

Appendices

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Appendix A Project scope, deliverables and methodology

The key deliverables the Ministry for the Environment required from this report are:

- a) *A review of existing literature documenting New Zealand-based ICM initiatives and, as necessary (where no documentation exists), examples of current ICM projects to answer the research questions that identifies the distribution, scale and characteristics of ICM initiatives included in the review*
- b) *identify the assessment criteria used to evaluate ICM effectiveness.*

As additional deliverables are:

- an annotated data base of ICM projects and literature as well as a list of people interviewed and sources explored for the project
- a final presentation in person at the end of the project.

The key stages in the methodology are discussed below and comprise:

1. establishing information sources and key contacts
2. determining approach to information organisation
3. reviewing literature
4. conducting in-depth interviews
5. collating and organising information
6. producing the final report.

A.1 Establishing information sources and key contacts

We used three main sources of information to ensure we accessed relevant material for the literature review and identified key contacts in the ICM sector in New Zealand.

1. Team member knowledge: We began our review from the basis of the already strong knowledge of our team members of ICM research and practice. This includes:
 - a previous survey of New Zealand and global literature and best practice for integrated catchment and coastal management, community engagement in ICM, the preparation of urban and rural integrated catchment management plans (ICMPs) and assessment and review of their quality and effectiveness. This work was prepared by Clare Feeney for the Auckland Regional Council.

Staff of ARC have already indicated that it would make the results available for this study even though they are not yet published

- the working knowledge of all team members of the range of disciplines and individuals that are engaged in ICM work, including their own experience in writing and reviewing ICMPs and pressure-state-response programmes. The team's working knowledge and contacts will be particularly important for the inclusion of examples of ICM projects that have not been published. For example, ICMPs that are still under development (e.g. South West Christchurch, Tauranga City Council, Styx and Hingaia) and ICM plans and programmes that have been undertaken on a voluntary basis by the community, e.g. Land Care programmes and Waicare programmes which have been implemented long enough for qualitative results to be discussed and reviewed. In particular Land Care groups in the intensive pastoral and dairy farming areas of NZ may prove to be valuable sources of information. The range of "informal" information sources includes scientific research contacts, iwi engagement, community and other stakeholder participation, landowner engagement, NGOs and local government
- past projects and other projects of which the team members are aware ensured a good mix of urban, rural, regional, territorial and council-, iwi- and community-driven projects.

2. MfE: We sought information, sources and contacts from MfE and the Ministry of Agriculture to ensure knowledge from within these two client ministries was included in the review.

3. Interviews with key informants: Interviews are discussed in detail below. A range of informants was contacted to ensure we were aware of and accessed all material relevant to this review including a cross section of different projects and New Zealand-based information/literature sources.

A.2 Determining approach to information organisation

We used the ISO plan-do-check-review cycle as a format for organising information for this review.

We established early in the review process an agreed set of criteria for effective ICMPs. based on information already provided in the RFP and refined after further

discussion with MfE staff and drawing on our own understanding and experience of best practice.

Using these two organisational tools, we defined the key issues to be identified from the review and ensured the literature review and interviews address these points. The literature review itself was structured in a template to assist this. This early definition provided focus and shape to the review. These features are further developed below.

A.3 Reviewing literature

Using the tools described above, a sample of the relevant literature was reviewed and a selected, annotated bibliography developed. Key principles were being drawn from this material. Team members used their experience in ICM practice and policy to ensure the literature review stayed focused on and relevant to the RFP, an important point given time constraints and the large field.

Discussed in more detail below, the key steps include:

1. reviewing unpublished ICM plans and projects
2. prioritising information for review
3. considering recent ICM legislation and policy.

1. Reviewing unpublished ICM plans and projects

ICM lends itself to community-based resource management initiatives, and can be expressed through the Landcare Association of New Zealand Land Care groups, iwi, Waicare, Trees for Survival and other community-based initiatives. In many cases Councils are aware of these groups and may even assist them directly or indirectly. The experience and knowledge of these groups have is invaluable to this review, so interviewees were asked to comment on the effectiveness or otherwise of non-regulatory ICM projects they know of and factors in their success.

2. Prioritising information for review

Due to the time constraints of the programme, we prioritised all literature, plans and projects identified in order to ensure that a representative sample of the most significant was included in the final report.

A.4 Conducting in-depth interviews

The team selected a number of key individuals for in-depth interviews using a semi-structured format based on questions derived from the research questions in the RFP and developed with the approval of MfE. The interviews drew out information linked to the reporting format described in section 3. We will also ask questions that will help officials use the information to inform government policy; for example, by asking interviewees what would support better ICM at the iwi/community level, territorial/asset management level and regional/catchment level.

Telephone interviews were conducted with the following, selected in consultation with MfE:

- iwi representatives
- regional and territorial councils urban and rural, active and inactive in ICM
- research institutions including Landcare Research and NIWA
- stakeholder groups including community groups, utilities and other NGOs.

A.5 Collating and organising information

Using the reporting format described above, information from the literature review and in-depth interviews was compiled and organised based on the ISO plan-do-check-review framework.

Appendix B Ethics review checklist

Social research ethics checklist

Why an ethics checklist for social research

It is advisable for researchers to routinely check their projects to ensure they are meeting ethical requirements. Checklists both act as an ***aide-memoire to good research practice***, and are frequently required procedure prior to seeking approval from ethics committees. Such protocols are likely to be increasingly employed as standard datasets to ensure compliance with research governance requirements. Governance is facilitated by the standardizing of information “fields” about individual research projects.

The following checklist and information form is intended to support ethical considerations throughout a project. Such a checklist prompts the making of clear statements of intent, mechanisms of approach and consideration of hazard arising from research in a manner that can be understood by the public and research professionals alike. While some of the items appear to be beyond the scope of ethics alone, any matter that may affect the success of research is of indirect ethical interest if it may expose respondents to exploitation or risk.

How to use this form

This form is designed to serve as the basis for a peer-review of your project with other social researchers. It can equally be used as a checklist for a self-review of ethics issues around any particular project. Self-reviews are likely to be most robust when worked through with a group of researchers.

Please type in the white boxes below each question. All boxes are to be completed. Those that don't apply to your project should be completed with N/A.

1. Project name:
Integrated Catchment Management Review
2. Applicant name(s):
Clare Feeney, Annette Lees, Maree Drury, Will Allen

3. Date by which a decision on this application is required in order that the project can proceed as planned, if approval is given:
n/a
4. Expected date of completion:
22 March 2010
5. Identity of field researchers: [Provide an indication of the skills of the research team, to see whether the right skills and/or supervisory practices have been put in place to safeguard funders, researchers and stakeholders.]
As above. All have wide range of experience in undertaking interview and analysis work (see curricula vitae)
6. Purpose of study: [Aims and objectives might indicate hypothesis testing, policy evaluation, and any potential “value” added to the subject group and/or society in general.]
The aim of this project is to provide information that will help officials to scope options for how the government can assist with improving the effectiveness of ICM initiatives. To achieve this we are reviewing literature on ICM projects/programmes and research within New Zealand and discussing ICM with a number of knowledgeable individuals.
7. Does the project require ethical/cultural approval by other bodies? If yes please name the other bodies, and confirm that you have appropriate permissions: [This question asks the proposal writers to identify the relationships that are appropriate. Particular attention needs to be paid to ensure that consideration has been given to the appropriate involvement of iwi. Approval may be by iwi and/or community groups and organisations]
Cultural approval by an iwi body is not needed, but care will be taken to ensure iwi views are included in this project.
8. Will the project require the researchers to be aware of, and use, cultural safety practices? If yes, outline how this will be managed: [Applicants may wish to think beyond national cultures and identities, to also consider how they would engage with other distinct social and professional cultures.]
Cultural safety is not expected to an issue for this project. Respectful engagement will be practiced for all interviews.
9. Sources of funding: [The organization, individual or group providing the finance for the study.]
MfE
10. Investigators and funder’s financial interests, if any, in the outcome of the project:
Investigators are paid contractors but have no financial interest in the study’s outcomes.

11. Scientific background:

[Some rationale for conducting the study should be offered. If this investigation has been done previously, why repeat it? Outline research methods being employed?]

MfE has specific knowledge it seeks to gain from this study (including the range of ICM initiatives underway in New Zealand and the impact and effectiveness of these initiatives). Research will be conducted using literature surveys and interviews.

12. Design of study:

[Describe briefly what will be done and how the subjects are to be expected to participate. What will be required of them? All procedural matters should be clarified. Depending on the methodology, steps may be detailed in advance, or set out through a process-led framework. Time commitments and data-collection settings should be revealed. Data analysis methods and procedures should also be clarified. If this study is part of a wider body of work, explain how it links with the wider inquiry including any implications required for ethics consideration.]

Existing written literature will be read. Interviews will be undertaken with selected subjects to expand the information attainable by the literature. Subjects will be asked to discuss the ICM initiatives known to them, and their broader knowledge of ICM. The information will be gathered through semi-structured interviews based on a questionnaire. Interviews will mostly take place by phone. Some interviews will be in person.

13. Types of person(s) taking part as participants:

[Who will take part. Why and how was the subject/respondent chosen? What broad sampling techniques have been deployed? Outline selection method, including stakeholder analysis where appropriate.]

Persons knowledgeable about ICM from a range of backgrounds and viewpoints will be sought for interviews. Subjects have been selected from the consultants' knowledge of the ICM field in New Zealand.

14. Recruitment procedures:

[Is there any sense in which subjects might be "obliged" to participate – or are volunteers being recruited? If participation is compulsory, the potential consequences of non-compliance must be indicated to subjects; if voluntary, entitlement to withdraw consent must be indicated and when that entitlement lapses.]

Nobody is obliged to take part. Participation in the interviews is entirely voluntary.

15. How much time will participants have to give to the project?

Between 1 and 2 hours.

16. Potential benefits and hazards:

[What risks to the subject are entailed in involvement in the research? Are there any potential physical, psychological or disclosure dangers that can be anticipated? What is the possible benefit or harm to the subject or society from their participation or from the project as a whole? What procedures have been established for the care and protection of subjects (e.g. insurance, medical cover) and the control of any information gained from them or about them? Are the target group or community in any danger of being over-researched.]

There are not risks to participants that we can anticipate.

17. Is any deception involved in the study?
No.
18. Confidentiality and anonymity: [Identify how and why decisions about the degree of confidentiality and anonymity to be provided to participants in the project were reached. If the project is promising confidentiality and anonymity detail the steps taken to safeguard the confidentiality of records and any potential identifying information about the subject.]
The names of those interviewed will be made available to MfE. All information and knowledge gained from the interviews will be collated so no one person's views will be identifiable. To this extent the information is anonymous and confidential. Transcripts and records of individual conversations will be destroyed after the final report has been accepted by MfE and will not be shown to MfE at any point.
19. IP Protection: [Consideration must be given to ownership of the information, and this should be documented. Particular care must be taken to identify where local and traditional knowledge are being provided, and how their owners' rights are protected. Also document how the researchers concerned will be using the information, and what they will own from the process.]
The final collated and interpreted information in the report, based on knowledge gained from literature and interviews will be held by MFE. Literature sources will be acknowledged in the report, as will the collective names of those interviewed.
20. Informed consent: [Consent may be provided in a number of forms depending on the research context. These can include written, oral, and proxy. Justification must be provided on what form is appropriate and why. Where written information is being provided, and written consent is required model forms must be provided.]
Informed consent will be obtained from each interviewee verbally prior to the interview taking place.
21. Data Protection: [The project should comply with the requirements of current data protection legislation and how this is accomplished should be disclosed to participating subjects and those monitoring the research procedure. This should include how and where the consent forms and data be stored until project completion; proposed data storage arrangements, degree of security etc. and whether material facts have been withheld (and when, or if, such facts will be disclosed).]
The interviews will centre on qualitative not quantitative information and will not therefore be collecting data.
22. How and where will consent forms be stored?
n/a

23. Dissemination of findings: [What is the anticipated use of the data, forms of publication and dissemination of findings etc? In areas where information is jointly owned by participants as co-researchers attention should be paid to how they want to use the data.]
All information collated will be in the form of the final report that is the property of MfE.
24. Are there any plans for future use of the data beyond those already described?
No.
25. Is there any other information, which you think would be relevant to the reviewers' consideration of this application?
No.

DECLARATION The information supplied above is to the best of my knowledge and belief accurate. Signature of Applicant: Date:

ASSESSMENT (Social research peer reviewers to complete) We(Names of peer reviewers)..... have reviewed the above project in discussion with(Name of proposer)..... and in our view: <input type="checkbox"/> Approval is given for the project to proceed as documented <input type="checkbox"/> The proposal requires further consideration of ethics issues Signature(s): Date:

Appendix C Key people

Note that every regional council and relevant CRI and NGO as well as many iwi and government departments also have specialists in ICM and related fields – they are not listed here.

Name	Position	Organisation
MfE Project Sponsors Group		
Joshua McLennan-Deans	Partnerships and Community Programmes	Ministry for the Environment
Piotr Swierczynski	Senior Analyst - Natural Systems Policy	Ministry for the Environment
Andrew Schollum	Senior Analyst	Ministry for the Environment
Chris Arbuckle	Senior Policy Analyst, Natural Resources Group	Ministry of Agriculture and Forestry
Grant King	Senior Policy Analyst, Sustainable Resource Use Group	Ministry of Agriculture and Forestry
Paula Warren	Principal Policy Analyst	Department of Conservation
Richard Ford	Principal Scientist	Ministry of Fisheries
Consulting Team		
Clare Feeney	Director	Environmental Communications Ltd
Annette Lees	Director	Annette Lees and Associates
Maree Drury	Senior Resource Management Consultant	Golder Associates (NZ) Ltd
Will Allen	Director	Will Allen and Associates
Review Group		
Matthew Davis	Partnerships and Community Programmes	Auckland Regional Council
Alan Campbell	Manager Sustainable Agriculture	Environment Waikato
Ian Gunn	Principal Advisor	Greater Wellington
John Threlfall	Director of Environmental Information and Science	Otago Regional Council
Michael Krausse	Science Team Leader	Landcare Research
Bruce Hooper	River Basin Governance	DHI, Brisbane
Interviewees: Questionnaire		
Alan Campbell	Manager Sustainable Agriculture	Environment Waikato
Andrew Fenemor	Programme Leader Integrated Catchment Management	Landcare Research
David Cameron	Manager, Land Management	Greater Wellington
Emily O'Donnell	Harbour and Catchment Management Coordinator, Peninsula Project	Environment Waikato
Garth Harmsworth	Scientist	Landcare Research
Gretchen Robertson	Projects coordinator	NZ Landcare Trust
Guy Salmon	Director	Ecologic Foundation
Ian Gunn	Principal Advisor	Greater Wellington
John Threlfall	Director of Environmental Information and Science	Environment Southland
Matthew Davis	Acting Group Manager, Partnerships and Community Programmes	Auckland Regional Council
Phil McGuigan	Resource Care Manager	Environment Canterbury
Robyn Skelton	Manager Land Resources (Western)	Environment BOP
Ross Abercrombie	ICM Coordinator	Environment Waikato
Tim Davie	Manager Surface Water Resources	Environment Canterbury
Tony Miguel	Manager, Ecowater	Waitakere City Council

Interviewees: Table 1

Bob Cathcart	Land Operations Manager	Northland Regional Council
Chris Arbuckle	Senior Policy Analyst, Natural Resources Group	Ministry of Agriculture and Forestry
Chris Purleigh	Land Manager	Hawkes Bay Regional Council
David Hewson	Senior Resource Care Co-ordinator	Environment Canterbury
Jan Heijs	Infrastructure Planning Manager - Three Waters	North Shore City Council
John Greer	Team leader	Ministry of Agriculture and Forestry
John Threlfall	Director of Environmental Information and Science	Otago Regional Council
Phil McGuigan	Resource Care Manager	Environment Canterbury
Rob Smith	Planning Manager	Tasman District Council
Simon Stokes	(Manager, Land Resources - Eastern	Environment BOP

Convenors of national networks, groups and forums

Ross Abercrombie	ICM Network	Environment Waikato
Mike Adye	River Managers Group	Hawkes Bay Regional Council
Dave Cameron	Land Managers Group	Greater Wellington
Paul Kennedy	Chair, Stormwater Special Interest Group	Water New Zealand
Marcel Bear	Modelling Special Interest Group	Water New Zealand

Other people with good knowledge

Christine Heremaia	Formerly of Christchurch City Council Waterways Unit	caheremaia@gmail.com
Dex Knowles	c/o NZARM (phillipsc@LandcareResearch.co.nz)	
Dorothy Wilson	Project Twin Streams	Waitakere City Council
Dex Knowles	c/o NZARM (phillipsc@LandcareResearch.co.nz)	
Frances Graham	Senior Analyst, Environmental & Border Health, Population Health Protection Group	Ministry of Health
Garth Eyles	c/o NZARM (phillipsc@LandcareResearch.co.nz)	
Helen Moodie	Regional Coordinator, Upper North Island	New Zealand Landcare Trust
Janet Gregory	Project Coordinator	New Zealand Landcare Trust
Jason Holland	North Canterbury Environment Office	Fish and Game New Zealand
John Gibbs	Manager, Taupo Sport Fishery	Department of Conservation
John Prince	Manager, Environmental Information	Environment Southland
Judith Earl-Goulet	ICM Co-ordinator	Environment Canterbury
Leila Chrystall	Environmental Scientist	Pattle Delamore Partners Ltd
Murray Neilson	Technical Support Officer	Department of Conservation
Neil Deans	Nelson/Marlborough Manager	Fish and Game New Zealand
Nicola McGrouther	Land Resources Officer	Otago Regional Council
Rachael Millar	Principal Planner	Environment Southland

Appendix D Literature review results summarised in tabular format

A summary table (Table 2) was used to assess the following well-documented ICM projects with a focus on fresh water quality and water use efficiency (sources are listed below each project):

1. Environment Waikato Evaluation of the Integrated Catchment Management Pilot, in two small rural catchments
2. Hurunui Community Water Development Project
3. Mahurangi Action Plan
4. Manukau Harbour Water Quality Management Plan
5. Integrated Catchment Management Plan for the Central Papakura Area
6. Proposed Waikato Regional Plan Variation 5 - Lake Taupo Catchment
7. Taieri River Year Five Project Review
8. Whaingaroa Environment Catchment Plan.

The summary tables for each project are overleaf.

Table 2.1 Assessing Effectiveness: REVIEW Evaluation of the Integrated Catchment Management Pilot Project - final report June 2009, Environment Waikato

Source: Environment Waikato. 2009. Evaluation of the Integrated Catchment Management Pilot Project – Final Report June 2009. Environment Waikato Technical Report 2009/17. Document # 509211.

