Economic Analysis Guidance: Concise version

Guidance on using economic analysis under the National Policy Statement for Freshwater Management 2014

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Prepared By:

Simon Harris

For any information regarding this report please contact:

Simon Harris

Phone: 0274 356 754

Email: simon@landwaterpeople.co.nz

LWP Ltd
PO Box 70
Lyttelton 8092
New Zealand

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1 Overview to economic guidance

The National Policy Statement for Freshwater Management 2014 (NPS-FM) requires regional councils to integrate the management of fresh water with the management of land and the coastal environment. Councils must establish objectives for fresh water, and set water quantity and quality limits in their plans, following a prescribed, nationally consistent process.

The process prescribed in the NPS-FM requires consideration of economics in a number of different ways. This guidance provides practical advice for those conducting and using economic analyses under the NPS-FM, and in particular when following the National Objective Framework (NOF) process prescribed therein for developing freshwater objectives and associated limits.

This economic guidance was developed for a client but eventually never used. It was originally intended as three parts:

- An extensive guidance document intended to provide material for incorporation into a web-based guidance resource. This material was originally designed to be developed into linked webpages for the different topic areas rather than being a document that is read from beginning to end.
- A series of regional council economic analysis case studies intended to be integrated into the web-based guidance pages.
- This document is the third component, and is prepared as a stand-alone concise report that can be downloaded and read as a quick guide to understanding and commissioning economic analysis for running a NOF process.

While this guidance uses plain language where possible, economics is a specialist discipline and there are a number of terms that describe important concepts that are not simple to place in plain language. Definitions for these key terms can be found in Appendix A. It is noted that economists may object to some of the use of terminology – our apologies for this but economists are not the main intended audience and we have preferred accessibility over precision where a choice has to be made.

2 What is economics and how is it useful?

Economics is the study of how scarce resources are allocated by individuals, enterprises and government. Economists regard everything that affects society and its welfare as being part of economics – including environmental, social and cultural resources. This includes the "market economy" which is the process by which goods and services are produced, sold and bought[1], as well as the other values that form part of the non-market economy and which are equally important to the overall welfare of individuals and society.

In terms of the NPS-FM[2] and the RMA, economics is both a ***wellbeing*** and a ***discipline***[3]:

- As a ***wellbeing*** it represents a set of economic values that must be considered under both the RMA (Section 32) and the NPS-FM (Policy CA2(f)(v) and Appendix 1).
- As a ***discipline*** it provides:
    i) methods for quantifying cultural, social and ecological wellbeings in monetary terms.
    ii) an approach to identifying the full range of values supported by ecosystems (Ecosystem Services) and methods to compare between values (e.g. Cost-Benefit analysis (CBA) or Total Economic Value (TEV) analysis).
    iii) an approach to understand how different policy options may affect economic behaviour and the efficiency of different options. It also assists in understanding how to mitigate adverse effects of actions, and provides insights into equity and welfare distributional outcomes.

There are not always tools available to address all the issues and values, but the framework and thinking available in economics can be useful across all disciplines. Figure 1 shows conceptually the theoretical and analytical coverage of economics.

[1] This latter definition is also consistent with terminology used in the RMA, which separates out the economic values from environmental, social and cultural values.
[2] Economics is specifically mentioned in the NPS-FM in the Preamble, in Policy CA2, in Appendix 1 (National values and uses for fresh water), and in the Interpretation as part of the definition of "efficient allocation".
[3] After MFE (2014): The term wellbeing is used in the context of the purpose of the RMA (Section 5), part of which is managing natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural wellbeing. A discipline is a branch of knowledge, one of which is economics; others typically involved in the development of limits under the NOF biophysical science disciplines, as well as the social sciences including specialist cultural knowledge.

