

river restoration



Planning for Waterways Management

Guidelines for
Preparing a
Waterways
Management
Program/Catchment
Plan



WATER AND RIVERS
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PLANNING FOR WATERWAYS MANAGEMENT

Guidelines for preparing a Waterways Management Program/Catchment Plan

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Jointly funded by



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Foreword

Many Western Australian rivers are becoming degraded as a result of human activity within and along waterways and through the off-site effects of catchment land uses. The erosion of foreshores and invasion of weeds and feral animals are some of the more pressing problems. Water quality in our rivers is declining with many carrying excessive loads of nutrients and sediment and in some cases contaminated with synthetic chemicals and other pollutants. Many rivers in the south-west region are also becoming increasingly saline.

The Water and Rivers Commission is responsible for coordinating the management of the State's waterways. Given that Western Australia has some 208 major rivers with a combined length of over 25 000 km, management can only be achieved through the development of partnerships between business, landowners, community groups, local governments and the Western Australian and Commonwealth Governments.

The Water and Rivers Commission is the lead agency for the Waterways WA Program, which is aimed at the protection and enhancement of Western Australia's waterways through support for on-ground action. One of these support functions is the development of river restoration literature that will assist Local Government, community groups and landholders to restore, protect and manage waterways.

This document is part of an ongoing series of river restoration literature aimed at providing a guide to the nature, rehabilitation and long-term management of waterways in Western Australia. It is intended that the series will undergo continuous development and review. As part of this process any feedback on the series is welcomed and may be directed to the Catchment and Waterways Management Branch of the Water and Rivers Commission.



Guidelines for preparing a Waterways Management Program/Catchment Plan

Purpose of this document

This document recommends a planning process, content and structure for waterways planning documents that focus at the catchment scale. While this document is principally aimed at Waterways Management Authorities developing Waterways Management Programs, the approaches and structures that are recommended are equally relevant to the development of catchment management plans.

Waterways Management Programs and Catchment Management Plans are similar in their approach with respect to managing waterways. Both involve a review of the critical management issues within a catchment context. They both consider the physical, biological, social and economic implications of management and both involve the community in management decisions.

This document is one of a series that suggests approaches to planning for waterways management at various scales (see Water and Rivers Commission, River Restoration Reports RR 12 and RR 14). Organisations looking to develop a Management Program or catchment plan should also refer to a waterways planning overview document that contextualises waterways management within the framework of natural resource management and outlines the principles and process by which management planning should occur (Water and Rivers Commission, River Restoration Report RR 11).

Catchment and waterways management planning

Catchments are the ideal scale at which to manage waterways because waterways obtain their water from catchments. Therefore the geology, geomorphology, biological and physical characteristics of the catchment influences the physical and chemical characteristics of the receiving waterbody. The strong linkage between waterways and their catchments makes it difficult to manage waterways in isolation.

In Western Australia, catchment management is undertaken by statutory and non-statutory groups in both rural and urban areas. Catchment management bodies work cooperatively to address a wide range of

environmental issues within a catchment including those that affect waterways. They also work towards providing a balance between the competing needs for social and economic development and the protection of natural resources.

Under the *Waterways Conservation Act (1976)*, Waterways Management Authorities may be formed to provide for the coordinated management of declared management areas (see Appendix 1). Management Authorities manage a section of river or waterway in accordance with the powers of the Act, the State-wide policies developed by the Water and Rivers Commission and locally developed management priorities or guidelines. Although management areas of these Authorities were initially delineated by cadastral boundaries immediately adjacent to the waterway, the more recently formed Authorities have management areas that extend to catchment boundaries. Management Authorities are also moving towards fuller partnerships with newer non-statutory community-based catchment groups to advance integrated natural resource management.

Waterways Management Authorities are required to prepare a Management Program for the area under their management. A Waterways Management Program must advocate for the protection and conservation of the waterway in question in keeping with the high community values that warranted the initial proclamation. These documents also guide the operations of the Management Authority and provide a clear statement of intent to other agencies and non-statutory catchment bodies involved in the use and management of the associated land and water resources.