		How well did it work?	What worked well?	Why did it work?	Barriers
PLAN: 1st order outcomes - enabling conditions and elements of a good plan	Commitment	i) Iwi support and engagement			
		ii) Community and stakeholder support and engagement	Community support mixed. Half or less of farms did farm plans	Scale: two medium sized hydrological catchments	?
		iii) Political support	Political mandate and government commitment		
		iv) Endorsement by local, regional and other relevant organisations	Regional - yes		
		v) Adequate funding secured, clear financial framework in place	Not for 100% farm involvement		
		vi) Contract (written or verbal) for action with accountabilities clearly defined for each partner	? Contract or agreement made	One on one farm advisors working with the farmers	Personal involvement, clear id of issues, on site specific
	Capacity	i) Ability/capacity of project staff to understand and work with policies, plans and hence fulfil their roles		Skilled staff assisting farmers one on one was effective in encouraging on farm change	
		ii) Adequate budgets allocated		Additional staff taken on during project to assist	Farm plans took longer than anticipated and not enough staff for one on one with all farms.
		iii) Ability/capacity of project staff to understand and work with technical information	Yes	Skilled staff assisting farmers one on one was effective in encouraging on farm change	
		iv) Local champions present	yes in farm advisors ? Community champions		
v) Ability/ capacity of project staff to understand social processes and work collaboratively in multi stakeholder situations including facilitation experience and supporting institutional and stakeholder group participation to achieve co-management			Skilled staff assisting farmers one on one was effective in encouraging on farm change, evidence of facilitation skills		

		How well did it work?	What worked well?	Why did it work?	Barriers
Planning	i) Stakeholders and their motivations are identified				
	ii) Vision defined. Improved freshwater quality is a vision	Yes/no. Some dispute was clearly stated at first meeting and if farmers knew what driver was			
	iii) Use of science, local and traditional knowledge				
	iv) Collaborative planning with all stakeholders				
	v) Multidisciplinary planning with team approach				
	vi) Management plan logic adopted with clear identification of issues, based on well developed fact base, with SMARTER objectives that are directly linked to resolving identified issues, anticipated outcomes and indicators, and articulated roles and responsibilities	Yes nutrient reduction budgets set for farms			CMA not considered, final receiving environment was freshwater in this project. Focus was improving freshwater quality.
	vii) Consideration of use of a range of implementation tools				
	viii) Combination of short and long term actions				
	ix) Plan easy to use, to understand, clearly workable and accessible to all stakeholders	n/a project/ programme. Consider farm plans?			
Legal and policy factors	i) Plan consistent and integrated with other plans, policies and budgets				
	ii) Plan consistent with Treaty of Waitangi principles				
	iii) Can be strengthened by legislative framework				
	iv) Consideration of all four wellbeings under RMA and LGA				

		How well did it work?	What worked well?	Why did it work?	Barriers
DO: 2nd order outcomes - uptake and changed practices	i) Positive changes in behaviours (in/directly affecting resources of concern) are visible at all levels of influence (land managers, public interest groups, iwi, local government)	Yes, by farmer when assisted by farm planning advisor. Industry representatives engaged	Farmers uptake actions that were affordable, did not adversely affect productivity or profitability and fitted with farm system		
	ii) All stakeholders are actively engaged in implementation (public/private sectors, institutions, iwi, community)				
	iii) Local ICM champions) in place	EW farm advisors were ICM champions.			
	iv) Implementation follows plan using adaptive management				
	v) Project flexible and able to take advantage of opportunities as they arise				
CHECK: 3rd order outcomes - monitoring the harvest	i) Monitoring and measurement of indicators for outcomes (social, ecological, economic and cultural) undertaken at all key points in project cycle				
	ii) Evaluation of monitoring results occurs in appropriate forums				
	iii) Targeted environmental and other wellbeings are maintained, restored or improved against baseline indicators. Water Quality improved	Water quality improved			
	iv) Stakeholders and iwi engaged in monitoring				
REVIEW: 4th order - learning and sustainable management/development	i) Project outcomes reviewed against plan and its implementation, using monitoring results across all four wellbeings under RMA and LGA				
	ii) Review times linked to decision-making and budgetary timeframes				

		How well did it work?	What worked well?	Why did it work?	Barriers
	iii) Review findings lead directly to adaptive management of project	No. Highlighted need to revise nutrient budgets and project goals when on farm changes take place, e.g intensification			
	iv) Review findings linked to organizational learning and changed practices including policies as well as other plans and programmes				
	v) New ICM projects build on knowledge from previous reviews in learning-centred organisations				
	vi) Review engages stakeholders and iwi				

Table 2.2 Assessing Effectiveness: Hurunui Community Water Development Project

Source: Hurunui Community Water Development Project Working Group. 2007. Hurunui Community Water Development Project Summary. Downloaded February 2010 from <http://www.maf.govt.nz/sff/about-projects/search/03-085/index.htm>.

		How well did it work?	What worked well?	Why did it work?	Barriers	
PLAN: 1 st order outcomes - enabling conditions and elements of a good plan	Commitment	i) Iwi support and engagement	Yes	Joint with Ngai Tahu Property	Group formed with similar interests	
		ii) Community and stakeholder support and engagement	Yes	Formed Hurunui Working Group	Multi-party potential benefits	
		iii) Political support	Unsure			
		iv) Endorsement by local, regional and other relevant organisations	Yes/No	Some supportive farming based groups		Environmental groups not supportive - objectors applied for Water Conservation Order - in part to stop project
		v) Adequate funding secured, clear financial framework in place	Not initially, may have now	Funding for investigations		
		vi) Contract (written or verbal) for action with accountabilities clearly defined for each partner	Yes, Hurunui Water Group (HWG)	HWG formed and signed letters of support	Committed parties to the investigations	
	Capacity	i) Ability/capacity of project staff to understand and work with policies, plans and hence fulfil their roles	In part	Project employed technical experts to assist investigations	Assume technical experts knowledge was part of options investigation	
		ii) Adequate budgets allocated	Yes, for initial study			
		iii) Ability/capacity of project staff to understand and work with technical information	Yes	Technical experts in HWG	Employed others where necessary	
		iv) Local champions present	Yes	Local companies and farmers driving project	Perceived joint benefits	
		v) Ability/ capacity of project staff to understand social processes and work collaboratively in multi stakeholder situations including facilitation experience and supporting institutional and stakeholder group participation to achieve co-management	Yes	Governance structure and agreements in place. Consultation with broad spectrum of stakeholders	Board structure and accountabilities well defined	

		How well did it work?	What worked well?	Why did it work?	Barriers
Planning	i) Stakeholders and their motivations are identified	Yes	Extensive consultation	Widespread consultation and media campaign	
	ii) Vision defined. Improved freshwater quality is a vision	Yes	HWG had a vision		
	iii) Use of science, local and traditional knowledge	Yes			
	iv) Collaborative planning with all stakeholders	No			Appears not to engage with potential objectors until NRRP process
	v) Multidisciplinary planning with team approach	No, not initially	Focused on defining the project first		
	vi) Management plan logic adopted with clear identification of issues, based on well developed fact base, with SMARTER objectives that are directly linked to resolving identified issues, anticipated outcomes and indicators, and articulated roles and responsibilities	No, no management plan for the project but project identified objectives			
	vii) Consideration of use of a range of implementation tools	Yes	Considered irrigation options from environmental, social and economic points of view		
	viii) Combination of short and long term actions	No			
	ix) Plan easy to use, to understand, clearly workable and accessible to all stakeholders	Yes, ??? report easy to understand			
Legal and policy factors	i) Plan consistent and integrated with other plans, policies and budgets	No/Yes	Involvement in NRRP process and considered option with regard to NRRP	Identify areas of potential constraints	Central and Regional Government planning changes
	ii) Plan consistent with Treaty of Waitangi principles	Yes	Project engaged iwi		
	iii) Can be strengthened by legislative framework	Yes			
	iv) Consideration of all four wellbeings under RMA and LGA	Yes	Assessment of planning, environmental and consenting issues	Used technical experts, good communication and	If consistent with NRRP the project may be

		How well did it work?	What worked well?	Why did it work?	Barriers
				consultation	strengthened. Unsure of present
DO: 2 nd order outcomes - uptake and changed practices	i) Positive changes in behaviours (in/directly affecting resources of concern) are visible at all levels of influence (land managers, public interest groups, iwi, local government)	Not able to be accessed			
	ii) All stakeholders are actively engaged in implementation (public/private sectors, institutions, iwi, community)	Yes, in planning phase/not at implementation phase			
	iii) Local ICM champion(s) in place	No			
	iv) Implementation follows plan using adaptive management	Yes, if goes ahead will follow plan and changes required by WCO and Plan			
	v) Project flexible and able to take advantage of opportunities as they arise	Yes, potentially, various options available			Flexibility will be undermined by financing and economic constraints
CHECK: 3 rd order outcomes - monitoring the harvest	i) Monitoring and measurement of indicators for outcomes (social, ecological, economic and cultural) undertaken at all key points in project cycle	Yes, at planning stage	Assessed options against four wellbeings		
	ii) Evaluation of monitoring results occurs in appropriate forums	Not at this stage			
	iii) Targeted environmental and other wellbeings are maintained, restored or improved against baseline indicators. Water Quality improved	Not able to tell yet as final option not decided			
	iv) Stakeholders and iwi engaged in monitoring	Not monitoring project yet	Monitoring was done to assess the options		
learning and sustainable management	i) Project outcomes reviewed against plan and its implementation, using monitoring results across all four wellbeings	Planned project is being reviewed against NRRP requirements. Project not implemented	Options assessed in terms of their consentability		

		How well did it work?	What worked well?	Why did it work?	Barriers
	under RMA and LGA				
	ii) Review times linked to decision-making and budgetary timeframes	N/a			
	iii) Review findings lead directly to adaptive management of project	N/a			
	iv) Review findings linked to organisational learning and changed practices including policies as well as other plans and programmes	N/a			
	v) New ICM projects build on knowledge from previous reviews in learning-centred organisations	N/a			
	vi) Review engages stakeholders and iwi	N/a			

Table 2.3 Assessing effectiveness: REVIEW: Mahurangi Action Plan

Source: Cole, J and A Lees. 2008. Mahurangi Action Plan – beyond 2009: community engagement and options for the future. A report prepared for the Auckland Regional Council in April 2008.

		How well did it work?	What worked well?	Why did it work?	Barriers	
PLAN: 1 st order outcomes - enabling conditions and elements of a good plan	Commitment	i) Iwi support and engagement	Minimal Iwi engagement			Not a strong existing relationship with Iwi
		ii) Community and stakeholder support and engagement	Yes, to a large extent	Staff-community relationships		Lack of clear long term planning
		iii) Political support	Yes		Keeping ARC councillors well informed	
		iv) Endorsement by local, regional and other relevant organisations	Yes			
		v) Adequate funding secured, clear financial framework in place	Yes	Clear budgets set in advance		
		vi) Contract (written or verbal) for action with accountabilities clearly defined for each partner	No			Lack of clear vision of project sustainability at project outset
	Capacity	i) Ability/capacity of project staff to understand and work with policies, plans and hence fulfil their roles	Variable			Lack of good planning hampered understanding
		ii) Adequate budgets allocated	Yes			
		iii) Ability/capacity of project staff to understand and work with technical information	Yes	Field staff with good technical knowledge and approachable		
		iv) Local champions present	Variable	Local support		No local champions identified at start-up
		v) Ability/ capacity of project staff to understand social processes and work collaboratively in multi stakeholder situations including facilitation experience and supporting institutional and stakeholder group participation to achieve co-management	Yes	Good field staff		Hampered by lack of good planning

		How well did it work?	What worked well?	Why did it work?	Barriers
Planning	i) Stakeholders and their motivations are identified	Variable	Willingness to engage in the field by staff		Many untested assumptions made
	ii) Vision defined. Improved freshwater quality is a vision	Not clearly			Poor planning
	iii) Use of science, local and traditional knowledge	Variable	Strong initial scientific monitoring		Not strongly linked to causes
	iv) Collaborative planning with all stakeholders	No			Planning all done by ARC
	v) Multidisciplinary planning with team approach	No			Silo approach to initial planning
	vi) Management plan logic adopted with clear identification of issues, based on well developed fact base, with SMARTER objectives that are directly linked to resolving identified issues, anticipated outcomes and indicators, and articulated roles and responsibilities	No			Lack of understanding of value of planning
	vii) Consideration of use of a range of implementation tools	No			Poor planning
	viii) Combination of short and long term actions	Yes	Engaging community with small projects	Good field staff	Links between planning and outcomes
	ix) Plan easy to use, to understand, clearly workable and accessible to all stakeholders	Variable	Verbal articulation of planning by staff		Poor planning
Legal and policy factors	i) Plan consistent and integrated with other plans, policies and budgets				
	ii) Plan consistent with Treaty of Waitangi principles				
	iii) Can be strengthened by legislative framework				
	iv) Consideration of all four wellbeings under RMA and LGA				

		How well did it work?	What worked well?	Why did it work?	Barriers
DO: 2nd order outcomes - uptake and changed practices	i) Positive changes in behaviours (in/directly affecting resources of concern) are visible at all levels of influence (land managers, public interest groups, iwi, local government)	Variable	Most targeted landowners engaged	Key aspects of project appealing to landowners	Not apparent that change occurred within ARC
	ii) All stakeholders are actively engaged in implementation (public/private sectors, institutions, iwi, community)	Mostly	Landowners actively engaged	Key aspects of project appealing to landowners	Iwi not fully engaged
	iii) Local ICM champion(s) in place	Variable	Some landowners beginning to take leadership	Appealing components of plan	Stakeholders not engaged in planning
	iv) Implementation follows plan using adaptive management	No			Plan not clear at project outset
	v) Project flexible and able to take advantage of opportunities as they arise	Variable	At the farm, project flexible	Good field staff	Plan not necessarily targeting all problems
CHECK: 3rd order outcomes - monitoring the harvest	i) Monitoring and measurement of indicators for outcomes (social, ecological, economic and cultural) undertaken at all key points in project cycle	Variable	Good biological monitoring		Social and other monitoring not well monitored
	ii) Evaluation of monitoring results occurs in appropriate forums	Yes	Results of monitoring returned to community		
	iii) Targeted environmental and other wellbeings are maintained, restored or improved against baseline indicators. Water Quality improved	Unsure	Community reports improved water quality		Too early to know if main outcome successful
	iv) Stakeholders and iwi engaged in monitoring	Variable	Landowners engaged		Iwi not engaged
REVIEW: 4th order - learning and sustainable management/development	i) Project outcomes reviewed against plan and its implementation, using monitoring results across all four wellbeings under RMA and LGA	Variable	Some review takes place		Independent and thorough reviews not specifically commissioned
	ii) Review times linked to decision-making and budgetary timeframes	Yes			Decisions do not await review outcomes

		How well did it work?	What worked well?	Why did it work?	Barriers
	iii) Review findings lead directly to adaptive management of project	Variable	Some changes made based on review		Decisions do not await review outcomes
	iv) Review findings linked to organisational learning and changed practices including policies as well as other plans and programmes	Variable	Great collaboration within ARC		Concept of partnership with stakeholders
	v) New ICM projects build on knowledge from previous reviews in learning-centred organisations	Variable	Importance of good planning recognised		Good planning not always followed
	vi) Review engages stakeholders and iwi	Variable	Stakeholders and iwi consulted		Stakeholders and iwi not part of review design

Table 2.4 Assessing effectiveness: The Manukau Harbour Water Quality Management Plan

Source: Auckland Regional Water Board (ARWB). 1990. Manukau Harbour water quality management plan. Manukau Harbour Action Plan.

		How well did it work?	What worked well?	Why did it work?	Barriers	
PLAN: 1 st order outcomes - enabling conditions and elements of a good plan	Commitment	i) Iwi support and engagement	Yes	Objective 10 of plan: "To consult with and give due weight to concerns of the Tangata Whenua as Kaitiaki of the Manukau." Asked them to write chapter of report and do research of interest to them. Tainui Trust had mandate to operate on behalf of all members of relevant tribes.	MHAP triggered by Treaty Claim by Nganeko Minhinnick and Te Puaha ki Manuka. Tangata Whenua resourced to do research and take part in MHAP. Set up ongoing Tangata whenua liaison group. Able to describe perspectives and histories in the Plan.	Tangata whenua taking part in management processes not natural to them.
		ii) Community and stakeholder support and engagement	Yes	Information on public aspirations from Manukau Harbour Recreation Study. 35 public talks. Events, Displays, malls, newsletter, radio, print media. Public meetings on draft plan + written submissions. 300 signatories to petition.	Formal PR and education programs with segmented audiences including schools. Set up 24-hr pollution hotline.	None noted (though of course more can always be done if there is more money!)
		iii) Political support	Yes from Auckland Regional Authority and Central Government.	Multi-party Political Advisor Group (PAG) formed. Regular meetings. Political representation from the then 30-odd territorial and regional electorates adjoining the Harbour, Tangata Whenua and the then Auckland Harbour Board.	Kept agencies up to date with progress, forum for discussion and "facilitate necessary actions that may have been identified at officer level but that were being delayed for one reason or another"	
		iv) Endorsement by local, regional and other relevant organisations	Yes, including farming and industry associations.	Officers liaison group (OLG): senior officers of the ARA (including Drainage), TAs, Auckland Harbour Board, Health Department, Department of Conservation, Ministry for the Environment, Ministry of Agriculture and Fisheries, Tangata Whenua, the Manukau Harbour Protection Society and other environmental groups.	Inclusive and consultative approach.	None noted
		v) Adequate funding secured, clear financial framework in place	Yes	Three-year action plan including staff and resources provided for.	Budget maintained for life of plan.	None noted

		How well did it work?	What worked well?	Why did it work?	Barriers
Capacity	vi) Contract (written or verbal) for action with accountabilities clearly defined for each partner	No contracts apart from employment and consultancies.	Good communication and dedicated project manager.	Regular meetings of PAG and OLG	Staff contracts 3-years only - though many proceeded to work for the ARWB and its successor the ARC.
	i) Ability/capacity of project staff to understand and work with policies, plans and hence fulfil their roles.	Yes: all staff trained in legislative and policy relevant to investigation and enforcement objectives of plan.	Contract staff working closely with permanent staff.	Located in same offices and fully supported/mentored.	None noted
	ii) Adequate budgets allocated	Yes from Auckland Regional Authority and Central Government.	Thorough and detailed costings prepared ahead of time based on a very clear plan of issues and actions.	Detailed and regular budget reporting.	None noted
	iii) Ability/capacity of project staff to understand and work with technical information.	Yes	Scientific advisory group (SAG) peer reviewed research proposals, identified gaps in work being done and sought new proposals to fill these gaps.	7 members invited to join SAG on the basis of the expertise and perspective they could contribute, not as representatives of their particular organisation, the objective being to obtain the best advice available.	None noted
	iv) Local champions present	Yes.	Permanent and contract staff worked with active local community people and groups	All working for same identified outcomes. ARWB receptive to community aspirations even if not directly related to issues/mandate.	None noted
	v) Ability/ capacity of project staff to understand social processes and work collaboratively in multi-stakeholder situations including facilitation experience and supporting institutional and stakeholder group participation to achieve co-management.	Yes - internal and external inter-agency and community liaison actively considered and engaged in.	Working groups set up as indicated by research results and clean-up activities to deal with specific issues. Also many relevant agencies (e.g. Manukau Sewage Treatment Plant) were part of the ARA at that time, making communication easier.	Brought together the relevant organisations that could coordinate work and make policy decisions. The groups formed and met on an as-required basis (1 group needed only 1 meeting to resolve the issue of mangroves and pacific oysters. Formal public education and communication program.	The then plethora of agencies including 30-odd TAs.
Planning	i) Stakeholders and their motivations are identified	Yes	Planning for this as part of budget preparation, setting up the 5 groups (PAG, OLG, SAG, working groups and	Use of available research and information; genuine and sustained commitment by	None noted

		How well did it work?	What worked well?	Why did it work?	Barriers
			Tangata Whenua Liaison Group	MHAP team and ARWB sponsors and participants	
	ii) Vision defined. Improved freshwater quality is a vision.	Yes: "Aim" was to "ensure the quality of the Harbour and its tributaries are suitable for a wide variety of uses for present and future generations". Several objectives related specifically and generally to water quality	Specified at the start.	Sustained focus on the practical philosophy (clean up pollution sources as we research them), the Aim and the 11 objectives and associated work programmes	None noted
	iii) Use of science, local and traditional knowledge	Yes to all three	Engagement with Tangata whenua, SAG and clear focus on the science necessary for good management	Good ongoing project management	The then plethora of agencies including 30-odd TAs.
	iv) Collaborative planning with all stakeholders	Engagement more than collaboration	Maintained focus on Tangata whenua needs and concerns and engagement with stakeholders via the various groups and communication/education campaigns	Built into the project methodology and committed to by MHAP and ARWB teams	
	v) Multidisciplinary planning with team approach	Yes	SAG and the other groups	Built into the project methodology and committed to by MHAP and ARWB teams	Some matters specifically excluded e.g. review of existing water rights (legal documents); discharge for the sewage plant (already being dealt with); the setting of minimum water quality standards - considered that targeted clean-up action would be more effective
	vi) Management plan logic adopted with clear identification of issues, based on well developed fact base, with SMARTER objectives that are directly linked to resolving identified issues, anticipated outcomes and indicators, and articulated roles	High-level outcome identified, objectives set (though quantitative measures and indicators not set at the start due to the need for more scientific and on-the-ground investigations to clarify the issues and actions). Roles and responsibilities clearly set out.	Clear objective that the output of the 3-year action plan would be an enduring evidence-based water quality management plan that would enable the ARWB and other relevant parties to meet Tangata whenua and public aspirations for the Harbour	Good mix of science, practical clean up and stakeholder engagement	None noted

