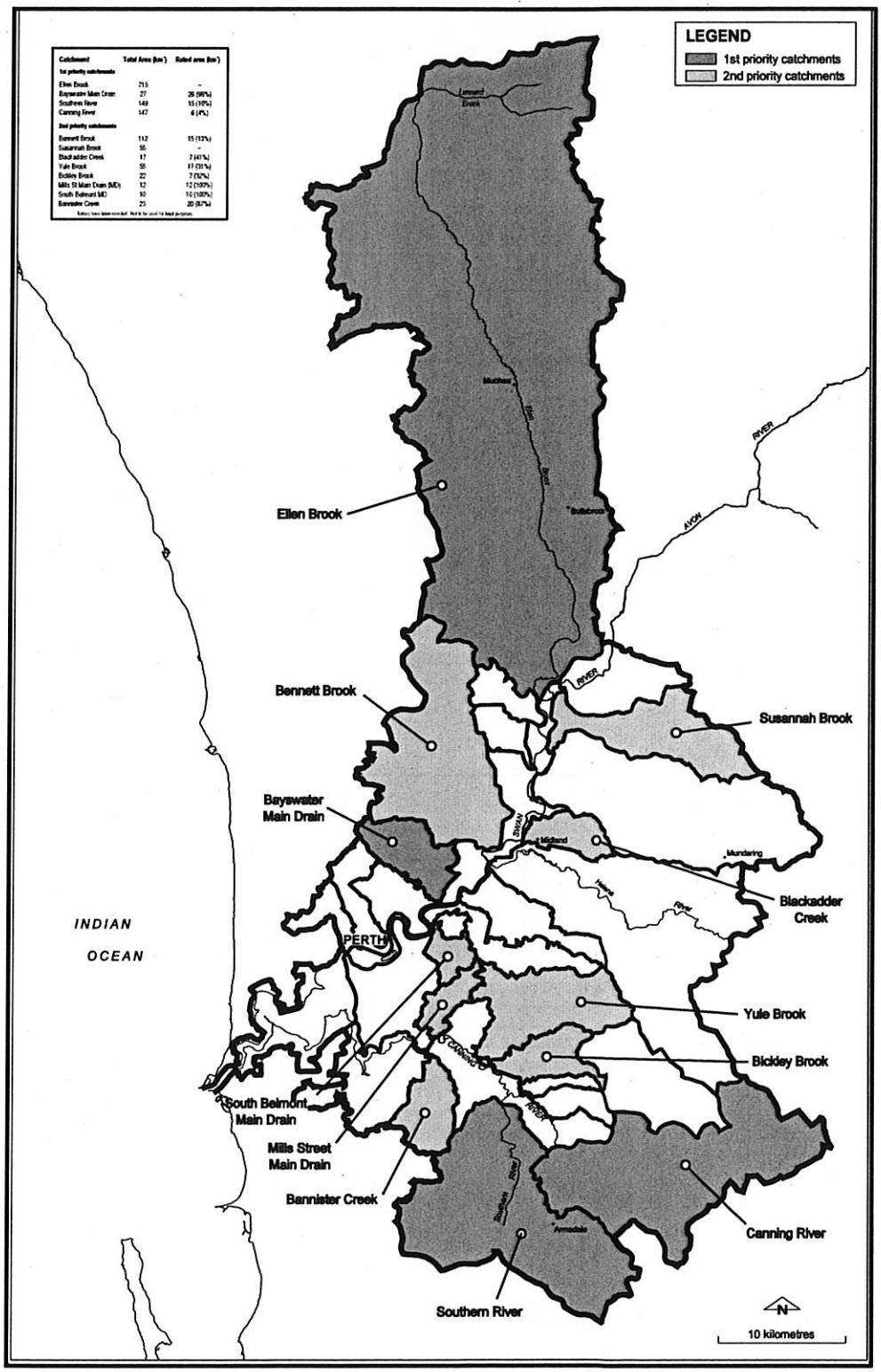



**Figure 5. First and second priority catchments in the Swan – Canning system as identified and the Swan-Canning Cleanup Program Action Plan**

# Sources

1. Riggert, T.L (ed.) (1978). *The Swan River Estuary Development, Management and preservation*, Swan River Conservation Board, Perth.

2. Shean M (1987). *The Swan River Management Authority and its Functions*, Swan River Management Authority, Perth.

3. Swan River Trust (1999). *Swan-Canning Cleanup Program Action Plan, An Action Plan to clean up the Swan-Canning Rivers and Estuary*, Perth.