Waterways Management Program documents should provide:

- A list of the important management issues and objectives that require attention from a scientific, legislative/policy and community perspective;
- A description of the waterway condition and management issues, together with identification of processes occurring within the catchment that influence these;



- A framework for planning and implementing management strategies that will result in the identified issues being addressed; and
- An approach to monitoring the success of management strategies and the Program overall.

Waterways management in perspective

Waterways include rivers, estuaries, coastal lagoons, coastal embayments and associated wetlands. The physical and ecological processes that lead to the degradation of these systems are often complex and take time to fully comprehend. There are, however, often strong pressures on the community and government to treat problems quickly, thereby addressing the symptoms rather than the causes. This can lead to management focusing on a single issue or problem (e.g. algae blooms, flooding, bank erosion, weed infestations, etc) and from a narrow viewpoint (e.g. water quality monitoring, engineering solutions, etc). A preferable approach is to address the cause of these problems. These causes are often a reflection of long term land use and require long-term management.

An effective management plan will build up a catchment-wide picture of the important environmental processes affecting waterways and integrate as much information as possible so that management actions address the cause of problems in preference to symptoms.

It is not possible to know everything about a river or estuarine system. Often some of the information required has yet to be collected and may take years to accumulate. Management will, therefore, often be undertaken with the best knowledge available at the time, knowing that management decisions will have to be flexible, adaptive and iterative.

Generally, there are multiple viewpoints of the people involved in the decision making process (community, local and state government agencies and other stakeholders). Not everyone will agree on what the problem is, or come to a similar view on the appropriate remedies. There are also complex institutional, bureaucratic and legislative agendas and frameworks in place, which often make it difficult to integrate the needs and requirements of different levels of government, decision making authorities and communities, to achieve the most sustainable outcome.

Components of a waterways Management Program and their development

The actual structure of a Waterways Management Program document will vary as preferred by the management body. An example of what a Management Program may contain is provided in Appendix 2. In general, a Management Program (or equivalent) would consist of 5 major components.

1. Preliminary information / management approach

This component explains the overall purpose and direction of the document. It provides an explanation of the management approach and style that is to be used to manage an area (e.g. regulatory, cooperative or a combination of both). This component of the document would also explain how the document was prepared and the timeframe for the life of the document.

2. Supporting and background information

Existing information on the physical, biological and social characteristics of the management area in question needs to be assembled. The information should ideally be compiled at the catchment scale and should include:

- Existing management plans or strategies;
- Scientific data (physical, chemical and biological aspects of the catchment);
- Historical data;
- Community values and inputs;
- Legislative and policy framework and considerations; and
- Advice from “experts”.

A comprehensive list of information that could be compiled for waterways is shown in Appendix 3. This information is generally collected by means of a literature review or fact finding study. It is important to examine as many avenues for this information including published government agency reports, academic literature, databases and other sources. Some information will be general in nature, but relevant to the management issues, while other information will be site specific.



A fact finding study should attempt to identify all potential sources of useful information. Tertiary institutions often house academics and research students who are producing competent research results that will not be published. There are also many individuals within the private sector, such as consultants (e.g. botanists, engineers etc) and serious amateurs (e.g. Birds Australia, naturalists clubs, Gould League, Wildflower Society) who regularly gather information, without it necessarily being published. Local community members are also a very useful source of information, particularly with regard to changes in the catchment over time, by providing oral history, photographic records and other historical data. In addition the value of indigenous knowledge should also be acknowledged and where possible incorporated.

This component of the document would also place the plan in context with other planning documents prepared at the local, regional or statewide level and consider legislation and policy at Federal, State and local government levels (e.g. Inter-governmental Agreement on the Environment, Agenda 21, Native Title requirements, etc). It is important to do more than simply state that other plans or policies exist in the catchment. Management groups should look at the content and intent of those plans and ensure that they are consistent, or explain the extent to which they are discrete or inconsistent. The plan should also examine and discuss ways in which its implementation can be integrated with the activities of other groups. Where possible, groups working on the same river or in the same region should be encouraged to share resources and integrate their plans. Finally, management strategies should comply with the relevant legislation, planning considerations and, where possible, government policy.

3. The actual Management Program

The Program itself comprises a number of distinct components that describe the vision for the area, prioritize the management issues and set goals, as well as describe objectives and strategies for their realisation.