		How well did it work?	What worked well?	Why did it work?	Barriers
Legal and policy factors	and responsibilities				
	vii) Consideration of use of a range of implementation tools	Yes	Specialist teams formed to investigate and clean up urban and rural point and non-point source pollution including sediment using education and if necessary enforcement under the then Water and Soil Conservation Act; production of best practice guides and review of planning and legal frameworks for effective management	Used widest possible range of tools then available based on good overseas and local knowledge	Legislative and institutional arrangements at the time were very unwieldy. Resource management law and local government reforms were announced after the action plan started and plan findings informed ARC input to the RMA development process.
	viii) Combination of short and long term actions	Yes: mix of action and science + education and communication	Recommendations from the MHAP and Water quality management plan were adopted and led to the establishment of a wide range of programs still in place today.	Entrenched the idea that long term programs were needed for ongoing management of issues identified and addressed during the 3-year action plan	Included Ch 7.3 "Procedures for ensuring on-going implementation and provide for reviews"
	ix) Plan easy to use, to understand, clearly workable and accessible to all stakeholders	Yes: the process began with the production of an action plan and budget for a 3-year process intended to deliver a management plan acceptable to all parties. The Plan is clearly set out and easy to follow by anyone.	Good structure and layout and comprehensive background and outputs included, as well as references to the detailed research and reports done during the 3 years.	Good ongoing communication and engagement	Hard copy only
	i) Plan consistent and integrated with other plans, policies and budgets	Yes	Chs 1.6 and 5.2 reviewed water and soil legislation including regional and district planning, Maritime Planning Scheme, NZ Coastal policy, Fishery and foreshore management plans and more, and assessed their adequacy	Seen to be an essential component of ensuring all issues were addressed in the long term	Many agencies and plans, many very weak or unwieldy
	ii) Plan consistent with Treaty of Waitangi principles	Plan instigated by ARC/ARWB in response to Tainui Treaty claim	Tangata whenua wrote chapter 3 of report and did research of interest to	Commitment made as part of Action plan to ensure this	

		How well did it work?	What worked well?	Why did it work?	Barriers
			them.		
	iii) Can be strengthened by legislative framework	Yes	Use of enforcement as required to clean up urban and rural point source pollution; informed development of policy framework under new RMA	Commitment made as part of Action plan to ensure this	
	iv) Consideration of all four wellbeings under RMA and LGA	Not applicable at the time (pre-RMA and LGA), but plan did address social issues (public aspirations); cultural issues (Tangata whenua perspectives included Archaeology and other matters of interest) with respect to the land and water environments of the Harbour. Policies related to financial commitment and performance monitoring were included in order to fund ongoing work.	Interested in and responsive to public and Tangata whenua aspirations. Also considered flooding and surface and underground water availability and allocation.	Commitment made as part of Action plan to ensure this	
DO: 2nd order outcomes - uptake and changed practices	i) Positive changes in behaviours (in/directly affecting resources of concern) are visible at all levels of influence (land managers, public interest groups, iwi, local government)	Yes: e.g. dairy shed systems 34% good treatment, 30% poor treatment, 36% direct discharge at 1st inspection; 78% good, 20% poor and 2% direct discharge by 1990. Similar level of improvement in priority industries in urban/industrial areas.	On the ground inspection of every high-risk urban and rural site.	Enough staff on the ground; mix of education backed up by enforcement where needed.	Unwieldy and expensive enforcement procedures of the times
	ii) All stakeholders are actively engaged in implementation (public/private sectors, institutions, iwi, community)	Yes	See above	See above	
	iii) Local ICM champion(s) in place	Yes.	Permanent and contract staff worked with active local community people and groups	All working for same identified outcomes. ARWB receptive to community aspirations even if not directly related to issues/mandate.	None noted

		How well did it work?	What worked well?	Why did it work?	Barriers
	v) Implementation follows plan using adaptive management	Yes	The pollution abatement program started at the same time as the science research programme. while results as they came in from each informed the other	Commitment made as part of Action plan to ensure this	
	vi) Project flexible and able to take advantage of opportunities as they arise	Yes	The active role of the 5 groups set up and public engagement	Permanent and contract staff worked with each other, other agencies, advisory groups and active local community people and groups	
CHECK: 3rd order outcomes - monitoring the harvest	i) Monitoring and measurement of indicators for outcomes (social, ecological, economic and cultural) undertaken at all key points in project cycle	Yes	Monitoring continuous throughout the 3 years, though focused on environmental indicators of interest to Tangata whenua and the public that indicate progress toward meeting those aspirations/outcomes rather than those outcomes themselves	Because the aim of the 3-year action plan was to produce a long term water quality management and monitoring program	
	ii) Evaluation of monitoring results occurs in appropriate forums	Yes	Communicated to stakeholders and to wider public	Commitment made as part of Action plan to ensure this	
	iii) Targeted environmental and other wellbeings are maintained, restored or improved against baseline indicators. Water Quality improved	Too soon to say for Harbour overall and biological monitoring results at the time of writing (after only 3 years) though improvement measured in monitored streams	Major urban and rural polluting point sources cleaned up	Commitment made as part of Action plan to ensure this	
	iv) Stakeholders and iwi engaged in monitoring	Yes	Tangata whenua were able to investigate archaeology, fish and fisheries, shellfish, plant resources, Manuka waters, runoff, freshwater ecosystems, works and structures. Major dischargers were also involved or informed.	Commitment made as part of Action plan to ensure this	
REVIEW: 4th order - learning and sustainable management/development	i) Project outcomes reviewed against plan and its implementation, using monitoring results across all four wellbeings under RMA and LGA	Yes though the four wellbeings per se were not applicable at the time (pre-RMA and LGA).	Clear (if not measureable) objectives set at the start	Good logical reporting structure made it easy to check outcomes vs. actions.	Not enough time for all outcomes to emerge by the time the project ended
	ii) Review times linked to decision-making and budgetary	Yes	3-year action plan finished on time and to budget	Good project management	

	How well did it work?	What worked well?	Why did it work?	Barriers
timeframes				
iii) Review findings lead directly to adaptive management of project	Yes	The pollution abatement program started at the same time as the science research programme. while results as they came in from each informed the other	Commitment made as part of Action plan to ensure this	
iv) Review findings linked to organisational learning and changed practices including policies as well as other plans and programmes	Yes	The ARC (which superseded the ARWB) set up environmental monitoring programs, urban, rural and sediment pollution abatement programs, technical publications, policies, plans, education/training/enforcement programs that arose from the MHAP and remain in place today	Evidence-based approach following 3 years of active clean up, research, iwi and stakeholder engagement	Following Resource Management Law and Local Government reforms (including the disestablishment of the DSIR and Water & Soil and Town & Country Planning Divisions of the MOWD) the integrated catchment-based focus of these programs was superseded by an issue-based approach
v) New ICM projects build on knowledge from previous reviews in learning-centred organisations	Yes - to some extent	See above	See above	See above
vi) Review engages stakeholders and iwi	Yes	Provision for ongoing review with stakeholders and iwi of results from the water quality management plan and its associated monitoring program	Included in Ch 7.3	

Table 2.5 Assessing effectiveness: Integrated Catchment Management Plan for the Central Papakura Area

Source: Environment Waikato. No date. The Whaingaroa Environment Catchment Plan. Caring for our environment now and in the future. EW Doc # 793960. Downloaded February 2010 from <http://www.whaingaroa.org.nz/>.

		How well did it work?	What worked well?	Why did it work?	Barriers	
PLAN: 1 st order outcomes - enabling conditions and elements of a good plan	Commitment	i) Iwi support and engagement	Kaitiaki group consulted	? Can't be assessed by Plan		
		ii) Community and stakeholder support and engagement	? Difficult to judge. Questionnaires sent to some residents, stakeholders identified, steering group of Council offices was main consultation party	? Can't be assessed by Plan		
		iii) Political support	PDC Support and ARC support	? Can't be assessed by Plan		
		iv) Endorsement by local, regional and other relevant organisations	PDC Support and ARC support			
		v) Adequate funding secured, clear financial framework in place	Yes for Plan development. ? for Implementation			
		vi) Contract (written or verbal) for action with accountabilities clearly defined for each partner	? Can't be assessed by Plan			
	Capacity	i) Ability/capacity of project staff to understand and work with policies, plans and hence fulfil their roles	Yes	Engagement of technical specialist for ICMP development	Combination of in-house and outside technical expertise?	
		ii) Adequate budgets allocated	Yes for Plan development. ? for Implementation			
		iii) Ability/capacity of project staff to understand and work with technical information	Yes	Engagement of technical specialist for ICMP development	Combination of in house and outside technical expertise?	
		iv) Local champions present	Council driven Plan and solutions. Little requirement for community to do anything			
		v) Ability/ capacity of project staff to understand social processes and work collaboratively in multi stakeholder situations including facilitation experience and supporting institutional and stakeholder group participation to achieve co-management	Council driven Plan and solutions. Little evidence of community facilitation ?			

		How well did it work?	What worked well?	Why did it work?	Barriers
Planning	i) Stakeholders and their motivations are identified	Stakeholders identified, motivations not explicitly referred to in ICMP			
	ii) Vision defined. Improved freshwater quality is a vision	Objectives stated, included improving freshwater quality			
	iii) Use of science, local and traditional knowledge	Use of science, engineering and local knowledge. No evidence use of traditional knowledge			
	iv) Collaborative planning with all stakeholders	Only with Steering Group which did not represent all stakeholders			
	v) Multidisciplinary planning with team approach	Yes	Steering group?		
	vi) Management plan logic adopted with clear identification of issues, based on well developed fact base, with SMARTER objectives that are directly linked to resolving identified issues, anticipated outcomes and indicators, and articulated roles and responsibilities	Issues identified, objectives SMARTER, anticipated outcomes and indicators not clearly defined. Roles and responsibilities all assumed to be PDC			
	vii) Consideration of use of a range of implementation tools	Yes, structural and non structural tool considered			
	viii) Combination of short and long term actions	Yes			
	ix) Plan easy to use, to understand, clearly workable and accessible to all stakeholders	Yes	Prioritisation tables	Made actions and priorities clear	
Legal and policy factors	i) Plan consistent and integrated with other plans, policies and budgets	Yes, appears to be			
	ii) Plan consistent with Treaty of Waitangi principles	No specific reference to how engaged Iwi were in process to assess.			
	iii) Can be strengthened by legislative framework	Yes supported by District Plan			
	iv) Consideration of all four wellbeings under RMA and LGA	Yes in BPO assessment			

		How well did it work?	What worked well?	Why did it work?	Barriers
DO: 2nd order outcomes - uptake and changed practices	i) Positive changes in behaviours (in/directly affecting resources of concern) are visible at all levels of influence (land managers, public interest groups, iwi, local government)	? Can't be assessed by Plan			
	ii) All stakeholders are actively engaged in implementation (public/private sectors, institutions, iwi, community)	? Can't be assessed by Plan. Council is the predominant implementation body			
	iii) Local ICM champion(s) in place	Council staff are the ICM champions			
	iv) Implementation follows plan using adaptive management	? Can't be assessed by Plan. Unsure if implementation has started			
	v) Project flexible and able to take advantage of opportunities as they arise	? Can't be assessed by Plan. Unsure if implementation has started			
CHECK: 3rd order outcomes - monitoring the harvest	i) Monitoring and measurement of indicators for outcomes (social, ecological, economic and cultural) undertaken at all key points in project cycle	? Can't be assessed by Plan. Unsure if implementation has started			
	ii) Evaluation of monitoring results occurs in appropriate forums	? Can't be assessed by Plan. Unsure if implementation has started			
	iii) Targeted environmental and other wellbeings are maintained, restored or improved against baseline indicators. Water Quality improved	? Can't be assessed by Plan. Unsure if implementation has started			
	iv) Stakeholders and iwi engaged in monitoring	? Can't be assessed by Plan. Unsure if implementation has started			
REVIEW: 4th order - learning and sustainable management/development	i) Project outcomes reviewed against plan and its implementation, using monitoring results across all four wellbeings under RMA and LGA	? Can't be assessed by Plan. Unsure if implementation has started			
	ii) Review times linked to decision-making and budgetary timeframes	States 5 yearly reviews			

		How well did it work?	What worked well?	Why did it work?	Barriers
	iii) Review findings lead directly to adaptive management of project	? Can't be assessed by Plan. Unsure if implementation has started			
	iv) Review findings linked to organisational learning and changed practices including policies as well as other plans and programmes	? Can't be assessed by Plan. Unsure if implementation has started			
	v) New ICM projects build on knowledge from previous reviews in learning-centred organisations	? Can't be assessed by Plan. Unsure if implementation has started			
	vi) Review engages stakeholders and iwi	Not specified in ICMP that it will involve stakeholders and iwi.			

Table 2.6 Assessing Effectiveness: Proposed Waikato Regional Plan Variation 5 - Lake Taupo Catchment

Source: Environment Waikato. 2007. Proposed Waikato Regional Plan Variation 5 - Lake Taupo Catchment. October 2007.
 Environment Waikato. No date. Protecting Lake Taupo: A Long Term Strategic Partnership. Downloaded February 2010 from <http://www.ew.govt.nz/policy-and-plans/Protecting-Lake-Taupo/>.
 Environment Waikato. No date. The Whaingaroa Environment Catchment Plan. Caring for our environment now and in the future. EW Doc # 793960. Downloaded February 2010 from <http://www.whaingaroa.org.nz/>.
 Nimmo-Bell, 2004. Environment Waikato. Sustainable Farming Project: A Sustainable Environmental Land Management System for Lake Taupo – a report prepared by Nimmo-Bell for Environment Waikato.
 Nimmo-Bell. No date. Taupo Lake Care: Final Report. Prepared by Nimmo Bell for Environment Waikato. SFF Farming Summary. Downloaded February 2010 from www.maf.govt.nz/sff/about-projects/search/03-210/final_report.html.

		How well did it work?	What worked well?	Why did it work?	Barriers
PLAN: 1 st order outcomes - enabling conditions and elements of a good plan	Commitment	i) Iwi support and engagement	Yes	Community survey	
		ii) Community and stakeholder support and engagement	Yes	Plan change - Variation 5 process	Lots of engagement, submissions
		iii) Political support	Yes, EW, TDC, Central Government	Central Government identify water quality in Taupo in Sustainable Development Action Programme	Central, Regional and District organisations and Iwi commitment and funding
		iv) Endorsement by local, regional and other relevant organisations	Yes, very much		
		v) Adequate funding secured, clear financial framework in place	Yes	As above	As above
		vi) Contract (written or verbal) for action with accountabilities clearly defined for each partner	Yes, by way of plan process? Yes by way of SFF projects	"whole of government approach"	Funding contract between Central Government, EW, TDC
	Capacity	i) Ability/capacity of project staff to understand and work with policies, plans and hence fulfil their roles	Yes	Land management and council processes all at same time	Multi-pronged approach
		ii) Adequate budgets allocated	Appears to be	See above, many funding parties	As above
		iii) Ability/capacity of project staff to understand and work with technical information	Yes, very much	A lot of science behind the projects	Long term knowledge of problem
		iv) Local champions present	Yes, in the form of Landcare groups		

		How well did it work?	What worked well?	Why did it work?	Barriers
Planning	v) Ability/ capacity of project staff to understand social processes and work collaboratively in multi stakeholder situations including facilitation experience and supporting institutional and stakeholder group participation to achieve co-management	Yes, lots of involvement of assistance staff to many projects in catchment, e.g., Landcare, MAF, EW	Lots of assistance from many agencies. Regulatory and non-regulatory approach at the same time	Commitment	
	i) Stakeholders and their motivations are identified	Yes	Consultation, options papers, RMA planning process	Very high profile	
	ii) Vision defined. Improved freshwater quality is a vision	Yes	All on same page in technical/science decisions	Agreed on issue	
	iii) Use of science, local and traditional knowledge	Yes	Lots of science	Issue well understood	
	iv) Collaborative planning with all stakeholders	Yes	Regional Plan change lead to intensive consultation	RMA consultation requirements?	
	v) Multidisciplinary planning with team approach	Yes, focus on water quality			
	vi) Management plan logic adopted with clear identification of issues, based on well developed fact base, with SMARTER objectives that are directly linked to resolving identified issues, anticipated outcomes and indicators, and articulated roles and responsibilities	Yes	Well-defined fact base, clear objectives. Indicator and monitoring clear, anticipated results	Written as RMA plan but for an obvious land/water interaction outcome	
	vii) Consideration of use of a range of implementation tools	Yes	Economic instruments, regulatory or non-regulatory		
	viii) Combination of short and long term actions	Yes	Immediate regulatory requirement, long term non-regulatory processes		
	ix) Plan easy to use, to understand, clearly workable and accessible to all stakeholders	Yes, for the regulator part, other parts in different documents	Teams across catchment	Active involvement by many agencies	
Legal and policy factors	i) Plan consistent and integrated with other plans, policies and budgets	Yes, appears to be across plans and councils	As above, multi-party approach	Joint involvement and commitment	
	ii) Plan consistent with Treaty of Waitangi principles	Yes	Long term relationship with iwi in catchment		

		How well did it work?	What worked well?	Why did it work?	Barriers
	iii) Can be strengthened by legislative framework	Yes, and was by Variation 5	Consistent with Central Government direction at time	Met Central Government objectives	
	iv) Consideration of all four wellbeings under RMA and LGA	Yes, but biophysical main driver	Financial assistance to "compensate" for loss of expansion		Less profitability in farming in the catchment
DO: 2nd order outcomes - uptake and changed practices	i) Positive changes in behaviours (in/directly affecting resources of concern) are visible at all levels of influence (land managers, public interest groups, iwi, local government)	Yes, regulation required change in behaviour. Landcare and community action as well lead to behaviour change?			
	ii) All stakeholders are actively engaged in implementation (public/private sectors, institutions, iwi, community)	Yes, appears to be			
	iii) Local ICM champion(s) in place	?			
	iv) Implementation follows plan using adaptive management	Yes, if use RMA review process	Too early to tell with respect to water quality outcomes		
	v) Project flexible and able to take advantage of opportunities as they arise	Not the regulatory aspect, would take time to alter			
CHECK: 3rd order outcomes - monitoring the harvest	i) Monitoring and measurement of indicators for outcomes (social, ecological, economic and cultural) undertaken at all key points in project cycle	Yes			
	ii) Evaluation of monitoring results occurs in appropriate forums	Yes			
	iii) Targeted environmental and other wellbeings are maintained, restored or improved against baseline indicators. Water Quality improved	Too early to tell			
	iv) Stakeholders and iwi engaged in monitoring	?			
learning and sustainable manage	i) Project outcomes reviewed against plan and its implementation, using monitoring results across all four wellbeings under RMA and LGA	Yes, in RMA plan process. Unsure in Landcare type processes			

		How well did it work?	What worked well?	Why did it work?	Barriers
	ii) Review times linked to decision-making and budgetary timeframes	Yes, in Plan change			
	iii) Review findings lead directly to adaptive management of project	Too early to tell			
	iv) Review findings linked to organisational learning and changed practices including policies as well as other plans and programmes	Yes, Variation 5 represents this			
	v) New ICM projects build on knowledge from previous reviews in learning-centred organisations	Yes	Good communication between stakeholder organisation		
	vi) Review engages stakeholders and iwi	Plan review will, yes			

Table 2.7 Assessing Effectiveness: Taieri River Year Five Project Review

Source: Brown, IC, 2006b. The Taieri Trust Year Five Project Review. Report prepared for the Taieri Trust, October 2006.

Edgar, N. 2002. Review of the Taieri Project. Prepared for the Taieri Trust, 20 August 2002.

New Zealand Landcare Trust. No date. The Upper Taieri Project: redefining Upper Taieri water allocation and management for the whole of community good. Downloaded March 2010 from <http://www.landcare.org.nz/regional-focus/lower-south-island/upper-taieri/>.

SFF Project Summary. No date. <http://www.maf.govt.nz/sff/about-projects/search/07-134/index.htm>.

Tyson B, Panelli R and Robertson G. No date. Integrated Catchment Management in New Zealand: a Field Report on Communication Efforts in the Taieri River Watershed. Conference paper not referenced.

