

# **National Water Quality Management Strategy**

# **Implementation Guidelines**

**1998**

**Agriculture and Resource Management  
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# Executive Summary

Water is one of Australia's most important natural resources. As Australia grows and develops, water resources are increasingly under pressure.

The National Water Quality Management Strategy provides the information and tools to help communities manage their water resources to meet current and future needs. It provides policies, a process and a series of national guidelines for water quality management.

The aim of this document is to assist government agencies and the community to prepare and implement plans to manage the nation's water resources. It also provides information on determining the quality aspects of the water authority's water, sewerage and drainage services.

The strategy's policy objective is:

*'to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development.'*

The objective will be achieved by applying a number of **principles** to water quality management, including:

- ?? ecologically sustainable development
- ?? an integrated approach to water quality management
- ?? community involvement in setting water quality objectives and developing management plans
- ?? government endorsement of the water quality objectives.

The **process** for water quality management uses the concept of environmental values to set local water quality targets. These targets are established by government, either directly or in partnership with the community.

The Council of Australian Governments (COAG) supports the development of the National Water Quality Strategy through the adoption of a package of market-based and regulatory measures, including the establishment of appropriate water quality monitoring and catchment management policies and community consultation and awareness.

The **product** is sustainable water resources of a quality that meets the community's needs.

These *Implementation Guidelines* describe the steps in developing and implementing plans to manage fresh and coastal waters and groundwater. They cover the use of the strategy's various guidelines, preparation of water quality management plans, and development of levels of service provided by water authorities. They also outline a step by step approach that may be used to develop an effective community communication program.

## **Acknowledgements**

This document is based on and contains parts of separate papers prepared by Trevor Blake, Environment Protection Authority, Victoria; Sandy Booth, Total Catchment Services Pty Ltd; John Court, J D Court and Associates Pty Ltd; and Richard Whately, Melbourne Water. Barry Sheedy, Melbourne Water, compiled the paper and wrote some sections.

# Introduction

Water is a vital and precious resource and arguably Australia's most important renewable resource. Plants, animals and fish depend on water of adequate quantity and quality for their survival. Good water is vital for urban supplies, agriculture, industry and recreation.

Development has had an impact on our national water resources, changing both the quantity and quality. These changes can affect the long term viability of the resource and the aquatic ecosystems.

Future generations of Australians will rely on these same water resources for their existence.

The National Water Quality Management Strategy (NWQMS) aims to meet these future needs by providing policies, a process and national guidelines for water quality management.

It is a joint strategy developed by two Ministerial Councils - the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) and the Australian and New Zealand Environment and Conservation Council (ANZECC).

The National Health and Medical Research Council is involved in aspects of the strategy which affect public health.

There are many authorities, agencies, organisations, businesses, groups and individuals who have an interest in water. Commonwealth, State and Local Governments have important roles to play.

These various interests and levels of government need to be brought together to plan for and achieve sustainability of our water.

Water management is a State and Territory responsibility. Each State and Territory has a different administrative framework. In some States, local government has a direct responsibility for water management. In addition, each State and Territory will have its own approach to the way it involves local community groups in the development of water quality management plans. This document describes a process which may be adopted where the development of water quality objectives involves the community. It is recognised that, in some instances, it may be necessary to omit parts of the process described in this document.

The NWQMS provides guidelines to assist in:

?? the management of water resources, including fresh waters, coastal waters and groundwater

?? decisions on the quality aspects of water, sewerage and drainage services.

?? facilitate and co-ordinate the application of the various strategies of government for the management of water resources and the quality of the services provided by water authorities.

The *Implementation Guidelines* provide information on how to implement the strategy. They aim to:

?? help government agencies and communities throughout Australia to prepare and implement plans to manage the nation's water resources

?? assist water users, water authorities and governments to evaluate and agree on the quality aspects of the authority's water, wastewater and drainage services

?? enable the various strategies of government to be co-ordinated and applied and to determine how a particular strategy is integrated with all the other government strategies.

They are for:

?? any community in Australia wishing to become involved in the process of developing water quality goals for local waters

?? water authorities and their customers wishing to review the authority's level of service

?? managers in government and industry

?? landholders and users

?? environmental groups

?? special interest groups.

The guidelines presented in this booklet enable the Commonwealth and each State and Territory to adapt, change or adopt the processes according to its legal and administrative structure and capabilities.

The process allows progressive development and implementation of plans and programs, providing opportunities for communities to work together to manage local water resources.

Some States and Territories which have programs under way may wish to review them in the light of these guidelines.

# The Principles

The NWQMS policy objective is:

*'to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development.'*

The strategy provides a consistent approach to water quality management through guidelines which promote a shared national objective while allowing flexibility to respond to regional and local differences.

A summary of the strategy's policies are set out in *Water Quality Management - An Outline of the Policies*. The policies are explained in detail in *Policies and Principles - A Reference Document*.

The principles include:

- ?? ecologically sustainable development
- ?? an integrated approach to water quality management
- ?? community involvement in setting the water quality objectives and developing management plans
- ?? government endorsement of the water quality objectives.

## **Ecologically Sustainable Development**

Ecologically Sustainable Development (ESD) aims to ensure that we can sustain both our economy and our environment, now and in the future.

The ESD Strategy identified core objectives and guiding principles designed to achieve the goal of development that improves the quality of life in a way that maintains the ecological processes on which life depends.

The core objectives of ESD are:

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

The guiding principles of ESD are:

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

These guiding principles and core objectives need to be considered as a package. No objective should predominate over the others.

A balanced approach is required that takes into account all these objectives and principles to pursue the goal of Ecologically Sustainable Development.

In the case of water resource management, the National Strategy for Ecologically Sustainable Development says that 'the challenge is to develop and manage in an integrated way, the quality and quantity of surface and groundwater resources and to develop mechanisms for water resource management which aim to maintain ecological systems while meeting economic, social and community needs.'

These principles, which are accepted by the Commonwealth, State and Territory governments and local government, are central to the management guidelines of the Strategy being developed for activities which have significant impacts on water quality.

The National Water Quality Management Strategy builds on the principles of the National Strategy for Ecologically Sustainable Development and provides the framework to protect the quality of local waters throughout Australia. It provides the transition from policy recommendations to real outcomes.

## **Council of Australian Governments Water Resources Policy**

A framework for reform in the water industry was agreed by the Council of Australian Governments (COAG) in February 1994. This strategic framework for the reform of Australia's water industry (Water Reform Framework) was subsequently adopted as part of the National Competition Policy Agreement.

The Water Reform Framework is a package of resource management and micro-economic reform measures. The scope of the package is broad. It embraces pricing reform, cost recovery, property rights, environmental provisions, trading in water entitlements, institutional reform and public consultation and participation.

In relation to the environment, the Water Reform Framework includes a statement 8(b) which refers to implementation aspects of the National Water Quality Management Strategy as follows:

*to support ARMCANZ and ANZECC in their development of the National Water Quality Management Strategy, through the adoption of a package of market-based and regulatory measures including the establishment of appropriate water quality monitoring and catchment management policies and community consultation and awareness.*

This clause was written during the development phase of the National Water Quality Management Strategy. It is clear that COAG saw a need for appropriate jurisdictional follow-through and envisaged implementation of water quality packages. These Implementation Guidelines, together with other sources of guidance, will be of assistance to the jurisdictions in deciding, according to their circumstances, practical programs or packages to achieve significant advances on water quality management and to implement the spirit of Clause 8(b) of COAG's Water Reform Framework.

### **Integrated Resource Management**

Integrated resource management considers all aspects of the resource use - the social, economic, environmental and other impacts. It embraces:

- ?? a holistic approach to natural resource management within catchments, marine waters and aquifers with water quality considered in relation to land use and other natural resources
- ?? co-ordination of all the agencies, levels of government and interest groups within the catchment
- ?? community consultation and participation.

Integrated Catchment Management (ICM) or in some States, Total Catchment Management (TCM), is increasingly becoming the 'umbrella' for sustainable natural resource management.

It provides the framework for the community, industry and all levels of government to work together to overcome environmental and resource management problems.

Development of catchment-based plans and strategies is central to ICM.

These include the control of point sources of pollution, influence of future land use and where appropriate, the adjustment of existing land use practices to reduce diffuse source pollution.

Plans will promote cleaner production through better housekeeping, best management practices and operational processes that minimise harmful environmental impacts from the beginning to the end of the production process. These plans should integrate ecological and conservation issues within the preferred implementation framework.

