Appendix 15 - Water Quality Management in New Zealand[1]

Context

In New Zealand, the Ministry for Environment sets legislation and policy at the national level. The principal legislation relating to water quality management is the Resource Management Act [RMA]. Under the RMA, New Zealand's regional councils (see map below) – which are based on catchment boundaries - have primary responsibility for managing water quality.

Introduction

Water in rivers, lakes and wetlands is one of New Zealand's most important resources. Good quality water is valued for many reasons; including its ecological function and its role in maintaining biodiversity, its scenic and recreation value, and its cultural and spiritual significance. It is also an invaluable resource for drinking, irrigation, aquaculture, many industrial processes, and for assimilating contaminants.

Developing a regional water quality plan is a complex, multi-disciplinary task that requires technical information from experts and knowledge of community values and expectations. The role of a plan is to guide the sustainable management of surface water quality, meaning plan provisions must allow for reasonable use of the resource,

[1] Sourced from: http://www.qp.org.nz/plan-topics/surface-water-quality.php

while safeguarding its life-supporting capacity and managing any adverse effects of its use.

Resource uses have the potential to affect environmental values by reducing water quality. Water quality planners must be able to identify the relevant values, account for the effects of different types of point and non-point source discharges, establish acceptable water quality for receiving waters, and establish acceptable zones for mixing of discharges.

A range of effective planning approaches are used in current practice in New Zealand. Significant challenges still exist, and developmental work is in progress. One of the largest challenges is managing non-point source discharges and the cumulative effects from land uses on water quality.

The following notes summarise planning for the management of surface water quality in rivers, lakes and wetlands in New Zealand. Surface water quality planning is a large and complex subject that ranges from strategic considerations, such as identifying the effects of land uses on the quality of adjacent water resources, to site specific issues associated with individual discharges. It has a considerable technical component that requires input from a range of disciplines (eg water chemistry, microbiology and aquatic ecology). At an early stage in the planning process planners should identify their technical information requirements, and relevant knowledge and expertise to meet these.

Planning for water quality cannot be separated from water quantity management, as a reduction in water quantity (for example, due to water takes) can result in a reduced capacity of that water body to dilute contaminants (see the water allocation guidance note for more information). Neither can surface water quality be managed independently of groundwater, or the beds and margins of water bodies, or the coastal marine environment or catchment land uses. Surface water quality must be managed comprehensively, and in a manner that is fully integrated with other environmental media and human uses.

The role of regional water quality plans

A regional water quality plan is a valuable part of a New Zealand regional council's overall framework for managing water quality. It enables a council to:

- Ensure that a wide range of environmental and cultural values, as well as many other important matters (such as those listed in Part II of the RMA) are considered, and that the most effective methods are used to manage any adverse effects of water use
- Establish and/or maintain an equitable use of resources
- Make consistent, justifiable decisions on consent applications for discharges into water, or discharges onto land that might result in contaminants entering water
- Avoid the re-litigation of issues through the resource consent process by dealing with common issues in the plan
- Take into account the cumulative effects of discharges
- Provide guidance to resource users on what is expected when seeking a consent
- Provide a framework to help monitor and measure the environmental results of plan provisions and management practices.

Section 65 of the RMA allows a regional council to prepare a regional plan at any time and sets out a number of circumstances in which '...a regional council shall consider the desirability of preparing a regional plan...' One of these circumstances, section 65(3)(h), relates to any use of land or water that has actual or potential adverse effects on water quality.

In the absence of a regional plan, water quality is generally managed by considering discharge consent applications on a case-by-case basis. This is because section 15 of the RMA restricts any person from discharging contaminants or water into water (or onto land in circumstances which may result in contaminants entering water) unless the discharge is expressly allowed by a rule in a regional plan, a resource consent, or regulations.