4. Government of Western Australia (1998). *Environmental Protection (Swan and Canning Rivers) Policy*, Perth.

5. ANZECC & ARMCANZ (2000). *Australian and New Zealand guidelines for fresh and marine water quality*. National Water Quality Management Strategy Paper No 4, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

6. Environmental Protection Authority (2002). *Environmental Protection Policy (Water Quality) Policy and Explanatory Report: Revised Draft*, Adelaide.

7. Environment Australia & Agriculture, Forestry and Fisheries Australia (2000). *Our Vital Resources: A National Action Plan for Salinity and Water Quality in Australia*, Canberra.

8. Environment Australia & Agriculture, Forestry and Fisheries Australia (2002). *Framework for the Extension of the Natural Heritage Trust*, Canberra.

9. National Land and Water Resources Audit (2002). *Australians and Natural Resource Management 2002*, Canberra.

10. Department of Environmental Protection (1998). *Environment Western Australia 1998: State of the Environment Report*, Perth.

11. Water and Rivers Commission (2002). *Water WA 2001: A State of Water Resources Report for Western Australia*, Perth.

12. Environmental Protection Authority (2003). *Draft State Monitoring and Evaluation Framework Discussion Paper*, Unpublished.

13. Environmental Protection Authority (2002). *Implementation Framework for Western Australia for the Australian and New Zealand Guidelines for Fresh and Marine water Quality and Water Quality Monitoring and Reporting Guidelines Nos 4 & 7: National Water Quality Management Strategy*, Perth.

14. Water and Rivers Commission (2001). *Draft consultation paper for the development of the Draft Statewide Waterways Management Strategy*, East Perth.

15. Government of Western Australia (2002). *Focus on the future: The Western Australian State Sustainability Strategy: Consultation Draft*, Department of the Premier and Cabinet, Perth.

16. Western Australian Planning Commission (2003). *Statement of Planning Policy No. 2: Environment and Natural Resources Policy*, Perth.

17. Swan Catchment Council (2002). *Draft Natural Resource Management Strategy for the Swan Region – a*, Perth.

18. Government of Western Australia (1998). *Swan River Management Strategy*, Perth.

19. Swan River Trust (1999). *Audit of the Swan River Management Strategy: A Status Report, Report No. 31*, East Perth.

20. Swan River Trust (2002). *Swan and Canning Rivers Precinct Planning Project, Precinct Plan Handbook*, Western Australian Planning Commission and Swan River Trust, Perth.

21. Swan River Trust (1997). *Swan River System, Landscape Description*, Swan River Trust Report No.27, East Perth.

22. Water and Rivers Commission (1999). *Planning and Management, Foreshore condition assessment in urban and semi-rural areas of south-west Western Australia*, River Restoration Series Report No. RR2, East Perth.

23. Swan River Trust (2003). *Setting Targets: Measuring the success of the Swan-Canning Cleanup Program*, River Science 7, Unpublished.

24. Swan River Trust (2003). *Estimating nutrient loads in the rivers and drains of the Swan-Canning catchment*, River Science 11, Unpublished.

25. Swan River Trust (2003). *Water Quality Targets for the Swan-Canning Estuary*, Swan-Canning Cleanup Program Report No. 29, East Perth.

26. Environmental Protection Authority (2001). *Draft Environmental Management Plan for Cockburn Sound and its Catchment*, Cockburn Sound Management Council, Perth.

27. Water and Rivers Commission (2002). *Statewide Waterways Needs Assessment, Prioritising Action for Waterways Management in Western Australia*, Water Resource Management Series Report No. WRM 31, East Perth.

# Appendices

## Appendix 1
## Acknowledgments

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# Appendix 2
## Glossary of acronyms and terms

### Acronyms

| | |
|---|---|
| **ACC** | Avon Catchment Council |
| **AQIS** | Australian Quarantine Inspection Service |
| **BMP** | Best Management Practice |
| **CAR** | Comprehensive, Adequate and Representative (reserves systems) |
| **CECP** | Centre of Excellence in Cleaner Production |
| **DAWA** | Department of Agriculture |
| **DCLM** | Department of Conservation and Land Management |
| **DoE** | Department of Environment |
| **DoF** | Department of Fisheries |
| **DoH** | Department of Health |
| **DPI** | Department for Planning and Infrastructure |
| **EMS** | Environmental Management System |
| **EPA** | Environmental Protection Authority |
| **EPP** | Environmental Protection Policy |
| **EQC** | Environmental Quality Criteria |
| **EQO** | Environmental Quality Objectives |
| **EV** | Environmental Values |
| **EWPs** | Environmental Water Provisions |
| **ICM** | Integrated Catchment Management |
| **KABC** | Keep Australia Beautiful Council |
| **LCDC** | Land Conservation District Committee |
| **LG** | Local Government |
| **NGO** | Non Government Organisation |
| **NT** | National Trust |
| **NHT** | Natural Heritage Trust |
| **NRM** | Natural Resource Management |
| **R&D** | Research and Development |
| **SCC** | Swan Catchment Council |
| **SCCP** | Swan-Canning Cleanup Program and Action Plan |
| **SCULP** | Swan Catchment Urban Landcare Program |
| **SRT** | Swan River Trust |
| **WALGA** | Western Australian Local Government Association |
| **WAPC** | Western Australian Planning Commission |
| **WC** | Water Corporation |
| **WSUD** | Water Sensitive Urban Design |