The same concepts can be applied to the management of coastal waters. These waters are affected by land-based activities as well as actions on the shoreline and in the sea.

Five key themes may be applied in a systems approach to water quality management.

### **Strategic planning**

Policies, planning and action should be linked to achieve an agreed vision or outcome. Important elements are:

- ?? setting of integrated objectives and priorities to protect the environmental values (beneficial uses) of fresh and marine water bodies
- ?? design of management options to directly or indirectly influence environmental outcomes, and which may have complementary benefits (eg wastewater treatment and wetland rehabilitation)
- ?? co-ordination of action plans for different aspects of resource management initiated by government, industry, landholder and community organisations.

### **Active partnership**

Collaboration among key stakeholders is encouraged to generate credibility, commitment and co-operation. Conflict-mediating processes are important.

### **Integrated approach**

Effective assessment of impacts and variables which affect water quality and overall catchment health requires a holistic approach. The emphasis is primarily technical and implications of catchment conditions and management actions are directly

relevant. At times, skills in resolving conflicts will be required. Key aspects of an integrated approach include:

- ?? analysis of aspects of the catchment system (eg water quality, streamflows, riparian conditions) impinging upon relevant values or uses of waterways
- ?? assessment of the ecological, economic and social values or beneficial uses of waterways and related impacts of management actions
- ?? monitoring of environmental conditions and related socio-economic factors.

### **Balance of social, economic and environmental impacts**

Evaluation of the overall merits of alternative combinations of technical solutions and implementation devices is required. The evaluation must identify options to balance social, economic and environmental impacts with respect to:

- ?? the efficient use of public and private economic resources
- ?? the effectiveness of actions in achieving desired outcomes
- ?? the equitable distribution of costs and benefits
- ?? progress towards sustainable systems of production.

### **Adaptive management**

Effective catchment management depends upon a reasonable understanding of:

- ?? major factors influencing water quality in the catchment or coastal waters
- ?? the impact of past changes and development on current water quality.

While it is recognised that an optimal knowledge and information base for catchment management is not available, there is usually sufficient information to identify and quantify the important local water quality issues. Key requirements are:

- ?? a sound overview of the effect of various activities on water quality, making maximum use of existing knowledge
- ?? a shared understanding by managers and stakeholders
- ?? good 'feedback' systems to monitor responses to management action.

## Environmental Values and Water Quality Objectives

The same water quality is not needed or wanted for all waters.

The *Australian Water Quality Guidelines for Fresh and Marine Waters* outlines five environmental values (beneficial uses) covering a number of categories including water for human use and ecosystems (see Figure 1). The guidelines provide a set of scientific criteria for water quality to match each value.

The set of criteria that satisfy all of the environmental values selected for a particular water body become its water quality objectives. These objectives are based on current scientific data from Australia and overseas and are the numbers to aim for in water quality programs.

<p>?? Protection of aquatic ecosystems</p> <ul style="list-style-type: none"> <li>- General ecosystems</li> <li>- Production of edible fish, crustacea and shellfish</li> <li>- Water associated wildlife</li> </ul>	<p>?? Agricultural water use</p> <ul style="list-style-type: none"> <li>- Irrigation</li> <li>- Livestock</li> <li>- Farmstead water supplies</li> </ul>
<p>?? Recreational water quality and aesthetics</p> <ul style="list-style-type: none"> <li>- Primary contact</li> <li>- Secondary contact</li> <li>- Visual use (enjoyment)</li> </ul>	<p>?? Industrial water use</p> <ul style="list-style-type: none"> <li>- Generic processes (heating, cooling)</li> <li>- Hydro-electric power generation</li> <li>- Textile industry</li> <li>- Chemical and allied industry</li> <li>- Food and beverage industry</li> <li>- Iron and steel industry</li> <li>- Tanning and leather industry</li> <li>- Pulp and paper industry</li> <li>- Petroleum industry</li> </ul>
<p>?? Raw water for drinking water supplies</p>	

**Figure 1: Environmental values**

## Catchment, Coastal and Groundwater Management Plans

The key to management of surface waters is the preparation and implementation of catchment management plans and coastal water management plans. The plans set out the actions to be taken to meet the agreed water quality objectives. Further detail on the preparation of these plans is at Appendix A.

### Groundwater

Many isolated communities and rural properties would not exist without good groundwater. The protection of groundwater is based on similar principles to those used to manage surface waters.

There are a number of features which apply to groundwater. These include:

- ?? the extent of the resource is often difficult to specify
- ?? the quality of groundwater can be directly affected by overdrawing on the aquifer's water
- ?? the flow of contaminants to an aquifer may take years or decades before being noticed
- ?? the cleansing of the water in aquifers is often slow and contaminants can accumulate quickly
- ?? the cost of cleaning up groundwater, once polluted, is often extremely high, if indeed it is technically possible.

For these reasons, the emphasis is on protecting the groundwater rather than improving water quality in aquifers. Appendix B sets out the steps to develop groundwater management plans.

### **State Facilitation**

Effective facilitation at the State or Territory level is essential for successful implementation of water quality management. While one government agency may have the lead role, other agencies which may also have key roles and responsibilities to fulfil should not be excluded. Local government agencies should also be included, particularly in States where local government has a role in water management.

Before starting, it is important that State and Territory governments:

- ?? provide a high level of political commitment
- ?? plan an appropriate statewide approach, while ensuring regional co-ordination and consistency
- ?? ensure adequate direction and support
- ?? identify and promote a sound mechanism for assessing and endorsing water quality objectives
- ?? ensure adequate monitoring
- ?? communicate with key stakeholders.

# The Process

The process includes setting State, regional and local water quality objectives and developing and implementing action plans to achieve these objectives. The extent of community involvement will vary depending on the approach taken by the State, Territory and local government authorities.

## Working Groups and Lead Agencies

The water quality management plan will be co-ordinated by a lead agent, usually a government department or agency. For some catchments, local government or a community based group may be the lead agent. As many agencies will have an interest or responsibility for issues considered within the management plan, they will usually co-ordinate a whole of government approach .

The lead agent is responsible for establishing working groups to develop the plan. It should:

- ?? enable all interested parties who wish to participate to do so
- ?? aim for an open process from the beginning
- ?? hear and consider a wide selection of views
- ?? aim to raise awareness of water issues in the local community via communication programs.

Working groups will usually be established for a particular geographical area, a catchment, aquifer, bay or estuary. The way they are formed is likely to vary in different States and Territories depending on their legislative and administrative structures. There may be instances where governments set water quality objectives without establishing local working groups.

Working group membership, ideally, should be limited to 8-12 people and include representatives of organisations listed in Figure 2. Groups of this size are preferred as experience indicates that outcomes are achieved more readily where the tasks are split between a small number of active members.

The working group should:

- ?? identify and include a broad range of stakeholders
- ?? ensure good communications and liaison with key stakeholders

?? allow representation according to local needs

?? not be dominated by sectional interests.

It is important that where there is a large number of interest groups, mechanisms are established to both canvass their views and to provide feedback on the process as it evolves.

It is critical that the working groups make and maintain contact with all interests including those with strongly opposing views.

It may be useful to establish a stakeholder advisory committee to bring together all major interests in one forum to discuss ideas, issues and proposals, and provide a broad-based sounding board.

?? Research bodies	?? Public users
?? Landowners	?? Environmental interests
?? Community interests	?? Primary industry
- service clubs	- land care groups
- sporting clubs	- farmers' organisations
- churches	- irrigation corporations
- community based groups	- mining groups
?? Education institutions	- forestry organisations
- schools	- fishing organisations
- colleges	?? Secondary industry
- universities	- industry associations
?? Local, State, Commonwealth governments	?? Water industry
- departments	?? Inter-governmental bodies
- agencies	- Murray-Darling Basin Commission etc.
- utilities	?? Tourist industry

**Figure 3 : Working group checklist of possible interests**

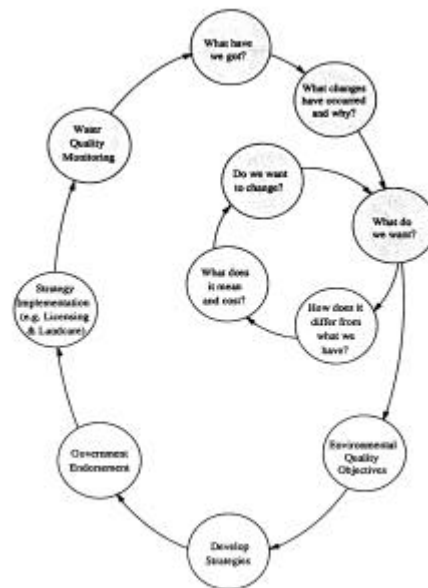
Suggested selection criteria for community and local government representatives are:

- ?? the ability to contribute directly to managing the process
- ?? the ability and eagerness to contribute
- ?? the ability to represent a wide variety of community views
- ?? a familiarity with water quality management issues

?? common-sense and ability to work with people.