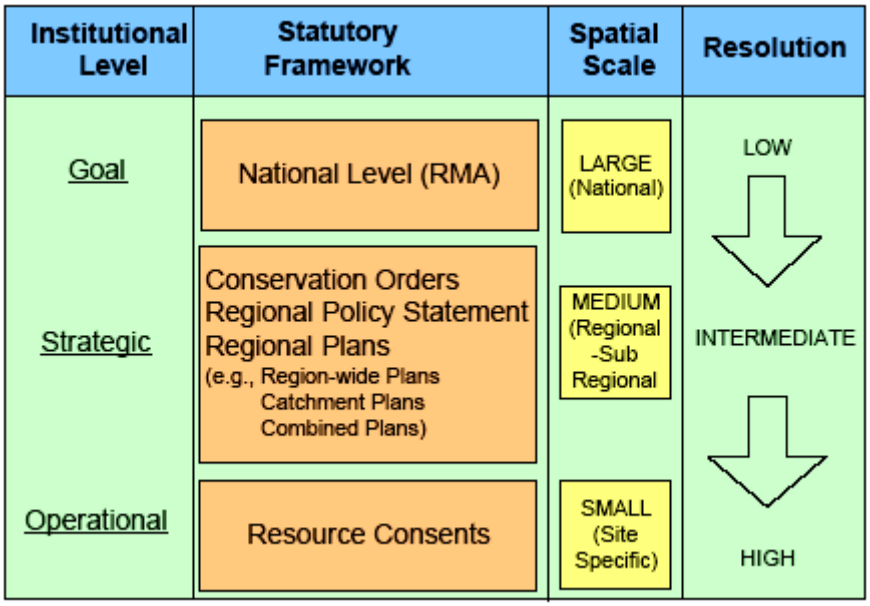
Although considering applications on a case-by-case basis allows councils to take into account the site-specific details for each discharge, it is unlikely to be the most effective way of managing the cumulative effects of discharges or the effects of activities that generate non-point source discharges. They also do not provide resource users with guidance on what is expected when preparing an application.

By contrast, regional water quality plans assist councils to co-ordinate regional functions to address environmental issues and provide a structured means for them to consider:

- National and regional policy and instruments (e.g. national and regional policy statements, water conservation orders)
- Local policies and plans (e.g. district and city plans)
- Integrated catchment management (e.g. considerations of the quality and quantity of surface water bodies, as well as the relationship of these resources with their catchment land-use and groundwater quality)
- Community priorities and requirements for resource use
- Integrated environmental monitoring.

The overall management framework under the RMA can be illustrated in Figure 1 as follows: the RMA at the national level; policies and plans at the regional level, and individual resource consents at the site-specific level.

Figure 1: NZ's RMA statutory framework for water quality management



Under this framework, a regional water quality plan must give effect to any national policy statements and the regional policy statement and must not be inconsistent with any other regional plan for that region (section 67 RMA).

The regional water quality plan should also:

- State the regional environmental values for rivers and lakes
- State the community expectations for use of the water resource
- Seek to resolve the conflict between sustaining environmental values and use of the water resource
- State the plan's objectives for environmental values
- State the plan's objectives for allowing resource use
- State the management controls (the policies and rules, which may include standards and other methods) to achieve the objectives.

Resolving conflict between environmental values and resource uses

Good quality water supports many environmental values and resource uses. It is also of spiritual value to Māori.

The key issues in surface water quality planning usually involve:

1. Conflict between human activities and the values associated with rivers, lakes and wetlands.
2. Determining the state in which water quality should be sustained.

Environmental values

Environmental values reflect the community's aspirations for the water in its region, and the level of water quality desired, including:

- Ecological function and biodiversity, such as plants, invertebrates, fish, and birds
- Natural character
- Natural features and landscape
- Cultural and spiritual
- Scenic and amenity
- Contact recreation, such as swimming, fishing, kayaking, and boating
- Mauri (life force) and mahinga kai (food and other resources).

Cultural and spiritual values

Many Māori consider water as the source of life and sustenance. Māori believe that water contains a mauri (life force) that joins physical and spiritual elements and links water to every other part of the natural world. Water is a taonga (treasure) because it carries the lifeblood of the land; the well-being of all living things depend on it. Maintaining water quality in the best possible condition, so that a river or lake and its ecosystems are healthy, is an issue of major concern for many Māori.

A Cultural Health Index for Streams and Waterways: Indicators for Recognising and Expressing Māori Values has been developed to facilitate the input and participation of iwi[2] into land and water management processes and decision making. This index links Western scientific methods and cultural knowledge about stream health,

[2] Māori word for a set of people bound together by descent from a common ancestor or ancestors

Particular values concerning water quality vary among tangata whenua, and depend on characteristics at specific sites. Consultation with local iwi is essential for identifying values.

Resource uses

Resource uses include:

- Human drinking supply
- Stock drinking supply
- Irrigation supply
- Industrial processing (particularly food processing)
- Aquaculture
- Groundwater aquifer recharge
- Contaminant assimilation, such as receiving discharges.

Human activities often affect environmental values by discharging contaminants into rivers or lakes. Contaminants in water can be increased and concentrated by point source discharges and non-point source (diffuse) discharges. Water takes (abstractions) can also affect water quality by reducing the water's ability to dilute contaminants.

