

# HOW WE CAN ALL CONTRIBUTE TO RESOLVING NUTRIENT WATER QUALITY ISSUES AND SUSTAINABLE LAND USE

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## **Introduction**

There are huge challenges involved in understanding and quantifying land use practices that generate nutrient and other contaminant losses that result in water quality objectives not being achieved. There are also many possible approaches to managing land use to achieve water quality objectives and many different drivers behind the different approaches that have been used and are being developed. There is no one right way. However, there are enough examples throughout New Zealand to start identifying some specific examples of opportunities for improvement.

The purpose of this paper is to highlight some important issues that reduce our ability to achieve both water quality objectives and sustainable land use management. The focus is on how to improve the development and implementation of regional plans, policies and rules, aimed at maintaining or enhancing water quality that has deteriorated primarily as a consequence of agricultural land use. The issues identified in this paper are based on observations of water quality, water resource management planning and regulatory processes in many regions.

The issues and suggested solutions identified are presented to stimulate discussion. Not all issues occur in all regions, but they do occur to a greater or lesser extent in at least one region. The suggested solutions are not intended to be comprehensive. They are a collection of some priority initiatives where we could all contribute to enhancing the progress towards the achievement of both water quality objectives and sustainable land use.

This brief paper will focus on the following specific opportunities for improvements.

1. Improving Resource Management Act processes
2. Working more collaboratively
3. Recognising modelling uncertainty
4. Improving modelling
5. Making information available
6. Implementation

## 1. Improving Resource Management Act processes

Issue	Why is this an issue	Simple solutions
Regional plans take too long to become operative.	Confusion and considerable complexity apply during prolonged periods when multiple plans have legal status. Costs increase to resource users and water quality can often deteriorate in this interim period.	<p>Provide more effective options that ensure that plans become operative within two years of notification of a proposed plan.</p> <p>Provide a streamlined process for simple enhancements of a regional plan.</p> <p>Use collaborative plan development processes that minimise the likelihood of prolonged appeals.</p>
Parties adopt a high-level adversarial approach, often at the level of objectives and strategic policies.	<p>These high-level debates occur repeatedly across New Zealand and don't add any value to the process.</p> <p>There are too many layers of similar broad objectives and policies repeated across New Zealand that don't provide adequate certainty for achieving measurable environmental objectives or certainty for resource users.</p>	There needs to be clearer national policies that would replace many similar regional plan policies. This will save significant resources for more meaningful and productive discussions about operational policies and associated implementation methods.
Limited adoption of best practices in water quality management in regional plans.	Best practices in regional plan development and implementation are not always widely adopted.	Regional councils need to encourage greater recognition and cooperation across regional councils to enable all regional councils to benefit from broader expertise and experiences.
Many significant RMA decisions made without the benefit of critical scrutiny of scientific evidence.	Many RMA decision-makers have no scientific expertise and may not recognise a technical issue and/or may not be equipped to understand the implications.	There needs to be a requirement to have scientifically qualified decision-makers on relevant regional plan and resource consent panels.
The Environment Court code of conduct for expert witnesses does not adequately recognise the role and importance of	The expert witness code of conduct does not properly provide for expert witnesses to address environmental modelling uncertainty.	The expert witness code of conduct needs to be extended to explicitly encompass uncertainties involved in environmental modelling.

environmental modelling.		
Many codes of practice and guidelines are not fit for regulatory purpose.	<p>Many codes of practice have not been written for a regulatory purpose but get applied in regional plans and resource consents.</p> <p>This means that plans and resource consent conditions that appear to require compliance with a code of practice are frequently unenforceable.</p>	Many codes need to be re-written so that they can be properly used in regulation.
<b>2. Working more collaboratively</b>		
<b>Issue</b>	<b>Why is this an issue</b>	<b>Simple solutions</b>
<p>Generally insufficient resources are invested in developing robust effective:</p> <p>a) regional rule conditions, and b) resource consent conditions.</p>	<p>This often results in inadequate regional rules and/or resource consent conditions, uncertainty for resource users and a lack of assurance for the wider community about the achievement of environmental objectives.</p>	<p>Develop and implement more collaborative approaches to developing regional rules and resource consent conditions.</p> <p>Provide more guidance and training on drafting regional rules and writing resource consent conditions.</p> <p>Promote specific RMA practitioner qualifications to stimulate more critical and effective development of regional rules and resource consent conditions.</p>
<b>3. Recognising modelling uncertainty</b>		
<b>Issue</b>	<b>Why is this an issue</b>	<b>Simple solutions</b>
<p>Modelling uncertainty is generally not adequately recognised at the plan development process and/or the implementation process, including the resource consent process.</p>	<p>The lack of recognition about uncertainties involved in regional plan development and implementation means that many decision-makers have an unfounded level of confidence about the outcomes that will result from plan implementation.</p>	<p>Technical experts need to explicitly incorporate uncertainty and sensitivity analysis in all modelling used RMA processes.</p> <p>Technical experts need to communicate modelling uncertainty to decision-makers.</p> <p>Decision-maker training needs to include an appreciation of the</p>

		reality and implications of modelling uncertainty.
Unfounded criticism of the ability of models to assist in environmental decision-making.	Deliberate dismissal of models as useful contributors to planning and regulatory processes can lead to important water quality issues not being adequately resolved, water quality problems getting worse and the eventual resolution of those issues becoming more challenging.	Develop broad support for the use of environmental models in informing RMA decisions while recognising the inherent uncertainties involved in all models.