# Terms

### Baseline data
Data which records the existing elements, characteristics and trends in an area to provide a measure against which progress can be assessed.

### Benchmarks
Measures of progress toward a goal, taken at intervals prior to a program's completion or the anticipated attainment of the final goal.

### Beneficial use
Use of the environment, or of any portion thereof, which is —
(a) conducive to public benefit, public amenity, public safety, public health or aesthetic enjoyment; or
(b) identified and declared under section 35(2) of the *Environmental Protection Act* to be a beneficial use to be protected under an approved **environmental protection policy**.

### Biological diversity or biodiversity
The variety of life forms: the different plants, animals and microorganisms, the genes they contain, and the **ecosystems** they form. It is usually considered at three levels: **genetic diversity**, **species diversity** and **ecosystem diversity**.

### Ecological integrity
The ability of an **ecosystem** to support and maintain key ecological processes and organisms so that their species compositions, diversity and functional organisations are as comparable as possible to those occurring in natural habitats within a region.

### Ecosystem
Any system in which living organisms and their immediate physical, chemical and biological environment are interactive and interdependent.

### Ecosystem diversity
The diversity of all living organisms and non-living components within a given area and their relationships.

### Ecosystem health condition
A condition of the **ecosystem** which is —
(a) relevant to the maintenance of ecological structure, ecological function or ecological process; or
(b) identified and declared under section 35(2) of the *Environmental Protection Act* to be an ecosystem health condition to be protected under an approved policy.

### Environmental Protection Policy
Statutory policy on behalf of the Parliament of Western Australia of intentions and principles in relation to the conservation, preservation, enhancement and management of a portion of the environment, which provides a framework for action and the setting of **environmental values**, **environmental quality objectives** and **environmental quality criteria**.

### Environmental quality criteria
Numerical values or narrative statements that serve as **benchmarks** for environmental performance or condition.

### Environmental quality indicator
A parameter or characteristic of the environment that can provide information on environmental performance or condition.

### Environmental quality objective
A specific management goal for a part of the environment and is either ecologically based by describing the desired level of health of the **ecosystem** or socially based by describing the environmental quality required to maintain specific human uses.

### Environmental value
Means —
(a) a **beneficial use**; or
(b) an **ecosystem health condition**.

### Evaluation
Evaluation is the careful assessment of the merit, worth and value of the administration, output and outcomes of a policy or program, which is intended to foster improved future results and actions.

### Fringing or riparian vegetation
Vegetation adjacent to the water body and directly dependent on the proximity of the **watercourse** or wetland.

### Genetic diversity
Variation of genes/genetic information contained in all individual plants, animals and microorganisms both within and between populations of organisms that comprise individual species as well as between species.

**Implementation**
The process of putting all policy or program functions and activities into place.

**Intergenerational equity**
The present generation should endure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations

**Landscape**
Made up of basic elements – climate, geology, topography, vegetation, fauna and humans – biophysical characteristics that can be used to identify differences between different landscapes.

**Monitoring**
All actions taken and equipment used for the purpose of detecting or measuring the presence, amount or level of any substance, characteristic or effect.

**Natural Resource Management**
In Western Australia NRM is defined as the ecologically sustainable management of the land, water and biodiversity resources for the benefit of existing and future generations, and for the maintenance of the life support capacity of the biosphere. It does not include marine or mineral resources.

**Policy area**
The area comprising the Swan and Canning Rivers and their catchments excluding water reserves and catchment areas constituted under Part IV of the *Metropolitan Water Supply, Sewerage, and drainage Act 1909*.

**Precautionary principle**
Lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

**Protected catchment**
The catchments, being that part of the **policy area** other than the **protected waterway**.

**Protected watercourse**
A **watercourse** within a **protected catchment**.

**Protected waterway**
The waterways, being –
(a) the management area as defined in section 3 of the *Swan River Trust Act 1988*; and
(b) that part of the port as defined in section 2 of the *Fremantle Port Authority Act 1902* as comprises the waters of the Swan River between the Western extremities of the North and South Moles and the Fremantle Traffic Bridge.