Point source discharges come from a single discrete point, such as the end of a pipe or drain. Some of these discharges are treated before being released into receiving waters, but many are not. Common examples include:

- Stormwater from reticulated networks, collecting run-off from roofs, roads, and carparks
- Wastewater containing community sewage
- Leachate from landfills and other contaminated sites
- Industrial by-products, such as cooling water, and process chemicals
- Agricultural by-products, such as dairy shed effluent
- Irrigation by-wash, such as canal and border-dyke return outlets.

Non-point source discharges are from widespread or diffuse sources. Contaminants enter rivers or lakes via runoff across land or shallow sub-surface drainage. These discharges are difficult to manage, because it is hard to establish a direct link between an adverse effect and its source.

Management options include reducing the contaminant at source, or using riparian management to maximise attenuation before contaminants enter rivers or lakes. Further detail can be found in the Ministry for the Environment's Managing waterways on farms: A guide to sustainable water and riparian management in rural New Zealand.

Common examples of non-point discharges are:

- Irrigation or rainfall runoff from agricultural land containing contaminants such as fertiliser, animal faeces, and eroding soil
- Runoff from horticultural land containing contaminants such as fertiliser, chemical sprays, and rotting produce
- Runoff from forestry land containing contaminants such as eroding soil, chemical sprays, and debris

- Runoff from mining areas containing contaminants such as eroding soil and rock
- Stormwater from areas that are not reticulated.

For more information and resources see Common point source and non-point source discharges

Measuring water quality

Water quality can be measured using chemical and physical measures and/or biological measures. The quality of both the discharge effluents and of the receiving waters can be measured. It is also necessary to measure ambient (background) water quality, preferably through time, in order to quantify how water quality has changed or is changing.

Community consultation is needed to establish less tangible aspects of water quality, such as its mauri. Interpreting water quality is not a straightforward activity. The water quality that is measured is often the consequence of complex interactions between a number of factors, and understanding, for example, the relationship between measured water quality and catchment land use often requires the application of specialised skills.

Chemical/physical measures involve the scientific measurement of contaminants of concern, or 'indicators' of contaminants of concern. Contaminants are usually of concern because they affect aquatic 'biological health' or some other value of a water body (e.g. visual amenity or human contact-related illness risk). Contaminants and indicators are often referred to as water quality variables or determinants or parameters.

Most contaminants and indicators are measured as concentrations (an amount per volume). Exceptions include temperature, pH, clarity, and colour.

Biological measures involve directly measuring aspects of the density and/or composition of the biological communities that live in rivers, lakes and wetlands, and using these as indicators of 'health.' This approach is based on the relationship between chemical/physical water quality and the health of the biological community, although care is needed when interpreting results because factors other than water quality are also important influences (e.g. water flow or level, substrate, riparian condition, or biological interactions). For this reason, a range of methods is often used.

Biological measures are particularly useful because the composition of the biological community reflects the water quality over a period of time, rather than just the single instant in time represented by a chemical measure.

For examples see Common measures of water quality.

Ambient (background) water quality usually refers to the existing quality of receiving water upstream of a discharge. This measurement includes concentrations of naturally occurring contaminants that are usually not harmful, and are often necessary, for aquatic life. For example, phosphorus compounds are released by eroding rocks, and phosphorus and nitrogen compounds are common components of biological processes. Concentrations of these contaminants can, however, reach harmful levels. Establishing the background water quality enables councils to decide

what is an acceptable change from background water quality, and establish standards that set an acceptable level of change from ambient conditions.

Cultural values of water quality should be recognised through consultation with the community to determine those aspects of water quality that cannot be measured scientifically. For example, the mauri (life force) of water cannot be directly measured, although measurements of water quality variables and biological indicators may help to assess some aspects of the state of mauri or effects on mauri.

Setting standards for water quality

Regional councils may choose to set water quality standards in a regional plan, but it is not mandatory to do so. If water quality standards are set, it is important to ensure that those standards meet the plan's objectives and policies for water quality and that they are reviewed over time to ensure ongoing suitability.