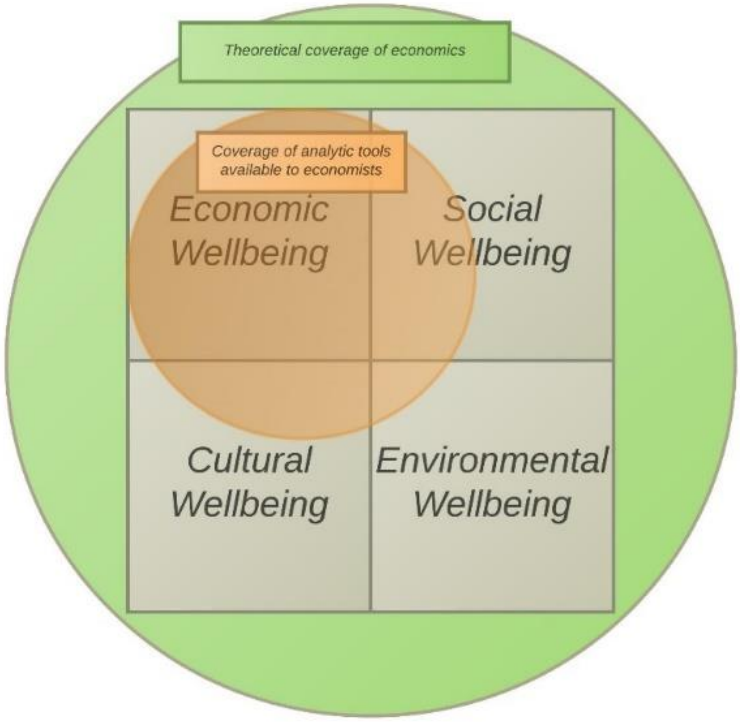


Figure 1: Economics is more than just the economy

Economic information sits alongside the biophysical environment information (e.g. hydrology, groundwater, river and lake processes, estuarine, ecology), and information about social, cultural and Māori values, all of which are needed to inform the process of developing objectives and limits under the NPS-FM prescribed NOF process.

The steps in the NOF process, and the subsequent plan making steps dictated by the RMA, are illustrated in Figure 2. As the discipline of economics can contribute to different aspects of the decision-making process, its role in setting objectives and limits will vary depending on the stage of the process. Economic analysis contributes primarily to the *Setting Objectives* phase, the *Limits, methods, comparing and choosing options* phases, and the *Plan writing and Section 32* analysis phase (see Figure 2)[4]. These phases require in depth assessment of economic wellbeing, as well as the use of economic analytical processes to develop and understand the impacts and interactions with other cultural, social and ecological wellbeings. Economics can also assist in identifying *Values and attributes* of importance through approaches such as the Ecosystem Services framework[5], and can be of use in developing a *Monitoring and Evaluation* programme.

[4] See web guidance for further understanding of these phases.
[5] The Ecosystems Services framework describes the way in which the environment provides a range of services that support human values (see web guidance Section 2.4).