**Representative**
Reflecting the characteristics or nature of the larger population in order to generalise.

**Resources**
Available or anticipated assets required for the development, **implementation** or **evaluation** of a policy or program including staff, equipment, or facilities.

**Species diversity**
This can be considered as the variety of individual species within a given area, such as a region.

**Stakeholders**
Those groups and organisations having an interest or stake in a policy or program, its implementation and outcomes (e.g. regulators, Government agencies, industry, scientists, residents, indigenous people, community groups).

**Sustainability**
Meeting the needs of current and future generations through simultaneous environmental, social, and economic improvement.

**Watercourse**
Means —
(a) any river, creek, stream or brook in which water flows;
(b) any collection of water (including a reservoir) into, through or out of which any thing coming within paragraph (a) flows;
(c) any place where water flows that is prescribed by local by-laws to be a watercourse,
and includes the bed and banks of any thing referred to in paragraph (a), (b) or (c).

# Appendix 3
## The Comprehensive Management Plan outlined in the EPP

Under clause 10 (2) the Comprehensive Management Plan is to –

(a) delineate the beneficial uses;

(b) establish a framework for the coordinated management of the protected waterways and the protected catchments and specify the persons, bodies, agencies or organizations responsible for that management;

(c) identify areas within the protected waterways and the protected watercourses which require protection;

(d) identify critical areas within the policy area which require -
  (i) priority protection; or
  (ii) priority remedial action to achieve the environmental quality objectives;

(e) recommend indicators, parameters or criteria to measure the environmental quality of the policy area;

(f) develop a programme to achieve and maintain pollutant levels in accordance with the environmental quality objectives;

(g) develop on-going programmes for community involvement in achieving the environmental quality objectives;

(h) include strategies for the development of best management practices for the control of drainage, sewage and the disposal of wastewater and the discharge of nutrients, whether directly or indirectly;

(i) include strategies to prevent litter entering the protected waterways;

(j) review the existing drainage systems to identify opportunities for enhancement to minimise the environmental impact on the protected waterways arising from their design and operation;

(k) specify a data management policy for, and which reflects the data needs of, the departments, bodies and persons;

(l) specify the period or periods within which any action recommended in the plan is to be implemented; and

(m) specify a period within which it is recommended the plan should be reviewed and, if necessary, revised by the Authority.

## Key initiatives to fulfil the requirements of the EPP

| | Key management initiatives* | | | |
|---|---|---|---|---|
| **Clause** | Riverplan | Swan-Canning Cleanup Program | Draft Swan Region NRM Strategy | Other initiatives |
| **a** Beneficial uses | Section 2 | | | |
| **b** Management framework | Section 2 and 3 | | | |
| **c** Protected areas | | | | Precinct planning project |
| **d** Critical areas | | Action plan 1st and 2nd priority catchments | | |
| **e** Indicators, parameters or criteria | Section 2 and 5 | | | |
| **f** Pollutant program | | Swan-Canning industry project; LG NRM Policy Project; Water quality monitoring programs; Computer modelling project; Oxygenation project; Sediment remediation project; Constructed wetlands project; Drain retrofitting project | Strategy 2.2.1 | |
| **g** Community involvement program | | Catchment group support; Property planning project; Community awareness & involvement; Caring for the Canning; LG NRM Policy Project; Swan-Canning industry project | Strategies 1.3.1, 2.3.1, 4.3.3, 4.3.4, 5.2.1, 5.3.2 | Swan Catchment Centre; Swan Catchment Urban Landcare Program; Ribbons of Blue / Waterwatch WA |
| **h** Best management practices | | Caring for the Canning; LG NRM Policy Project; Swan-Canning industry project | Strategies 2.1.2, 2.2.1, 3.2.1, 3.2.2, 3.3.2 | Drainage reform group |

| | Key management initiatives* | | | |
|---|---|---|---|---|
| **i** Litter strategies | | | | SRT waterways cleaning; Waste Wise WA; KABC programs; Clean Up Australia campaigns |
| **j** Review drainage system | | | | Drainage reform group |
| **k** Data management policy | | | | Western Australian Land Information System Policies |
| **l** Implementation of plan | Section 4 | | | |
| **m** Review of plan | Section 4 | | | |

* These initiatives may need to be modified or new initiatives developed where there are currently gaps in river management.

## Key initiatives

### Caring for the Canning (Swan-Canning Cleanup Program)

A management plan guiding river management in the Canning Catchment. The focus of the plan has been the development of environmental water provisions in consultation with key stakeholders.