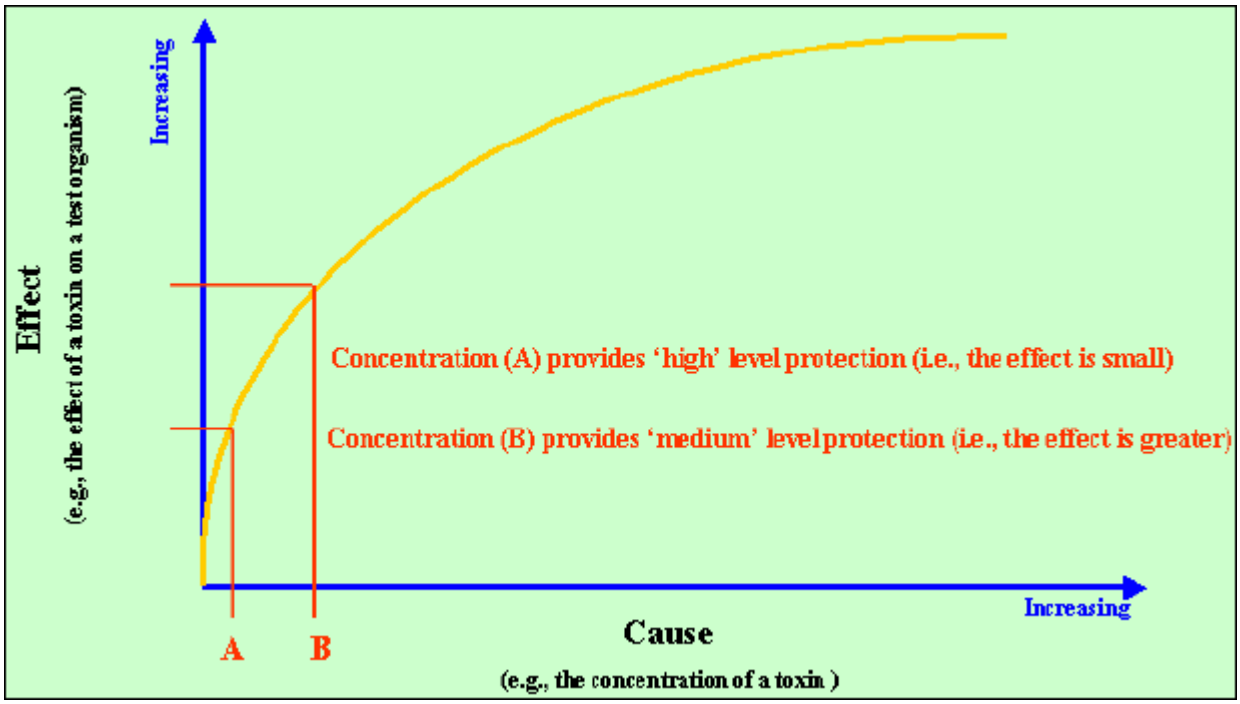
Setting water quality standards is a complex task that requires input by experts in water quality and aquatic ecology. The scientific information usually underlying water quality guidelines can be used to develop standards, but it is important to understand the difference between guidelines and standards. Guidelines do not have any statutory standing and they generally offer several levels of environmental protection, which are provided as 'options' that may apply to different types of water bodies, or different management purposes. Standards within rules in a plan have the authority of regulations under the RMA and can be enforced. They must therefore be carefully defined and justified based on the circumstances of the water bodies to which they apply.

When setting standards, councils also need to consider what mixing is appropriate or 'reasonable' in order for a discharge to meet the standards.

Guidelines

Guidelines are usually based on scientific information about the effects of contaminants on the environmental conditions of a water body, or on the organisms that live in that water body. This relationship can be seen as a conceptual cause-effect curve such as Figure 2:

Figure 2: Illustration of a typical 'cause-effect' relationship



For example, the cause-effect curve for a particular toxin is established by measuring growth impairment or death as the effect of increasing concentration of a toxin on aquatic species.

Adverse effects are not always the result of increasing concentrations. For example, aquatic species require dissolved oxygen for survival and adverse effects occur when concentrations decrease. Similarly pH can have adverse effects below and above a certain tolerance range.

In addition, the concept of a cause-effect relationship is also relevant for effects that are not related to aquatic biology. For example, the risk of water contact-related illness in humans increases with micro organism indicator concentration. Similarly, the 'conspicuousness' of changes in water colour to the human eye increases with measurable changes in hue.

The key point is that cause-effect relationships provide the basis for suggesting concentrations of contaminants that provide an identified level of protection.

For example, the Australian and New Zealand Guidelines for Fresh and Marine Water Quality provides a risk-based approach by presenting four options for concentrations of many toxic contaminants. These options are designed to protect aquatic organisms at either 99%, 95%, 90% or 80% levels of protection. These options are points on the cause-effect relationship for a range of New Zealand and Australian aquatic species. The Guidelines also show how to develop options for other levels of protection based on site-specific or region-specific information.