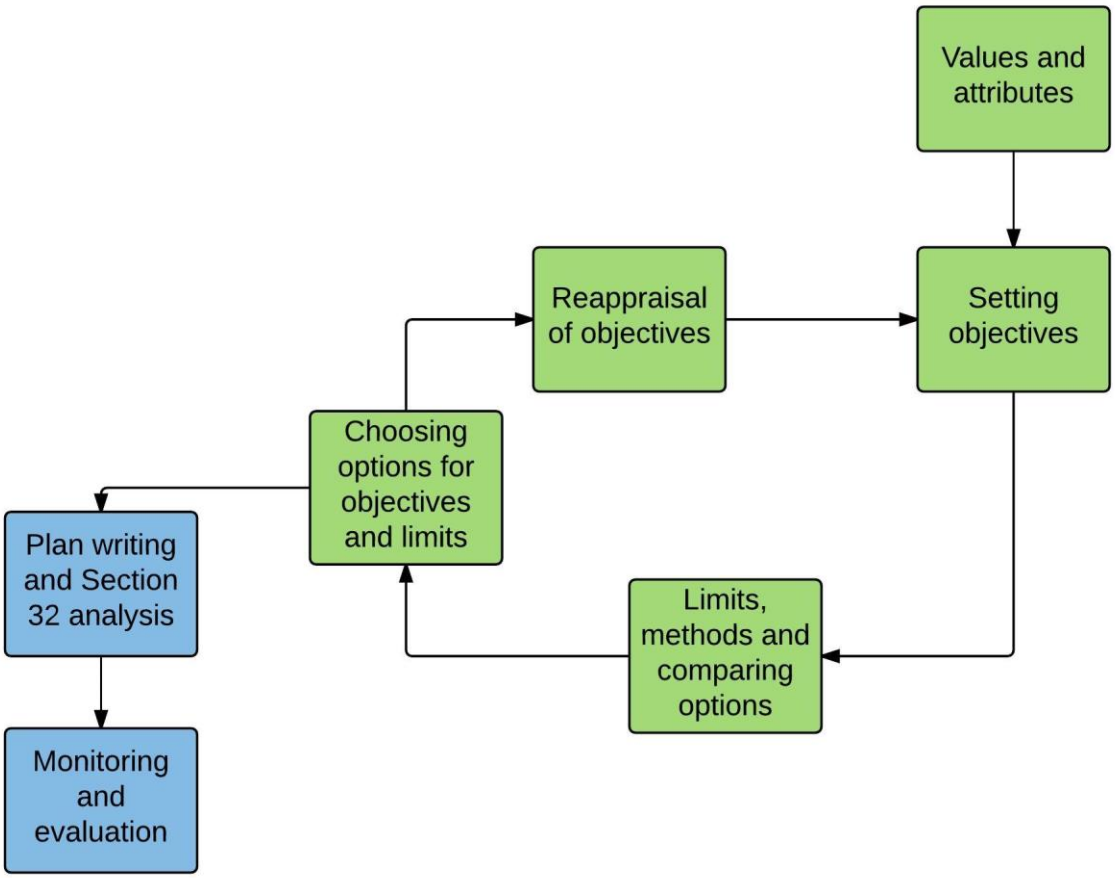


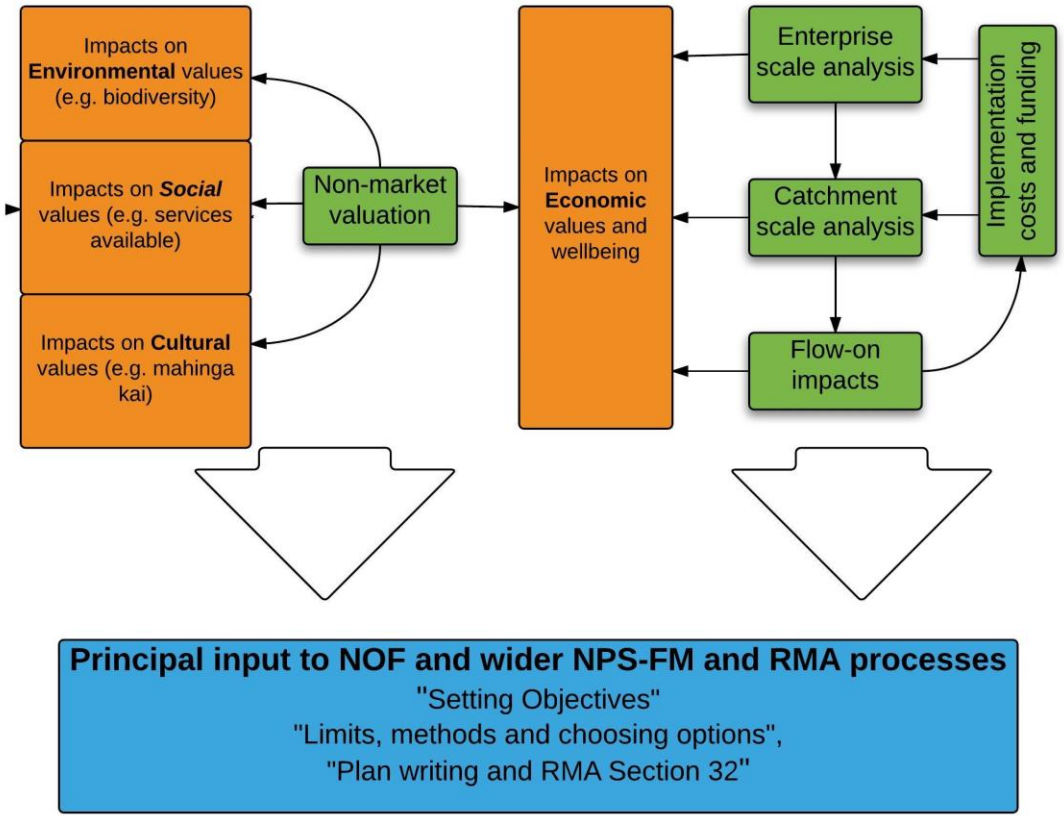
Figure 2: Stylised representation of stages in the National Objective Framework process (green) and subsequent plan making under the requirements of the RMA (blue)

3 The elements of an economics work programme

This section provides guidance on common elements of an economics work programme. Five types of economic analysis are identified (see Figure 3), and the use of each of these to assess impacts on environmental, social, cultural and economic wellbeings is discussed individually in Sections 3.1 to 3.5.

The task of drawing together the various types of analysis into a programme of work to support objective and limit setting processes is then described in Section 3.5.

Figure 3: Five types of economic analysis (green boxes) commonly used to assess impacts of scenarios on the four wellbeings (orange boxes), as part of the process of setting objectives and limits in regional plans under the National Objective Framework process and wider NPS-FM and RMA requirements (blue box)



3.1 Analysis at a business or enterprise scale

The business or enterprise scale economic analysis describes the structure of enterprises operating in the catchment, and the likely impact of different limits and policy options

Enterprises refer to farms, businesses, council operations such as sewage and stormwater management, and other organisations that provide goods and services. In rural catchments enterprise scale analysis will almost certainly be required for the main primary sector enterprises, which typically include dairy, dairy support, sheep and beef, horticulture and

forestry. Other enterprises may include aquaculture; hydro generation; tourism businesses; drinking water, community supply, industry and wastewater sectors; and in municipal catchments there may be a large and diverse range of enterprises affected.

Enterprise scale analysis is typically the most fundamental part of the economic assessment. It underpins subsequent catchment scale and flow-on economic impact modelling, is highly important to many stakeholders, and in a hearing process the enterprise scale models (e.g. farm models) are often vigorously contested. The enterprise models also provide some stakeholders (those with businesses or enterprises that utilise or affect land and water resources) a basis for assessment against their personal situation, which is useful in understanding the impacts of limits and policies at the level of individuals. It is therefore an area where some time and resources are well spent. However, enterprise scale analysis can also absorb excessive resources without major gains in the quality of the decision, so care is warranted.