- **A vision** is an agreed set of views and values that describe the desired state for the management area in the long term.
- **Issues** reflect problems, challenges and opportunities for the catchment that require attention. A list of the types of issues that may need to be addressed by a

Waterways Management Program are shown in Appendix 4.

- **Goals** are statements that describe the desired end state with regard to issues and reflect the overall vision. They usually apply to the whole planning area and are not normally quantitative.
- **Objectives** describe what is to be achieved under each goal. There may be more than one objective per goal. Objectives are usually quantitative (i.e. measurable) and have a timeframe outlined for their achievement. They can apply to the whole program area or a geographically specific area within it.
- **Strategies** should clearly correspond to an objective and detail how the objective will be achieved. There can be more than one strategy per objective. Strategies usually describe who is responsible, the timeframe required (e.g. short, medium, long-term) and sometimes outline the cost. Strategies are not necessarily related to on-ground works. They can also recommend actions that address data gaps, institutional and behavioural change.

4. Implementation framework

It is not uncommon for documents detailing effective and innovative management strategies to end up sitting on the shelf. It is therefore important that strategy implementation be considered during the development of a Management Program. The document should describe the mechanisms for implementation of the Program. The mechanisms may involve: formalised agreements with stakeholders; arrangements for obtaining resources; arrangements for maintaining communication and accountability in decision making and methods for resolving future management issues.

Implementation of the strategies should be according to their priority, and a timetable is generally developed by the management body on a financial year basis.

5. Monitoring and evaluation approach

A Management Program needs to describe the process that will be undertaken with respect to monitoring the success of the plan and evaluating the approach as issues change and new knowledge becomes available. The document needs to identify measurable performance indicators against which progress towards objectives are measured and to set a specific timeframe for monitoring.



A timeframe for evaluating and reviewing the plan itself also needs to be identified, as well as persons or organisations responsible for monitoring and evaluation.

Importance of community consultation

Community consultation (including a variety of stakeholders) is essential in developing relevant and suitable management options. The process of community consultation is not a “one-off” process (see Water and Rivers Commission, River Restoration Report RR 11). It is usually an iterative process, where key issues are developed, information gained, additional issues are identified and then further refined and so on, until consensus is reached on a vision, goals, issues, objectives and strategies, leading to an agreed management approach and outcomes.

Stakeholders include members of the community who use the waterway, local land holders, agencies with responsibilities for aspects of waterways management (chiefly the Water and Rivers Commission, the Department of Transport, Port Authorities and Department of Conservation and Land Management, Local Government and other concerned groups and individuals who are willing to act (see Water and Rivers Commission, River Restoration Report RR 11). Stakeholders should be consulted to ensure all ideas, opinions and needs are considered in the management planning process. This is an extremely important step in the process of developing a comprehensive Management Program, as consultation will enable management decisions to be made that are supported by the community and therefore will be more likely to succeed.

There are a number of means by which to consult stakeholders. Some will be more appropriate in certain geographical areas and at certain times in the process than others. These include:

- Meetings with state and local government agencies to enable them to provide ideas or comments and input their legislative and policy responsibility;
- Focus groups of key stakeholders that have been identified to gain their input and knowledge;
- Letters to all interested organisations, groups and individuals inviting their input / submissions into the process;
- Public meetings / workshops for the community through which the needs and aspirations of the general public can be identified; and
- Surveys or structured questioning used to gather objective characteristics or attitudes of the community.

Obtaining community support for the Management Program

It is important that the community understands and is supportive of the proposed strategies in the Program. If the community has been involved throughout the whole process of developing the Program, then there should already exist a high level of community understanding of what is being attempted. In some cases further consultation, explanation and negotiation will be required before the majority of the land holders and wider community understand the management strategies. Some strategies may need to be reviewed and adapted from what was originally proposed. It may be necessary to find the balance between what is scientifically and technically recommended and what the community is willing to implement.

A draft document should always be prepared so that the stakeholders can look at the management recommendations and to give them an opportunity to comment upon and influence the document. This will help ensure the success of the Management Program.