Many guidelines used in New Zealand are complex, and require professional technical advice to interpret. Guidelines commonly used include:

- Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (MfE 2003)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000)
- New Zealand Periphyton Guideline: Detecting, Monitoring and Managing Enrichment of Streams (Biggs, 2000)
- Water Quality Guidelines No. 1 - Guidelines for the Control of Undesirable Biological Growths in Water (MfE, 1992) (Note: These guidelines have been largely superseded by the New Zealand Periphyton Guideline except for the sewage fungus component, for which the 1992 guideline remains current.)
- Water Quality Guidelines No. 2 - Guidelines for the Management of Water Colour and Clarity (MfE, 1994) (Note: These guidelines have been largely incorporated into the ANZECC & ARMCANZ (2000) guidelines)

Standards

Standards define a threshold for the point on the cause-effect curve that is deemed to be acceptable for a given situation. A standard can be either a numeric value for a contaminant or a narrative description of an environmental state.

Defining standards requires both the use of scientific information, such as cause-effect relationships in guidelines, and value judgements concerning what values to protect and at what level. Many plans include standards within rules as methods to achieve objectives and policies.

Section 69 of the RMA allows water quality standards to be set regionally in plans, and provides direction for regional councils in setting such standards. In particular sect. 69(3) requires that regional councils shall not set standards which may result in a decline in existing water quality unless it is consistent with the purpose of the RMA.

Section 43 of the RMA allows standards to also be set nationally. However, there are currently no national standards for water quality.

Related statutory restrictions that are sometimes referred to as standards are:

- Restrictions on granting permits for discharges with certain effects – sect.107 RMA
- Restrictions on allowing permitted activities with certain effects – sect. 70 RMA.

Other related standards are:

- Minimum standards for Water Quality Classes in the Third Schedule RMA.
- National standards for drinking water quality, administered by the Ministry of Health. They apply to water quality for drinking water 'at the tap' which may or may not have been treated. They do not have any statutory standing for environmental water quality, but they are often used as guidance where water bodies (and particularly groundwater) are used for drinking supply. For more information see National Standards for Drinking Water Quality.
- Proposed national environmental standard for human drinking-water sources. The Ministry for the Environment is working with the Ministry of Health to develop and implement a national environmental standard for human drinking water sources under the RMA. The standard is intended to help regional

councils and water suppliers manage drinking water sources better, which will ultimately lead to better quality drinking water.

The benefits of setting water quality standards in a regional plan are:

- They provide certainty about desired environmental outcomes and therefore what is expected from resource users
- They are generally measurable and can provide benchmarks against which to measure cumulative effects as well as the effectiveness of plans
- They provide clear guidance for processing resource consents.

The disadvantages of setting water quality standards in a regional plan are:

- It can be very difficult to define standards that are appropriate across a range of different types of waterbodies with different characteristics and different values. This approach can result in some waterbodies being under protected while resource use is unnecessarily restricted in others. This difficulty can be reduced by using spatial frameworks to group waterbodies into classes with distinctive characteristics and values.
- They can reduce the discretion that a regional council has when processing resource consents on a case-by-case basis.

Some examples of regional plans that have used standards are:

- Manawatu Catchment Water Quality Regional Plan (Horizons Regional Council)
- Waimakariri River Regional Plan (Environment Canterbury)
- Opihi River Regional Plan (Environment Canterbury)
- Proposed Regional Freshwater Plan for Southland (Environment Southland)

'Reasonable mixing'

The RMA requires that any water quality standards imposed through s107, s69, s70 or the Third Schedule shall be met after allowing for 'reasonable mixing' of discharges. This requirement implies that it is sometimes necessary and acceptable to allow for a zone in the receiving water to not meet water quality standards. Such a zone is called a 'non-compliance zone.' The question is: what sized non-compliance zone is reasonable?

Regional plans need to address this question if adopting the use of standards. When a standard is set in a plan, the size of the non-compliance zone considered reasonable for that standard should be defined as specifically as possible.

When dealing with individual discharge consents, the usual approach is to estimate the size and shape of the non-compliance zone for each contaminant in a particular discharge, taking into account:

- The discharge flow rate
- The contaminant concentration
- The mixing properties in the receiving river, lake or wetland
- The relevant water quality standard

- Whether the size and shape of this particular non-compliance zone will compromise the management objectives for the specific receiving river, lake or wetland.

If the non-compliance zone will not compromise the management objectives, it is a 'reasonable mixing zone.'

Matters that should be considered in reaching a decision include:

- The size (length, width, area) of the zone, relative to dimensions of the whole river or lake
- The type of contaminant in the zone, and the type and magnitude of effect, for example, acute or chronic effects
- Any special local use or value of the river or lake
- Whether effects could occur beyond the non-compliance zone, such as the restriction of fish passage to upstream spawning areas
- Any cumulative effect of multiple non-compliance zones, whether or not they overlap
- Whether all reasonable effort has been made to minimise the non-compliance zone.

No specific, quantified mixing zone will be reasonable in all cases because management objectives and environmental characteristics vary between rivers and lakes, and different contaminants have different effects on the management objectives. This makes defining a single criterion for reasonable mixing impossible.