The key question answered by enterprise scale analysis is:

- ***How are enterprises (e.g. farms and other businesses and operations) financially affected by freshwater limits and policy options, and how will they respond?***

Enterprise scale analysis involves developing financial models of enterprises in each of the sectors of importance. These models describe what is happening in those enterprises now, and estimate the changes in response to a limit or policy option. Multiple models or methods may be needed to describe the range of possible impacts. For example, the impact of nutrient limits, irrigation reliability changes, and flooding may all require a different set of models to be developed.

There are at least four broad approaches to enterprise modelling as shown in Table 1. The use of more than one approach is recommended. A basic level of analysis would be to use existing survey data combined with some expert stakeholder input – for example checking the validity of the existing survey data with stakeholders from enterprises in the catchment. For highly resourced programmes where there is intense demand for resource use and/or a sensitive environment, best practice is to use new survey data of enterprises in the catchment combined with expert and quantitative modelling to determine responses to policy options.

Stakeholder engagement in all parts of the enterprise modelling is strongly recommended. This provides practical benefits in terms of harnessing stakeholders knowledge and input, identifying and validating data sources and variables, and improves the acceptability of the results and the process overall for those stakeholders involved. Engaging with stakeholders early in the process helps identify what is required in terms of additional data and expertise.

Table 1: Options for enterprise modelling

Enterprise modelling method	Example	Pros	Cons	Comment
General survey data – existing data	Beef and Lamb, DairyNZ data	Simple, inexpensive	May not be representative of the local area, restricted to the data available	Useful basic approach, can also be useful for calibrating expert and quantitative models
Local survey data model – survey enterprises in catchment	DairyNZ in Selwyn-Te Waihora	Highly representative, involvement of stakeholders	Expensive, time consuming, dependent on those willing to participate.	Worthwhile if resources available
Expert (consultant or stakeholder)	Hawke's Bay hearing – MRB developed models	Reflect local conditions and systems closely, full range of system issues.	Reflect consultant or group experience, which often tend to be the top (best practice) operators	Can be the only feasible option in some locations, often used in conjunction with quantitative models.
Quantitative models	Farmax, GSL[6]	Able to test scenarios outside current experience	Some difficulty representing all factors in a system, and handling variability.	Very useful for mitigation modelling.

Key Points for modelling at business or enterprise scale

- Enterprise modelling is generally the most fundamental of the economic analysis and underpins subsequent analysis at other scales.
- Effort should reflect the larger sectors and those more significantly affected. It may be necessary to aggregate others or describe effects qualitatively.
- Early, detailed and ongoing engagement with enterprise stakeholders affected by limits is highly recommended.
- Where possible more than one approach should be used.

3.2 Analysis at a Catchment or Freshwater Management Unit (FMU)[7] scale

Catchment or FMU scale analysis describes overall changes in enterprise activity at the catchment scale.

Catchment or FMU scale analysis refers to analysis of the way economic wellbeing changes at the catchment scale under different policy options. This involves describing land uses and other enterprise activities across the catchment, and identifying how they will change in response to limits and policy approaches.

[6] Grazing Systems Ltd model.

[7] A Freshwater Management Unit (FMU) is defined in the NPS-FM as "…*the water body, multiple water bodies or any part of a water body determined by the regional council as the appropriate spatial scale for setting freshwater objectives and limits and for freshwater accounting and management purposes.*"

Questions addressed by catchment scale analysis include:

- ***What are the overall total and sector scale impacts for enterprises in a catchment or FMU?***
- ***How will land use and other enterprise activities change under different future scenarios including different limits, different development scenarios, and different policy approaches?***

The options for modelling at the catchment scale are broadly summarised in Table 2. If the scenario itself describes the mix of land use and other enterprises, and mitigation or development in a catchment, then only aggregation modelling may be required (first row). However if some estimation is needed of how enterprises will change in at a catchment scale (e.g. changes in land use), in response to a policy, then some estimation modelling may be required as shown in rows 2 and 3. The expert rules approach involves the development of a set of rules that describe how changes may occur in a catchment – for example, in response to a reducing limit dairy farms may change to lower intensity dairying and sheep and beef. Quantitative modelling works in a similar manner to the expert rules, but uses various routines to select the responses based on maximising something (typically profit) within various constraints.

Care is needed to ensure that any catchment scale modelling reflects realistic responses to policy options. For example, there is little point in a model that relies on trading to produce an optimal mix of land uses, if that mechanism is not likely to be available as a policy tool. Nor is there any value in a model that requires a highly detailed and complex policy instrument if that is not likely to be practical in the current planning context.

For most situations catchment scale modelling has very low additional data requirements because the datasets are the same as those required in other parts of the economic analysis (e.g. particularly enterprise scale modelling) or from modelling in other disciplines (e.g. biophysical, social and cultural).