The working group chairperson will usually be someone from the local community. Active, committed and democratic leadership is essential.

The working group will help local communities and interested people come to terms with, and then answer, a number of questions in the process of developing water quality objectives as illustrated in Figure 3.



**Figure 3: The process of setting water quality objectives**

Note: Government endorsement refers to the approval of the water quality objectives and the proposed strategies to achieve them. Government input and involvement could also occur at any of the other elements of the process.

## Water Quality Targets

The process for water quality management for fresh and marine waters uses the concept of environmental values to set local water quality targets. This is established in partnership with the community and government. It provides:

- ?? a consistent approach to setting goals, objectives and standards
- ?? stakeholder involvement in defining goals, developing plans and implementing strategies
- ?? clear and flexible ways to achieve the desired result with responsibilities for each action assigned and known
- ?? monitoring and reporting on progress towards the desired water quality objective
- ?? matching the administrative structures to the physical and social constraints, commonly on a catchment or sub-catchment basis.

The process results in management plans with an integrated and workable set of desirable water quality objectives and feasible management options. It involves:

- ?? establishing current water quality information and uses of the water resource
- ?? proposing environmental values the community desires for the local waters
- ?? evaluating the proposed values' environmental, social and economic impacts
- ?? agreeing on acceptable impacts and amending the proposed values as necessary
- ?? establishing water quality objectives based on the agreed environmental values
- ?? government endorsement of the objectives.

The next step is to develop the action plan, implement it and monitor and review the effects of the actions taken. Appendix A provides further detail. The review might include further consideration of the environmental values and the water quality management plan. Water quality management is an interactive process.

The process for establishing the quality of water to be delivered by water authorities is similar to that described above, except that the water quality targets will be based on drinking water guidelines. The *Australian Drinking Water Guidelines* contains further detail.

## **Identifying Current Water Quality and Environmental Values**

All existing information on water quality and current environmental values and uses must be identified and collated.

The following information will assist with collection and standardisation of the data. Information might include:

- ?? environmental values of the water
- ?? the number, location and nature of users
- ?? where particular environmental values apply
- ?? the duration of water use
- ?? an assessment of community perceptions on the adequacy of present water quality for current and future enjoyment
- ?? current land use in the catchment.

## **Proposing Environmental Values**

The desirable environmental values should be those which the local community wish to protect and enjoy now and in the future. These values should:

- ?? receive support from the local community, interest groups and the wider region
- ?? be consistent with the areas' sustainable needs
- ?? consider the needs of downstream communities.

They may:

- ?? aim to improve the current conditions
- ?? achieve a different water quality in each of a number of catchment segments
- ?? recognise that a section of a waterway is unable to achieve a certain water quality at a particular time.

## **Evaluating the Impacts**

The effects and implications of adopting agreed environmental values must be assessed, community acceptance sought on impacts and values modified if required. It is often useful to list the changes that have occurred in the catchment and the impacts on water quality that have resulted from these changes.

This involves a comparison of the waterways' current condition with the water quality objectives, including confirmed existing uses and likely desired uses.

The result can be used by the working group to resolve how to involve communities and interest groups in identifying desirable uses for their local waterways.

This process should involve surveys and face to face discussions with the local community and downstream users. It may also include regular newsletters and media articles supported by:

- ?? meetings and presentations
- ?? shopping centre/field day stalls
- ?? use of local talk back radio.

The differences between the objectives and the current and likely future water quality will indicate the direction that the working group should take, as illustrated in Figure 4.

Equal to	Better than	Worse than
?Adopt agreed objectives and forward for endorsement.	?Adopt agreed objectives and forward for endorsement. ?Weigh benefits of activities that reduce the current water quality while still maintaining quality at or above the agreed objective.	?Detailed work will be required. ?Identify a range of feasible management options to improve water quality to reach objectives.

**Figure 4: Comparison of current water quality against objectives**

### **Analysing the implications**

The potential impacts from adopting desirable objectives may be considerable, particularly where current and likely future water quality falls well short.

A detailed, wide ranging analysis of the implications must be undertaken including social, environmental, economic, scientific, administrative and policy considerations.

National, State and local objectives should be included in analyses along with consideration of the NWQMS guidelines, which provide a national benchmark.

## **Modelling**

The technique of modelling may be able to be used for some catchments to help produce a management plan. Catchment models predict the likely change in water quality resulting from particular changes in the catchment.

Management plan efficiency increases by taking advantage of plans previously developed for similar catchments. These plans will have already identified a range of management options and optimised the costs.

Some local modification may be needed, however because of the resources required it is likely that only significant catchments are modelled.

## **Evaluating the management options**

A range of management options will be developed to achieve the desirable water quality objectives.

Each must be evaluated on the basis of the social, economic and environmental impacts. The technical, administrative and enforcement feasibility should also be considered.

Options could range from capital works such as upgrades of wastewater treatment plants to education programs encouraging behaviour changes in rural or urban communities.

There will be increased commitment to ownership and support of options if they are identified and developed in association with those responsible for implementing them and those affected by them.

Some options will be too expensive, impractical or not achievable at a particular time, requiring longer time frames to be set.

In this case, intermediate water quality objectives would be set and action taken to meet them in the given time.

## **Confirming a feasible solution**

Support for finalised feasible options must be sought from key organisations and bodies via a series of presentations and meetings.

Once support is received, the working group may prepare an options paper for community comment outlining the desired environmental values and uses, their derived water quality objectives and the feasible management options.

Following a reasonable period for comment, including public meetings if required, the water quality objectives and management options can be finalised by the lead

agency and a report outlining the results prepared. This report would include the detailed actions needed to achieve improved water quality - the action plan.

### **Long term and intermediate objectives**

While the aim of the process is to establish long term water quality objectives, there may be instances where intermediate objectives are established. These intermediate water quality objectives might be seen as milestones to be achieved in moving towards the long term objectives. Alternatively, short term objectives may be useful where there is uncertainty on the long term goals or where additional scientific information and research is required.

### **Endorsing the Water Quality Objectives**

The lead agent or agencies will review and present water quality management plans for a region or a local area to the government for endorsement. The endorsement might range from formal adoption through to a community/government agency partnership agreement. A critical step is to have natural resource managers agree to and share a common vision of the water quality objectives.

The recommendations to government should cover:

- ?? consistency with national agreements
- ?? acceptability to other agencies
- ?? scientific soundness
- ?? economic soundness incorporating the social, environmental and health costs.

Water quality objectives can be used by government as:

- ?? long term targets with only general obligations
- ?? long term targets to be taken into account when granting relevant approvals, eg licences and land clearing etc
- ?? targets with defined constraints when granting approvals
- ?? 'never to be exceeded' environmental standards when granting approvals.

Following government endorsement, the lead agent will co-ordinate the report's implementation.

### **Monitoring the Progress**

Progress towards achieving water quality objectives must be continually monitored and reviewed.

Water quality will improve dramatically in some instances (eg wastewater discharge point upgrades), but may take many years to show measurable responses to decreases in diffuse pollution discharges.

Monitoring programs are likely to be different for fresh and marine waters, and vary depending on particular local water quality issues. They provide an essential feedback mechanism to guide adaptive process management.

Community/landholder involvement in catchment monitoring can offer great benefits, yielding information of both scientific and practical relevance, helping to develop shared ownership of catchment knowledge and commitment to action, and modifying previous approaches to land and water management.

The type of monitoring could range from an expensive formal scientific program to a less expensive community-based monitoring system, such as Waterwatch, or it could be a combination of the two.

As the changes in water quality may take some time to emerge, it is important to monitor and evaluate the human processes designed to improve water quality. The evaluation should determine whether there has been adequate co-ordination between agencies and whether the community does 'own' the water quality processes. If not, the reasons why should be established.