		How well did it work?	What worked well?	Why did it work?	Barriers	
PLAN: 1 st order outcomes - enabling conditions and elements of a good plan	Commitment	i) Iwi support and engagement	No, appears not to involve iwi			
		ii) Community and stakeholder support and engagement	Yes	Wide stakeholder representation on Trust	Good communication and information exchange	Threat of losing water rights needed to be overcome
		iii) Political support	Yes, ORC involved	ORC, Taieri Trust, Landcare work together	Recognised need	
		iv) Endorsement by local, regional and other relevant organisations	Yes, ORC, DoC, Fish & Game and irrigators			
		v) Adequate funding secured, clear financial framework in place	SMF funding for five years			No future funding?
		vi) Contract (written or verbal) for action with accountabilities clearly defined for each partner	Unsure?			
	Capacity	i) Ability/capacity of project staff to understand and work with policies, plans and hence fulfil their roles	Yes, in part			
		ii) Adequate budgets allocated	Yes/No, doubt over future funding	Government three rounds of SMF funding	Project showing success	
		iii) Ability/capacity of project staff to understand and work with technical information	Yes	Used technical experts where needed i.e., University of Otago		
		iv) Local champions present	Yes, Landcare Trust			

		How well did it work?	What worked well?	Why did it work?	Barriers
	v) Ability/ capacity of project staff to understand social processes and work collaboratively in multi stakeholder situations including facilitation experience and supporting institutional and stakeholder group participation to achieve co-management	Yes, Landcare Trust co-ordinator experienced	Having an appointed co-ordinator	Needed central co-ordinators	
Planning	i) Stakeholders and their motivations are identified	Yes	Multi-agency and community involvement		Lack of involvement of TLAs and slow response from DoC
	ii) Vision defined. Improved freshwater quality is a vision	Yes, environment improvement generally is objective			
	iii) Use of science, local and traditional knowledge	Yes	Work with University of Otago, DoC, ORC, community		
	iv) Collaborative planning with all stakeholders	Yes	Good communication	Frequent contact via NZLCT and Taieri Trust	
	v) Multidisciplinary planning with team approach	Yes, although bio-physical greatest			
	vi) Management plan logic adopted with clear identification of issues, based on well developed fact base, with SMARTER objectives that are directly linked to resolving identified issues, anticipated outcomes and indicators, and articulated roles and responsibilities	Issues defined elsewhere. Objectives set as outcomes. No indicators			
	vii) Consideration of use of a range of implementation tools	Yes	Field days, websites, newsletters, school events	Utilised farmers as leaders and experts in the community seen as major achievement	
	viii) Combination of short and long term actions	Yes	Education, some riparian planting, irrigation projects		
	ix) Plan easy to use, to understand, clearly workable and accessible to all stakeholders	Not sure if there is ever one plan?			
Policy	i) Plan consistent and integrated with other plans, policies and	Yes	Clear statement of outcome areas (7) in strategic plan		

		How well did it work?	What worked well?	Why did it work?	Barriers	
		budgets				
		ii) Plan consistent with Treaty of Waitangi principles	Yes		Little information on iwi involvement	
		iii) Can be strengthened by legislative framework				
		iv) Consideration of all four wellbeings under RMA and LGA	Yes, in outcome areas			
DO: 2nd order outcomes - uptake and changed practices		i) Positive changes in behaviours (in/directly affecting resources of concern) are visible at all levels of influence (land managers, public interest groups, iwi, local government)	Yes/No, most changes on ground in small localised situations. Works programmes that had resulted from trusts' activities have been extremely successful	Improvement in working relationships and raising awareness of environmental issues in the catchment	Large size of catchment and diversity of issues. Different motivations. Entrenched attitudes. Time. Perception of some agencies did not want to give up their power	
		ii) All stakeholders are actively engaged in implementation (public/private sectors, institutions, iwi, community)	Yes, in terms of education and communication	Actively involved mix of organisations including schools, university, community groups and irrigation groups	Opportunity for rural people to be involved	iwi only slightly involved?
		iii) Local ICM champion(s) in place	Yes, Taieri Trust and NZLCT	Having established and respected organisation assists the project	Skills available in project co-ordination	
		iv) Implementation follows plan using adaptive management				
		v) Project flexible and able to take advantage of opportunities as they arise	? can't tell			
CHECK: 3rd order outcomes - monitoring the harvest		i) Monitoring and measurement of indicators for outcomes (social, ecological, economic and cultural) undertaken at all key points in project cycle	Yes, three reviews and questionnaires	Social outcomes: opening lines of communication, increasing mutual work standing, multi-agency approaches		
		ii) Evaluation of monitoring results occurs in appropriate forums	Yes, at Landcare Trust, SMF			

		How well did it work?	What worked well?	Why did it work?	Barriers
	iii) Targeted environmental and other wellbeings are maintained, restored or improved against baseline indicators. Water Quality improved	Yes/No, majority of respondents thought moderately successful in improving water quality. Evidence available suggest the Taieri Trust project has not lead to widespread changes on the ground. Isolated examples of changes can be found, e.g., Owhiro programme, riparian planting sites. No indication from the evidence available through the review process as to whether the Taieri Trust project has been a catalyst of future widespread changes on the ground. Still not possible to determine the long term impact on environmental health. View from respondents that Taieri Trust had made an important contribution in area of improving the sound health of the catchment through programmes that helped empower local community members. No examples of economic improvements in catchment health.			Some issues focus at lengthy statutory planning process. Many issues large and entrenched. Problems expensive to fix. Negative attitude towards "environmental agencies". Only limited help available each year.
	iv) Stakeholders and iwi engaged in monitoring	Yes, community, ? Iwi	Schools programme		
REVIEW: 4 th order - learning and sustainable management/development	i) Project outcomes reviewed against plan and its implementation, using monitoring results across all four wellbeings under RMA and LGA	Yes, three reviews against outcomes done	Review process at middle and end of project	Highlight areas of achievement and barriers to achievement	
	ii) Review times linked to decision-making and budgetary timeframes	Yes, linked to SMF funding rounds			
	iii) Review findings lead directly to adaptive management of project	Yes/No, some surveyed feel project findings not fed back to key policy makers effectively			
	iv) Review findings linked to organisational learning and changed practices including policies as well as other plans and programmes	Not sure ?			

		How well did it work?	What worked well?	Why did it work?	Barriers
	v) New ICM projects build on knowledge from previous reviews in learning-centred organisations	Not sure ?			
	vi) Review engages stakeholders and iwi	Yes, surveys undertaken	Field report on project undertaken	Surveyed main parties on their views of the project and provided feedback to project co-ordinators	

Table 2.8 Assessing effectiveness: The Whaingaroa Environment Catchment Plan

Source: Environment Waikato. No date. The Whaingaroa Environment Catchment Plan. Caring for our environment now and in the future. EW Doc # 793960. Downloaded February 2010 from <http://www.whaingaroa.org.nz/>.

		How well did it work?	What worked well?	Why did it work?	Barriers	
PLAN: 1 st order outcomes - enabling conditions and elements of a good plan	Commitment	i) Iwi support and engagement	Yes and No, Manawhenua undertaking own process			
		ii) Community and stakeholder support and engagement	Yes	Community discussions and meetings over a long time period		
		iii) Political support	Yes from EW and Councils			
		iv) Endorsement by local, regional and other relevant organisations	Yes, wide level of involvement			
		v) Adequate funding secured, clear financial framework in place	Various sources of funding over the years and self directed financing through group activities			
		vi) Contract (written or verbal) for action with accountabilities clearly defined for each partner	Not sure, some accountabilities have been defined.			
	Capacity	i) Ability/capacity of project staff to understand and work with policies, plans and hence fulfil their roles	Essentially voluntary community project with some organisational assistance, so roles are self imposed.			
		ii) Adequate budgets allocated	Various funding sources			
		iii) Ability/capacity of project staff to understand and work with technical information	Community advisors in Harbourcare group now very experienced			Initial problems due to inexperience but essentially rectified now.
		iv) Local champions present	Yes, many			
		v) Ability/ capacity of project staff to understand social processes and work collaboratively in multi stakeholder situations including facilitation experience and supporting institutional and stakeholder group participation to achieve co-management	Yes, appears very collaborative approach			
	Plan ning	i) Stakeholders and their motivations are identified	Yes			

		How well did it work?	What worked well?	Why did it work?	Barriers
Legal and policy factors	ii) Vision defined. Improved freshwater quality is a vision	Yes, well defined			
	iii) Use of science, local and traditional knowledge	Yes, seems to have combined all of these quite well, although Iwi knowledge sometimes withheld for use in hapu plans and due to sensitivity of knowledge.			
	iv) Collaborative planning with all stakeholders	Yes			
	v) Multidisciplinary planning with team approach	Yes			
	vi) Management plan logic adopted with clear identification of issues, based on well developed fact base, with SMARTER objectives that are directly linked to resolving identified issues, anticipated outcomes and indicators, and articulated roles and responsibilities	Yes, focus areas, goals, targets and indicators defined, roles and responsibilities well documented. Review process suggested.			
	vii) Consideration of use of a range of implementation tools	Yes very wide range			
	viii) Combination of short and long term actions	Yes			
	ix) Plan easy to use, to understand, clearly workable and accessible to all stakeholders	Yes			
	i) Plan consistent and integrated with other plans, policies and budgets	Difficult to judge			
	ii) Plan consistent with Treaty of Waitangi principles	Yes, definitely attempting to be inclusive and share decision making			
	iii) Can be strengthened by legislative framework	Yes if regional and district councils involved chose to			
	iv) Consideration of all four wellbeings under RMA and LGA	Yes, more than other plans			

		How well did it work?	What worked well?	Why did it work?	Barriers
DO: 2 nd order outcomes - uptake and changed practices	i) Positive changes in behaviours (in/directly affecting resources of concern) are visible at all levels of influence (land managers, public interest groups, iwi, local government)	Appears to have resulted in behaviour changes, but not documented in article reviewed			
	ii) All stakeholders are actively engaged in implementation (public/private sectors, institutions, iwi, community)	Yes, multi party implementation of projects			
	iii) Local ICM champion(s) in place	Yes, many			
	iv) Implementation follows plan using adaptive management	Unable to assess			
	v) Project flexible and able to take advantage of opportunities as they arise	Appears to			
CHECK: 3 rd order outcomes - monitoring the harvest	i) Monitoring and measurement of indicators for outcomes (social, ecological, economic and cultural) undertaken at all key points in project cycle	Indicators developed, Not known if monitored.			
	ii) Evaluation of monitoring results occurs in appropriate forums	?			
	iii) Targeted environmental and other wellbeings are maintained, restored or improved against baseline indicators. Water Quality improved	?			
	iv) Stakeholders and iwi engaged in monitoring	Iwi developing own hapu management plans			
REVIEW: 4 th order - learning and sustainable management/development	i) Project outcomes reviewed against plan and its implementation, using monitoring results across all four wellbeings under RMA and LGA	Not known			
	ii) Review times linked to decision-making and budgetary timeframes	Yes, annual review within time for budget allocation decisions			
	iii) Review findings lead directly to adaptive management of project	Not known			

		How well did it work?	What worked well?	Why did it work?	Barriers
	iv) Review findings linked to organisational learning and changed practices including policies as well as other plans and programmes	Not known			
	v) New ICM projects build on knowledge from previous reviews in learning-centred organisations	Seems to occur, the Catchment Plan built on project outcomes before it.			
	vi) Review engages stakeholders and iwi	Management Plan intended to do so? Not known if happened.			

Appendix E Semi-structured questionnaire used to guide interviews

Background information on project

The Integrated Catchment Management (ICM) Review is a project being undertaken for Ministry for Environment by consultants from Environmental Communications Ltd. The aim of this project is to provide information that will help officials to scope options for how the government can assist with improving the effectiveness of ICM initiatives. To achieve this we are reviewing literature on ICM projects/programmes and research within New Zealand and discussing ICM with a number of knowledgeable individuals.

MfE is interested to understand which existing ICM initiatives are regarded as successful, what has worked well and why, and what factors act as barriers to success. We have identified a number of factors that ICM practitioners and researchers list as important to achieve effective outcomes for ICM. We are interested to build on and deepen this knowledge.

Using the broadest definitions of ICM, the number of ICM projects, programmes and research initiatives being implemented in New Zealand probably numbers in the thousands. We have selected a sample of these to examine in more detail, representing a mix of urban/rural, focus, expected project outcomes, scale, and degree of integration across disciplines.

We wish to expand on the information we can gather through the literature with in-depth interviews. The questions below will be the focus area for these interviews. Some interviews may seek specific information about projects that are already documented.

Information collected will be qualitative rather than quantitative. Individual interview content will be kept confidential.

Your experience

What is your definition of ICM?

What ICM projects or programmes have you been involved with and for how long?

Describe their scope (urban/rural; focus; outcomes; scale; degree of integration).

General

How widespread is the uptake of ICM approaches in New Zealand?

What governance arrangements do you think are effective for ICM?

Project start-up

For an ICM to be effective, what factors are critical to be in place at project start-up?

What in your experience is most often the trigger for an ICM start up? Does that trigger point have a role throughout the project development?

Which parties need to be involved and committed at the outset?

Is it important to have a contract at the beginning that spells out responsibilities and commitments for each party?

What level of capacity is essential for effective start –up?

What is the role and value of local champions?

What can go wrong with project start-up and why?

For the projects you've been involved with, what would you have changed about the way they started up, if you could have?

Planning

What planning factors are critical to consider when designing an ICM?

Who should be involved in planning the ICM?

What is the role of science and local knowledge?

Good planning has clear logic with a vision defined, clear identification of issues, SMART objectives and so on. The plan itself should be easy to use, accessible and easily understood. Did the ICMs you are familiar with have good planning? If yes, what factors ensured good planning took place? If no, what was wrong and why?

In the planning of the projects you know, was a range of implementation tools considered? If no, should it have?

Did it include short and long term actions?

Did it build on knowledge of other/previous ICM projects?

What can go wrong at the planning phase and why?

How well do links work between each level or scale of the programme?

Integration

ICMs differ in their degree of integration and multi-disciplinary components. Describe these aspects of the projects you are familiar with.

Does the degree of integration/multidiscipline impact on the effectiveness of the project?

Why or why not?

Implementation

What is your definition of ‘success’ and ‘effectiveness’ for the ICMs you are familiar with?
Thinking about *implementation* of ICM, have the projects you’ve been involved with been successful and effective?

Describe the role of stakeholders in implementation.

Was the plan followed in the implementation for the projects you have been involved with?

Was the plan flexible enough to embrace changed circumstances?

What can commonly go wrong in the implementation stage?

Monitoring

Has monitoring been part of the plans of your ICM experience? Please describe it.

Whose responsibility is monitoring and who should be involved in it?

Thinking back on the project you’ve been involved with, what could have been improved about the monitoring?

What are the barriers to good monitoring?

For water quality-focused plans have you been able to document measurable, timely cost-effective improvements in fresh water quality and associated variables such as evidence of land use/management changes?

For water allocation plans: Are you collecting evidence of more efficient use of extracted water?

Review

Have the ICM projects you’ve been involved with been reviewed? If no, why not?

If yes, describe the review process – eg, was it independent?

At what point in the project development have reviews taken place?

Who was involved in the review?

What happened with the results of the review?

Did the review result in any changes in the organisations (policies, practices, staffing etc) engaged in the ICM project?

What are the barriers to take-up of ‘lessons learned’ from reviews? What could help overcome those barriers?

Recommendations

If someone in your position elsewhere was to consider beginning an ICM what is the key advice you would give them?

What contribution could central government play to enhance the effectiveness/take-up of ICM? How effective is their current role?

What main factors act as barriers to effective ICM design and implementation?

Are there any other points you would like to make?

Appendix F Detailed key to contents of Table 5

The items below were considered when identifying the key characteristics of ICM initiatives in New Zealand for the purposes of carrying out the rapid appraisal and populating Table 4 in Section 3 of the main report:

1. The lead agency
2. The landscape (whether the initiative is rural, urban, or rural and urban)
3. The purpose – whether the initiative is focused on:
 - water allocation
 - soil erosion
 - flooding
 - agri-nutrients or other rural non-point sources
 - rural point sources such as farm effluent discharges
 - water quality/ecology
 - stream bank erosion and ecological effects of changes in the urban hydrograph
 - urban water quality associated with illegal industrial or other discharges such as erosion and sediment control from large and small building sites and contaminants from high levels of motor vehicle traffic
4. The main drivers or triggers for the development of the initiative, such as:
 - iwi or community concern
 - the need to obtain new consents under RMA sunset clauses on network discharges or mining rights
 - urban growth
 - rural land use intensification/dairying
 - major non-compliance with RMA provisions (e.g. rural, urban or industrial point-source pollution)
5. Scale/receiving environment (based on Gustafson and Feeney, 2008) including national, regional, local or other:
 - national scale such as a national policy statement
 - whole of region policy/regional plan scale
 - macro-scale: all catchments round a whole freshwater or saline receiving environment e.g. a lake, major wetland or estuary
 - meso-scale: whole contributing catchment around a macro-catchment

- micro-scale: subcatchment – part of a meso-catchment
 - structure plan, subdivision or site (these may cross catchments)
 - groundwater aquifer including recharge zones (which may also cross surface catchments)
 - national programme, multi-site projects
 - other (e.g. ecological district or tribal rohe)
6. Degree and nature of integration: what things have been integrated, e.g.
- more than two of the matters listed above AND links to land use controls
 - more than two of the phases of the RMA/LGA policy cycle (research, policy, plans and rules, consenting and compliance, enforcement, other methods including education and financial/in-kind support, outcome monitoring and plan effectiveness review
 - iwi engagement
 - involvement of external stakeholders
 - assessment of outcomes across all four wellbeings etc
7. Degree of regulation – where along the spectrum of regulatory – non-regulatory methods does the initiative sit and what mix of both methods is used
8. Degree of documentation: how formally or thoroughly documented the initiative is
9. Planning focus the focus or stage of the initiative in terms of whether it encompasses all four major planning phases (plan, do, check, review) or does it (by intention or de facto) address only some of them.

Appendix G Selected catchment-related interest groups in New Zealand

Below is a summary of some of the main interest groups we discovered that are relevant to catchment-related outcomes in New Zealand. The list does not include all the professional associations (e.g. the Limnological Society). Groups are listed in no particular order:

1. NZARM
2. Regional Land Managers Group
3. River Managers Group
4. Water New Zealand Special Interest and Water Groups
5. Primary sector water partnership
6. ICM Network
7. Land and Water Forum
8. IPENZ/Water New Zealand Rivers Group
9. Irrigation New Zealand.

They are briefly summarised below.

G.1 NZARM (New Zealand Association of Resource Management)

The New Zealand Association of Resource Management (NZARM) is an Incorporated Society with membership drawn from those engaged in the management of natural and physical resources. Its mission is to:

- represent and promote the views and interests of persons who are involved or interested in resource management
- promote good practice, competence, and ethics in resource management
- promote effective communication and transfer of information between members, other resource management practitioners, and the community, concerning resource management
- encourage community awareness of the nature and value of resource management.

In recent years the Association has run conferences on ICM-related themes.

G.2 Regional Land Managers Group

The Land Managers Group is a group of Regional Council staff who meet every six months to share information and best practice. It was set up by Garth Eyles and Dex Knowles and its forerunner was a similar body of staff from the catchment boards that existed before the 1989 local government reforms, and it was not until about 2000 that practitioners realised they needed to set up another such group.

The Group's convenor is David Cameron from the Greater Wellington Regional Council and it reports to the CEO Group of CEOs of regional councils throughout the country.

The term land management here does not refer to district planning land use but to soil erosion control. As such the Group works closely with other with groups working with biosecurity, pest control and so on. Its members also address matters such as urban erosion and sediment control, riparian matters, biodiversity, some aspects of landscape and amenity and the influences of climate change on soils.

In many catchments around New Zealand, such matters are a core part of ICM.

G.3 River Managers Group

The River Managers Group is a group of Regional Council staff who meet regularly to share information and best practice with a particular focus on river issues and the engineering/technical aspects of flood management. The Group is convened by Mike Adye of the Hawkes Bay Regional Council.

G.4 Water New Zealand Groups and Forums

The information below is taken from Water New Zealand website

<http://www.waternz.org.nz>.

G.4.1 Stormwater Special Interest Group

The Stormwater Special Interest Group has been in existence for several years and has a membership of over 300 interested people. In August 2001 its structure was formalised with the setting up of a Management Committee, whose duties include responsibility to the members of the Group for its administration and carrying out its policy under the umbrella of Water New Zealand. The Group caters to all people involved or interested in the management of stormwater systems.