There are various methods of reviewing the draft document, including:

- Public meetings / seminars to outline the content of the Program and to provide an opportunity for comment and input;
- Access to draft at relevant government agencies and libraries so that the community has the opportunity to prepare written submissions (a proforma submission is usually helpful here);
- A brief summary document, providing an overview of the main issues, findings and recommendations (if only to inform those who do not wish to comment);
- Telephone hotline given out for people to phone and gain information; and
- Displays (e.g. at shopping centres) to offer information and provide a chance for the general public to comment.



Following the collection and careful consideration of all the comments, the document should be revised and a final version prepared. A list of submissions should be prepared and the common areas of concern identified. This list, together with details of how these concerns were dealt with, should be included in the final document. Alternatively, a review of public submissions could be a separate document.

After community support for the plan has been gained and appropriate suggestions and changes have been incorporated, then the final Waterways Management Program can be produced. It is important, however, to view the Program as a “living document”, one that is part of the process of adaptive environmental management.

References and further reading

Water and Rivers Commission (2000), *Planning for Waterways Management: An Overview*. Water and Rivers Commission, River Restoration Report RR 11.

Water and Rivers Commission (2000), *Planning for Waterways Management: Guidelines for Preparing a Regional Strategy for Natural Resource Management*. Water and Rivers Commission, River Restoration Report RR 12.

Water and Rivers Commission (2000), *Planning for Waterways Management: Guidelines for Preparing a River Action Plan*. Water and Rivers Commission, River Restoration Report RR 14.

Woodhill, J. and Robins, L. (1998), *Participatory Evaluation for Landcare and Catchment Groups*. Greening Australia.



Appendix 1

Waterways Management Authorities

The *Waterways Conservation Act (1976)* provides for the management of waterways in need of coordinated management through the declaration of Management Areas with defined boundaries and the establishment of Management Authorities. Management Authorities manage their sections of waterway in accordance with the powers of the Act, the State-wide policies developed by the Water and Rivers Commission and regional/local management guidelines and priorities that they establish for themselves. The latter must be consistent with Commission policy.

The first three Waterways Management Authorities that formed had their management areas delineated by cadastral boundaries immediately adjacent to the waterway. The most recent Waterways Management Authorities have management areas that cover their respective catchments. This recognises that without proper catchment management, many waterways could not be effectively managed. Waterways Management Authorities are also moving towards fuller partnerships with newer non-statutory community-based catchment groups to promote integrated natural resource management.

The responsibilities of a Waterways Management Authority in accordance with the Act are presented below.

Under Section 26(3) of the Waterways Conservation Act, the Management Authority shall have responsibility for the initial preparation and constant review of the proposals for any management program related to its area, and shall act in consistency with that management program.

Under Section 35 of the Act, the Management Authority may cause to be prepared a detailed documented program of the operations that are to be undertaken pursuant to the Act – a Management Program - for the Management Area under its control and to periodically review that Program. The Program is generally prepared as a guide for the operations of the Management Authority or a 'statement of intent'.

The Management Authority may also develop working plans or "action plans" for the improvement, development and maintenance of the waters and associated land, the prevention and control of fires, the public utilisation of the area, the study, care and restoration of the natural environment, the conservation of indigenous flora and fauna and such other matters as the Management Authority and the Commission recommend and the Minister approves.

Appendix 2

Example of a table of contents for a Waterways Management Program

(note: this could be adapted to a catchment plan)

1. Introduction

- 1.1 Purpose and aim of the Management Program
- 1.2 Introduction to the waterway and its problems

2. Background information

- 2.1 The waterway and its catchment
 - 2.1.1 Values of the waterway
 - 2.1.2 Impacts of human development
- 2.2 The management context
 - 2.2.1 The Waterways Management Authority and how it relates to the Water and Rivers Commission
 - 2.2.2 Integrated Catchment Management arrangements in the region
 - 2.2.3 Roles of other government agencies, local government and community groups
- 2.3 Preparation of the Program
 - 2.3.1 Legislation requirements and responsibilities
 - 2.3.2 Community consultation
 - 2.3.3 Structure of the Program
- 2.4 Implementation
 - 2.4.1 Responsibilities for implementation
 - 2.4.2 Planning mechanisms
 - 2.4.3 The management cycle – ongoing review