## **Regional Co-ordination**

Committees may be established to provide a regional overview for the water resource as a whole.

The key role is to advise the lead agent on regional water quality objectives and members should include a range of interests, including landholders or users, environmental interests, local government and state government agencies.

In some instances, regional water resources committees will report annually to a State Co-ordinating Committee. They may rely heavily on agency resources and support to be effective.

Regional committees need to ensure that:

- ?? all interests in the catchment are taken into account
- ?? adequate liaison is maintained with local government in catchment matters
- ?? working groups established to develop water quality objectives have adequate resources, take account of catchment-wide factors and keep to a reasonable timetable in developing their proposals.

## **Review of Outcomes**

The water quality objectives and the environmental values that have been adopted should be reviewed periodically to ensure that community expectations are being satisfied.

Water quality management is an ongoing adaptive process which responds to changes in the catchment as well as changes in community expectations. Water quality management is an interactive process.

# The Product

The product of the NWQMS is sustainable water resources of a quality that meets the needs of society.

Action plans are implemented as a means of delivering the product. Progress and actions are monitored and measured against objectives.

## Considering a Mix of Tools to Achieve Objectives

Marketing and communication are important to the success of water quality management. Many of the strategic actions will not be legislative, but will rely on voluntary community commitment, continued education and selling of the concepts.

The choice of measures and their mix will depend on their relative efficiency and effectiveness in achieving the expected outcomes.

Sections 6.4.1 to 6.4.3 of *Policies and Principles - A Reference Document* detail the need for careful consideration in determining the appropriate mix of regulatory, market based and advisory tools in product delivery.

Regulatory measures will be appropriate for licensed point sources such as effluent from wastewater treatment plants, industrial waste and some forms of intensive agricultural waste.

It may be possible to extend regulatory measures to urban runoff by licensing stormwater drains as is now done in the United States.

There will be many diffuse or 'non-point' sources of effluent not suitable for direct 'end-of-pipe' regulation. Other types of statutory measures may be applied through planning and local government laws and ordinances.

At the local level, littering and stormwater may be managed by laws and ordinances while erosion and runoff may be controlled at the development approval stage and by planning legislation.

Much of the diffuse pollution will need to be managed by changes in attitude leading to behaviour change. Education programs directed at the general public and specific groups such as farmers and graziers will be key activities.

Government departments and agencies, environment and conservation groups and educational institutions will be important sources of information and resources.

Some market based mechanisms suitable for application include:

?? tradeable effluent permits and pollution charges

- ?? tariffs, levies or surcharges for materials that may affect water quality such as soluble fertilisers
- ?? a user pays approach to water consumption
- ?? performance bonds on licence conditions
- ?? subsidies on slow release fertilisers
- ?? soil erosion measures
- ?? salinity controls.

The application of these techniques is summarised in Figure 5.

These various instruments should be consistent with and aim to achieve the principles of waste minimisation, cleaner production, best management practices, and reuse and recycling.

### **Funding and timetabling**

Funding and progressive resourcing of programs will be crucial in determining a reasonable rate of progress. Local resources, both people and funds, should be identified. Sources of funds include:

- ?? government grants for public works and agricultural support
- ?? rates and charges by water and drainage boards
- ?? special catchment levies
- ?? private sector funding for specific projects
- ? market based measures such as polluter pays principle.

SOURCE	INSTRUMENT FOR MANAGEMENT		
	REGULATORY	MARKET BASED	EDUCATIONAL
<b>POINT SOURCES (Licensable)</b>			
Sewage treatment works	Licence limits, Regulations	Per unit charges for significant pollutant concentrations	Public information about sources of Phosphorous and Nitrogen. Minimise wastewater and contaminants at source
Industrial works	Licence limits, Regulations, Specific regulations for toxics	Per unit charges for significant pollutant concentrations	Public information about pollutants released. Minimise wastewater and contaminants at source
Food processing works (abattoirs, milk processing, etc)	Licence limits, Regulations, Specific regulations for toxics	Per unit charges for significant pollutant concentrations	Public information about pollutants released. Minimise wastewater and contaminants at source
Irrigation	Licence limits, Regulations, Specific regulations for toxics	Water pricing and tradeable water titles	Public disclosure of agricultural chemicals used
Forestry	Operational limitations on licences	Financial penalties for increases in erosion	Public disclosure of erosion caused and runoff changes
Stormwater	Monitoring requirements on licences; best practice conditions	Per unit charges for significant pollutant concentrations	Education campaign on litter and garden pollution
<b>DIFFUSE (NON-POINT) SOURCES (Non-licensable)</b>			
Rural runoff	Enforcement by Soil Conservation Agencies of soil erosion measures; Local and Regional Plans	Subsidies to reduce the price of revegetation. Use of product charges. Financial incentives for soil erosion measures.	Extension training. Property management planning campaign.
Urban runoff	Approvals of land use to include runoff controls. Local and Regional Plans	Fines for polluting activities, eg not cleaning up dog faeces.	Litter reduction campaigns; garden management campaigns
Sewer overflows	Guidelines		

**Figure 5: A reference list of tools to achieve objectives**

# Water authorities and levels of customer service

This section deals with the relationships between the water authorities, their customers and the relevant government agencies. For example, the environment protection agency will be involved in the management of effluent, and the health authority in drinking water quality.

In the past, water authorities usually decided the quality of their water and wastewater services. These days, the level of service is set either by government as part of an operating licence or by the authority after consultation with customers.

Where water authorities have been corporatised, the government will usually issue an operating licence with specific performance measures covering financial, technical and customer service aspects.

Some authorities are involving customers in decisions about levels of service. Customers want input to decisions because these determine the quality and cost of services.

Decisions on the levels of service should be based on local knowledge and estimates of risk and cost. Consumer needs and expectations will influence the extent to which each community will accept them.

Considerable expenditure may be required to achieve the desired levels of service, resulting in capital works being phased in over a number of years.

Appendix C sets out the steps that could be followed to develop authorities' level of service. In cases where a public consultation program is proposed, the program should:

- ?? include consideration of future expenditure options
- ?? provide access to factual and understandable information which can be used as the basis for informed discussion and input. This would usually include the performance of the water supply or wastewater system compared with guidelines and/or existing licences.
- ?? allow adequate time for consultation

?? identify all interests groups and individuals who will be affected and ensure they are able to participate despite barriers of language, distance, technical knowledge, or lack of resources

?? ensure the public understands and agrees to the consultation process.

The program should aim to develop knowledge of and involve the community in the water quality issues. The program is a two way process that provides information, receives feedback and responds to the community.

A comprehensive consultation strategy might include:

?? public hearings

?? workshops or seminars on key issues

?? briefings or workshops targeted at groups with specific interests or responsibilities such as local government or regional councils, industry groups and elderly citizens groups

?? a media program targeting press, radio and television

?? market research to determine community views, knowledge and perceptions

?? preparation of technical issues papers

?? newspaper advertising of activities, public hearings and available papers

?? school programs.

Appendix D contains more detailed information on developing community consultation programs.

# **Glossary**

## **Beneficial uses**

Refer to Environmental Values.

## **Criteria**

Parameters or maximum levels of contamination that can be tolerated, based on scientific evidence and informed judgement, for specific uses of water or for the protection of specific environmental values.

## **Environmental values**

Particular values or uses of the environment that are conducive to public benefit, welfare, safety or health and that require protection from the effects of pollution, waste discharges and deposits. Several environmental values may be designated for a particular water body.

## **Guideline**

Numerical concentration limit or narrative statement (water quality) recommended to support and maintain a particular objective.

## **Levels of service provided by water authorities**

The parameters that specify the product or the service delivered by the water authority to its customers. Levels of service may include the quantity and quality of drinking water or effluent for reuse.

## **Objectives**

See water quality objectives.

## **Principles**

The fundamental policies and philosophies which are used as the basis for action.

## **Process**

The course of action designed to achieve an intended result.

## **Product**

The desired outcome.

### **Standard (water quality)**

An objective that is recognised in enforceable environmental control laws of a level of government.

### **Water quality objectives**

A set of numbers or guidelines which satisfy all of the environmental values for a particular water body.

### **Water quality management plans**

Plans setting out the proposed water quality objectives and the implications of adopting them for particular catchments, coastal waters or aquifers.