The Group's objectives are to:

- promote the advancement of stormwater operation and management in order to improve the quality of service to customers, protect the environment, and optimise the sustained use of stormwater assets
- disseminate information related to stormwater issues
- provide a forum for the discussion of stormwater management issues
- promote and undertake projects in areas of common need and interest
- develop and maintain a set of national industry standards and policies
- promote the interests and needs of stormwater personnel through the proactive maintenance of formal lines of communication within all sectors of the stormwater industry through the Association
- promote education and public understanding of stormwater issues

The group has a twelve-strong management committee comprising representatives from a range of consultancies, industry suppliers, territorial and regional councils. It runs a major international conference every odd-numbered year in Auckland in May (the South Pacific Stormwater Conference) and a national Stormwater Conference in the intervening years in May in Rotorua.

G.4.2 Water New Zealand Modeling Special Interest Group

The Modelling Group has been a very active and successful special interest group of Water New Zealand for several years now. It is managed under the umbrella of Water New Zealand by an enthusiastic management committee that meets regularly to discuss the Group's activities and direction.

The group has a fifteen-strong management committee comprising representatives of utilities, specialist consultancies, territorial councils and a University. It has a stream at the stormwater conferences every year.

G.4.3 Water Services Managers' Group (WSMG)

The Water Services Managers' Group (WSMG) is made up of Territorial Local Authorities or their agents who are responsible for the management of water supply, trunk sewers, local reticulation, sewage treatment and stormwater assets. It was formed by a merger of the Water Supply Managers' and Drainage Managers' Groups in November 2007. Its major aims and objectives include to:

- promote a forum for the collection, sharing and debate of information on all matters relating to the management and operation of public water supply and wastewater treatment and disposal systems
- promote the advancement of the operation and management of these assets to improve the quality of service to customers, protect the environment and optimise the sustained use of these assets
- provide funding and undertaking of research projects in areas of common need and interest to members
- promote the development of industry standards and policies
- focus on the delivery of high quality water and wastewater services in a reliable, sustainable and cost-effective manner
- disseminate information relating to water supply and drainage management issues and provide a forum for discussion
- develop and maintain a set of national industry standards and policies
- act as an advocate to promote the interests and needs of water and drainage management by the proactive maintenance of formal lines of communication with all sectors of government and the industry through the Association.

Meetings are held approximately six monthly, in mid/late April and October.

G.4.4 Turnbull Group

The Turnbull Group, facilitated by Water New Zealand, was set up as an independent, multi-sector body committed to a solutions-based approach to improved water management; taking a leadership role in the development of commonly agreed principles and structures through which competing interests in water resources can be reconciled. The group has worked on the Resource Management Act reforms and looking at how an Environmental Protection Agency can be integrated within a proposed national governance structure for water in New Zealand. This work is presented in the 'Governance of water: A proposal from the Turnbull Group' in July 2009. It can be found at http://www.waternz.org.nz/documents/comment_and_submissions/090730_governance_of_water.pdf.

G.4.5 Senior Executive's Forum

The Senior Executives Forum is a group of CEOs and senior executives who meet four times a year to discuss issues of relevance to water utilities. The Forum is facilitated by Water New Zealand and is intended to inform the Water New Zealand Board and

executive staff on issues of common interest specific to water utilities.

G.5 Land and Water Forum

The Land and Water Forum is a multi-sectoral entity established by Cabinet. Its broad intent was delineated in a Cabinet paper, 'A Fresh Start for Freshwater'. While the plenary form of the Forum includes over 50 sector groups, a small group of 20 individuals, including iwi representatives, has been charged with addressing three, interconnected areas – governance, water quality and allocation. The small group is assisted by five "active observers" from central and local government. The Forum is chaired by Alastair Bisley and is required to make non-binding recommendations to Cabinet by 31 July 2010.

G.6 Primary sector water partnership

The Primary Sector Water Partnership is a group of major primary sector organisations committed to ensuring the sustainable use of freshwater resources in the primary sector. It has prepared a collective action plan that builds on the individual environmental management programmes of the various partners (NZ forest Owners Association, Federated Farmers, Fert Research, Meat and Wool New Zealand, Fonterra, Foundation for Arable Research, DairyNZ, Horticulture New Zealand, Irrigation New Zealand and Dairy for Life). In June 2008 it produced a 'Summary of the Plan of Action' with measurable environmental targets relevant to each member. The purpose is to promote sustainable freshwater management in the land-based primary sector by supporting and co-ordinating the sector's initiatives.

G.7 ICM Network

This group was formed in 2009 and aims to encourage exchange of information and best practice for people actively working on self-identified ICM programmes. Its convenor is Ross Abercrombie of Environment Waikato.

G.8 IPENZ/WNZ Rivers Group

Formed collaboratively by IPENZ and Water New Zealand in June 2009, the Rivers Group website is <http://www.ipenz.org.nz/riversgroup/>. Membership is open to all people passionate about New Zealand rivers and their sustainable use and management, whether they are an engineer, scientist, planner, academic, hydrologist, geomorphologist, climatologist, land manager or individual river enthusiast.

□ The Rivers Group was formed in 2009 to provide a forum for those involved with, and with an interest in rivers, flood risk management and the operational and environmental issues of catchments and river systems. □ The Group incorporates a wide variety of fields and of practice and interest to do with rivers, including cultural health, water quality, water quantity, flood management, energy generation and environment protection, as well as promoting a multi-disciplinary approach for river management, that reflects cultural and societal diversity in an integrated and holistic manner.

□ □ Key objectives of the Rivers Group are to:

- provide a national focus for all matters relating to rivers in New Zealand
- promote best practice and the sharing of technical knowledge in all aspects of catchment management, flood risk management and river engineering throughout New Zealand
- promote relevant science and research, disseminate information, hold events and otherwise promote leadership and best practice in river, catchment and flood risk management among professionals, academics, decision makers and the general public
- provide political and industry leadership towards achieving national consistency in government policies and programmes affecting catchment and river management and flood risk
- facilitate cross-disciplinary discussion with other professionals involved in catchment management, flood risk management and river management
- conduct all such lawful activities as are incidental or conducive to the attainment of the objectives of the Rivers Group, and to conduct all the affairs of the Rivers Group in a businesslike manner
- give effect to the principles of the Treaty of Waitangi.

The Group has draft rules and a draft strategic plan on its website.

G.9 Irrigation New Zealand

The following information is taken from the Irrigation New Zealand (INZ) website <http://www.irrigationnz.co.nz/>. INZ is based in Canterbury and describes itself as a 'unified national body to represent all irrigation interests'. Its mission is to 'promote excellence in irrigation development and efficient water management throughout New Zealand, based

on the principles of responsible and sustainable water management.’

Its background is the formation in 1978 of the New Zealand Irrigation Association, which went into voluntary recess in 1993. Re-launched in 2001, it was rebranded as Irrigation New Zealand in 2004.

The Association has rules and a constitution. Its vision is:

1. To be recognised as New Zealand’s leader in sustainable irrigation
2. To be the primary contact and support vehicle for addressing irrigation challenges and opportunities at both a national and local level

Its goals and objectives are set out under headings 1-5 below.

1. Advocacy & Leadership

Goal:

To proactively represent member interests whilst leading the irrigation sector forward in the development of sustainable irrigation and water resource management

Objectives:

1. Engage with central government to ensure -
 - There is a detailed understanding of the benefits and opportunities for irrigation in NZ
 - Current and future policy development is irrigation friendly
2. Engage with local authorities to ensure -
 - There is a detailed understanding of the benefits and opportunities for irrigation at the regional level
 - Current and future policy development and generic decision making is irrigation friendly
3. Engage with local authorities to demonstrate the benefits and encourage the development, implementation and uptake of irrigation user groups and ASM principles
4. Actively encourage uptake of irrigation best management practices and technologies

2. Relationships & Linkages

Goal:

Develop strategic partnerships with key stakeholders to enable INZ to better realise its key goals and objectives

Objectives:

1. Develop and strengthen alliances with NZ primary sector based partners to increase INZ's reach and effectiveness in achieving its goals and objectives
2. Develop relationships with the wider community to foster a better and factual understanding of the benefits and opportunities offered by irrigation
3. Develop new and strengthen existing alliances with sister international organisations to increase INZ's effectiveness in achieving its goals and objectives

3. Membership, Marketing & Communication

Goal:

To grow and diversify membership to represent the majority of the NZ irrigation community

Objectives:

1. Ensure existing and potential members understand INZ's purpose, role and achievements
2. Develop and diversify the added value component of INZ membership
3. Develop feedback pathways to ensure membership satisfaction and stability

Goal:

To ensure the wider community develops a broad understanding of the benefits and importance of irrigation in the development of resilient communities

Objectives:

1. Provide help and support to rural communities in the promotion of irrigation
2. Develop learning pathways to better inform the urban and peri-urban community of irrigation

4. Education & Training

Goal:

To be the recognised facilitator of and repository for the development, upkeep, promotion and implementation of generic irrigation education and training resources

Objectives:

1. Develop, maintain and promote an entire of suite of NZ irrigation industry standards and associated training

2. Develop, implement and promote a quality assurance scheme for the NZ irrigation industry
3. Develop and maintain a web based resource detailing all irrigation related training opportunities in NZ

5. Research & Development

Goal:

To be the recognised facilitator of and repository for, generic irrigation research and development in New Zealand

Objectives:

1. Facilitate and support the development of a professional grouping of commercial irrigation interests in NZ
2. Provide leadership in the development of irrigation BMPs (best management practices) and for research and development in NZ
3. Develop and maintain a web based resource detailing all irrigation related BMPs and research and development for NZ

Appendix H Case studies

H1 Case studies from S4 “What has worked and why”

The following case studies are summarised below:

- the Sherry River
- the Taieri Trust
- six urban stream projects
- the New Zealand Landcare Trust
- the Aorere Catchment Group
- five rural sustainable land management groups.

H1.1 *Building the Sherry River ICM community*

The Sherry River initiative aims to improve water quality within the Sherry River catchment, a 7800 hectare sub-catchment in the upper reaches of the Motueka River near Nelson. Research undertaken through the Motueka ICM research programme in 2001 identified some major water quality problems related to dairy herd crossings. Sherry River landowners have taken ownership of the issue and four new stock crossings have been developed as a direct result of this work. Current monitoring is now showing water quality to be routinely improved as a result of this work. From that beginning the range of activities being undertaken by the community has grown significantly. In addition to riparian planting and stock elimination fencing activities, the group with ongoing support from the Council and Landcare Trust has gained funding from the Sustainable Farming Fund and employed their own consultant to assist them to develop individual environmental farm plans and best management solutions tailored to Sherry River climate.

Landcare Trust coordinator Barbara Stuart says that the Sherry River experience highlights much of what is needed for successful community-based projects to succeed.

The initial project got off to a very positive start because:

- the initial “Cows in creeks” research findings were shared by the Motueka ICM science team and discussed with landowners at farmhouse meetings
- facilitation and other coordination has been provided through the involvement from the beginning of the NZ Landcare Trust
- having this initial dialog between council, researchers and landowners was useful to building a collaborative atmosphere from the first farmhouse meeting
- ongoing research involvement to monitor results of the new stock crossings, and then to gain an acknowledgement of that success in the subsequent “Cows out of creeks” report build and reinforced motivation for the joint approach.

Catchment Group meetings help create a bigger picture for all those involved. It is not just about any individual farm, but it is about a number of farms and land uses in the context of a whole catchment. Equally importantly the project has linked the wider catchment community. It has created new opportunities for dialogue between farmers and upstream

forestry managers and council river supervisors about the impacts of the different land uses in the catchment, including e.coli run-off, sediment sources and willow maintenance.

H1.2 The Taieri Trust

The Trust appears to have taken the “resilient communities” approach to ICM, as evidenced by its objectives, which are (ibid) to:

1. enhance existing relationships and partnerships
2. establish an information exchange system
3. implement actions for environmental improvement
4. design reflection and evaluation strategies.

On the basis of these, the Trust aims to develop better relationships, improved monitoring, smoother RMA processes, fairer whole-of-community outcomes, improved environmental outcomes and more efficient use of water as a results of the multi-stakeholder catchment management groups that will develop a community-led operational system for water allocation.

An independent review (Tyson, 2004) found the Taieri Trust to represent “one of the best examples to date of an integrated approach to catchment management in the country. As such, it serves as an important model for agencies and communities in the country interested in sustainable ways to remediate deteriorating environmental conditions”.

The barriers and solutions from the review are summarised in Table 5.

Table 1 Barriers and solutions to ICM in the Taieri

Source: Tyson, 2004

Barriers	Solutions
<ul style="list-style-type: none"> • consumer expectations outside the catchment drive production practices in the catchment • limited supply of water and lack of water harvesting/storage for irrigation • multiple demands are difficult to balance • lack of communication leads to suspicion/tension • lack of rural:urban understanding • lack of models for managing resources • unrealistic expectation and reluctance to compromise (e.g., water demands exceed supply) • entrenched attitudes and ignorance of water quality problems • uncertainty on how to transfer knowledge effectively • RMA lacks implementation and enforcement • lack of leadership 	<ul style="list-style-type: none"> • establish a common vision by increasing community participation • engage lwi in Taieri Trust activities • perform cost:benefit analyses and prioritize interventions based on findings • Taieri Trust can build vision and lead as an educator/communicator but needs a long-term strategic plan • the regional council needs to take ownership on implementation • look at options and feasibility of various water management initiatives before 2021 • help the community with RMA processes • build more public awareness of water quality issues • improve information management between the Trust, agencies and community • use local knowledge • expand the Trust's role as an information clearing house • seek additional funding for more local interventions, development of a community nursery, high school

• lack of money for compliance (e.g., fencing)	programs and a symposium for children and schools
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H1.3 Six urban stream projects

An analysis of six urban ICM projects in Auckland (Tiffany Bush, Friends of the Oakley and Whau Creeks, KERP, Tamaki Estuary Protection Society and Project Twin Streams – Scott, 2007) found that factors that enhanced community engagement in group activities and building group capacity and partnerships with local government and industry are closely linked.

Factors identified as critical to successful capacity-building included:

- leadership (political or organisational)
- targeted planning and communication
- a willingness to identify and engage existing community organisations
- adequate resourcing, knowledge and skills of the sponsor organisation and its personnel
- flexibility and creativity to engage the community's different motivations for participation
- local projects that give regular opportunities for people to connect with and become involved with caring for their local area.

The analysis (Scott, 2007) showed that groups had built varying levels of working relationships with councils, from participation in consultation processes to active partnerships on catchment management. The analysis also highlighted that the availability of resources was critical for building effective partnerships with local government.

H1.4 The New Zealand Landcare Trust

Edgar (2004) prepared a final report on a project that was originally aimed at sharing community best practice in ICM. In essence, the project developed and supported a national network of ICM practitioners and participants who shared experiences about the practical application of ICM initiatives at a community level.

It then made recommendations about supporting the national co-ordination of community-based ICM experiences and ICM in New Zealand.

The findings are reported here because while they target gaps, they also act as indicators of elements of effectiveness (and the ability to measure it) in the following areas:

- the need for requires resourcing to achieve outcomes
- the need for more formal and systematic attempts at developing project performance criteria before start-up
- development of criteria or indicators to evaluate the human dimensions of projects, particularly where the focus is on establishing the value of an initiative within communities.
- communications are key to sharing experiences, including newsletters, working groups, regional meetings and regularly updated materials on the web

- community capacity building in ICM is needed on a range of issues, including not only ICM but related resource management issues such as
 - catchment planning techniques
 - environmental monitoring, including for land, water and biodiversity
 - riparian and waterway restoration and management
 - pest management
 - biodiversity
 - land, stream, wetland management
 - predictive ecosystem models
 - flora and fauna identification and life histories.

Training in the following generic skills was also requested by participants:

- group learning
- partnership development
- changing behaviours and perceptions
- how to involve the community
- how to support/motivate community volunteers
- integrating science into community action
- working with industry/business
- indigenous approaches and consultation, including guidelines for incorporating indigenous and traditional knowledge into ICM processes
- extension tools, facilitation, information transfer techniques
- integrating social and economic dimensions
- project management
- use of databases and GIS techniques
- integrated environmental management.

H1.5 The Aorere Catchment Group

Key findings from a presentation to the Federated Farmers Dairy Council in February 2009 by farmer and Dairy Chair Michelle Riley (in Brown, no date) were:

1. A group approach takes the pressure off individuals. It allows learning to happen in a non-threatening way. It means there is always someone with energy when other's energy levels are low.
2. Use the farmers in your group as experts, they are! They have been key speakers at all the field days we have had.
3. Move past emotion, engage in high quality discussion.
4. It takes time - our council have realised that everything can't be done at once and we have to explore ideas or technologies that may just be coming on stream. It is best to improve a system well, over time, than just do a quick fix.

5. Bring in other experts to interact with your group, they learn a lot in addition to you gaining specific information in their specialty. ('Experts on tap not on top' - Gretchen Robertson, Landcare Trust). Farmers need to be supported with science, as we discussed with DairyNZ and Fonterra at our meeting.
6. Keep the process open - people can join in or pull back according to their life challenges and time availability. It is never too late to come on board and there will be changes in farm ownership and staff along the way.
7. Communicate well with your members. We really need to understand the land/water interface a lot better than we have done and realise the impacts land management has on our waterways. It was interesting to hear Mike Scarsbrook say that sedimentation is the biggest threat to our waterways, and we saw another example of this on a farm tour that had peat lake depths decreasing because of this. The sediment traps the farmers built are very effective at mitigating this.
8. Acknowledge the problem/s and learn how this affects other land or water based businesses. In our case the aquaculture group; we have learnt a lot about their compliance constraints - testing regimes, quality control; effects of sediment, nutrient and bacteria on the shellfish; costs and returns; effects of floods on water quality... And we have met these people and visited mussel farms.
9. Liaise with and utilise outside agencies - Landcare Trust - a cross boundary organisation - has been fantastic at supporting our group with ideas, administration, dialogue, telling us we are doing well! They have been excellent to work with and we are now involving other top of the south groups, building collaborative networks of landowners. In the case of other conservation groups we have found them also to be great at coming on board, however, it has been on our terms. This is a landowner group, we drive it.
10. Build meaningful relationships. We had Forest and Bird and a Streamcare group represented with displays at our FARMDAY, Fish & Game were unable to attend the day, but are keen to do so in the future.
11. Let's earn back the respect we seem to have lost. This ties back into point two. Farmers are experts at land management.
12. Emergent leadership strategies draw in and develop leaders for the future, including our younger members.
13. Tell your story in a positive way. Manage media releases, wait until you have a good story to tell, you have to be able to substantiate it. Good stories build traction.
14. Celebrate success! Make it social and fun. Evaluate outcomes and plan the group's future.
15. And finally - *start where you are at, do what you can, use the gifts you have.*

H1.6 Five rural sustainable land management groups

Based on five case studies and a literature survey and overview of 19 projects, MAF (1999) found that groups work well: their enthusiasm, fostering of debate, demonstration of new practices, and in-kind effort is likely to produce a greater and more effective impact than would farmers paying for information on a one-to-one basis. They provide an effective ready-formed means of raising awareness and discussion on a range of issues and/or providing a vehicle for education. Effectiveness is increased when the groups provide hands-on learning opportunities and can demonstrate clear benefits from new practices and groups are an important means of liaison between farmers/growers and the

various agencies that have an interest in the rural community. Groups also provide a mechanism for encouraging social contact and support within rural communities. The importance of this should not be undervalued for a sector of society that is under considerable economic pressure and experiencing the negative effects of declining services.

The research identified the following factors of success:

- strong motivation is necessary if a group is to enjoy widespread initial support and longevity. In Kurow it was the 1984/85 drought. For Hawkes Bay it was being the first pipfruit monitor orchard plus having a whole range of technical issues requiring resolution
- objectives should be clear, measurable and have widespread support among the membership. The North Otago Group a clear objective (to meet council planning requirements) and as a result it quickly became effective. In contrast, Nelson had no clear objectives and it took over a year for the group to get going
- using hands-on involvement by group members to demonstrate new practices is much more effective than researchers or council representatives talking at people from a theoretical base. The wider the context in which issues can be demonstrated, the more effective is the transfer of ideas
- groups benefit greatly from having a professional co-ordinator. A good group co-ordinator must be self-motivated, prepared to do anything, have good people skills, have a wide range of expertise and knowledge, and be able to bridge the gap between farmers, policy makers, environmental groups and the wider community
- the quality of the farmer leader (group chair) is crucial. This person must be pro-active, respected, and committed to environmental issues
- the effectiveness of the groups seems to be related more to group structure and approach, than to the amount of funding received. However, our research indicates that a minimum of \$25,000 per annum is required to run a group effectively.