3. The resource

- 3.1 Physical characteristics of the waterway and its catchment
- 3.2 Hydrological regime
- 3.3 The biota of the waterway
- 3.4 History of land use
- 3.5 Impacts of land use
- 3.6 Land ownership
- 3.7 Waterway use in detail and conflicting demand
- 3.8 Outstanding values of the waterway – ecological, social and economic
- 3.9 Recent research and surveys

4. Management issues

- 4.1 Details of the major issues warranting the management plan
- 4.2 Details of any conflicting or compounding issues

5. The basis for management

(alternatively this could be at the head of the document)

- 5.1 Vision and mission of the Waterways Management Authority
- 5.2 Philosophy and approach of the Waterways Management Authority
- 5.3 Key objectives and goals
- 5.4 Guiding principles
- 5.5 EPA/Ministerial recommendations if any

6. The Management Program

- 6.1 Protecting the waterways
 - Examples:
 - 6.1.1 Reducing nutrient loads
 - 6.1.2 Reducing erosion and sedimentation
 - 6.1.3 Reducing point source pollution
- 6.2 Restoring and conserving the waterway environment
 - Examples:
 - 6.2.1 Foreshore management agreements and fencing programs
 - 6.2.2 Landscape protection
 - 6.2.3 Restoration of foreshore vegetation and seagrass beds and stabilisation works
 - 6.2.4 Environmental water requirements
- 6.3 Planning
 - 6.3.1 Regional planning
 - 6.3.2 Local planning
 - 6.3.3 Waterways recovery planning
 - 6.3.4 Climate change
 - 6.3.5 Increasing demand for waterway use
- 6.4 Providing for community use
 - 6.4.1 Recreation
 - 6.4.2 Tourism
 - 6.4.3 Public access



- 6.5 Increasing community awareness
 - 6.5.1 Community involvement and information
 - 6.5.2 Education
- 6.6 Research and survey needs
- 6.7 Monitoring and evaluation
- 6.8 Funding of waterways management
(Include opportunities for self-funding)

7. Management of local areas

(As for basic Action Plans if wish to include ground level management)

8. Making it happen

- 8.1 Implementation of the Program
- 8.2 Action planning
- 8.3 Policy and guidelines
- 8.4 Administrative procedures and operation arrangements
- 8.5 Arrangements for ongoing review

9. Appendices



Appendix 3

Waterways information that could be compiled during the development of a Management Program

Physical, Chemical and Biological Considerations

Catchment Location / Features

- Locality plan
- Size of catchment
- Major rivers / streams
- Major townships
- Political boundaries (LGA's)
- Population
- Main road network

Climate

- Type (mediterranean, temperate, tropical etc)
- Rainfall averages – within catchment
- Variability of rainfall
- Temperatures
- Evaporation rates
- Prevailing winds

Topography

- Elevation
- Broad landscape units (e.g. uplands, escarpment, foothills, alluvial floodplains, coastal dunes)

Geology and Soils

- Geological history
- Geological provinces
- Soil types

Landuse and Historical Channel Change

- Changes in land use patterns
- Private land, reserves, national parks, state forests
- Rural and rural / residential

- Urban – residential, commercial, industrial
- Current status and trends
- Changes in river planform, geometry etc (natural and human induced, direct and indirect alterations)

Hydrogeology

- Location of groundwater resources
- Surface water / groundwater interactions

Hydrology

- Discharge variability

Geomorphology

- Slope
- Valley confinement
- Channel geometry
- Channel planform (e.g. braided, meandering, anastomosing)
- Continuum of river processes

Surface and Groundwater Resources

- Dams, weirs and reservoirs
- Surface and groundwater extraction

Riparian Vegetation

- Original vegetation communities
- Description of major species groups for each community
- Spatial and temporal changes to riparian vegetation
- Any rare or threatened species
- Riparian/terrestrial vegetation linkages (habitat corridors)
- Riparian/aquatic interactions

Terrestrial Fauna

(e.g. Reptiles, Mammals/Marsupials, Birds)

- Distribution
- Diversity
- Rare or threatened species



Aquatic Ecosystems

- Occurrence of estuarine, fresh and saline systems
- Trophic status
- Riparian condition and channel form
- Major aquatic flora communities
- Aquatic fauna communities – diversity and distribution