The impossibility of a single, quantitative criterion for a reasonable mixing zone presents particular challenges for developing regional plans. The most justifiable definitions of reasonable mixing depend on case-by-case conditions, which is contrary to the aim of providing prior certainty in a regional plan. Defining sub-regional spatial frameworks helps to account for some of the variability between objectives for different rivers and lakes. See Define a spatial framework for further discussion.

Existing regional water quality plans deal with this challenge in different ways. Some councils have elected to reserve discretion over the definition of reasonable mixing, while others have used 'rules of thumb', such as five or 10 times a river's channel width, for purely practical reasons.

Terminology

The RMA does not define or provide guidance on reasonable mixing, which has led to wide debate and often there is confusion over terminology. It is important that regional plans use consistent terminology.

Refer to the publication, 'Reasonable Mixing': A Discussion of Reasonable Mixing in Water Quality Management (Rutherford et al. 1994) for:

- Full definitions of common terminology
- Principles and approaches that are generally regarded as best practice in setting policies for reasonable mixing.
- Use accurate and consistent terminology when defining reasonable mixing, a reasonable mixing zone, and a non-compliance zone.

- Refer to the Manawatu Catchment Water Quality Regional Plan for an example of a reasonable mixing policy that provides a practical definition for reasonable mixing, while still retaining discretion over its application.

Developing provisions

Like all regional policy statements and plans, regional water quality plans need to show a clear relationship between the purpose for managing a particular water body and the issues, objectives, policies, methods, and anticipated environmental results (AERs).

- Identify the people with the right skills to develop provisions. Developing an effective water quality plan requires the input of different technical skills, including:
    - Water quality scientists and ecologists
    - Experts in Māori values
    - Specialists in water uses and values, such as the needs of recreational users, dischargers and irrigators
    - Resource management policy analysts
- Use consistent terminology and meanings for purposes, issues, objectives, policies, and methods.
    - See the guidance on: Development of the policy framework
    - See Drafting Issues, Objectives, Policies and Methods in Regional Policy Statements and District Plans
- Elicit community views on water quality outcomes. For example, use discussion documents, issues/options reports, community surveys and focus group meetings. See the guidance note on Consultation.

The process

Developing provisions for a water quality plan essentially involves answering the key questions: Where? Why? What? How?

- First gather as much information as possible about the current water quality, resource uses and environmental values, of rivers, lakes and wetlands in the region.
- Undertake an analysis of the issues, including conflicts between environmental values and resource uses such as discharges, as well as linkages between surface and groundwater quality and quantity, and management of land-uses. See the guidance note on development of the policy framework
- Determine a spatial framework to define **where** the issues occur and **where** the water quality planning provisions will apply, and to determine the approach to developing the provisions.
- Define the management purposes that identify **why** water quality is being managed, particularly issues of conflict between environmental values and resource use. This may include defining areas where water quality is to be maintained in its natural state.
- Develop explicit objectives that describe **what** environmental state is required to support the purpose.
- Develop policies that define **how** the objective is to be achieved. These will include policies to manage point and non-point source discharges and may need to include a policy for 'reasonable mixing.'

- Develop methods that state **how** the policy will be implemented. A wide range of methods can be used, including regulatory methods (such as standards) and non-regulatory methods (such as community education and promotion initiatives). See the guidance note on section 32 - Methods of Implementation.
- Define anticipated environmental results that are measurable and can indicate the extent to which the objectives will be obtained within the lifetime of the plan.
- Create a monitoring strategy that compares progress against the anticipated environmental results and tests **how well** the plan provisions are working. The monitoring strategy should also continue to monitor the state of the environment. See the guidance note on policy and plan effectiveness monitoring.

Gather information

Planning for water quality requires detailed information on:

- Existing water quality, how it has changed or is changing, and the factors influencing that change
- Existing discharges and land uses that affect water quality
- Existing and likely future demands for water use
- Community expectations for environmental values and resource use
- Conflicts between environmental values and resource uses.

Analyse issues

Analysing and focusing issues is an important and complex task in developing plan provisions. Issues must be clear statements about matters that need addressing to achieve the purpose of the RMA and should be thoroughly researched and consulted upon. For example, the conflicts between environmental values of rivers, lakes and wetlands, and various point and non-point source discharges are usually key issues for water quality. The issues should be analysed in detail, including the linkages between surface and groundwater quality and quantity, and management of land uses.

Define a spatial framework

A spatial framework for water quality planning may involve breaking the region into catchments, individual rivers, lakes or wetlands, or even parts of rivers, lakes or wetlands.