### Catchment group support (Swan-Canning Cleanup Program)

Administrative and operational funding allocated to catchment groups to facilitate the implementation of on-ground activities.

### Clean Up Australia campaigns

The organisation raises awareness of environmental and litter issues through community education. The organisation's campaigns include Clean Up Australia Day, Litter Prevention in Schools/Leave Only Footprints and the Waste Reduction Program for Business.

### Community awareness and involvement (Swan-Canning Cleanup Program)

Communication strategies to raise awareness of river and catchment issues and increase community involvement and corporate support.

### Computer modelling project (Swan-Canning Cleanup Program)

Computer modelling of catchment and estuary conditions provides a way of assessing the changes in the estuary likely to occur in response to changes in water quality. Provides a mechanism for testing the effectiveness and relative cost benefit of different management strategies.

### Constructed wetlands project (Swan-Canning Cleanup Program)

Well designed constructed wetlands have significant potential to improve the quality of water draining from modified landscapes.

### Drainage reform group

State agencies, local government and industry working cooperatively to reform drainage management in WA. A Memorandum of Understanding has been signed and a Drainage Reform Group formed with the overall process being facilitated by CSIRO Land and Water.

### Drain retrofitting project (Swan-Canning Cleanup Program)

Pollution control devices and other catchment measures to reduce levels of nitrogen and phosphorus entering the river system.

**Property planning project (Swan-Canning Cleanup Program)**
Assistance provided to semi-rural landholders to improve their land management and reduce nutrient and soil losses.

**Keep Australia Beautiful Council (WA) programs**
Programs to promote responsible community attitudes towards the disposal of litter. Programs include Tidy WA in May, Keep Australian Beautiful week; Tidy Towns, Perth Environment Awards, Best Beaches and Earth Schools competitions.

**Local government natural resource management project (Swan-Canning Cleanup Program)**
Outlines environmental management polices, guidelines and checklists for direct adoption by local governments and the provision of training in environmental management.

**Oxygenation project (Swan-Canning Cleanup Program)**
Oxygenation improves water quality by increasing dissolved oxygen concentrations and reducing the supply of nutrients that lead to algal blooms.

**Precinct planning project**
A policy framework for local governments making land use planning decisions in relation to the Swan and Canning Rivers. The project manual provides guidance on land use, urban design and stormwater and land management.

**Ribbons of Blue / Waterwatch WA**
A community involvement, environmental water quality monitoring and awareness raising program for schools and community groups. Develops skills and understandings about water quality in a whole of catchment context.

**Sediment remediation project (Swan-Canning Cleanup Program)**
The application of Phoslock™, a modified clay to reduce dissolved phosphorus and inhibit phytoplankton growth.

**Swan-Canning industry project (Swan-Canning Cleanup Program)**
Provides operational support to achieve behavioural change in small industry to ensure their management practices are environmentally acceptable and do not lead to pollution of the Swan-Canning River system or ground water resource.

**Swan Catchment Centre**
Provides essential information, support and resources to over 250 community conservation groups in the Swan-Canning catchment.

**Swan Catchment Urban Landcare Program (SCULP)**
A joint initiative between Alcoa and the Swan-Canning Cleanup Program, SCULP provides funds to community groups and local government for on-ground restoration and environmental protection projects.

**Swan River Trust waterways cleaning**
Cleaning beaches, removing debris, reshaping eroded beaches, foreshore protection works and responding to pollution incidents are part of the continuous work undertaken by the Swan River Trust.

**Waste Wise WA**
Promotes waste minimisation and recycling in schools and community. Waste Wise includes programs such as eco-office, cleaner production, the green stamp program and so on.

**Water quality monitoring programs (Swan-Canning Cleanup Program)**
Monitoring programs measure performance against targets and track trends in water quality and river health.

**Western Australian Land Information System (WALIS) Policies**
WALIS is a partnership of State government agencies, local government and private organisations that enables co-ordination of the State's geographic information and establishes policies and standards that ensure the effective management of this information.

# Appendix 4

## Key International, National, State, regional and subregional plans and legislation

**INTERNATIONAL**

Convention on Biological Diversity (1993).
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).
General Agreement on Tariffs and Trade (1993).
Japan Australia and China Australia Migratory Bird Agreements (JAMBA & CAMBA).
Local Agenda (1992).
Ramsar Convention (1971).
United Nations for Framework Convention on Climate Change (1994).