Flooding and Stormwater

- Flood maps / flood prone areas
- Flood mitigation practices
- Current stormwater management practices

Fire Management

- Fire regime
- Current management practices

Water Quality

- Nutrients / eutrophication – spatial and temporal patterns and sources
- Pollutant problems
- Salinity issues
- Estuarine considerations

Weeds and Feral Animals

- Species and distribution
- Likely causes (e.g. soil disturbance)
- Dispersal techniques

Socio-economic Considerations**Other Management Plans / Recommendations in Existence**

- Integrated Catchment Management Plans
- Local action / site management plans
- Regional Natural Resource Management Strategies

Legislative/Policy Considerations

- Relevant legislation (how they impact on this particular catchment)
- Federal, state and local government policies
- Regional (landuse planning) and local (Town Planning Schemes) restrictions

Aboriginal and European Heritage Considerations

- Sacred sites
- Land use rights
- Aboriginal culture and perspective
- European historical sites
- Landscape heritage

Public Access and Circulation

- Roads / crossings
- Rail
- Boating / ramps / marinas
- Bicycle / walking tracks
- Access for maintenance

Public Health and Safety

- Water quality considerations
- Warning signs
- Fencing and access issues
- Mosquitoes

Recreation

- Boating / waterskiing
- Fishing
- Swimming
- Canoeing
- Bushwalking / cycling



Appendix 4 - Water resource management issues

| Theme | Issue | Condition | Cause/Pressure |
|--------------|---|--|--|
| Ecological | Instream and riparian vegetation degradation. | Declining riparian vegetation. Exposed and eroded foreshores. Erosion and sedimentation. Ecosystem decline. Fragmentation. Loss of diversity. | Livestock grazing. Salinisation and waterlogging due to clearing. Inappropriate fire regimes. Conflicting and unsustainable use of the riparian zone. |
| | Exotic plant and animal invasions. | Weed infested foreshores. Clogged waterways. Loss of native vegetation. Altered stream ecology. Ecosystem degradation. Threat to native species by predation and disease. | Weed introductions. Livestock grazing. Aquaculture escapees. Existing pests. Garden escapees. |
| | Nutrient enrichment. | Declining water quality. Algal blooms – macro and micro. Fish kills. Loss of seagrass. River pool stagnation. Anoxic events. | Nutrient and organic matter transport from catchments. |
| | Point source pollution. | Declining water quality. Algal blooms – macro and micro. Fish and invertebrate fauna kills. Loss of seagrass. River pool stagnation. Anoxic events. Environmental contamination. | Discharge of pollutants. Biocide use. |
| Hydrological | Stream salinisation. | Decreased useability of water. Dying vegetation. Changes from freshwater to saltwater conditions. Salinised stream water quality. Exposed foreshores. Loss of diversity. | Altered catchment hydrology brought about by clearing. |
| | Waterlogging and inundation. | Dying vegetation. Increased extent of water logging along waterways. Stagnation. | Altered catchment hydrology brought about by clearing. Inadequate drainage. Sedimentation of waterways. |



| Theme | Issue | Condition | Cause/Pressure |
|----------------------|----------------------|---|---|
| Hydrological cont'd. | Stream flow changes. | Declining basal flows. Vacant niches for invasive species. Blockage to fish passage. Altered flow regimes. Drowned river valleys. Altered timing, pattern and volume of flow. Loss of wetland and floodplain connection. Altered stream ecology. | Damming of streams. Building weirs, culverts and crossings. Pumping from streams and wetlands. Pumping from streams and wetlands. Water drainage and extraction. Increased groundwater levels. |
| | Flooding. | Increased flood frequency. Increased flood damage. Use of floodplain for development. Erosion and avulsions. | Inappropriate floodplain development. |
| | Drainage. | Degraded drains. Erosion and sedimentation. Weed infestation. Eutrophication of downstream waterways. | Rural and urban drainage. Channel straightening and desnagging. |
| Geomorphological | Channel changes. | Channel widening and deepening. Changes to riffle patterns. In-stream erosion and sedimentation. Floodplain erosion. Loss of river pools. | Altered catchment discharge regime and loss of vegetation. Direct excavation of channel bed. |