Key Points for Catchment modelling

- Use data and models from the enterprise scale, and land and other resource use in common with the biophysical, social and cultural modelling.
- The basic approach of aggregating outputs from enterprise-scale analysis is common to all models and analysis at catchment scale.
- If economics input is needed to estimate a response to a policy in a scenario, a range of approaches should be considered.
- When undertaking estimation of responses to policies, keep in mind that the uncertainty in any estimation of a policy response is extremely high.

Table 2: Options for catchment scale modelling

Catchment modelling method		Example	Pros	Cons	Comment
Aggregation of enterprise scale data		All	Simpler and less expensive	Requires other models if estimation of policy response needed.	Underlies all catchment modelling approaches
Estimation of policy response	**Expert rules**	Tukituki	Inexpensive, transparent	Limited sophistication of response, not likely to produce objectively optimal outcome.	High level of stakeholder acceptance where involved in the development of the rules
	Quantitative	NZFarm, LAM[8]	Base models established, once set up can be run for a range of different scenarios.	Poor transparency, can produce unrealistic outcomes	Determine whether the scenarios being considered require estimation, and what quantitative modelling will represent.

3.3 Flow-on analysis of impacts to enterprises, households and employment

The flow-on economic wellbeing analysis involves estimating the flow-on impacts from changes in enterprises involved in the catchment to the wider economy.

Flow-on impacts measure the changes in wider economic activity in an area as a result of changes in some specific enterprises or sectors. This is often known as regional economic impact analysis, but can be applied at various scales other than the region. It is very useful for describing impacts in the wider community, and is normally included in the analysis package unless the process is for a very small area.

Questions addressed by flow-on economic analysis

- ***What are the implications for the whole of the local economy, households, and employment from limit setting?***

For all practical purposes Input Output (IO) modelling[9] is the most appropriate quantitative approach to this question, although flow on impacts may also be qualitatively described. Generally, IO modelling can be incorporated into the development of the enterprise and catchment scale analyses, and where possible and affordable is a worthwhile addition. Basic assessment programmes with fewer resources would use existing generic IO models, while good practice for well-resourced programmes would involve use of survey information to understand local patterns of revenue and expenditure, and to modify the generic IO model accordingly for local conditions. Common approaches are shown in Table 3.

[8] Land Allocation and Management model.
[9] The IO model describes the relationship between the sectors of an economy in terms of flows of goods and services. IO models are used to estimate how a change in one sector will impact on other sectors.

Table 3: Options for flow-on impact modelling

Enterprise modelling method	Example (see detailed guidance)	Pros	Cons	Comment
Existing IO models	Tukituki	Quick, relatively inexpensive	Not customised	Low cost entry to flow-on impacts
Basic IO model modified with industry data	Waikato Healthy Streams	Reasonably quick, medium cost	Limited customisation to the catchment	Worthwhile if resources available
Basic IO model modified for local scale with survey data	Upper Waitaki	Reflect local patterns of expenditure, allows smaller areas	Can be reasonably expensive and time consuming	Worthwhile if resources available

Key Points on flow-on modelling of economic wellbeing

- Flow-on analysis is often known as 'regional economic impact analysis' but can be applied at various scales
- Some form of flow-on analysis is normally always included in an assessment programme
- Flow-on modelling uses Input Output (IO) models.
- It measures impacts not costs and benefits.
- Flow-on modelling requires use of specific experts.
- Better (more locally customised) characterisation of the IO models can be worthwhile depending on the specific situation.

3.4 Non-market valuation

Non market valuation provides a monetary estimate of those values (primarily social, cultural and environmental) that aren't normally directly bought and sold.

Non-market values are those values in a catchment which are not traded directly in the marketplace. Non-market values include amenity, recreation, drinking water, cultural, biodiversity, and intrinsic values. Non-market valuation can also be used to estimate the impacts of long term changes in the biophysical environment on enterprises where the time horizons extend beyond the concerns of the enterprise owner. Changes in non-market values in response to different scenarios are normally assessed by other technical disciplines including biophysical, social and cultural. However, it is also possible to estimate a monetary figure for some of these values, despite them not being bought and sold directly. Some people find such estimates useful in some circumstances for deliberating the merits of scenarios, while others prefer to rely on the non-monetary biophysical, social and cultural assessments.

Questions addressed by non-market economic analysis include:

- ***How do recreation, amenity, biodiversity and ecological, and intrinsic values of a catchment compare in monetary terms with the market sectors – both in total size and in the impact of changes to them?***
- ***What aspects of the catchment contribute to the recreation, amenity, biodiversity and ecological, and intrinsic values?***

- ***How will long term changes in ecosystem services affect enterprises and catchments?***

There are a range of approaches to assessing the non-market values commonly found in freshwater management processes, as shown in Table 4. Each of these approaches has its advantages and disadvantages, and each requires some specialist expertise. The best approach for councils without any in-house expertise is to source specialist economic input, and work with the specialist to pick the methods that best fit the local circumstances and the resources available.