Overall impacts included improved relationship with councils: where the groups have been able to involve outside stakeholder groups, particularly regional councils, there have been very real benefits to both farmers and local communities. Whereas land users and regional councils were fundamentally opposed during the early years of some groups, these relationships have, over time, improved dramatically. Through the process of sitting down together and talking through issues, there has been a very helpful increase in the understanding, transparency and accountability of the councils who service rural communities and vice versa. This can provide a mechanism to initiate appropriate action when environmental issues arise.

Incentives for change included positive and negative approaches:

- in all cases financial incentives were seen as the most effective way of encouraging change, particularly when economic risk is high (e.g. subsidies for tree planting on hill country). All groups see the need to protect vulnerable areas but this comes at a cost. Fencing riparian strips or areas of bush, or planting trees to protect against tunnel and gully erosion can be expensive while providing no economic return. Effective measures to assist with meeting or reducing these costs (e.g. subsidies on materials, rate rebates) would encourage an uptake of these practices
- rules and regulations have a place but should only be used as a last resort and only where there are adequate resources to ensure compliance

- the threat of possible regulation is often all that is needed to bring home the economic impact to farmers and cause them to change their behaviour.

Seeing is believing, as the authors found: the “credibility of environmental improvements is likely to be greater if farmers/orchardists can see demonstrations on a range of neighbouring farms rather than just on a single focus or monitor farm, which may have quite different qualities to their own property”. Other findings were that:

- monitor farms are restrictive in terms of what they can demonstrate because results are confined only to one set of soil/physical/climatic/ financial/social factors. However, where there are outstanding technical issues to be resolved (e.g. spray application rates), the focus farm/orchard can be very effective. This is particularly so for intensive production systems that are relatively homogeneous, e.g. pipfruit
- monitor orchards/farms can be effective at demonstrating the results of research undertaken for improved economic performance, but overall, there is a real question as to whether technological transfer relating to environmental sustainability can be effectively achieved through the monitor/focus farm/or orchard approach
- where technology is known, a district approach appears to be more effective for technology transfer than the single monitor farm approach
- when there are a number of issues to be addressed across a wide range of land-use types, it is much more effective to pick the issues and then the farms to demonstrate a particular solution than to attempt to demonstrate all new ideas on a single property
- the district approach facilitates involvement by a much wider range of land-users and potentially facilitates the addressing of a wider range of issues.

MAF made the following recommendations to improve effectiveness of sustainable land management (SLM) groups:

- central government needs to specify nationally applicable objectives for SLM in consultation with local government and farm communities
- the goals of SLM should tie together economic and environmental sustainability objectives, in order that these objectives are mutually reinforce one-another. Environmental sustainability should not be compromised in the quest to improve the financial viability of farms or orchards
- funding for SLM should be made contestable and transparent, and funding criteria should be negotiated on a local level to ensure particular community priorities are not subsumed by national imperatives
- where MfE is providing funding, it must specify much clearer environmental objectives, outcomes and monitoring methods as part of funding approval. These need to be simple and easily applied
- a person with expertise in group facilitation and strategic planning should be provided as part of the funding package. This person would assist SLM groups to establish clear objectives, outputs, extension strategies, and measures of effectiveness, which meet the needs of both the funding agencies and the farmer/grower community. Having a clear plan developed at an early stage will enable SLM groups to use more of their funded period to focus on achieving results. It will also provide an opportunity to ensure that activities give increased emphasis to achieving environmental benefits
- funding agencies and SLM group initiators should recognise that land-users are more likely to adopt better environmental practices where they can see a clear benefit

(short, medium or long-term) to the economic sustainability of their operation. Consequently, group objectives and extension activities should make a clear link between environmental and economic benefits

- where there are no economic benefits to farmers, e.g. in the case of ongoing environmental monitoring, central government should provide funds to cover the costs of these SLM project components
- where there are externalities, which need to be addressed, regulation should be a last resort. Central and local government should first negotiate with communities to reach mutually acceptable solutions
- agencies such as MAF, MfE, councils, fertiliser companies, meat companies, and marketing organisations need to co-ordinate requests to farmers for base data. Much of the information they require is common and should only be collected once
- the funding timeframe needs to be extended beyond six years. Increased awareness of sustainability issues is happening, but changes in behaviour take time and observable changes in the environment can take much longer. Experience to date suggests that it takes up to three years to establish a functioning group and a further three years to achieve tangible environmental outputs. Thereafter environmental outcomes become apparent over the next 20 - 30 years. Funding is needed over this latter period to monitor the changes and feed this information back into the process.

H2 Case study from S5 “Barriers to development and adoption of catchment-related initiatives”

H2.1 Regulatory barriers: case study of North Shore City

Regulatory mechanisms can pose challenges to councils and communities wanting to introduce more sustainable forms of urban development. This subsection summarises three papers by Heijs (2008, 2009 and 2010) describing some of the experience of the North Shore City Council with trying to introduce low impact urban design for more sustainable water management – as mandated by the Auckland Regional Council – into its land use, asset management and stream and beach care programmes.

Although the papers cite a number of different case studies, this review will focus on the experience with Long Bay.

The North Shore City Council stormwater team’s process of introducing low impact urban design (LIUDD) into new and existing developments began with convincing other parts of the council (e.g. councilors, management, planning, roading, parks/open space, communication, consenting) that it was a sound idea: interestingly, councillors were more receptive and senior managers more risk-averse. Other stakeholders included the Auckland Regional Council, the development industry and the community itself.

Costs – tangible and intangible – were a major part of the debate: there are many reasons why LIUDD was desirable, but if it proves more expensive, how much are we prepared to pay? How do the life cycle costs compare with the short term capital costs? What are the perceived vs the real costs: How will ongoing operation and maintenance and enforcement costs be funded?

In 2004, the Council agreed on a Stormwater Strategy. The District Plan then had to be changed, research and pilot/demonstrations conducted and guidelines and practice notes prepared.

Heijs distinguishes between things we want to do – like recognising benefits across all four wellbeings, staff education, industry and community liaison – and things we have to do – meeting the requirements of the RMA, Building Act, Building Code, Regional Plan, District Plan, Structure Plan and technical guidelines of the Auckland Regional Council and the North Shore City Council itself.

Although the internal and external consultation was demanding and time-consuming, the RMA processes were worse. While “the theory is great”, Heijs found that in practice, making plan changes was extremely expensive due to legal arguments and the argument for the greater good was lost.

He says that “Such institutional barriers and difficulties with the legal framework provide barriers for councils wanting to do the right thing. Because the RMA is an enabling act and effects based, it is not always helpful to assist councils in meeting the four wellbeing-outcomes required by the LGA in an efficient way. Processes are prohibitively expensive and have uncertain outcomes.”

Long Bay is North of North Shore City and has a number of unique features such as the prominent ridgeline, a high quality stream, a regional park and a Marine Reserve. In an Environmental Court Ruling in 1996 Long Bay was allowed to be urbanised but under strict conditions. As a result, the Long Bay Structure Plan, of which stormwater

management is an important component, has been in the making for over 15 years. The Council was keen to protect and where possible enhance the existing natural environment, and there were a number of appeals against the Structure Plan provisions. The case was heard before the Environment Court in 2007 and at the time of writing this report the decision is not yet out.

The Long Bay Structure Plan was the first structure plan where land use planning and catchment planning were developed simultaneously in order to protect the natural environment by careful management of the land development process. It was recognised that complying with, more general regional guidelines and the District Plan provisions for other parts of the City, was not sufficient to protect and enhance the very sensitive and high quality receiving water environments. A low impact design (LID) was included in the proposed structure plan, with a combination of:

- avoiding or minimising land modification and urbanisation and related earthworks of those parts of the catchment that have sensitive receiving environments
- protection of headwater streams as an important contributor to the health of the stream system
- concentrating urbanisation in areas where the effects are minimal or can better be managed
- “fit-for-purpose” stormwater management requirements related to the receiving water environment and land use
- use of on-site stormwater management practices such as rain tanks and bio-retention, to minimise changes to stormwater runoff from the site, including roads. The use of rain-tanks also contributed to the reduction of water demand, another sustainability objective
- use of a stormwater treatment train approach.

“You cannot half protect a stream,” says Heijs: “A decision on a branch-by-branch or a consent-by-consent basis, as argued by the developer, will almost certainly lead to an unsatisfactory result as clearly shown elsewhere in the city. Instead, an integrated and precautionary approach using international best practice is warranted to ensure successful protection of the Vaughans stream system and the Marine Reserve.

“The good part of the court case outcome was that, from a water management point of view, the outcome was very successful. The [Judge] accepted the LID and the rationale applied to justify this approach. He clearly rejected the branch-by-branch approach and the “leave it to the individual consent” approach that was proposed by the developer. One example was that the Court often used the map showing the streams and stormwater sub-catchment as a reference in its decision. Another interesting example was that the judge did not accept the current water quality in the lower catchment, caused by poor land management by the developed as the baseline. Sustainable water management, as an input and major driver to land use planning, was accepted!

“The downside of the court case was, in my observation, the process which was, although very interesting, frustratingly long and prohibitively expensive. This raises questions around the legal framework and possible implication for other similar cases in the country.”

The legal and institutional barriers Heijs identified related to the time-consuming process and heavy legal costs.

The Council spent approximately \$1.5 million on the technical work related to the 3-waters management throughout the Long Bay Structure plan process. This excludes legal fees and fees outside stormwater management area such as land use planning, geotechnical advice, transport, archaeology and so on.

Expense and uncertainty often deter the Council (and, Heijs suspects) many other councils, from taking or defending appeals. Yet, he observes, North Shore City is one of the bigger councils in New Zealand and much better able to financially support lengthy and complicated processes.

Based on his experience overseas, he believes that land-use planning processes would be more efficient if they were based more on community outcomes rather than RMA effects. One example is the way “speculation” is avoided by valuing the land against “past land use” instead of against “potential land use”. In this case the financial incentive to take cases to court reduces significantly.

As he observes, the RMA is an “enabling” act and effects-based, whereas the LGA is outcomes-based, requiring councils to deliver on community outcomes and look after the four wellbeings. These two are at odds or at least requiring very innovative approach in writing outcomes into District Plan requirements. The RMA has good intentions, but is very difficult to implement, requires lengthy and expensive processes, prohibitively expensive and does not deliver on LGA requirements. Outcomes to date in North Shore have shown that our District Plan and consenting processes have failed to adequately protect our streams and beaches, yet the process of changing it is also protracted and expensive.

Heijs proffers the following example: “The Court decision related to Long Bay ruled that the Awaruku slopes can be developed to a higher density compared to what was proposed both by Council and the developer. I’m guessing that this was done to offset some of the loss of yield in other areas of the Structure Plan for environmental reasons. Although this decision can be justified from an effects based assessment, it does totally ignore the community (LGA) interest that might not aspire to this type of development but is sidelined and has no say in this part of the process. Community concerns are generally considered in district plan processes, but only at the beginning. As the process moves into hearings and court appeal processes the ability of the community to be considered reduces significantly and community outcomes are often not achieved. Again as argued in the previous section the RMA is a “rich-man’s” act with the result that private good has too much weighting compared to the common good.”

In conclusion, Heijs notes that if the Environment Court largely “agrees with the proposed stormwater management and stream protection components of the Structure Plan, the spending of the \$1.5 million and all those years of planning will be worth while. It would hopefully set a benchmark for future developments in New Zealand. If the Court disagrees, it would put NZ back at least 10 years compared to international best practice.”

H3 Case study from S6.3 on “Participatory monitoring and evaluation”

The information here is taken from Allen et al (2002a). References are listed in the main report.

Participatory approaches pose new challenges for decision makers and evaluators. They require change at the policy level to respond to local demand, and to empower communities to act (Narayan 1993). At the programme level, detailed outlines for action can no longer be drawn up at the outset, since problem solving is based on partnerships and cooperation, and not the quest to achieve some externally identified goal. Inevitably, whatever aims are finally chosen, implementing the solutions to reach them will involve a long process of difficult dealings with a great variety of individuals, groups, and institutions who can make them fail or succeed (Mermet 1991).

Problems with conventional evaluations

Conventionally, evaluation involves measuring performance against preset indicators, often with the help of outside experts at the end of the project cycle. Monitoring and evaluation of participatory processes requires an approach that moves beyond these models of project evaluation, and recognises participation's quantitative and qualitative dimensions. Participation is not merely a one-off input or action in relation to a project; it is an ongoing process underlying the project's progress. As such, it cannot be understood using a simple snapshot approach. Traditional forms of monitoring and evaluation can result in:

- an overconcern with effort, effect and efficiency, and the tangible and material performance of the project
- a bias towards favourable quantitative outcomes and failure to capture unforeseen consequences
- a bias towards external conception and implementation, taking little note of the experiences of local people
- time-consuming major evaluation exercises that absorb the energy of project staff
- monitoring being feared rather than embraced by project members.

Monitoring and evaluating in this way does not help improve ongoing projects, nor can participants learn from “surprises”. Both are required in the learning-based approaches being adopted by organisations in regard to resource-use-efficiency initiatives (Vickers & Cordey-Hayes 1999).

Participatory monitoring and evaluation

Participatory monitoring and evaluation represents a different philosophy of monitoring, and the questions that it should shed light on. In particular, participatory monitoring and evaluation recognises that it is important for all stakeholders to have ways to evaluate the participatory process in which they are involved. For instance, funders need evidence that their investments are paying off and need intermediate indicators of success (e.g. within the time frame of funding cycles) for process-oriented initiatives such as capacity building. Equally, other stakeholders giving their time to help the particular effort (e.g. land managers providing information, agency staff facilitating projects) need evidence that their input is having an effect, at the least, to maintain their motivation for continued involvement. Because these programmes are designed to be responsive to changing community needs, one of the most pressing requirements is to develop appropriate

evaluative processes to foster ongoing learning, correction, and adjustment by all stakeholders.

This involves clear objectives and indicators of success that promote accountability, and which can be monitored and evaluated by the relevant participants and decision makers at all levels.

Evaluation is no different to any other monitoring programme. It will pay off only to the extent that it reflects on the results of past actions, and enables people to think more clearly about their future actions (Bosch et al. 1996). Beyond the individual programme level, collaborative initiatives can be seen as experiments providing opportunities for practitioners and action researchers to learn about fundamental, cross-cutting questions concerning the best way to model programmes. They are also an opportunity to examine the role that social capital and capacity building can play in helping achieve more environmentally sound management. Hence, information from evaluation of these initiatives can be fed back to shape future policy and research agendas.

Participatory monitoring and evaluation in practice

Monitoring and evaluation of participation should involve both qualitative and quantitative elements. In any programme there will be tangible outcomes that can be quantified so that the extent of change can be judged. There will also be aspects that can only be described and ultimately interpreted to understand the change that has taken place. Participatory monitoring and evaluation covers a number of approaches including auto- or self-evaluation, beneficiary assessment, participatory impact monitoring, participatory assessment monitoring, and evaluation. All these approaches have in common the active and meaningful involvement of one or more “stakeholders” in the design, implementation, analysis, and critical review of monitoring and evaluation activities. This moves beyond roles traditionally assigned to researchers or to “external” evaluators contracted by funders to look at project or programme achievements.

Participatory monitoring and evaluation builds upon the approaches and tools used in participatory (action) research, but also borrows from traditional social science approaches and conventional monitoring and evaluation theory and practice. Participatory monitoring and evaluation has a special interest in looking at participation itself, seen both as a means to an end (the process of participation) and as an end in itself (enhanced participation in terms of number of people and/or quality of involvement).

More than any other activity and by its very nature, building the capacity for groups to mature depends for its effectiveness on participant ownership and commitment. Its success will rely on the use of participatory and formative evaluation exercises that strengthen the ability of groups and group-members for ongoing self-assessment and correction. By engaging in such exercises groups will be able to progress from dependency to interdependency (Pretty & Frank 2000). The monitoring and evaluation component of environmental research and development programmes, then, needs to be equally about building capacity, diagnosing constraints and opportunities, and trying to make programmes grow and expand, as it is about measuring and describing progress on the ground against preset targets.

The participatory nature of these evaluations encourages the use of evaluation as a learning tool and allows the perspectives of different team members to be articulated. It also provides information to feed into programme design, enabling the programme managers, in partnership with team members, to rethink and adapt goals and methods during the programme according to emerging issues.

It is often useful to have a third party help with evaluation. Ideally, they should specialise in: helping the different parties frame realistic goals, measuring progress towards operationalising them, recognising when a change of strategy may be required, and extracting insights from their hard labours. As Ashton (1998) points out evaluators are not expected to have answers, but they are expected to raise important questions for participants to answer.

Finally, it is important to plan strategies for approaching and involving each person or group at the beginning of the evaluation exercise. How to do this will usually depend on the results of an initial stakeholder analysis. How involved each stakeholder is will depend on the appropriate type and level of participation. There is no need to involve reluctant stakeholders and stakeholders may change their level of involvement as the process continues, thus partnerships should be flexible and designed to grow. Where the stakeholder is a group rather than an individual, you may need to decide whether all in the group participate or only representatives of the group.

H4 Case studies from S6 “Significant constraints to effectiveness of ICM”

The following case studies are summarised:

- efficient use of freshwater: the Office of the Auditor-General's report
- ecological bottom lines for freshwater: the Dairying and Clean Streams Accord
- linking interventions with monitoring outcomes: the Auckland Regional Council's state of the environment report
- how much is enough? Benchmarking second and third order outcomes for riparian plantings and soil conservation.

H4.1 Efficient use of freshwater: the Office of the Auditor-General's report

Local authorities are responsible for supplying drinking water to about 87% of the country's population. The Office of the Auditor-General (OAG) carried out a performance audit (2010) of local authorities (TAs) to form a view about how well prepared the country is to meet the likely future demand for drinking water based on a representative sample of eight local authorities. Of these, three were managing their drinking water supplies effectively to meet forecast demand for drinking water, three could be doing better and two were managing poorly. The better-placed local authorities have consistently used a wide range of strategies to influence demand and supply patterns and have an ongoing focus on water supply efficiency, such as minimising water leaks.

Challenges include the need for some significant improvements in forecasting, planning, and upgrading infrastructure; increasing competition for access to water; the need to reduce consumption; the costs associated with upgrading infrastructure and meeting the drinking water standards for water quality; managing demand to reduce consumption; improving information available for forecasting, planning, and asset management and risk management planning, all of which were noted as being likely to increase in difficulty in the future.

Some TAs were limited by the quality of information they had, particularly about assets and water use as well as about evaluation of the costs and benefits of strategy options. Some could do more to improve the efficiency of their water supply systems through, among other things, active leakage and pressure control programmes to result in, among other things, more efficient and sustainable use of water.

Levels of service, performance measures, and targets varied, and while this may be appropriate given the different circumstances of each TA, in some instances, targets were poorly defined, making it difficult to measure progress.

While most of the eight TAs were clearly taking sustainable development into account, the actions they had chosen were not comprehensive: none had a fully integrated approach to dealing with sustainable development and supplying drinking water.

Opportunities to improve how they manage their drinking water supplies include:

- improving the information available for demand forecasting;
- using more tools to assess and verify the reliability of their demand forecasting;
- preparing comprehensive demand management plans; and
- putting more emphasis on improving the efficiency of water supply systems.

The OAG observed that these findings were “generally consistent” with the Office’s 2008 findings on the quality of performance reporting. It may be remarked that they are also generally consistent with the findings of this report.

H4.2 Aiming for ecological outcomes: the Dairying and Clean Streams Accord

The Dairying and Clean Streams Accord is a ten-year agreement signed in May 2003 between the Ministry of Agriculture and Forestry, the Ministry for the Environment, Fonterra and Local Government New Zealand (on behalf of regional councils) aimed at achieving “clean healthy water in dairying areas”.

The Accord sets out five targets:

- dairy cattle excluded from 50% of streams, rivers and lakes by 2007, rising to 90% by 2012
- 50% of regular crossing points have bridges or culverts by 2007; 90% by 2012
- all dairy farm effluent discharges comply with resource consents and regional plans immediately
- all dairy farms have in place systems to manage nutrient inputs and outputs by 2007
- 50% of regionally significant wetlands fenced by 2005, rising to 90% by 2007.