### **Working group**

A group of people in a particular geographical area, representing stakeholders and interest groups, established to provide community input and to assist in setting local water quality objectives and developing the water quality management plan.

# References

## National Water Quality Management Strategy

Paper No.	Title
<b>Policies and Process for Water Quality Management</b>	
1	Water Quality Management - An Outline of the Policies
2	Policies and Principles - A Reference Document
3	Implementation Guidelines
<b>Water Quality Benchmarks</b>	
4	Australian Water Quality Guidelines for Fresh and Marine Waters
5	Australian Drinking Water Guidelines - Summary
6	Australian Drinking Water Guidelines
7	Guidelines for Water Quality Monitoring and Reporting
<b>Groundwater Management</b>	
8	Guidelines for Groundwater Protection in Australia
<b>Guidelines for Diffuse and Point Sources</b>	
9	Rural Land Uses and Water Quality - A Community Resource Document
10	Guidelines for Urban Stormwater Management
11	Guidelines for Sewerage Systems - Effluent Management
12	Guidelines for Sewerage Systems - Acceptance of Trade Waste (Industrial Waste)
13	Guidelines for Sewerage Systems - Sludge (Biosolids) Management
14	Guidelines for Sewerage Systems - Reclaimed Water
15	Guidelines for Sewerage Systems - Sewerage System Overflows
16a	Effluent Management Guidelines for Dairy Sheds
16b	Effluent Management Guidelines for Dairy Processing Plants
17	Effluent Management Guidelines for Intensive Piggeries
18	Effluent Management Guidelines for Aqueous Wool Scouring and Carbonising
19	Effluent Management Guidelines for Tanning and Related Industries
20	Effluent Management Guidelines for Australian Wineries and Distilleries

## **Other guidelines**

- 21 Agricultural Council of Australia and New Zealand, *National Guidelines for Beef Cattle Feedlots in Australia*, March 1992.
- 22 National Health and Medical Research Council, *Australian Guidelines for Recreational Use of Water*, 1990.

## **Other references**

- R1 Australian Government Publishing Service, 1992, *National Strategy for Ecologically Sustainable Development*.
- R2 Australian Water Resources Council, Australian and New Zealand Environment and Conservation Council, Proceedings of National Conference, Water Quality Management and Ecologically Sustainable Development 'Delivering on Opportunities', December 1992.
- R3 Australian Water Resources Council, Review of Effluent Disposal Practices, Water Management Series No. 20, 1991.
- R4 Australian Water and Wastewater Association, *The Community and Decisions about Water*, AWWA Workshop, August 1992.
- R5 Burton, Professor John, *The Big Picture, Water*, Australian Water & Wastewater Association, October 1993.
- R6 Commonwealth of Australia, *National Forest Policy Statement*, 1992
- R7 Environmental Defender's Office, *Inland Rivers, Regulatory Strategies for Ecologically Sustainable Management*, 1994
- R8 Kinnersley D. 1988, *Troubled Waters. Rivers, Politics and Pollution* (Hilary Shipman, London)
- R9 Resource Assessment Commission, *Coastal Zone Inquiry*, Final Report, November 1993.
- R10 World Conservation Union, United Nations Environment Program, World Wide Fund for Nature, *Caring for the Earth, A Strategy for Sustainable Living*, October, 1991.
- R11 Australian Quarantine and Inspection Service, Department of Primary Industries and Energy, *Draft Australian Ballast Water Strategy*, November 1994.

# APPENDICES

## **Appendix A: Steps to Develop Catchments and Coastal Waters Management Plans**

A step by step model has been developed to provide a consistent approach to the development of water quality management plans for catchments and for coastal waters. It is intended as a guide only, as the steps that will be used in the different States and Territories will depend on the administrative structures in that State or territory, and on the current development of water management plans and on other local factors.

### **STEP 1 Identify the planning region**

Planning regions for water quality management should be based on natural catchment areas, modified where necessary, to take account of major aquifers crossing catchment boundaries.

Within major natural catchments, there is also need to take account of 'social catchments' characterised by close linking of social interests which may include:

- ?? economic activities
- ?? upstream/downstream catchment interactions
- ?? regional cultural identity
- ?? administrative areas.

Within a social catchment, a significant number of stakeholders representing different interests need to be actively committed to catchment management if it is to be successful. If strong interest exists only at a sub-catchment scale, efforts should be initially focused there, using promotion of local achievements to stimulate action in other areas.

For coastal waters, the plan may be based on ecosystem boundaries, that are commonly determined on the basis of transport systems (eg circulation), biological processes and community groups along the coast.

### **STEP 2 Develop appropriate mechanisms for stakeholder involvement**

The key stakeholders span across the range of relevant interests. Once a core stakeholder group has been formed, it should have the responsibility to refine an involvement process suited to local circumstances and the available resources.

### **STEP 3 Assess the resource and scope the range of issues to be addressed**

Stakeholder discussions should consider both the planning region and the scope of the issues to be addressed by the management plan.

If key stakeholders are interested in only a narrow range of issues, it may be necessary to focus on these initially, while facilitators acting in a catalyst role may seek to draw out a recognition of interdependent problems or processes.

### **STEP 4 Identify the background information about the resource**

Identify the basic background information which provides the limits for ecologically sustainable development of the resource in the region, including water sources, the natural quality and quantity variability, and the region's climatic variability.

### **STEP 5 Identify the environmental values of waters in different parts of the catchment**

With the assistance of catchment planners and technical specialists, stakeholders should identify the current environmental values and future values which may be needed and achievable. These judgements will be interim, pending detailed assessment.

Two crucial and inter-related judgements are needed:

1. What forms and levels of extractive use of water (drinking, agriculture, industry) may be required from different sections of waterway, taking account of water conservation measures, potentially available flows, economic development and ecological impacts?
2. What forms and levels of non-extractive use of water (ecosystem protection, fishing, swimming, boating, viewing) may be achievable in different sections of waterway, taking account of competing extractive demands and the discharge of contaminants?

Assessment of potential extractive demands will require modelling of the catchment system in relation to its hydrology, analysis of user demands and policy options for water management.

Assessment of non-extractive uses requires a combination of surveys of current and potential user demand and assessment of current habitat values and restoration potential.

Local stakeholders' knowledge of recreation patterns and their perceptions of the relative naturalness of different sections of waterway, supplemented by simple 'objective' surveys, have been found to provide a sound basis for broad-scale assessment of non-extractive uses.

While tentative nominations of environmental values to be protected will be determined through the consultative process, final recommendations will need to take account of scientific and economic assessments. Conversely, scientific and economic assessments will be needed to inform the consultative process.

#### **STEP 6 Identify water quality problems and associated factors affecting environmental values**

A balanced approach recognising the range of factors affecting environmental values of water and waterways is needed. Water quality will often be only one of several major categories of environmental constraints. For example, stream flow, riparian vegetation and stream bed stability are major determinants of aquatic habitat potential.

A related consideration is that water quality in itself may not be a strongly motivating concern. Land managers will be primarily interested in issues affecting management of their land, rather than the effects of their management on waterways.

From the perspective of a community interest in water quality, the challenge is to encourage a 'positive' recognition of the links between the productivity of land and associated water quality issues, for instance, links between water quality and clean agriculture and also between water quality and regional economic development. The concept of best management practices can be useful in this context. Best management practices are described in more detail in *Rural Land Uses and Water Quality*.

Local stakeholders will be keen to reduce water quality problems which affect them, eg irrigators who are affected by upstream water quality.

Other guidelines that may give relevant information include *Guidelines for Sewerage Systems-Effluent Management*, *Guidelines for Urban Stormwater Management* and the series of effluent management guidelines for industries such as piggeries, tanneries, wineries and distilleries etc. The papers of the National Water Quality Management Strategy are listed in Appendix E.

#### **STEP 7 Determine where and from what sources degradation of water quality is occurring**

In most parts of Australia, available water quality data has been inadequate to identify with any confidence or accuracy the contributions of sub-catchments and contaminant sources to total contaminant loads in different sections of a waterway.

A combination of fixed-site monitoring at a small number of sites and self-monitoring of effluent discharges will provide information on the contribution of relatively regular point-source discharges to total catchment loads, but the remainder has sometimes been uncritically attributed to the effects of agriculture and forestry activities.

At least rough estimates should be obtained of the contaminant contributions from stream and catchment erosion, agricultural runoff, as well as urban and industrial wastewater. Event sampling as well as ambient water quality monitoring will enable pollutant loads to be estimated.