Non-market valuation is not simple, can be misleading, takes time, and the potential for misuse should not be underestimated. However, the non-market valuation may provide an indication of scale that will assist in indicating whether the value and its changes under different limits are of a similar order of magnitude to the estimations for other market economic values. It may also provide useful information on which aspects of a catchment are more important for a particular use, and how the values are likely to change in response to changes in the resource.

Before embarking on non-market valuation there are three questions that should be considered:

- Are the technical tools, data and resources available?
- How will the results be used in the decision process and integrated into the decision?
- Is it appropriate to describe the value in monetary terms, and what are stakeholder preferences for any monetary valuation?

Key Points in non-market valuation

- The advantages and disadvantages of undertaking a non-market valuation must be assessed in the local situation.
- Some people find non-market valuations useful while others prefer to rely on non-monetary biophysical, social and cultural assessments of these values. The stakeholder concerns and preferences for estimating a monetary price for their wellbeing will be of key importance in any given project situation.
- Identify whether the technical tools and data are available to assess the value under consideration, and whether the cost is worthwhile relative to other uses of the resources.
- Consider how the non-market valuation will contribute to the decision and decision making process, and how appropriate it is to place the value in monetary terms.

Table 4: Typical values and approaches to non-market valuation

Study Type	Non-market values	Typical approach (see detailed guidance)	Data requirements	Outputs	Relative Time and Cost	Expertise needed
Desktop	All	Benefit transfer	Small – sufficient to ensure sites are comparable.	Indicative estimate of the equivalent value if the original site characteristics existed in the study catchment	Low	Small in house or consultant
	Drinking water	Cost replacement or treatment (also known as "shadow price")	Data on drinking water sources, type (well etc.), treatment costs etc.	Estimate of the cost of providing equivalent water quality	Low-medium	Small in house or consultant
	Flooding	Cost of fixing flooding (shadow price)	Data on flood mitigation costs	Estimate of equivalent cost of mitigating additional flooding	Low-medium	Significant in house or consultant
	Long term impact to ecosystem services	Cost of fixing or replacement	Various	Estimate of the value of changes to other ecosystem services	Low-medium	Small in house or consultant
	Amenity – where people live	Estimating effect of water characteristic on property prices (also known as "hedonic valuation")	Valuation or sales data	Estimate of the difference that clean or available water makes to property prices	Medium	Significant in house or consultant
Survey	General water quality or quantity	Ask people to choose among different options – Choice modelling	Web or in person survey	Estimate of how different attributes contribute to value	Medium -High	Significant in house or consultant
	Amenity - visitors	Ask people to choose among different options - Choice modelling	Web or in person survey	Estimate of how different attributes contribute to amenity value	Medium -High	Significant in house or consultant
	Recreation	Travel behaviour and associated cost	Web or in person survey	Value of site for recreation – can be relative to other sites with other water attributes	Medium -High	Significant in house or consultant
	Biodiversity/ecological/existence	Ask people to choose among different options - Choice modelling	Web or in person survey	Estimate of how different attributes contribute to value	Medium -High	Significant in house or consultant

3.5 Implementation costs and funding

Implementation costs and funding refers to the costs incurred as a result of any policy controls and how they are funded. The implementation costs are incurred by councils and by stakeholders interacting with the council.

Any policy process has costs for implementation that include education, monitoring, consenting, compliance, enforcement and management. They are costs incurred to implement and comply with the proposed measures in the plan. These costs may be to the council, such as monitoring or education, or to those affected by the plan such as the costs of developing farm plans or preparing consents, or simply becoming familiar with the policies and rules.

These implementation costs must be included in the analysis of overall costs and benefits of the proposed measures. An understanding must also be developed of how the costs will be distributed among different stakeholders in the community. The size of these costs and how they are funded are often major socio-political considerations in National Objective Framework processes.

There are likely to be personnel within any council who are familiar with developing costings and undertaking analysis of funding. Thus this analysis can often be undertaken in house, although use of external consultants is also common, depending on capacity available. Suitable people are often located in the finance section of the council and these staff should be regarded as a useful starting point for assistance with this part of the limit setting process. If they are not able to do this work, they may already use someone familiar with the local council processes who is able to help.

Key Points on implementation costs and funding analysis

- Do costing approximately initially and refine through the process.
- Present funding analysis as options
- In-house resources (people and information) will often be available to assist with the cost and funding analysis. As a minimum they will be able to provide a good starting point.

4 Putting together an economics work programme

This section considers how to put the various components (enterprise scale, catchment scale, flow-on analysis, non-market valuation, and implementation cost analysis) together in a coherent programme of analysis.

4.1 Key aspects to consider

The goal is to develop a programme that uses available resources – time and money - most effectively to provide the highest quality information possible to inform and make a resource management decision. Suggestions for how the resources can be directed to achieve this are provided below.

