INTEGRATED CATCHMENT MANAGEMENT POLICY-MAKING IN NEW ZEALAND

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1 *The why and who of integrated catchment management*

The idea of integrated catchment management (ICM) really only starts to be meaningful when there is understanding of why there is a need for management, and who is doing the management. The rest is all about getting the information and the tools and approaches to manage successfully. Integration in catchment resource management is required by the RMA; and it is not so much a question of whether we should be striving for integration but how we get there and what we need to achieve it.

In any catchment, the landowners are key decision makers. They make a myriad of decisions concerning resource use, each of which has the potential to impact either positively or adversely on water, land and air resources and their communities. Such decisions and impacts both enhance resource values or create risks for them (eg. the use of rivers other than as a water source or the planting or removal of forests), that are held by community interests, both present and future.

But landowners don't make their resource use decisions in isolation, and their decision making can be more or less constrained by the application of public powers to regulate or the expectations of their community to limit the exercise of private decisions.

Land owner decisions can also be influenced by the market for their goods and services and market expectations for the environmental performance of landowners' production activities. They can be further influenced by their peers in production

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Whenever there are differences in positions among resource users, including landowners, there is the question of whether and what public policy is required to resolve those differences. These situations are called resource management policy issues, and while there may be a factual resource origin for each issue, ultimately every policy issue is a difference between expectations of people.

2 *What is policy-making?*

Policy-making is the process used to determine community outcomes for resource management policy issues. It is a process, not an end in itself. It is a looped process, where steps are checked and repeated. The same process applies to ICM and all other resource management. The key steps in policy-making are:

- the problem perception - the development of awareness and understanding of a difference between the value of a resource to someone and an effect (usually adverse) on someone else.
- The collective or social nature of the problem as an issue – people making decisions and carrying out activities that can have consequences that are inconsistent with the outcomes that communities may desire.
- The linked nature of different problems that flow from the linked nature of catchment functions and processes, and the need to address these links with other community interests
- The definition, evaluation and implementation of potential solutions; drawing on science, decision-making and practical tools and approaches through a structured public process of inquiry, decision, and delivery.
- The challenge of monitoring at a range of scales to gain sufficient useful knowledge of the results of catchment management so that problem-solving adaptiveness and perceptions of success can be gauged with confidence over time.

Since 1991 and the commencement of the Resource Management Act (RMA), the community has a regular say in how natural resources in catchments can or should be used or managed through regional and district plans. Both types of plans can include catchment management objectives, and they establish the boundaries and conditions for resource use activities. Plans also establish the procedures and processes for determining resource allocation where the resource has no private property feature – rivers, water, the coast, and a clean environment. Resource allocation issues can get increasingly complex as the demand for a resource rises or the difference between individual and community expectation increases.

There can be high levels of tension and conflict in determining appropriate resource management outcomes, and the combination of methods to achieve them, because this process deals with people's rights and opportunities for access or use of natural resources.
Because of these tensions, it is always important that first of all, policy issues are usefully identified and understood. The problems might be legacy issues (contaminated land is a prime example) or current – such as water quality effects arising from land intensification; or future issues – what to do about climate change risks.

3 *The needs of ICM policy-making*

Underlying any catchment management policy issue is the world of technical information derived from research and monitoring about catchment dynamics.

The resolution of an issue requires some understanding of the interplay between the functions and processes involving water, its pathways and interaction with the land's surfaces and plants and animals, and the impact of people on the landscape. While there are general principles of catchment behaviour derived from research, every individual catchment is different by degrees, and needs its own information.

Catchment research and management practice to deal with land and water use and degradation issues is many decades old in New Zealand.

While law to require ICM is much more recent (the RMA), there has been a continuous body of both research, policy-making and delivery on the ground, driven by earlier laws that focussed on specific catchment management issues.

Practices were led by individual disciplines of soil conservation, hydrology, agricultural engineering, forestry science, and land and freshwater ecology.

However, much of the professional practices were not well connected with the need for good policy-making to deal with a recurring set of catchment management issues around the country. These include soil erosion, flood control, water allocation, pollution control, river management, and more recently the management of rural landscapes.

While there was a good body of practice in addressing landowner needs in land and water use, until about a decade before RMA, this practice had been applied in a limited amount of catchment management policy-making. There was no law then to empower it, and besides, the impacts on community interests were not seen as significant

Since then, the intensity, understanding and complexity of catchment management issues has risen progressively, as resource demand, impact, and expectation have increased in most catchment settings. In addition to the imperative from current law for ICM, the RMA has introduced the fundamental goal or purpose of sustainable resource management for ICM .

So what does ICM policy-making need? We consider that effective policy-making needs:

- sufficient relevant knowledge of the dynamics of the catchment,
- in enough detail or resolution to allow
- robust predictive evaluations of the consequences of possible management approaches,
- in terms of both biophysical impact and socioeconomic significance.

Both technical understanding of catchment changes as well as an understanding of the significance of likely outcomes need to be adequate for making good decisions in the policy making process.

In this light, we consider that ICM policy-making in New Zealand both past and present has been variably and often not well supported.

4 What policy-making tools are needed?

Tool development to support ICM policy-making thus far in New Zealand is most evident in the use of geospatial information systems, to organise data, and predictive models, of cuts or slices of the whole catchment system.

Research information about catchment system interactions and connections applied in predictive simulation models can help understanding of the consequences of various management options that might be adopted to solve identified resource management issues.

A good groundwater model is invaluable when considering various water allocation scenarios. They are also a great predictive tool in indicating what the environmental pressure points or risk

thresholds are and can help suggest monitoring triggers (triggers for rationing) to ensure sustainable abstraction.