The use of spatial frameworks recognises that different rivers and lakes have different environmental values and resource uses, and have different capacities to assimilate contaminants, all of which depend largely on physical characteristics and location. The purpose of spatial frameworks is to more specifically and justifiably assign provisions that are appropriate to the characteristics of different rivers and lakes. The gathered information and analysis of issues will help determine which spatial framework is appropriate.

The RMA statutory framework sets broad goals and regulations that apply across the whole of New Zealand, rather than being specific to particular parts of the country. Regional policy statements and plans can apply spatial frameworks to subdivide water bodies into types, in order to apply strategic provisions that take account of the variability between different types of rivers and lakes. Individual resource consent

processes are guided by national regulations and regional policies and rules, but involve case-by-case consideration of site-specific conditions.

- Identify and define the spatial framework that is most appropriate to the issues being addressed and the plan's overall management purpose.
- Apply provisions to types of rivers and lakes defined by the spatial framework.
- Use maps to present spatial frameworks in plans.

A recent approach to grouping rivers that share similar physical characteristics is the River Environment Classification (REC). Environment Canterbury and Environment Southland are using the REC to define spatial frameworks for their water plans. For a discussion of the use of river classification approaches for regional plans see Using River Habitat Classification in Regional Plans.

Define the management purposes

Deciding on the purpose for managing a particular water body involves a value judgement and is a political decision. Since water bodies typically support many values and resource uses, some of which may be in conflict with each other, a judgement must be made to choose and prioritise which values will be managed for, and at what level of protection. This is the defined 'purpose for management' and it will drive the development of objectives.

- Identify which environmental values and resource uses are in conflict with each other.
- Prepare a paper for council outlining the pros and cons of various possible outcomes and the management implications associated with each option.
- Obtain council decision on the management priorities to be placed on the different values, and the levels of protection assigned to those values.

Develop objectives

Objectives describe the environmental outcomes required to support the defined management purpose.

Ideally, objectives should be specific, quantitative and measurable descriptions of environmental state or condition. However, quantitative outcomes can be difficult to define, especially when applied to large-scale spatial frameworks. This is because appropriate outcomes vary between rivers and lakes with different physical characteristics, environmental values, and uses. This variation decreases if spatial frameworks are used. In addition, as it is not possible to foresee all outcomes, and scientific knowledge about effects is sometimes uncertain, narrative objectives are often used.

The problem with narrative objectives is that they are open to interpretation and difficult to measure, and are therefore less certain and justifiable.

- Use numeric objectives where possible.
- Where narrative objectives are necessary, these should be as specific and precise as possible in describing the desired outcome.
- The extent to which the objectives will be achieved within the lifetime of the plan will be measures by the anticipated environment results (see below).

Develop policies

Policies define the course of action needed to achieve the objectives. For example, policies could state that land uses or point-source discharges should be managed such that they do not cause water quality effects that are inconsistent with the objectives.

Develop rules and other methods

Rules and other methods define how the policies will be implemented to achieve the objectives. Water quality plans usually include a wide range of methods, ranging from rules and standards relating to discharges, to community education and promotion initiatives, and more recently, to rules governing land use in catchments.

The use of rules governing land development is an emerging but contentious area of water quality planning that is potentially very important for future regional water quality plans. Such rules have been proposed on the basis of s9(3) RMA which imposes restrictions on certain uses of land that (it is contended) could have adverse effects on water quality. There may also be some basis for rules governing land development under s15(1)b RMA which restricts any person from discharging any contaminant onto or into land in circumstances which may result in that contaminant entering water.

A mix of regulatory and non-regulatory methods is generally the best way to achieve water quality management outcomes because:

- Problems are addressed more completely from several angles
- A mix of methods will have a greater ability to change the awareness of a greater proportion of the community
- A mix of methods is generally most cost effective

See section 32 - Methods of Implementation guidance note.

Develop anticipated environmental results

Anticipated environmental results should be measurable and should indicate the extent to which it is anticipated the objectives will be achieved within the lifetime of the plan.

Create a monitoring strategy

Monitoring the effects of resource uses on rivers and lakes is an essential part of planning for water quality. Development of monitoring programmes requires careful forethought. Good design is essential if strategies are going to answer adequately the kinds of questions that will be asked of them. For example, where programmes are intended to determine rates or magnitudes of changes in water quality relative to plan objectives, particular emphasis needs to be given to statistical considerations.