**NATIONAL**

Action Plan for Australian Agriculture.
Australian Heritage Commission Act (1975).
Australian National Strategy for the conservation of Australian Species and Communities threatened with Extinction.
Bushcare Program.
Convention on Biological Diversity (1993).
Council of Australian Government's Water Reform Program.
Income Tax Assessment Act (1936).
Key Wetlands and Natural Diversity Recovery Program.
Managing Natural Resources in Rural Australia for a Sustainable Future: A Discussion Paper for Developing a National Policy (1999).
Monitoring River Health Initiative.
National Dryland Salinity Program.
National Ecotourism Strategy (1994).
National Feral Animal control program.
National Forest Policy Statement (1992).
National Framework for the Management and Monitoring of Australia's Native Vegetation.
National Greenhouse Strategy (1999).
National Land and Water Resources Audit (2000).
National Land and Water Resources Audit (2000).
National Landcare Program.
National Local Government Biodiversity Strategy (1999).
National Pollutant Inventory.
National Principles for the Provision of Water to ecosystems (1996).
National Riparian Zone Program.
National Strategy for Agricultural and Veterinary Chemicals.
National Strategy for Ecological Sustainable Development (1992).
National Strategy for the Conservation of Australia's Biological Diversity (1996).
National Tourism Strategy.
National Water Quality Management Strategy (1998).
National Weeds Strategy (1997).
National Wetlands program.
Nationally Agreed Framework for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia (1997).
Native Resources and Protection Act.
Native Title Act (1993).
Natural Heritage Trust Act (1997).
Natural Resources Management Strategy 1988.
Plantations 2020.
Revised Strategy for Ozone protection in Australia
State of the Environment–Australia (1996).
Sustainable Agriculture– Assessing Australia's Recent Progress.
Sustainable Regional Development Final Report (1999).
The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (2000).
Wetlands Policy of the Commonwealth of Australia (1997).

**STATE**

A Nature Conservation Strategy for Western Australia–Draft (1992).
Agricultural and Rural Land Use Planning Policy (2000).
Bush Fires Act.
Coastal Zone Management Policy for Western Australia–Draft (2001).
Community Support for Natural Resource Management–Future.
Conservation and Land Management Act (1984).
Country Coastal Policy DC6.1.
Draft Algal Bloom Management Strategy (1999).
Endangered Species Protection Act (1992).
Environment Water Provisions Policy for Western Australia (2000).
Environmental Protection Act (1986).
Environmental Weed Strategy for Western Australia (1999).

Final Report of the Native Vegetation Working Group (2000).
Fish Resources Management Act (1994).
Frameworks: Future Needs (2000).
Land Administration Act (1997).
Land Management Act (1984).
Memorandum of Understanding for the protection of remnant vegetation on private land in the Agricultural Region of Western Australia (1997).
Metropolitan Water Authority Act (1982).
Nature Based Tourism Strategy for Western Australia (1997a).
Protection of Ground Water from pollution in WA – Draft Regional Development Policy for Western Australia (2000).
Protection of Remnant Vegetation on private land in the Agricultural region of Western Australia (1997).
Representative Marine Reserve System for Western Australia (1994).
Rights in Water and Irrigation Act (1914).
Soil and Land Conservation Act (1945).
State Lime Strategy – Draft (2001).
State Marine Waters Policy, Draft Environmental Protection (1998).
Statement of Planning Policy No. 2: Environment and Natural Resources Policy (2003).
State of the Environment (1998).
State Planning Strategy (1996a).
State Water Quality Management Strategy (1999).
State Water Use Strategy (1999).
State Weed Plan Draft (1999).
Town Planning and Development Act (1928).
Vegetation Management Act (1997).
WA Salinity Strategy (2000).
Water and Rivers Commission Act (1995).
Waterways Conservation Act (1976).
Waterways WA–Draft Statewide Policy #4 (2000).
Western Australian Government Framework for Natural Resource Management to assist in achieving sustainable natural resource management (2000).
Wetlands Australian Planning Commission Act (1994).
Wetlands Conservation Policy for Western Australia (1997).
Wildlife Conservation Act (1950).

**REGIONAL**

Agricultural and rural land use planning policy (1999).
AGWEST Sustainable Rural Development Program: Strategic Plan (1998-2003).
Bush Forever (2000).
Draft Avon River Basin natural resource management plan (2000).
Draft Environmental Protection (Swan Coastal Plain Wetlands ) Policy (2000).
Environmental action: Government's response to the State of the Environment Report (1999).
Future Perth Indicators (1999).
Swan Coastal Plain - A Strategy for a Sustainable Future (1999).
Swan-Canning Cleanup program and Action Plan.
Swan Region Natural Resource Management Strategy (2002).
WAste 2020 Draft Strategy (2000).
Western Australian Government Sustainable Cities Initiative (2000).
Working together – A recovery action plan for the Swan-Avon catchment (1997).