Assessment of the contributions of sediment and associated phosphorus from in-stream and off-stream erosion requires specialist skills. However, at a coarser scale, sub-catchment water quality can provide a strong indication of overall diffuse contributions.

Land manager and community involvement in assessing the quality of water draining from sub-catchments offers great potential for raising awareness of water quality issues and a commitment to action.

Simple technologies can be used by non specialists to assess with reasonable accuracy the level of water quality indicators including turbidity, conductivity and phosphorus.

### **STEP 8 Determine local water quality objectives**

It may be convenient to divide the planning region into a number of geographic segments or sub-catchments with distinctive combinations of environmental values and management activities.

Sets of local water quality objectives can be established for each sub-catchment.

The following process can be used to develop objectives:

- ?? determine the water quality required to protect desired environmental values
- ?? assess the difference (gap) from current water quality
- ?? assess the cost of necessary management actions
- ?? resolve the acceptable quality/cost trade-off relative to protected environmental values.

The second step is the most relevant one at this stage of the process; interaction will be needed at a later stage to arrive at a final decision.

The *Australian Water Quality Guidelines for Fresh and Marine Waters*, ANZECC 1992, should be used to provide general guidelines for setting of water quality objectives in relation to environmental values.

However, within this general framework, the development and justification of local water quality objectives can present a substantial scientific and decision-making challenge. This is particularly so for indicators such as phosphorus and nitrogen for which the Guidelines specify a broad band of potentially acceptable levels.

Local or comparative evidence of threshold levels of environmental impact (eg eutrophication) is needed to guide objective-setting for such indicators. The cost implications of such critical indicators will also impinge on whether wide safety margins are acceptable.

Normally, concentration objectives for different water quality indicators will be used. However, for various cumulative (conservative) contaminants, such as salt, phosphorus and some toxicants, load objectives may also be desirable.

Load objectives need to be assessed in relation to either some specified point on a waterway or for a particular water body where the cumulative load may have a significant impact, eg provide a sufficient nutrient loading to generate an algal bloom.

They provide a potential criterion for determining acceptable contributions to the total load from different sources.

### **STEP 9 Identify technical options and assess implementation mechanisms for management action**

Technical advisers will play a vital role in identifying potential management actions in different areas and assessing their potential effectiveness. The advisers' credibility within the local community will be crucial in enabling constructive interaction between technical and lay participants.

Advisers may offer a list of options, with an assessment of their potential effectiveness, which may be added to, interpreted and utilised by the stakeholder groups.

Stakeholder groups will have a major role in developing management options to improve water quality. It is at this point that the critical choice between mechanisms must be resolved, via:

?? regulation

?? market mechanisms

?? education

?? co-operative action

?? some creative amalgam.

For example, while changes in certain land management practices may be relevant technical options, the means of introducing these changes warrants careful attention to ensure the concerns of the local community are not overridden.

Factors that influence the choice of specific management actions include:

?? availability of relevant technologies

?? efficiency of relevant technologies

?? familiarity with relevant technical practices

?? availability of necessary administrative and management resources

?? cost of implementation

?? political acceptability of management and cost-sharing arrangements.

### **STEP 10 Identify priority areas and time targets for water quality improvement**

Two questions will help set priorities:

1. Which actions will lead to the greatest improvement in environmental quality?
2. What should be the timetable for these improvements?

The potential social and ecological benefits of improved quality in different areas and implementation feasibility will be major considerations.

Depending on the magnitude of the gap as assessed in Step 7 and the feasibility of implementation, staged time targets will be needed to work towards long term water quality objectives.

### **STEP 11 Assess potential environmental effects of different management actions**

Some form of modelling of the environmental effects will be necessary to enable assessment of associated benefits.

Quantitative modelling may be used if there are resources available. Modelling tools should be designed to assist decision-making, not to display technical sophistication. They should therefore:

- ?? provide a focus for developing a shared understanding of system dynamics and management scenarios

- ?? provide an integrative perspective of key sub-systems
- ?? incorporate key dynamic (hydrological) processes
- ?? provide useful information on relevant performance indicators
- ?? enable examination of relevant management options in relation to historic system conditions
- ?? provide an appropriate level of spatial and temporal resolution
- ?? have realistic data requirements
- ?? enable at least partial calibration and verification of the model against key parameters
- ?? be capable of refinement as knowledge of system behaviour increases
- ?? be comprehensible and fairly transparent to lay users.

The Adaptive Environmental Assessment and Management (AEAM) approach to system assessment and management satisfies these demanding criteria.

**STEP 12 Assess the potential ecological, economic and social impacts of different management actions**

The environmental effects of various management actions, as well as associated effects, need to be assessed in terms of their impacts or costs and benefits relative to ecological, economic and social values.

**STEP 13 Formulate broad management strategy options to achieve different environmental objectives or targets**

Three or four distinct, strategic options, including 'do nothing', should be presented for consideration by key stakeholders, the wider community and decision makers. They may cover a range of issues, including:

- ?? long term objectives and staged targets for environmental quality
- ?? favoured implementation tools
- ?? level of planning detail
- ?? cost-sharing arrangements
- ?? available public resources
- ?? levels of private cost

?? co-ordination and administrative arrangements.

The social and economic implications of different environmental goals will be a crucial factor. However, the most sensitive aspect will be the potential impacts upon different interest sectors.

The allocation of sectoral 'reduction targets', the means of achieving the targets, and costs for different groups will be important issues.

The impact of each of the options on point-source and non-point dischargers, and on urban and rural communities, is also likely to influence stakeholder responses.

Choosing the best option is essentially a matter of politics. Which matters can be resolved by consensus between stakeholders? Which matters will be referred to the ultimate decision makers?

#### **STEP 14 Evaluate the cost-effectiveness and associated impacts of alternative management strategies**

There should be an evaluation of the overall effectiveness, costs and other impacts of options.

Costs of the options will be needed, but many categories of impacts will be qualitative only. Comparison of the options will be both quantitative and qualitative.

#### **STEP 15 Formulate a draft management strategy**

The assessment and refinement of management options is usually an interactive process.

Various implications of potential options are progressively identified and a preferred strategy or combination of actions drafted.

Resource constraints will generally mean different elements of the strategy need to be staged to reach nominated objectives.

Staged targets will provide a framework for adaptive management, priority-setting for action programs being adjusted as progress is assessed.

The draft management strategy will contain the various options with their advantages and disadvantages. The preferred option will be nominated.

#### **STEP 16 Release draft water quality management strategy for public comment**

Public comments will help to extend and refine the evaluation of the potential impacts of the management strategy. A reasonable time, say three to six months, should be provided to enable considered responses to be prepared.

**STEP 17 Finalise and then submit water quality management strategy to government for approval**

Procedures will vary in States and Territories. Cross-portfolio implications will generally warrant consideration by either Cabinet or the appropriate Cabinet Committee or Ministerial Council.

**STEP 18 Develop local water quality management plans for priority areas in conjunction with related land and water management planning**

Responsibility for developing local management plans should be devolved to appropriate working groups or government agencies.

**STEP 19 Implement management strategy (including local water quality management plans)**

The lead agent, along with other relevant agencies and committees, should co-ordinate implementation.

**STEP 20 Monitor effects of implementation of the strategy and adjust action plans**

The lead agent should undertake progressive review of the strategy, drawing upon agency and community water quality monitoring and in-depth evaluation of pilot initiatives.

## **Appendix B: Steps to Develop Groundwater Management Plans**

A step by step model has been developed to give a consistent approach to the development of groundwater management plans.

It is intended as a guide only, as the steps that will be used in the different States and Territories will depend on the administrative structures in that State or territory, the current development of water management plans and on other local factors.

A number of the NWQMS papers provide more detailed information that may assist in developing groundwater management plans. The *Guidelines for Groundwater Protection in Australia* give a detailed framework for protecting groundwater from contamination. The framework is based on a determination of the beneficial uses (environmental values) of the particular aquifer. The *Australian Water Quality Guidelines for Fresh and Marine Waters* give detailed information on environmental values and the associated water quality parameters.

Other guidelines that may be relevant for some aquifers include *Guidelines for Sewerage Systems - Effluent Management, Rural Land Uses and Water Quality, Guidelines for Urban Stormwater Systems* and the effluent management guidelines for a range of industries such as piggeries, tanneries, wool scouring etc.