Progress is measured by the results of Fonterra’s On-farm Environmental and Animal Welfare Assessment, which has a 99% participation rate, and regional council monitoring of compliance with regional plans and resource consents. It may be noted that both of these are second order outcomes.

The Accord is a voluntary agreement, but two methods of enforcement are available:

- the normal compliance inspection and enforcement procedures in place in all regional councils, which do prosecute persistent or serious offenders
- Fonterra's threat to refuse to accept milk from non-complying farms (it was reported on National Radio's Morning Report on 18 March 2010 that this has been done twice in the last year).

The 2008/9 snapshot revealed that while some progress was made toward achieving three of the Accord targets, the number of farms where effluent discharge complied with resource consents and regional plans dropped to its lowest level since 2003, with an average of 15% "significant" non-compliance with regional council rules (maximum 27% in Northland) and rates of full compliance varying regionally from 39% in Northland to 96% in Taranaki.

Interestingly, the latest report notes that only seven of the 13 regional councils had defined and identified their regionally significant wetlands and of these, only three have met the 2007 target. (This is likely to indicate capacity gaps within councils.)

These results indicate that sector-based voluntary agreements, especially when supported by guidelines and financial measures, can improve performance but won't address all non-compliance. However, wide variations in enforcement capacity between regions also shows that the provision of regulatory and enforcement mechanisms is not in itself sufficient to ensure improved performance and hence improving environmental quality (second and third order outcomes respectively).

The adoption of the Accord's actions by individual farmers also needs to be linked to water quality monitoring results in dairying catchments – the third order outcomes that are the Accord's ultimate objective.

H4.3 Linking interventions with monitoring outcomes: the Auckland Regional Council's state of the environment report

The Auckland Regional Council's 2009 state of the environment report highlights some clear issues for ICM. It uses the DPSIR model (driver, pressure, state, impacts, responses) in order to (p8) enable complex social, economic, historical and scientific information to be woven together. However, the conclusions note (p296) that the "complexity of natural systems is such that we may never know as much as we would like to about the state of our environment. We are only just beginning to understand the intricate relationships between species, populations and ecosystems, and also the interactions with people, both immediate and cumulative."

One of the issues this raises is the attribution problem previously noted: in complex environments such as cities and regions experiencing Auckland's rate of growth and consumption it can be hard for state of the environment monitoring to identify the effects – and effectiveness – of issue- or place-based management programmes, especially where "after we have intervened it will take time, often decades, for results to be apparent in monitoring data" (p297). Logic models (Hellberg et al, 2009) can help to expose logical gaps, flaws and assumptions, but targeted programme monitoring and review is also vital. Chapter 6 of the report addresses this by assessing the effectiveness of the management responses by looking at compliance as well as state of the environment monitoring to answer the question "Is it working?"

A key comment in the conclusions relevant to this report is (p296) that "Many of the negative trends highlighted in this report occur despite regulatory efforts by the ARC and

other authorities. This illustrates that while regulation is important (and has probably been critical to arresting decline in the state of some natural resources) the mitigation of impacts possible through individual consent practices is limited. In reality, consented activities will still contribute to many of the environmental problems we face. This means that effective environmental management will always require more than simply requiring, considering, issuing and enforcing consents for individual activities. It will require careful planning (where trade-offs are made at a higher level), community and landowner engagement, public investment, inducements and initiatives. In doing so, we must carefully consider where the costs and benefits for these types of interventions lie to ensure that they are fairly and equitably allocated between the public and private sectors, without loading costs onto future generations.”

The report also notes that (p298) “In many ways the information in this report confirms that we have exhausted the easy opportunities for environmental improvement, just as we should have. Like other cities in New Zealand and around the developed world we are at the cusp of a new era in environmental management. The relatively easy-to-deal-with point sources of pollution have been regulated and cleaned up ...Over the next decade we face the task of addressing the more challenging diffuse sources of pollution. ... Particular examples of concern include run-off from land into surface or ground water following rainfall or the cumulative contribution of many home fires burning during winter. This new focus will necessitate greater landowner and stakeholder engagement to manage land use practices more effectively.

“This may also involve looking ‘up the pipe’ to focus on what happens before a discharge occurs and controlling contaminants at source (such as low impact design to stormwater and land management, which is a more proactive and more cost effective way to reduce pollution). In rural areas it will mean much greater scrutiny of land management practices.

“These diffuse discharges mean we need greater integrated management across land and water resources. This is not a new concept but we have yet to fully realise its potential. In essence it means we need to manage the land to take care of the freshwater and marine environments. Managing the marine environment starts at the top of our highest ranges and hills.”

This is a strong endorsement of the catchment-based focus of the Auckland Sustainability Framework, and together with other parts of the report, essentially espouses ICM.

H4.4 How much is enough? Benchmarking second and third order outcomes for riparian plantings and soil conservation

Riparian management projects are being undertaken across New Zealand in an attempt to reverse some of the impacts of land use on waterways, as Parkyn and Davies-Colley (2003) observed, usually involving fencing out livestock and planting trees along stream margins to create buffer zones in the expectation that this will “help deal with problems including channel instability, degraded aquatic habitat, and water pollution from diffuse inputs, as well as improve aquatic and terrestrial biodiversity.”

The authors asked if these small strips of land within a much larger agricultural landscape can really solve all of these problems, and if so how long does it take. They assessed nine riparian management schemes on North Island streams in March 2000 in which buffer zones had been fenced and planted for 2-24 years and compared each to unbuffered control reaches upstream or to nearby streams where the riparian zone was grazed by livestock. The lengths of stream protected by buffer zones ranged from 200-4,000m

above the sample reach. Streams were small to medium-sized (channel widths 1.5-8 m) and macroinvertebrate community composition was used as the main indicator of water and habitat quality, along with stream habitat assessment including temperature, water quality and visual water clarity.

Overall, streams within buffer zones showed quite a few improvements compared to the control reaches and improvements could occur quite quickly. For example, a small Raglan stream showed improved stability and reduced nutrient contamination after only 2 years. However, responses were variable across streams.

Macroinvertebrate communities shifted significantly towards “clean water” or native forest communities at only three of the nine sites. Streams that showed improvement had well-established canopy trees and detailed analysis suggested that improvements here were linked to decreases in water temperature. Therefore, restoration of stream invertebrate communities might be expected only after the plantings had grown big enough to shade the stream.

While the authors concluded that riparian management can improve both water quality and habitat for aquatic life, they noted several points for project proponents to bear in mind when setting their expectations of riparian management:

- it won't happen overnight! Water quality may improve quickly, but restoration of shade and temperature, and thereby stream aquatic life, could take decades
- what are the farmers upstream doing? If upstream reaches are unprotected by fences and/or buffer zones, restoration efforts will be affected by livestock access and the lack of contaminant filtering and shade
- is there native forest in the headwaters or nearby? Biodiversity in the stream and riparian area may only improve if there are sources of aquatic animals and pathways for them to recolonise the stream (e.g., adequate microclimate for the adult aquatic insects that fly).

The authors concluded by noting that the key to improving water quality and restoring ecological diversity is *connection* and that rehabilitation of streams is most likely to be successful when planting in riparian zones begins from the headwaters and progresses down through the catchment to produce a long, continuous buffer.

This advice is corroborated by one long-time regional council co-ordinator of various community groups, who noted that in order to “get riparian restoration working properly”, needs include:

- good evidence of where to put plantings for maximum impact, e.g is shade most needed over pools, or riffles or mixing zones, depending on outcomes sought and the nature of the stream
- identification of plants that are good for nutrient removal as well as shade
- staggering the plantings along the stream and making each one long enough to reduce water temperature to 13°C or below, then starting the next planting 100m downstream so as to get maximum value for money
- really good water quality and ecological monitoring by the group for example by high-quality SHMAK work – the results really win land owner support
- training of land owners at local shed meetings
- collaborative programme set up with and for them

- integration of the restoration work with farm management considerations such as stocking rates and placement, soil compaction measures and grass growth rate.

The secret, he observed, is to “get them thinking of water quality in the same terms as farm productivity”.

He also noted that community groups do have a role but it is limited: supporting them is very resource-intensive for regional councils and while they do raise awareness of actions for beneficial environmental change, the practical results are most obvious among younger farmers and in small catchments.

Ian Brown in his review of the effectiveness of environmental farm plans and ICM (2006) found that most information about third-order outcomes came from meta-analyses such as that of Hicks (2002), who collated all available New Zealand information on the benefits of various conservation practices to support Environment Waikato’s Project Watershed. As cited in Brown (p14), in terms of environmental outcomes, Hicks found that:

- modifying cultivation practices reduces sediment entering waterways by up to 50%
- by providing fenced riparian strips faecal coliforms are reduced typically from 500+ per 100 ml to <50 per 100 ml; sediment from streambank reduced by 40%; dissolved P input reduced by 25%+; particulate N reduced by 30%+
- through pole planting on slopes the area eroded by slip/earthflow/gullies is reduced from 10% to 2.5% in a big storm, and from 1% to 0.2-0.5% in a small storm; (less farm infrastructure damage – fencing, \$6 to \$44/ha, track clearance, \$1 to \$26/ha, pasture renewal, \$3 to \$4/ha)
- through blanket tree planting the area eroded by slips/earthflows/gullies is reduced from 1% to 0.1% in small storms and from 10% to 1.2% in big storms. Sediment load reduced by 50-90% where entire catchments are afforested.

These two examples show that the vexatious problem of attribution (was it our interventions that caused a change in the environmental parameters of concern?) can be overcome to some extent by using such studies as benchmarks for second order outcomes (how much work is enough?) and their relationship to observed third order outcomes (how much difference did we make?).

H5 Case studies from S8 “Catchments and coasts”

Four case studies of integrated catchment and coastal management (ICCM) initiatives are summarised below:

- the Manukau Harbour Action Plan
- the Mahurangi Action Plan
- the Hauraki Gulf Forum
- the Integrated Kaipara Harbour Management Group (IKHMG), Kaipara
- informing aquaculture decisions: the Motueka ICM Research Programme.

H5.1 The Manukau Harbour Action Plan

The following material is from Gustafson and Feeney (2008).

The Manukau Harbour Action Plan (MHAP) was to a large degree the result of the Manukau claim to the Waitangi Tribunal by Nganeko Minhinnick and Te Puaha ki Manuka. The Tribunal ruled in its findings in 1985 (section 2.2) that there was a need for co-ordinated research aimed at developing management policy and an “affirmative action plan”.

The then Auckland Regional Water Board (ARWB) took the finding seriously and by 1987 had obtained funding to start a three year action plan that aimed to “set up a comprehensive water quality management framework for the Manukau Harbour and catchment to ensure the quality of the Harbour and its tributaries are suitable for a wide variety of uses for present and future generations” (p4). Its objectives were to:

- identify and quantify the relationships between all major land uses and the Manukau Harbour environment
- identify and as far as possible abate and control all significant point pollution sources within the Harbour catchment
- identify the necessary planning and legal frameworks to ensure the implementation of the Management Plan. Where shortfalls in existing planning/legal provisions are identified, means should be found to remedy these
- identify and quantify the distribution and extent of the major biological resources of the Harbour
- identify the various uses of the Harbour;
- identify the aspirations for the Harbour and obtain substantive consensus on the desired Harbour environment
- characterise the bulk water quality of the Harbour
- identify areas of the Harbour resource that are of concern from a public health point of view
- review authorised uses to ensure they comply with Management Plan policies
- consult with and give due weight to the concerns and objectives of Tangata Whenua as kaitiaki of the Manukau
- review currently used management tools to ensure their appropriateness and where shortfalls are identified develop new tools to achieve the MHAP’s overall objectives.

In addition to the core management staff at the ARWB, a project manager and five staff were appointed for the duration of the three-year project. Four visited all rural and industrial properties in the catchment to record the land use and how any environmentally hazardous material are held on site and assess and advise on environmentally safe options for storage, handling and disposal. A fifth was a soil conservator whose role was to reduce sediment loads from farms and earthworks. All five were also involved in identifying what land use, water quality or other controls needed to be reviewed and what other controls were needed (p6). These inspections accounted for 65% of the total budget, the remainder focusing firstly on reviewing existing information and undertaking research in areas where more information was needed about the Harbour, and secondly on public education for more proactive, cost-effective environmental management.

As well as visiting thousands of sites and ensuring the cleanup many hundreds of pollution sources, the Action Plan team produced the Manukau Harbour Water Quality Management Plan (ARWB, 1990), which came up with findings and policies relating to:

- interagency involvement and coordination
- Tangata Whenua liaison, perspectives and research;
- pollution abatement and control, including:
 - rural wastes and runoff
 - urban stormwater runoff quality
 - industrial pollution abatement
 - sediment runoff from rural and urban areas
- long term aquatic resource monitoring (saline, freshwater, groundwater, biological)
- shellfish and finfish resources and their state, and other biological inventories
- bathing beach surveys
- harbour sediment accumulation and chemistry
- public health considerations
- solid and liquid waste handling, including household hazardous waste and waste minimisation
- sewage reticulation and treatment, including pump station overflows, other sewage treatment plants and on-site systems (apart from the Manukau Sewage Treatment Plant, which was undergoing a separate review at the time)
- stream channel works for flood mitigation
- harbour developments and uses
- public education and aspirations
- further work and procedures for ensuring ongoing implementation and review.

Although it was set up as a water quality action plan, it is clear from the above that the MHAP had a wider scope, effectively that of an ICMP. It brought research and management of water quality and ecosystem health in the Region up to the standard of the work already done on flooding, rural soil conservation and water resources allocation. It went further again, in terms of public engagement, interagency liaison and Tangata Whenua involvement.

Of particular interest are the levels of organisation set up to coordinate and guide the Action plan, which proved to be a productive working model, especially given the much greater organisational and legislative complexity of the times:

- the political advisory group (PAG): chaired by the ARWB Chairman, the PAG included political representation from the TAs and ARA electorates adjoining the Harbour, Tangata Whenua and the Auckland Harbour Board. Its purpose was to keep these key agencies up to date with progress, provide a forum for discussion on relevant matters and “facilitate necessary actions that may have been identified at officer level but that were being delayed for one reason or another” (p51)
- the officers liaison group (OLG): membership comprised senior officers of the ARA, TAs, Auckland Harbour Board, Health Department, Department of Conservation, Ministry for the Environment, Ministry of Agriculture and Fisheries, Tangata Whenua, the Manukau Harbour Protection Society and other relevant environmental groups. Like the PAG, the purpose of the OLG was to regularly update senior officers of agencies with responsibilities for the Harbour with progress and provide a forum for discussion on relevant matters
- a scientific advisory group (SAG): established in 1988, its functions were to provide a peer review of research proposals submitted for funding as part of the Action Plan, identify gaps in the work being undertaken by the Action Plan and seek new proposals to fill these gaps. The seven members of this group were “invited to join the SAG solely on the basis of the expertise and perspective they had to contribute, not as representatives of their particular organisation, the objective being to obtain the best advice available” (p52)
- working groups: working groups were set up as indicated by the results of research and cleanup activities to deal with specific issues, with the aim of bringing together the relevant organisations that could coordinate work and make policy decisions. The groups formed and met on an as-required basis, with one group needing only one meeting to resolve the issue of mangroves and pacific oysters (p52)
- Tangata Whenua liaison and input: Tangata Whenua were contracted to prepare various reports, starting with one on their perspectives on the shellfish resources which became TP75 (ARWB, 1998). Other reports on the conservation and management of the Harbour covered topics including fin fish and plant resources, waters, runoff of sediment and other waste matter, freshwater ecosystems and works, developments and structures in and around the Harbour. This work was presented as Chapter 3 of the 1990 Action Plan.

The programmes set up in 1988 included stormwater quality, rural and industrial pollution abatement, erosion and sediment control and public education. These programmes have remained core components of the environmental management work in the Region since then, and have resulted in the setting up of similar programmes throughout the rest of the country. The ability of the ARWB to continue this work was an endorsement of the MHAP’s success, as the Committee was able to be confident enough of the value to be gained that it provided funding to allow the contract staff to be taken onto the permanent staff. These programmes survived the restructuring of the ARWB into the Auckland Regional Council resulting from the local government reforms of 1990 and the passage of the Resource Management Act in 1991. It is likely that the consultative, multi-stakeholder partnership approach was largely the reason for this.

However, when the various MHAP programmes were carried over into ongoing core functions, the overall catchment-based focus needed to co-ordinate these into an integrated catchment-based framework seemed to get lost. Rural, industrial, sediment and

storm water work continued, but as region-wide single issues rather than catchment-specific groups of issues.

H5.2 The Mahurangi Action Plan

The following information is taken from Morresey et al (2010).

The Mahurangi Action Plan (MAP) was set up in 2004 as a 5-year pilot after monitoring indicated Harbour ecology was declining, reflecting long-standing Tangata Whenua and community concerns. Increased suspended and deposited sediment was identified as the cause of a steady ecological decline in the Harbour from the early 1990s, with an increase in the rate of decline from 2003. The data provided clear evidence of a marine environment under increasing stress:

- a decline in the abundance of many species, especially those that can't tolerate sediment, such as cockles, wedge shells and horse mussels
- increasing similarity in sediment sizes and species presence and abundance between sample sites that had originally been chosen for their differences.

The harbour monitoring results showed:

- that the problem was increased amounts of suspended sediment and sediment deposition
- the effects were significant and spread throughout the harbour
- effects matched the known patterns of sediment movement in the harbour
- effects matched the known habitat preferences of the sentinel species monitored and their sensitivity to increased levels of sediment suspended in the water and smothering by settled sediment.

This consistent change could not be explained by any big storms (which can sometimes cause environmental damage that natural processes will gradually repair); and monitoring of other estuaries in the region did not reveal similar changes.

In 2001 monitoring results showed declines in the abundance of sediment-intolerant species (including filter feeding bivalves such as cockles) and increases in some sediment-tolerant species at two of the five intertidal sites.

Monitoring also showed decline in the abundance and size of horse mussels (a habitat-forming species) at all three subtidal sites. Two years later (survey results are reported every two years) all intertidal sites showed some trends of population change. Four of the five intertidal sites showed declines in abundance of sediment intolerant species and increases in abundance of more sediment tolerant species.

Horse mussels are important in the structure and function of their ecosystem: they clear the water of suspended matter; provide shelter for other animals living among them; sponges and soft corals attach to their shells; their excretions help to bind sediments and provide food for smaller organisms; and they can even affect the water flow. But horse mussels are very sensitive: NIWA research had showed that their numbers in the Mahurangi are declining, mainly due to elevated levels of suspended sediment. If the food content in the higher levels of suspended sediment increases, such animals may be able to get more nutrition for time spent feeding. If the food content decreases, they have to

work harder for their food. The more energy they have to spend to gain the same amount or quality of food, the less energy they have for growth and reproduction. As the energy used on feeding increases, they lose condition and finally die. Were horse mussels to disappear, the Harbour ecosystem would significantly change, with big impacts likely on many species, including cascade effects on juvenile snapper abundance and ultimately on the numbers of adult fish produced from this estuarine nursery.

Results from the latest saline water quality assessment indicate an improving situation at two of the three monitored sites. Mahurangi Heads and Dawsons Creek were ranked as “very good” based on the levels of nutrients and faecal coliforms. Unfortunately, increasing levels of turbidity, temperature and some nutrients at Mahurangi Heads indicate that the “very good” assessment may be under threat.

In summary, as previously advised through out the life of MAP, it will take up to 10 - 20 years before significant environmental changes within the Mahurangi Harbour will be evident. Overall, the monitoring programme continues to provide useful information on trends and cycles in monitored populations and sediment characteristics that can be used to guide and inform the effectiveness of catchment management within the Mahurangi Estuary. Results from the State of Environment Monitoring programme indicates that there is continuing concern, although there is evidence that recovery is occurring in some areas. Monitoring is still detecting declines in abundance of species known to be sensitive to increased sediment loading. However, recent evidence of recruitment of juvenile shellfish is encouraging and highlights the potential for the recovery of areas of the harbour as the work in the Mahurangi catchment continues.