**SUBREGIONAL**

Caring for the Canning, Southern and Wungong Rivers (2002).
City of Canning Integrated Catchment Management Strategy.
Conservation reserves for Western Australia -The Darling system - System 6 (1984).
Draft Pioneer Park Ecological Recovery Plan (2001).
Draft Southern River, Forrestdale, Brookdale, Wungong Structure Plan Urban Water Management Strategy (2002).
Eastern Metropolitan Regional Council Regional Environmental Strategy (2000).
Erosion and Sediment Control Manual for the Darling Range (2001).
Foothills Structure Plan (1992).
Draft Interpretation Plan for Canning River Regional Park (2002).
Local Government Natural Resource Management Manual (2002).
North-Eastern Corridor Extension Strategy (2000).
North-eastern Hills Settlement Pattern Plan (2000).
Proposals for Darling Range Regional Park (1995).
Shire of Mundaring Environmental Management Strategy (1996).
Swan Estuary Marine Park and Adjacent Nature Reserves Management Plan 1999-2009 (1999).
Upper Canning Southern Wungong Catchment Management Plan (1999).

# Appendix 5

## Organisational arrangements in the EPP area

This information has been adapted from the draft Swan Region NRM Strategy.

| Organisation | Key Legislation and Policies | Key current activities | Monitoring and reporting |
|---|---|---|---|
| **Department of Environment/ Environmental Protection Authority/ Swan River Trust/Keep Australia Beautiful Council** | *Environmental Protection Act 1986*<br><br>*Environmental Protection (Swan and Canning Rivers) Policy*<br><br>*Environmental Protection (Swan Coastal Plain Lakes) Policy*<br><br>*Waterways Conservation Act 1976*<br><br>*Rights in Water and Irrigation Act 1914*<br><br>*Swan River Trust Act 1988*<br><br>*Litter Act 1979* | • Set environmental objectives and standards<br>• Pollution control and regulation of industry through licensing<br>• Implementation strategies for Environmental Protection Policies (EPPs)<br>• National Pollutant Inventory<br>• National Environment Pollutant Monitoring<br>• Project assessment (EIA process)<br>• State Salinity Strategy<br>• Licensing of water use<br>• Development of Environmental Water Provisions (EWPs)<br>• Waterways WA Program<br>• Information and advice to guide waterways management planning<br>• Advice on wetland evaluation and management<br>• Flood forecasting and advice<br>• Awareness raising and technical support<br>• Swan-Canning Cleanup Program and Action Plan<br>• Planning river management<br>• Promote responsible community attitudes towards the disposal of litter | • Annual reporting<br>• State of the Environment Reporting<br>• Reviews of EPPs<br>• Industry audits<br>• Ribbons of Blue<br>• Frogwatch<br>• Review of Swan-Canning Cleanup Program and Action Plan<br>• Tidy Towns, Perth Environment Awards, Best Beaches and Earth Schools |
| **Department for Planning and Infrastructure/ Western Australian Planning Commission** | *Town Planning and Development Act 1928*<br><br>*Metropolitan Region Scheme Act 1963*<br><br>*Western Australian Planning Commission Act 1994*<br><br>Statements of Planning Policy | • State Planning Strategy<br>• Metropolitan Region Scheme<br>• Regional Strategies<br>• Subdivision and Development Control Policies<br>• Implementing Bush Forever (with other agencies)<br>• Jandakot Land Use and Water Management Strategy<br>• Gnangara Land Use and Water Management Strategy<br>• Promotion of water sensitive urban design<br>• Development of Urban Bushland<br>• Statement of Planning Policy<br>• Agricultural and Rural land use | • Annual reporting<br>• Audit of Bush Forever<br>• Appeals process |