The above guidelines provide a starting point for the evaluation of the impacts of discharges and land uses in the vicinity of the aquifer. State policies and local conditions may lead to variations from the national guidelines in particular cases.

### **STEP 1 Identify the planning region**

Protection plans may apply to specific geographic localities of various sizes from statewide to an aquifer with a single well.

They may cover part or whole of an aquifer, or groups of aquifers. The choice will depend on the sources of recharge, the use of the water and nature and extent of the communities using the water.

### **STEP 2 Develop appropriate mechanisms for stakeholder involvement**

A working group will generally be established to inform the community and to obtain its views.

Once a core stakeholder group has been formed to guide the development of the groundwater protection plan, it should have the responsibility to refine an involvement process suited to local circumstances and available resources.

### **STEP 3 Assess the resource and scope the range of issues to be addressed**

The strategic assessment of the resource involves an appreciation of the quantity and the quality of the resource, its recharge and discharge zones, its interaction with surface water and other groundwater resources, environmental links and demands, and consumption demands on the resource by all consumer groups.

### **STEP 4 Identify the beneficial uses of the groundwater**

Refer to Section 3 of the *Guidelines for Groundwater Protection in Australia* which lists the various beneficial uses and Section 5.5 which has a detailed discussion on identifying them.

### **STEP 5 Identify water quality problems and associated factors affecting beneficial uses**

The various sources of contamination likely to affect the aquifer should be identified. Other local issues concerning the quality or the use of the groundwater should also be considered.

### **STEP 6 Formulate specific protection policies**

A decision needs to be made on the general policy approach to the protection of a particular groundwater resource.

An important factor to be considered is the consequence of degradation or pollution of the resource.

The objective of this policy decision should be to maximise the net benefits of the resource to society in the long term.

Section 5.4 of the groundwater guidelines provides further detail.

### **STEP 7 Set water quality objectives**

The policy decision from Step 6 raises the issue of water quality objectives and criteria, and how they will be applied. They may be narrative or prescriptive and relate closely to the designated beneficial uses.

Sections 5.6 and 5.7 of the groundwater guidelines give more detail on groundwater objectives and criteria.

### **STEP 8 Assemble a range of protection options**

Various components of the protection plan should be considered at this stage.

Aquifer classification systems, the assessment of vulnerability, land use controls, and consideration of the risk and consequences of contamination by different activities and substances are some of the measures that can be evaluated.

Refer to Sections 5.8 and 5.9 of the groundwater guidelines.

### **STEP 9 Look at monitoring and review options**

A program of monitoring and review should be an integral component of any protection plan. Two distinct sub-programs are required.

One should monitor the effectiveness of a developed groundwater strategy in the broader sense, and the other involve technical groundwater resource monitoring and review.

The plan should be monitored to evaluate its effectiveness from two broad viewpoints:

1. The extent to which the plan has been implemented.
2. The extent to which the plan has succeeded in meeting the goals for protection.

The technical monitoring program is designed to determine whether, when and how groundwater contamination is controlled. Refer to Section 5.10 of the groundwater guidelines.

### **STEP 10 Draw up contingency measures**

Approvals for activities with the potential to contaminate groundwater should include provisions for contingency measures.

The range of measures and the level of action to be taken are described in Section 5.11 of the groundwater guidelines.

### **STEP 11 Select preferred options and finalise the plan**

The selection of options should be made after a very careful consideration of social, economic and environmental effects, such as land use changes to reduce groundwater pollution, over the lifetime of the strategy.

The community needs to understand and accept the chosen set of options.

### **STEP 12 Implement the protection plan**

Implementation will require definition of the various agencies' roles and co-ordination of their efforts.

There needs to be a consistent approach with similar or complementary plans that may be developed for surface waters.

## **Appendix C: Steps to Develop Water Authorities Levels of Service**

As discussed in an earlier section, the level of service is set either by government as part of an operating licence or by the authority after consultation with customers.

Where the levels of service are set by government, the particular jurisdiction will determine the process to be used to decide on the levels of service.

In cases where the water authority sets the levels of service after consultation with its customers, the steps below could be followed.

A number of national guidelines relate to levels of service. Local conditions, State policies and community desires may lead to variations from the national guidelines. Relevant guidelines include *Australian Drinking Water Guidelines*, the various *Guidelines for Sewerage Systems* and *Guidelines for Urban Stormwater Management*.

A list of the documents of the National Water Quality Management Strategy is in the References section.

### **STEP 1 Identify the planning region**

The planning region for services provided by water authorities will usually cover all or parts of the serviced area. In many cases, the same levels of service will apply across the serviced area.

However, there will be occasions where specific local factors lead to varying levels of service in different sections of the serviced area.

### **STEP 2 Develop appropriate mechanisms for customer and stakeholder involvement**

The water authority should gather information on customer preferences, including the views of all of the special interest groups as well as the customers who are not involved in these groups.

It may be useful to establish customer committees and to obtain views through a more random selection process such as focus groups.

### **STEP 3 Scope the range of issues to be addressed**

The issues may cover some or all of the services - water supply, wastewater treatment including reuse and sludge management, and drainage.

Determine one issue at a time so that community resources do not become overloaded in resolving a series of complex issues at once.

Issues may include:

- ?? how to increase the level of public interest and involvement in the consultation process
- ?? definitions of terminology, eg guidelines, standards, levels of service, characteristics, values, monitoring (in relation to water quality), and why it is used
- ?? the reasons for using guidelines rather than standards. This may involve challenging the public perception of the relative strengths and weaknesses of legal versus voluntary agreements.
- ?? community understanding of levels of service
- ?? what reporting structures are the most effective in delivering information to the community.

#### **STEP 4 Identify the current level of service**

The authority should prepare a comprehensive report on the current level of service.

#### **STEP 5 Identify technical options and assess implementation mechanisms**

In conjunction with the customer groups, the authority should list a range of options to be considered for adoption and then canvassed widely among its customers. The authority will consider Government policies on levels of service such as drinking water quality and the treatment of wastewater. In some States or Territories, the level of service may be specified in the operating licence issued by Government to the authority.

#### **STEP 6 Value the potential ecological, economic and social impacts of the different options**

The environmental effects of various management actions, as well as associated effects, need to be assessed in terms of their impacts or costs and benefits relative to ecological, economic and social values.

#### **STEP 7 Prepare and release a draft options paper on levels of service**

This paper should set out the information gathered in Steps 1 to 6 and be issued for public comment.

A reasonable time of at least three months should be allowed to enable the options to be considered.

### **STEP 8 Finalise the report on the levels of service for endorsement by the water authority**

The comments should be analysed and if necessary, discussed with the consumer groups involved in the earlier stages of the process.

The authority should consider the comments and decide on the levels of service.

### **STEP 9 Develop and implement the proposals**

When the levels of service have been agreed, the water authority should implement the necessary actions to achieve the agreed levels of service.

This may include new works, revised operating procedures and changes in the cost to consumers.

### **STEP 10 Report to customers on the levels of service achieved**

The water authority should report to customers at regular intervals on the target level of service and the actual level achieved for the reporting period.

## Appendix D: Steps to Develop Community Communication Programs

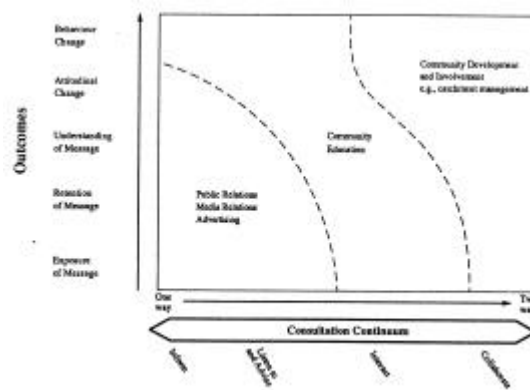
This Appendix outlines a step by step approach to developing an effective communication program. It is included to assist organisations wishing to establish a community communication program. The program should be designed to provide a two way exchange of information and views.

A communication program can include a range of activities such as community education, interpretation, community consultation, community relations, media liaison and advertising.

While the boundaries between these activities overlap, the principles outlined in this guide apply to all of these activities.

Community education programs, through increasing awareness and understanding, aim to encourage long term behavioural change in the community.

Community education, using a range of tools and techniques, is one element of an overall integrated communication program which includes public relations, media relations, advertising and community development and involvement (see diagram below).