The best models will only be as good as the information feeding them – making an immediately obvious need for a connection between the ensuring the right mechanisms are in place to collect the right data (e.g. actual water use data as well as flow and groundwater level data).

Land use modelling - especially where land use has potential to affect groundwater or surface water quality or quantity - is still in its infancy. We suspect that there is a range of environmental indicators or land use parameters about which we either don't collect information or don't currently realise the importance of. We need to be asking more questions about what are the environmental triggers or thresholds for risk or management action.

For example, what about soil organic matter and its importance in ecosystems for a range of reasons, including the climate change driver for soil as a carbon sink. Information about this may eventually prove important in long term land management decision-making.

Attempts to link or integrate models to yield a coherent picture of the catchment dynamics relevant to the issues are under way, as forms of futures modelling. The Motueka ICM research programme is pioneering such attempts in the New Zealand ICM context under the IDEAS project work, but both limitations in scope, data and resolution are still some of the barriers to this becoming an effective policy-making tool. Other barriers are the need to bridge the gap between findings of biophysical consequence and those of socioeconomic significance.

Tools for the evaluation of catchment management outcomes are not well developed. But this part of a lack for resource management policy-making generally in New Zealand. All policy evaluation relies on good information on community values and risks from catchment resource uses, including the scale and significance of these, across time, space, and social stake. Much of the time, this information is absent or poorly sourced or organised, or insufficiently precise. The kinds of tools needed include resource evaluation frameworks with consistent or comparable methods for significance evaluation at different scales; We need better comparative risk assessment methods to enable priority-setting across conflicting uses for the same resource.

This is notably important for water resources in ICM, and we are working to advance national research into these kinds of tools for all water bodies in any catchment setting in New Zealand. Here the need for more information about how communities value their water bodies, including the intrinsic, cultural, and economic dimensions associated with resource values is fundamental to water management policy-making across all catchments.

5 Reflecting successes in some ICM policy issues

Community and stakeholder concerns about measured water quality in the Sherry have informed an investigation into understanding and managing the effects of cow crossings. A wonderfully collaborative effort saw landowners coming to a high level of understanding about the effects of their cow crossings on water quality in their local river and adopting alternative management methods to deal with the problem. Their objectives aligned with wider community objectives for swimmable water.

That the water still does not meet swimmable water quality indicates an optimism very prevalent amongst resource users and managers in New Zealand at the moment - that good environmental outcomes can be achieved by focussing on specific activities and devising appropriate performance standards or good practice for them.

A quick glance at most regional plans will show that regulations developed to limit adverse effects are generally focused on defined activities. The Fonterra Clean Streams Accord for much of the dairy sector also looks at key mitigation activities like fencing, culverts and nutrient budgets.

There are few regions in NZ that do not manage most direct discharges of contaminants to waterways pretty well. However, water quality in many areas, especially lowland streams and in catchments subject to intensive land uses can be poor and is often found to be degrading.

A resource management issue having legacy as well as current and future dimensions is the management of gravel resources in Tasman rivers. The Motueka is a valuable source of high quality gravel aggregate for the construction industry. There has been a net bed degradation over the past 30 years in the Motueka River and resulting concerns about impact of gravel extraction in the Motueka River.

The Motueka ICM programme included a catchment-wide study looking at the dynamics of sediment transport in the river and the connections between flood effects and gravel extraction. The study so far has highlighted the need for good data on which to base sustainable management decisions on. Traditional cross section data needs to be complemented with accurate gravel extraction records and detailed location and time related information about river protection works.

We still have a situation in which views about gravel management in the Motueka are often founded on personal experience rather than a more integrated knowledge about how the river functions.

Are we being integrated in the way we manage our water resources when we focus on the individual components of a land use activity without a more integrated approach to the combined and cumulative effects of land uses? It appears to us that most of the work done so far in managing intensive land use effects on water quality is more adaptive than integrated. The difficulties inherent in managing cumulative effects of land use activities relate to having insufficient understanding about what the key thresholds or indicators over an entire catchment or landscape actually are – or could be.

6 Reflections on research for ICM policy-making

Arising from our reflections so far, we believe that in the general arena of ICM research, the approach has mostly been to research catchment resource issues, with policy-making as a user context. Little attention has been focussed in research on ICM policy, its needs and how to improve it. There is an apparent gap in ICM research between those who study natural systems, and those who seek to resolve policy problems.

Aggravating this situation is the reality that publicly funded research into catchment resource issues is likely to remain a scarce resource itself. This has implications for the design and

integration of such research with community-based policy planning for ICM led by councils under current laws.

The result of this has been vast amounts of scientific data output and the lack of context in which to judge or improve its relevance or value for policy development. What happens all too often is that although the data might be there it has not always been delivered or applied in a way that meets resource managers' needs for ICM policy. The same catchment issue is re-examined over again in time and in space.

In our experience, the Motueka ICM programme has delivered some good environmental information to guide policy development but has yet to directly help in the policy evaluation challenges facing ICM, whether in the Motueka or elsewhere in New Zealand catchments. There has been key resource investigation into stock crossing impacts on water quality, sediment transport mechanisms, groundwater and river water connections.

The immediately useful projects are those that are both focussed and related to current identified issues. Not all of the ICM project results have the same policy-related applicability

There has been a lot of information collected during this ICM programme and it will be a challenge to determine what parts of it have policy relevance either now or in the future. But rather than seeking to capture a large knowledge-base across a demonstration catchment, research into common themes across multiple catchments, focussing on linkages between system elements or thresholds and triggers across a variety of catchment settings might be a more effective way of generating knowledge useful for ICM policy-making.