- The greatest gains in reducing uncertainty and maximising the acceptability and flexibility of the economic outputs can be made at the enterprise scale – through data gathering, modelling and use of experts.
- Differences in transparency and acceptability between the method options primarily occur at the catchment scale modelling, and mainly with predictive modelling.
- Gains in flexibility generally come with simpler models that can be reconfigured to answer questions that weren't considered at the outset when developing the analysis. However this flexibility depends on the availability of data to address the new questions.
- In collaborative process settings there are significant gains to be made in engaging with stakeholders in enterprise and catchment modelling.
- Flow-on modelling is an accepted part of impact analysis, and at least basic flow-on modelling is a worthwhile addition to most economics programmes.
- The gains from the use of non-market valuation will be very dependent on the situation and the views of stakeholders involved. Specialist assistance will be required in understanding what can be done and how it will help.

Decisions on where and how to prioritise resources will be context dependent. Some suggested sample programmes are shown in Table 5 – these are intended to give general guidance on ways that analysis could be prioritised depending on the resources and time available. However, any actual programme developed will need to be driven by the requirements in the particular catchment, the values present and the decision-making process used.

4.2 Who should undertake the analysis?

Economics is a specialist technical discipline and someone with economics expertise will usually be required to undertake the analysis. Some information on economic[10] wellbeing may be gathered and assessed without specialist expertise, such as enterprise outputs based on industry sources and Statistics NZ, and numeric estimates of numbers, types and locations of enterprises and households affected by particular proposals. Beyond this it would be worthwhile to access either in-house or consultant specialist expertise in economics.

[10] Economic used here in the RMA sense, where it is noted as a value in conjunction with social, cultural and ecological values – see Section 2.

Row 7 in Table 5 provides suggestions on the source of expertise to undertake economic analysis in relation to the scale of the analysis undertaken.

Table 5: Sample programmes prioritised by resources and time available

	Few resources, little time			**Major resource, multi year**
Enterprise scale analysis	Industry information on enterprises	Industry data and stakeholders, regional economic development agencies	Industry data, stakeholders, expert and/or quantitative modelling	Survey, Industry data, stakeholders, expert or quantitative modelling
Catchment scale analysis	Numbers, types and locations of enterprises affected	Aggregation modelling	Aggregation and simple estimation modelling	Aggregation and complex estimation modelling
Flow-on impacts		Basic tables with or without some alteration	Tables adjusted with enterprise information	Tables adjusted with local survey based information
Non-market valuation		Benefit transfer, potentially cost based approaches.	Benefit transfer, cost based approaches, simple survey non market valuations.	Benefit transfer, cost based approaches and more complex survey or data based valuations
Implementation and funding	Broad indicative costing			Itemised costing with funding analysis
Who?	In house, non-expert	In house economist or consultant	In house economist plus consultant	Significant in house resources and/or consultant

4.3 Stakeholder engagement

Stakeholder engagement on economic analysis ensures that *the values of importance to the stakeholder group are represented in the decision making process in a meaningful, fair and acceptable manner*. Good quality engagement improves reliability of the input information used for economic analysis, improves acceptability, understanding and discussion of the results, and thus ultimately increases robustness of the analysis outputs and the decision overall.

It will rarely be possible to meaningfully engage on economic analysis with the whole community because of the limitations in time, resources and capability. It is often necessary to convene smaller groups of stakeholders to ensure sufficient focus on the constituent parts of the economic analysis.

- Decisions on the range of groups will be situation specific, but a group to engage over enterprise and catchment scale analyses is almost always useful.
- To be effective, stakeholder engagement needs to occur early and be sustained throughout the process. The time taken for the group to learn to work together and to trust the council staff and technical experts should not be underestimated.

- While the membership of a subgroup on economic analysis will depend on the context, experience suggests that a more open membership is ultimately more successful. It can also be very helpful to use an external expert, who is independent of the technical and decision process, to work alongside stakeholders.

When reporting back the results of economic analysis to stakeholders it is useful to recognise at least three levels of reporting to cover the needs and capacities of different audiences (see guidance on addressing uncertainty, available on the LWP website[11]). These are[12]:

- Comprehensive: A report with detailed methods and assumptions, the full range of analytical outputs across relevant indicators, and describing the associated uncertainty.
- Summary: This level of reporting is to provide easy access for stakeholders to the results of an analysis.
- High Level Summary: This provides a summary level indication of the predicted change in indicators of economic values across a range of scenarios, and able to be usefully integrated with summary level predictions of changes to indicators of environmental, social and cultural values produced by other technical disciplines.

4.4 Timing of work programme

Management of the work programme timeline is critical for ensuring that information and economic modelling outputs are available at the right times in the decision making process. While the timing of different parts of the economic analysis will obviously be situation dependent, there are some definite stages that will need to begin earlier in order to meet the needs of later modelling efforts. Table 6 below indicates likely timing requirements and dependencies that will assist with designing and managing an effective economics work programme.