**Figure 6: Communication model**

Community education goals are to:

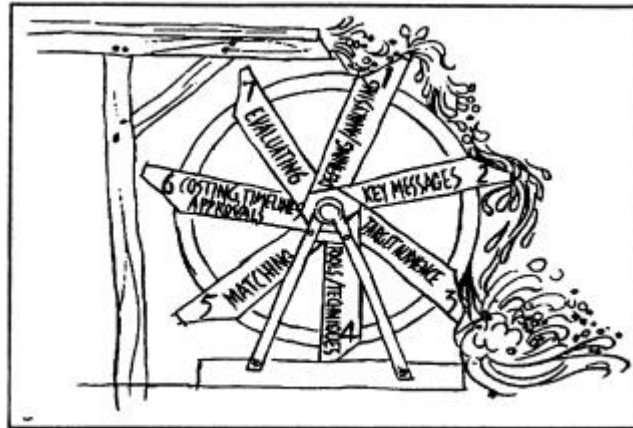
- ?? increase community awareness and knowledge of the water authority's areas of responsibility and services
- ?? educate the community about the constraints and realities of service delivery by the authority.
- ?? enable informed participation and decision-making by the community about services provided by the authority which affect their lives.
- ?? encourage customers to understand and act in a way that minimises the impact of their lifestyles on the authority's water, wastewater and drainage systems.
- ?? encourage the authority to move to the interactive model of communication in its community education programs.

The primary aim of community consultation is to involve stakeholders and/or the broad community in the decision making process.

The type of consultation desired will determine which element of the communication model is chosen. The type required will depend on the perceived importance of the issue by the community as well as environmental, economic and social impacts.

Communication programs should build on a platform of previous knowledge and experience. So, before deciding on the outcome or level of impact a program is trying to achieve, a check should be made to determine the target audience's level of awareness or understanding.

## A seven step guide to your communication program



As you work your way through the seven steps, you may find the need to modify your analysis by going back through the circle; or you may even be able to do some of the steps together. Every effort should be made to involve the community in the decision making process from the start.

The important point is to ensure that no steps are left out.

### **STEP 1 Defining and analysing the situation**

Situations requiring a communication program can arise from a number of sources. For example a new initiative, an emerging issue, a regular activity, a management directive, as a result of feedback from customers or formal evaluation of an existing communication program.

In order to answer the following key questions, it will be important to draw upon different sources of information, namely; previous experience of other organisations, feedback from staff, market research and reports.

- ?? What is your communication need or issue?
- ?? Is this need or issue part of a larger problem?
- ?? Can the need or issue be linked with an existing or proposed communication program?
- ?? What are the urgent, short term and long term needs?
- ?? Is another type of management response also required? For example, develop a policy or enforce a regulation.
- ?? What factors will have a positive impact on your program? For example, benefits, motivators. What resources are already available?

?? What factors will have a negative impact on your program? For example, barriers.

?? Are there any groups directly affected by the issue?

- If yes: Who are they?
- Do they know about the issue?
- If yes: What do they know about the issue?
- If yes: How have they obtained information about this issue?
- What is/would be their attitude towards the issue?

?? Decide on a broad strategy, recognising that different target audiences will have different needs and that higher level outcomes may require several stages leading to behaviour change.

## **STEP 2 Key messages**

The information collected in Step 1 tells you about people's existing knowledge and attitudes.

Now you have to work out what you want to communicate to people; what you want them to know, feel, think or how you want them to behave.

Firstly, identify the essential one or two key messages you wish to communicate. Keep it simple. An example of a key message is: Water quality is generally acceptable. We should reduce the amount of nutrients entering the stream.

From the essential key messages you will probably need to develop supporting messages which go into more detail.

If you want to change behaviours about the issue or situation, you will need to make sure your selected messages cover the five different types listed below.

If you just want to raise awareness, then include informative and feelings or responsibility messages.

?? Informative messages - convey facts. For example, 150 litres of water is flushed down a household toilet every day.

?? Feelings messages - get people emotionally involved in an issue. For example, plastic in waterways can kill or injure animals.

?? Responsibility messages - appeal to a person's sense of what is right or proper. For example, one person's small contribution of litter can produce a major problem.

?? Empowering messages - empower people to act. For example, individual actions no matter how small, do make a difference.

?? Action messages - advise people how they can become involved or what to do.  
For example, Do the right thing. Dispose of your litter thoughtfully and recycle when you can.

### **STEP 3 Target audiences**

Audiences can be defined several ways, for example geographical region, ethnic background, socio-economic group, age group, occupational group, special interest group, or behavioural or attitudinal segment within a broader community.

?? Who are your target audience(s)? Internal or external?

?? Who are the audiences that you most want to reach? Prioritise your list.

### **STEP 4 Possible communication tools and techniques**

Some tools and techniques are:

- ?? Conferences, seminars
- ?? TV and newspaper ads
- ?? Articles in newspapers and magazines
- ?? Brochures
- ?? Education poster
- ?? VCE schools kit
- ?? Speakers kits for talks
- ?? Displays
- ?? Personal briefings

You will need to think widely and creatively about possible tools and techniques for your communication program.

Brainstorming is a quick and easy way of freeing up your mind and generating lots of ideas quickly.

Techniques can be selected from personal contact, participatory media, 'activated' displays, static displays and media, audio visual media and mass media.

### **STEP 5 Matching your audience to key messages and techniques**

Select the appropriate key messages for each target audience.

Determine which communication technique(s) are appropriate, effective and cost efficient for each target audience.

Identify which techniques will be used to transmit each message. Check that each message is going to be effectively transmitted. You may want to use more than one technique per message.

Finally, you will need to check that there is an appropriate balance between techniques which give information and those which facilitate interaction between the water authority and its audience(s).

The communication program matrix may assist in completing this step.

**Communication program matrix**

A	B
<b>Key messages</b>	<b>Appropriate tools and techniques</b>
Message 1 (M1)	Tool A
Message 2 (M2)	Tool B
Message 3 (M3)	Tool C
Message 4 (M4)	Tool D
Message 5 (M5)	Tool E

C	D	E
<b>Target audiences</b>	<b>Priority key messages</b>	<b>Priority tools &amp; techniques</b>
Audience 1	M1, M3, M4, say	Tools C, D, E, say
Audience 2	M1, M2, M5	Tools A, C, E
Audience 3	Etc.	Etc.
Audience 4		
Audience 5		

- Column A** lists the various messages to be conveyed by the communication program.
- Column B** lists the tools and techniques to be used in the program
- Column C** lists the various target audiences, one to a line, eg general, schools, older customers, environment groups, etc.
- Column D** contains, on each line, the messages from Column A for each target audience in Column C.
- Column E** contains the tools and techniques to be used to convey the messages of Column D to the Target Audience in Column C.

## **STEP 6 Costing, timelines and approvals**

In this step you will turn your outline of a communication strategy into an action plan.

### **?? Costing**

Identify initial capital and recurrent costs including staff and any on-going costs. Check the possibility of any potential income.

### **?? Timelines**

Timelines are set to ensure that sufficient staff and financial resources are available to deliver the program's various components. Timelines should also identify key milestones and evaluation points.

### **?? Exposure and distribution**

Techniques which require your target audience to visit a site, eg park display, tree planting program or wastewater treatment complex tour need to be effectively promoted via advertisements, presentations, launches etc.

A distribution plan needs to be developed before a publication is written, so that you can be sure that your messages will reach your audience and you know how many copies to print.

Videos and films also need distribution outlets.

### **?? Approvals**

You will need to document the proposed communication program in a proposal for approval by your manager using the material you have gathered so far.

### **?? Brief**

If you propose to use other staff or consultants to develop some part of your program, eg publication or a video, you will need to prepare a job brief for them.

## **STEP 7 Evaluating**

Finally you will need to set measures to evaluate your program. Go back to your essential key messages from Step 2 and your target audience from Step 3.

?? Did your message(s) reach the audience to the extent expected? How do you know?

?? Were your message(s) understood? How do you know?

?? Did you achieve the hoped for effect? How do you know?

### **STEP 8 Feedback**

Where the communication program has been designed to obtain suggestions and views from the community, the information and conclusions should be summarised and provided to the community. Reasons for preferring a particular outcome should be included.

**Note : Appendix D has been taken from 'Community Communication Programs - A Seven Step Guide' prepared for the Major Urban Water Authorities of Australia by Richard Whately of Melbourne Water.**