Develop a monitoring strategy that:

- Fills information gaps that have been discovered
- Tests assumptions implied by the plan provisions

- Measures whether the plan is effective, by comparing actual results with the anticipated environmental results and measuring progress towards achieving the objectives

Best practice examples

Planning for water quality is a developing area. Many regional councils are currently working on regional water quality plans using a variety of approaches to developing provisions. These can be summarised into three broad approaches. Many councils have used a combination of these approaches. The choice of combination depends on regional characteristics such as the size and nature of water resources, and the level and type of resource use.

The following examples illustrate best practice in particular aspects of plan preparation, as described in the guidance note.

Waimakariri River Regional Plan Date (PDF 2.57MB)
The Waimakariri River Regional Plan provides an example of where provisions have been applied to rivers or lakes with similar characteristics. These are grouped according to their characteristics. Plans using this approach apply spatial frameworks to group rivers and lakes with similar characteristics. Plans then assign management purposes and apply provisions, including standards, to these groups. The strength of this approach is that provisions can take account of the variability in physical characteristics among different rivers and lakes, as well as various purposes for managing different groups.

Regional councils that are trying this approach include:

- Environment Canterbury (Proposed Natural Resources Regional Plan)
- Environment Southland (Proposed Regional Freshwater Plan for Southland).

Provisions applied to water quality classes

Manawatu Catchment Water Quality Regional Plan (PDF 314KB)
The Manawatu Catchment Water Quality Plan is a best practice example of where provisions have been applied to water quality classes. These are based on management purposes, as defined in the Third Schedule of the RMA. Most plans using this approach use spatial frameworks to identify rivers and lakes within each class. The plans then apply conditions and/or standards to each class. The strength of this approach is that it provides clear linkage between provisions and the various purposes for managing particular water bodies or parts of water bodies, even if the effects of some activities are not well understood. Several regional councils have created Water Quality Classes, based on management purposes similar to those set out in the Third Schedule of the RMA.

Councils that have used this approach include:

- Environment Waikato
- Horizons Regional Council
- Environment Canterbury
- Environment Southland
- Greater Wellington.

Provisions based on activities

Proposed Auckland Regional Plan: Air, Land and Water - 5. Discharges to Land or Water (PDF 222KB)
Chapter 5 of the Proposed Auckland Regional Plan – Discharges to Land or Water provides a best practice example of where provisions have been based on activities. The plan sets rules for particular activities, such as specific types of discharges, and makes some activities permitted and others discretionary. Most plans apply conditions and/or standards to the permitted and discretionary activities. The strength of this approach is that it provides clear direction for resource users undertaking activities for which the effects are well understood. Most regional councils have used this approach for at least some of their water quality planning provisions.

Councils that have used this approach include:

- Auckland Regional Council
- Otago Regional Council
- Environment Waikato
- Taranaki Regional Council
- Hawke's Bay Regional Council
- Horizons Regional Council
- Environment Canterbury
- Environment Southland
- Greater Wellington.

RMA provisions

- **Sections 5 to 8** provides the broad purpose and key principles for the sustainable management of natural and physical resources (including water).
- **Section 9** imposes restrictions on certain uses of land. The section is relevant for two reasons. First, the word 'land' in this section includes the surface of water in any lake or river. Second, some uses of land could have adverse effects on water quality that could contravene rules relating to water quality in a regional plan.
- **Section 13** imposes restrictions on certain uses of the beds of lakes and rivers.
- **Section 14** imposes restrictions relating to the take, use, dam, or diversion of water.
- **Section 15** imposes restrictions relating to the discharge into water of any contaminant or water unless authorised by a rule in a regional plan, resource consent, or regulations.
- **Section 43** allows for the possible development of national standards for water quality
- **Sections 59 to 62** provide for the compulsory preparation of regional policy statements and require the contents of these to include issues, objectives, policies and methods (excluding rules) for managing natural and physical resources (including water)
- **Sections 63 to 70** provide for the optional preparation of regional plans (except regional coastal plans, which are compulsory under s64) and provide direction on the contents of such plans.
- **Section 69** provides direction on the use of Water Quality Classes and standards described in the Third Schedule.

- **Section 70** provides directions on the minimum receiving water quality standards that must be met if a regional council provides rules allowing permitted activities. Section 70 also allows for 'reasonable mixing.'
- **Section 107** places restrictions on the granting of discharge permits unless minimum receiving water quality standards (the same as those in s70) can be met. Section 107 also allows for 'reasonable mixing.'
- **Section 137** provides for the transfer of discharge permits.
- **Part IX (sections 199 to 217)** provides for the creation of Water Conservation Orders to recognise and sustain any outstanding values of rivers or lakes.
- **Part XII (s329)** provides for regional councils to issue a temporary direction to restrict or suspend any discharge of any contaminant during any serious temporary shortage of water.
- **Third Schedule** provides for Water Quality Classes