[11] http://landwaterpeople.co.nz/wp-content/uploads/2018/02/A-Draft-Guide-to-Communicating-and-Managing-Uncertainty-When-Implementing-the-National-Policy-Statement-for-Freshwater-Management.pdf
[12] Further detail can be found in the comprehensive web-based guidance

Table 6: Suggested timing of work programmes for economic analysis

Work type	PROJECT STAGE					Dependencies
	Scoping and Setup phase	**Early phase**	**Mid phase**	**End stage**	**During deliberation**	
Project administration	Define problem, water quantity and/or quality contaminants to be analysed, identify resources available, make decision on in-house or consultant analysis	Define likely scenarios	Input from biophysical modelling	Outputs to social and biophysical modelling.		Note that other biophysical modelling may depend on scenario specification through catchment estimation modelling
Enterprise scale modelling	Identify enterprises likely to be affected, data available, commission consultant if used	Data collection, set up stakeholder engagement	Modelling, stakeholder engagement		Add enterprises types or definitions, adjust mitigation levels, additional outputs reported	
Catchment scale modelling	Policies and scenarios likely to be considered, need for estimation, commission consultant if used	Define land uses, set up any stakeholder engagement at catchment scale.	Model development, scenario requirements.	Incorporate enterprise scale modelling	New or altered scenarios, change spatial divisions, respond to other requests	Dependent on Enterprise scale modelling.
Flow-on impacts	Identify approach, commission consultant.	Any survey in conjunction with enterprise scale modelling	Set up basic tables.	Incorporate enterprise scale modelling		Dependent on enterprise and catchment scale modelling.
Non-market impacts	Engage with stakeholders on which values to be assessed.	Define values to be addressed, commission consultant.	Develop survey instrument undertake surveying	Analysis and reporting	Qualitative assessment or cost based approaches for other values not analysed	Dependent on biophysical modelling to specify change in non-market values.
Implementation and funding costs				Assess implications of policy approaches for implementation and funding costs.	Assess implications of different policy proposals.	Requires specification of policy proposals.

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Appendix A Key terminology

Table 7: Terminology used in economic guidance material

Term	Used here to describe
Market values	The values involved in the market economy, derived from the buying and selling of goods and services. Key economic sectors to understand (depending on the catchment in question) include primary production (e.g. agriculture, horticulture and forestry), hydro-electricity generation, tourism, aquaculture, other water dependent industries, and community water supply and wastewater sectors.
Non-market values	These are values affected by decisions in the NPS-FM, but which are not generally bought and sold – at least not directly. They include recreation and amenity values, biodiversity values, and cultural values.
Impacts	Positive or negative changes in a value or attribute relative to a comparative baseline or alternative.
Economic instruments	Mechanisms that use market instruments to improve the efficiency of resource use by individuals and enterprises. They include trading and resource rentals, and associated instruments such as allocation mechanisms and structuring of permits.
Ecosystem services	All goods and services, both economic and non-market, derived from the resources in a catchment. Generally, the focus is on those goods and services that are likely to be affected by changes as a result of the NPS-FM.
Permits	Permits refer to regulatory mechanisms such as resource consents and other regulatory approvals that allow the use of a resource, including allowing a discharge into a water body. They may also allow other aspects of behaviour or resource use that are involved in limit setting.
Objectives	The community objectives for the catchment. These include the compulsory freshwater objectives described in the NPS-FM, but also may be set for non-compulsory values described in Appendix 1 of the NPS-FM and any other community values identified by the regional council.
Indicators, Attributes	Metrics used to describe the extent to which an objective has been achieved (e.g. GDP, profit, employment). Indicators are used to describe the results of the economic analysis and some may be selected for use as “attributes” during the process prescribed in Policy CA2 of the NPS-FM. The water quantity and quality attributes described in Appendix 2 of the NPS-FM are examples of indicators that

	have been selected as compulsory attributes at the national scale.
Enterprise	A business, farm, or other organisation, typically involved in the buying and selling of goods and services.
Primary industry	Collective sectors of the economy involved in resource based activities – farming, fishing, forestry, mining etc.
Flow-on impacts	The effects that changes in different sectors have on the economy as a whole.
Optimisation	Refers to procedures that seek out the combination of variables that maximises some particular desired attribute. Thus for example land use and intensity of agriculture can be arranged in multiple different ways, but some arrangements will show greater profitability across the catchment than others. In this example an optimising routine could identify the configuration of land use and intensity that maximises the net profit in the catchment while staying within a nutrient cap.
Welfare	A measure of whether someone is better or worse off. Thus for example additional revenue may not mean additional welfare if a business ends up spending more to generate the extra income than the revenue generated. In such an example profit, taking into account any additional capital and management costs, is a better measure of welfare change.