| Organisation | Key Legislation and Policies | Key current activities | Monitoring and reporting |
|---|---|---|---|
| | | Statement of Planning Policy (No 11)<br>• Finalisation of the Environment and Natural Resources Management Statement of Planning Policy<br>• Acquiring land for Comprehensive, Adequate and Representative (CAR) Reserve system (reserved for Parks and Recreation)<br>• Metropolitan Region Scheme and Model Scheme Text | |
| **Department of Conservation and Land Management** | *Conservation and Land Management Act 1984*<br><br>*Wildlife Conservation Act 1950*<br><br>*Wetlands Conservation Policy 1997* | • Finalisation of Biodiversity Conservation Act<br>• Recommending conservation requirements<br>• Management of the conservation estate including CAR Reserve System<br>• Off-reserve conservation<br>• Research, Education and Extension<br>• Conservation activities with community groups<br>• Protection of Threatened Species and Ecological Communities<br>• State Salinity Strategy<br>• Wildlife Conservation<br>• Area management plans<br>• Special areas management (e.g. State Salinity Strategy, State Wetland Conservation Strategy) | • Area conserved /reserved<br>• Annual reporting |
| **Department of Agriculture** | *Soil and Land Conservation Act 1945*<br><br>*Agriculture and Related resources Protection Act 1986* | • Completion of Agriculture Management Act<br>• State Salinity Strategy<br>• Property Planning for landholders in the Swan-Canning catchment<br>• Regulating rural land degradation issues including remnant vegetation protection<br>• Developing and extending Best Management Practices for rural land use<br>• Biosecurity and management of pests and diseases<br>• Management of the Natural Heritage Trust in WA<br>• Agricultural resource management<br>• LCDC administration | • Annual reporting<br>• Best Management Practices in place<br>• NRM |
| **Department of Fisheries** | *Fish Resources Management Act 1994* | • Licensing and management of aquaculture, commercial and recreational fisheries<br>• Volunteer Fisheries Liaison Officer (VFLO) program<br>• Fish management plans<br>• Recreational Fishing License regulations<br>• Codes of practice | • Annual reporting<br>• State of the Fisheries Report |

| Organisation | Key Legislation and Policies | Key current activities | Monitoring and reporting |
|---|---|---|---|
| | | • Fish and fish habitat protection<br>• Fishcare WA projects<br>• Fish for the Future campaign | |
| **Department of Industry and Resources** | *Dangerous goods (Transport) Act 1998*<br><br>*Mining Act 1978* | • Licensing and ministerial conditions on existing operations<br>• Environmental assessment of new proposals | • Annual reporting |
| **Water Corporation** | *Water Corporation Act 1995* | • Environmental programs<br>• Water supply<br>• Drainage and sewerage<br>• Management of vested land<br>• In-fill sewerage progress | • Annual reporting to Minister<br>• Condition on vested lands<br>• Bi-annual Operating Licence audits |
| **Other Agencies/ Authorities/ Corporations**<br>**- Main Roads**<br>**- Department of Health**<br>**- Fremantle Ports**<br>**- Western Power** | Various | • Environmental programs<br>• Road management<br>• Management of health-related services<br>• Port management<br>• Power supply | • Annual reporting |
| **Commonwealth Government** | *Environmental Protection and Biodiversity Conservation Act 1999*<br><br>NHT legislation | • National Biodiversity Strategy<br>• Natural Heritage Trust investment to agencies, local governments and community<br>• Commonwealth EIA processes<br>• National Pollutant Inventory<br>• Setting guidelines and national benchmarks and strategies<br>• National salinity and water quality management<br>• International treaty obligations | • Annual reports<br>• NHT reviews<br>• National Land and Water Resources Audit<br>• State of the Environment Reporting |
| **Local Governments, Department of Local Government and Regional Development, Western Australian Local Government Association,** | *Local Government Act* and specialist Statutes<br><br>*Town Planning and Development Act 1928*<br><br>Statements of Planning Policy | • Regional development/planning<br>• Recycling / waste minimization<br>• Drainage<br>• Town Planning Schemes<br>• Rural land use strategies<br>• Local planning policies<br>• Local planning strategies<br>• development policies<br>• Strategic environmental planning<br>• Local Bushland Management Plans<br>• Local Agenda 21<br>• Support for local groups | • Annual reporting<br>• State of the Environment Reporting<br>• Local Agenda 21 reporting<br>• Local Biodiversity Strategies<br>• Input into Regional NRM Strategies |
| **Swan Catchment Council, Avon Catchment Council, Regional NRM Groups, Catchment groups and other Community** | NHT legislation<br><br>*Incorporations Act 1983* | • Education and awareness building<br>• Working together<br>• Community development and training<br>• Foster community-government partnerships<br>• Representation to government<br>• Group support and funding | • Annual reporting to NHT and local government<br>• Annual reporting to stakeholders<br>• Regional NRM Strategies |

| Organisation | Key Legislation and Policies | Key current activities | Monitoring and reporting |
|---|---|---|---|
| **Groups and NGOs (incl. National Trust and Greening Australia)** | | • Local environmental planning and community education<br>• Influencing environmental change<br>• Policy development<br>• Monitoring<br>• Environmental programs<br>• Coordinating community, government and industry support<br>• Support for community groups<br>• Influencing environmental change and community education<br>• Conservation activities on-ground | |
| **Industry and Industry associations** | Various legislation and licensing requirements | • Codes of practice<br>• Monitoring impacts<br>• Implementing environmental management systems (ISO)<br>• Sponsorship to community<br>• groups and Landcare Trust | • Reporting to regulating bodies<br>• Published environmental reports |