#### 4. Improving Modelling

Issue	Why is this an issue	Simple solutions
Not all models used in RMA processes have gone through appropriately rigorous calibration and evaluation or been regularly independently reviewed.	<p>This can result in an inappropriately high level of confidence in model predictions.</p> <p>This is specifically relevant to Overseer but also applies to many other models used in RMA processes, particularly catchment scale models.</p>	<p>There should be limited reliance on models until they have gone through appropriate ongoing rigorous calibration and evaluation and independent review.</p> <p>Multiple sources of information should be used to maximise certainty for the application of model outputs in regulation.</p>
Underinvestment in the science underpinning, and interoperability of, environmental models.	<p>Many environmental models, including Overseer, are reliant on limited scientific research which increases the uncertainty associated with outputs.</p> <p>There is limited ability to link important models e.g., CLUES and Overseer. Therefore, limiting our ability to predict the outcome of land management practices on receiving water quality.</p>	<p>Significantly increase funding to develop catchment models like CLUES to better utilise Overseer in catchment studies to link farm-scale nutrient loss with catchment water quality objectives.</p> <p>Increase investment in model interoperability e.g., to ensure model interoperability between Farmax, Overseer and CLUES.</p> <p>Increase the investment in and application of targeted research to improve and update the understanding of Overseer components e.g., factors driving P loss, N loss to water in different soils and in high and low precipitation environments, etc.</p>

		Invest in robust calibration and evaluation of Overseer, including the compilation and use of existing research data.
5. Making information available		
Issue	Why is this an issue	Simple solutions
Timely information on the state of the environment is frequently difficult to obtain e.g., LAWA surface water quality information can be over 14 months old.	Robust RMA decisions generally need up to date environmental information. Out of date information may compromise the ability to make sound decisions.	Increase investment in transferring and analysing regional council water quality data to ensure that publicly available information is no older than three months.
Readily available water quality information is frequently limited to surface water quality and usually does not include groundwater quality, e.g., LAWA only includes data on rivers and lakes.	Groundwater is often the main primary receiving environment for nutrients lost from agricultural activities and information on groundwater quality is needed to better understand the linkages between land use and water quality.	Extend LAWA to include a similar network of long-term groundwater quality monitoring sites and implement existing national guidelines on site selection and groundwater quality monitoring protocols to ensure that data is regionally and nationally comparable.
Many relevant NZ scientific research and investigation publications are not readily available to the public.	The results of much research, funded by NZ central and local government agencies, are only available after paying significant annual or one-off fees to an overseas publisher.  Relevant information is often not available to resource managers and users.	Central and local government funding for scientific research and investigations should require publishing of results in open access journals.
Uncertainty about the quality of published technical information.	The level of publication peer review that has been carried out is frequently not made clear.  Critical peer review is essential for confidence in the results and conclusions of technical publications.	CRIs, research organisations, universities and regional councils need to document the expectations of the peer review process including specific quality thresholds a document needs to meet. An example of this is available from the journal <a href="#">Nature</a> .
It can be difficult to find information on the	Frequently multiple contaminants need to be	More investment in the collation of contaminant loss mitigation

relative effectiveness, costs and applicability of strategies to reduce single or multiple contaminant loss to water in different situations.	targeted in different situations, e.g., different soils, climate, land use, etc.  Many important RMA decisions need reliable information on contaminant loss mitigation strategies.	strategies is needed together with information on the cost-effectiveness and suitability for different farming activities and situations.  Need to maintain and enhance investment in contaminant loss mitigation strategies.
Lack of relationships established between dissolved nutrient concentrations and plant growth/biomass in many rivers and lakes.	This makes it difficult to establish robust targets for river and/or lake nutrient concentrations that would maintain periphyton, phytoplankton or macrophytes at desired coverage and/or biomass.  If the receiving environment nutrient concentration targets are not known, then it can be challenging to identify robust catchment and individual property nutrient load targets.	Regional councils need to develop more investigations to establish relationships between location-specific desired periphyton, phytoplankton, macrophyte extent/biomass and the nutrient concentrations/loads that are consistent with these targets.

## 6. Implementation

Issue	Why is this an issue	Simple solutions
Regional plan water quality management plans need very clear and measurable water quality and land management objectives. However, such plans have inherent uncertainties and it is very difficult to know for certain for many years or even decades if a regional plan is successful.	This can result in significant uncertainty for resource users and the wider community not knowing the extent to which a plan is successful.  There are concerns about whether the level of land use controls is appropriate and if the water quality objectives will be achieved.  This level of uncertainty can undermine confidence in regional water quality plans.	Develop a greater level of appreciation of the uncertainties involved in catchment water quality management.  Ensure that monitoring and investigation programmes are developed to enable ongoing assessment of the success of plans.  Develop 'agile' policies, rules and resource consent mechanisms that take this level of uncertainty into account.