H5.3 The Hauraki Gulf Forum

Section 15 of the Hauraki Gulf Marine Park Act (HGMPA) (2000) states that the Forum has the following purposes:

- (a) To integrate the management and, where appropriate, promote the conservation and management in a sustainable manner, of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments, for the benefit and enjoyment of the people and communities of the Gulf and New Zealand.
- (b) To facilitate communication, co-operation, and co-ordination on matters relating to the statutory functions of the constituent parties in relation to the Hauraki Gulf, its islands, and catchments, and the Forum.
- (c) To recognise the historic, traditional, cultural, and spiritual relationship of Tangata Whenua with the Hauraki Gulf, its islands, and, where appropriate, its catchments.

The Forum membership comprises:

- representatives of the Ministers of Conservation, Fisheries and Maori Affairs
- six representatives of the Tangata Whenua of the Hauraki Gulf and its islands (appointed by the Minister of Conservation after consultation with the Tangata Whenua and the Minister of Maori Affairs)
- representatives from the twelve local authorities around the Gulf, including two regional councils, four city councils and six district councils.

Section 17 of the Hauraki Gulf Marine Park Act (2000) sets out the Forum's functions. These include:

- preparing a list of strategic issues and determining a priority for action on each
- producing a state of the environment report for the Hauraki Gulf every three years
- monitoring and sharing information on the state of resources
- receiving reports from:
 - constituent parties on addressing the strategic issues
 - Tangata Whenua on iwi management or development plans
 - persons and groups with an interest in the Gulf
- promoting and advocating integrated management and, where appropriate, sustainable management
- encouraging and disseminating educational and promotional material
- facilitating and encouraging co-ordinated financial planning
- commissioning research into matters relating to the functions of the Forum
- producing an annual report each year, which is presented to the House of Representatives by the Minister of Conservation.

In 2008 the Forum identified the strategic issues for the Gulf related to:

- integrated management
- raising awareness, understanding and recognition of the national significance of Tikapa Moana - Hauraki Gulf
- pataka (storehouse of food and knowledge)
- water quality
- biodiversity
- natural character and landscape
- cultural heritage
- access
- coastal hazards
- climate change.

Now in its tenth year, the Forum notes that in order to change behaviour on the ground, the provisions of the HGMPA will need to be implemented into RMA plans which, unlike regional policy statements, have the power to regulate activities through rules. It has recently released a publication (Hauraki Gulf Forum, 2009) about the changes that can be made to regional coastal plans, regional and district plans in order to help give effect to its purpose. It is also preparing a report on the use of non-regulatory methods (Trotman, 2010).

H5.4 The Integrated Kaipara Harbour Management Group (IKHMG)

The following material is from Gustafson and Feeney (2008).

The Kaipara is the largest enclosed harbour in the Southern Hemisphere and the “food basket” of Ngati Whatua. A wide range of authorities have statutory responsibilities in

relation to the harbour and their challenge is to deal with competing and sometimes conflicting uses, including dairy farming, exotic forestry, subdivisions, sand mining, fishing, aquaculture, and energy generation activities. The information below is drawn from the website of the Integrated Kaipara Harbour Management Group (IKHMG), referenced in section 6.

The IKHMG is an initiative developed by Te Uri o Hau and its stakeholders to help manage the Harbour. The Kaipara is a sacred taonga and Kaitiaki are responsible for protecting it for the benefit of all people. The Kaitiaki vision is focused on “the realisation of rights as Te Uri o Hau” and Nga Kaitiaki Tai Ao o Kaipara and “a natural environment that is rich in diversity and life-supporting capacity”. Nga Kaitiaki Tai Ao o Kaipara see their role as providing the leadership to coordinate the various resource management agencies and stakeholders in a united vision for the management of the Kaipara Harbour catchments and of the harbour itself. This would assist them in meeting their responsibilities under the Te Uri o Hau Settlement Act and is consistent with a number of Memoranda of Understanding and Protocols established between Te Uri o Hau Settlement Trust and key stakeholders.

The vehicle for achieving the vision is a Sustainable Kaipara Catchment Plan. An Interim Kaipara Management Group was formed to undertake a 6 month programme, appoint a Project Co-ordinator and oversee research and co-ordination with the aim of scoping an agreed approach to achieve a Sustainable Kaipara Catchment Plan. The first report back to the wider group was in March 2006. The group is a broadly based movement of common interests and is not aimed at supplanting any agencies which have statutory responsibilities but rather aims to explore the means by which all interests, public and private, cultural and social, commercial and recreational, can focus on a common vision and achieve a responsible outcome. Additionally, the ARC and NRC have initiated a Kaipara Harbour Scoping Study. The Kaitiaki see it as essential to develop a unified approach to research and planning for the Kaipara with the interregional authorities.

The Environs Holdings Trust of Te Uri o Hau Settlement Trust was successful in a seeding grant application to the Foundation for Research, Science and Technology/Health Research Council (2004/05) to identify research priorities for the Kaipara and Mangawhai Harbour catchments. An initial meeting with Manaaki Whenua – Landcare Research began a process to identify research priorities took place in Whangarei on March 17, 2005. The outcome of that meeting was a plan of action based around a successful process used for Integrated Catchment Management of the Motueka River. That process led to the formation of the Integrated Kaipara Harbour Management Group (IKHMG).

The IKHMG identifies the following issues facing the Kaipara:

- biodiversity
- climate change
- fish stocks
- integrated management and coordination of action
- kaitiakitanga
- resource use and development
- sedimentation and water quality
- socio-economic opportunities.

In terms of integrated management and coordination of action, the Kaipara is governed by two different Regional Councils, Auckland and Northland; two different District Councils, Kaipara and Rodney), two different Department of Conservation (DoC) conservancies and the Ministry of Fisheries (MFish). There is a plethora of plans, conflicting management philosophies and a highly fragmented legislative framework that includes:

- Regional Coastal Plans, focused on the coastal marine area, but not fisheries or the Marine Protected Areas under the RMA;
- Fisheries Plans under the Fisheries Act 1996, focusing on single fish stocks in fisheries management areas;
- Protected Species Action Plans under the Marine Mammal Protection Act 1978, focused on national-level plans for species such as marine mammals and seabirds;
- Regional Coastal Environment Plans under RMA with only policies for land areas (see section 4.3.1.2 of this report))
- Coastal Compartment Plans under the RMA for small areas of coastal edge;
- Iwi Planning Documents under the RMA for individual iwi rohe;
- Long Term Council Community Plans under the LGA that focus on broad environmental, economic, cultural and social outcomes as well as budgetary provisions for each of the individual councils;
- Marine Protection Planning to provide for marine protected areas within a region developed under the non-statutory Marine Protected Areas Policy Statement and Implementation Plan of DoC and the Ministry of Fisheries in 2005 and the Marine Reserves Act 1971;
- District Plans under the RMA that help the two territorial authorities address functions such as managing effects of land use, noise, and impacts of land use on indigenous biodiversity. They set out rules that implement policies and must give effect to Iwi authority planning documents and regional and national policy statements;
- Annual Plans under the LGA to promote sustainable development.

The IKHMG notes that there are different rules on the land versus the coast/marine environment and then again in the north versus the south. of the Harbour, including the “lack of planning integration across Mean High Water Spring (MHWS) which is a widely recognised problem across the country”.

The IKHMG notes also a lack of planning capacity and varying resources across agencies, with smaller councils struggling to develop and retain sufficient planning expertise to undertake their strategic planning functions and a lack of robust information that together reduce the ability to make informed decisions about development and resource use.

Nga Kaitiaki Tai Ao o Kaipara see themselves as coordinating the management of the harbour, but currently lack capacity to fulfil this vision and need the support of management agencies. Te Uri O Hau see themselves as the only management body with a fully integrated perspective, and together with other hapu of Ngati Whatua are driving the Integrated Kaipara Harbour Management Group project to create a healthy and productive Kaipara using an integrated management plan.

Such a plan would provide better integrated management of the Kaipara Harbour and catchment through such approaches as:

- developing a clear and common philosophy of how Kaipara ecosystems will be managed by Tangata Whenua and agencies;
- ensuring adequate provision for public participation across all sectors, for example, fisheries, marine protection, resource consents;
- ensuring accessible and timely conflict resolution processes across all sectors;
- improving communication between agencies so actions by one management agency do not have unintended consequences in another agency;
- integrated planning at compatible scales; and
- building trust to achieve effective integrated management.

H5.5 Informing aquaculture decisions: the Motueka ICM Research Programme

Landcare Research et al (no date) found that the Motueka “catchment” extends offshore to encompass more than 400 square kilometres of Tasman Bay. Such outflows can affect the stability, productivity and ecosystem health of river deltas and this has a flow-on effect on marine fisheries and aquaculture potential. Physical and chemical (nutrient) characteristics of the water column in the Motueka River plume in Tasman Bay has been shown to stimulate the growth of micro-algae on which shellfish (including farmed mussels) depend for food. However, suspended sediment from the river mouth has also been shown to generate chronic high-turbidity conditions in near-bottom waters that can interfere with the feeding of scallops and potentially other commercially and ecologically important benthic suspension-feeding animals – a mechanism that has been suggested as a major contributor to the poor performance of the Tasman Bay scallop resource in recent years.

Of the catchment’s 400 km² influence, 50-90 km² of seabed contains high heavy metal concentrations derived from those naturally present in sediment flushed from the erodible Red Hills at the head of the catchment – these are beyond ANZECC levels for ecosystem health and may be affecting freshwater and marine life. Such catchment-coastal connections demonstrate that management of coastal ecosystems, fish and shellfish resources need to take account of activities across the entire land/sea continuum of the redefine “catchment”, and, as the authors observe, this is a major deviation from current coastal management practice.

Water quality and productivity on the 4,200 ha of designated Aquaculture Management Areas off the Motueka River mouth is affected by the river’s discharge, especially in large floods. Information about the extent and magnitude of freshwater effects on seawater temperature, salinity, density, chlorophyll-*a*, water clarity and nutrients was mapped to provide a basis for understanding the nature and spatial extent of catchment effects on wild, enhanced and farmed shellfish resources.

Information generated by the Motueka ICM programme proved critical to the consenting of a large offshore mussel farm in western Tasman Bay, with the first stage of development achieving marketable product size and quality within seven months. Seasonal growth rates are consistent with variations in river plume characteristics and mussel growing conditions and catchment implications are being tracked over time.

Harvest conditions are being developed by the industry using ICM data showing elevated faecal indicator organisms after rain in a plume extending at least 7km offshore – the first

such observation in New Zealand of ruminant faecal contamination from a plume extending well offshore. Cawthron is now developing new microbial technology to track the source and fate of land-derived faecal contamination in waterways and coastal environments.

Other work includes real-time bacteriological water quality data collection, spat collection and survival and food availability for shellfish, as well as models of, among other things, the marine food web from algae up to finfish.

Such models will allow the evaluation of trade-offs between large-scale land use change onshore and offshore aquaculture scenarios.

H6 Case study from S10 “ICM: meeting iwi and community aspirations for catchments and coasts?”

This section summarises the findings of Project Twin streams and recent rural catchment-based research in New Zealand with respect to the four wellbeings.

H.6.1 Project Twin Streams

Led by Waitakere City, Project Twin Streams in Waitakere City, Auckland, is an ICMP that is more integrated across the four wellbeings and better reviewed than many urban initiatives:

- covering 10,000 hectares and with 103,000 residents, it takes a community development approach to catchment management, where local groups are recruited to engage with the community on behalf of the council
- different parts of the City Council, the Auckland Regional Council, local iwi, schools community groups and Landcare Research are all engaged
- it encompasses all four wellbeings under the RMA and LGA under the umbrella of urban sustainability
- it has a 150-year vision
- it provides for environmental monitoring
- it specifically provides for external independent programme review (see Trotman and Wood, 2006) – both formative (real-time or process evaluation) and summative (impact or medium or long-term outcome evaluation).

The Project was triggered by a number of issues, including flooding, erosion and sedimentation of stream beds, unacceptable levels of sewer overflows and the highest levels in the region of contaminants in the discharge of the Henderson and Huruwuru Creeks to the Waitemata Harbour, where levels of zinc, lead and copper caused sediments in parts of the Harbour to exceed the Auckland Regional Council's highest ecological risk level.

Instead of continuing to use traditional stormwater management systems, the Project opted for a more sustainable approach, involving preventing and repairing environmental harm by reducing impervious surfaces, creating and connecting riparian buffer zones, creating wetlands, detaining stormwater, using stormwater source control, managing non-point source pollution, controlling water use demand, allocating water for environmental services and land disposal of stormwater.

Community and iwi involvement was included in order to strengthen local communities, promote learning, provide cultural and economic opportunities.

Project Twin Streams carries out Pressure-State-Response (PSR) monitoring and ecological surveys and has produced a number of reports. The PSR framework uses a variety of indicators that measure performance and indicate how well the project's objectives are being met across all four wellbeings.

In addition, a number of community groups carry out Waicare monitoring whereby they monitor and report stream water quality on a regular basis (all of the community contract organisations are also Waicare groups).

Environmental monitoring began in 2003 and is still in its early stages, which means that it is too soon for clear trends to be identified. However baseline conditions have been identified, and there have been some noted improvements in certain locations.

The project looks at how households can become more sustainable. It looks at how cycle and walkways along streams can reconnect communities while providing opportunities for fun and fitness. The Eco Matters Trust provided households with water conservation devices and has monitored declines in per capita water usage as a result.

Based on the premise that a partnership approach is more likely to achieve long-term change towards sustainability, the Project works with community organisations working with local people to develop the project in their own localities, organize community events, carry out informal public education, do planting and weeding and carry out their own monitoring and evaluation so as to connect with wider community goals.

For its part, the Council funds the employment of community co-ordinators; provides expertise, advice and support; provides educational and promotional material, plants, tools and help with weed control, consents and planting supervision; and provides support for health and safety, monitoring and evaluation and finance.

The project has three stages:

- Stage 1: stream restoration programme
- Stage 2: behaviour change for sustainable living
- Stage 3: integrated catchment management.

Table 2 shows how the project's high level objectives (these are broken down and indicators developed further in the report) traverse all four wellbeings. They show the project combines a "resilient communities" approach together with an "ecological bottom lines" focus, both of which are part of the preparation of an ICMP that will support network discharge consents.

Project Twin Streams activities formally began in 2003 and it is currently funded until 2012. There is a formal three-stage approach to programme evaluation:

- Stage 1: July 2003-June 2007 – a formative evaluation set how the first phase of the project, from 2003 to 2007 would be assessed. It captured progress in this phase and provided a clear platform from which to assess and plan the journey of Project Twin Streams as it evolved
- Stage 2: July 2007-June 2010 – process and outcome evaluation
- Stage 3: July 2010-June 2012 – outcome evaluation, at the end of the project.

The overarching purpose of the Stage 1 formative evaluation of Project Twin Streams was to provide participants, funders and decision makers with clear information on progress made against stated objectives, and information to assist with ongoing planning and decision-making. Specific objectives were to:

- describe what has happened, including the core processes, activities and milestones during the establishment period
- establish baseline information across all strands of the project (environmental, social, economic and cultural/spiritual)
- capture the process of contracting local community organisations and the community development model that is emerging

- identify what sustainable development means for Project Twin Streams so far
- gain participant views on the project, including its strengths, weaknesses, opportunities, risks and areas for improvement.

Table 2 Project Twin Streams vision and objectives across the four wellbeings

Source Trotman and Wood, 2006

Project Twin Streams	
Working together for healthy streams and strong communities: creating a sustainable future	
Environmental Objectives	Social Objectives
<ul style="list-style-type: none"> • Integrated land use planning and management of the three waters to minimise flooding and reduce pollution and siltation in streams and the harbour • Integrated catchment management planning and application of the treatment train approach • Recreate and restore ecological corridors, extending the Green Network • Create low-impact footprints in the future through low-impact urban design and form • Encourage and support 'green' technologies in households, business and the public sector • Contribute to mitigation of climate change including upholding the Kyoto protocol • Monitor and evaluate the effectiveness of PTS in improving the environmental and ecological health of the catchment 	<ul style="list-style-type: none"> • Encourage communities to understand and take responsibility for the social, environmental, cultural and economic development of their localities • Facilitate the development of locality and community PTS governance structures • Foster sustainable community leadership • Develop and promote an integrated holistic approach which connects with people's minds, bodies and spirits. • Create life-long learning about how to live, work and play sustainably • Provide pedestrian and cycle linkages that promote healthy lifestyles • Promote opportunities that advance affordable and sustainable housing • Evaluate effectiveness of the community development approach in improving the health and wellbeing of the catchment.
Economic Objectives	Cultural Objectives
<ul style="list-style-type: none"> • Create opportunities for collaborative ventures with government, business, iwi, urban Māori and academic institutions • Be a catalyst for iwi, Māori and community economic and enterprise development • Develop opportunities for research and new water, waste and energy efficient technologies. • Monitor and evaluate the effectiveness of PTS in increasing job and economic development opportunities 	<ul style="list-style-type: none"> • Foster expression of iwi and diverse cultural world views through creative methods such as storytelling, art, music and literature • Ensure inclusiveness of and learning from different cultural and world views • Recognise, respect and uplift the heritage of local areas • Promote creative ways for learning and as a key agent of change • Monitor and evaluate the effectiveness of using arts and culture to increase the understanding and uptake of local communities and iwi

Stage 2 reviews have since been carried out but the results are not yet available. However, it is clear how the information from the formative evaluation will enable much better assessments of the project's third order outcomes and hence its effectiveness.

The project has received international recognition, and results to date (Chilcott, 2009) indicate it has supported the development of strong community leadership and stewardship, including by:

- 15,000 volunteers
- contracts with 6 communities

- 67 long term adoption groups
- 30 Schools actively engaged
- 450,949 plants planted
- 84 houses purchased for flood control
- 10 km of walkways and cycleways constructed along the streams.

H6.2 Research findings and needs

Dodd et al (2009) conducted a review of the results, outputs and outcomes of recent rural catchment-based research in New Zealand (the scope of the report did exclude catchment management projects with limited research involvement). The review aimed to derive key lessons of use to policy developers, policy implementers and researchers seeking to operate within an integrated catchment management (ICM) framework.

Fourteen location-specific studies were included, as well as some non-specific studies, but. The compilation of this report relied on analysis of published literature and interviews with senior researchers involved in studies conducted or updated in the last ~20 years. Thus, the report should be considered as an analysis of the role of research in the application of ICM in New Zealand, rather than an analysis of ICM.

Key lessons representing the dominant themes arising from the catchment studies reviewed are summarized below under the headings of biophysical, social (including process), economic and integrated research.

Environmental management:

- homogenization of stream structure and habitat (e.g. water temperature), leading to reduced aquatic faunal diversity across catchments, is a key degradation process which must be reversed to restore environmental values
- variable or critical source areas – sites with impacts disproportionate to their size – can either contribute differentially to contaminant loads (e.g. livestock crossings, flood irrigation) or have key roles in mitigating losses (e.g. headwater and riparian wetlands). Such sites are priorities for cost-effective protection/remedial action
- contaminants can take various flow paths (e.g. surface vs. groundwater) which need to be identified to understand and mitigate the associated lag effects on receiving water bodies
- stock exclusion from waterways is highly effective at reducing direct inputs of pollutants and thus effecting large proportional reductions in contamination
- the continuity of riparian vegetation in time and space, interacting with stream order, is critical for mitigating land use effects on habitats and contaminant loads (where they pass through the zone of influence of the plants)
- extreme weather events have disproportionate effects on soil and water quality in the context of long time scales, and interact with different land cover patterns to produce variable recovery rates
- land use has far-reaching effects on downstream and offshore ecosystems
- the use of information generated by land-use comparisons and associated modelling (as opposed to that derived from actual land use change) for planning land use

change has limitations in terms of unanticipated transition effects and their interactions with other dynamic drivers (e.g. climate and economic cycles)

- variable time lags in environmental responses to management are a feature of catchment-scale processes and must be considered in planning
- there are a number of factors that drive additional time lags in the on-ground application of environmental management practices by land managers.

Social and cultural processes:

- catchment-scale natural resource issues cannot be resolved within any single property and require landowners to work cooperatively with each other and with the responsible agencies to identify environmental priorities and organise the necessary resources to achieve desired outcomes
- two distinct types of communities (“communities-of-place” and “communities of interest”) should be recognized in designing participatory approaches to integrated catchment management. Some catchment scale issues may be addressed by only focusing a study upon the local residents (communities of place), and other issues may need everybody with an interest in the waterway to be included (communities of interest)
- integrated collectives require participation from both “decision-makers” and “decision-takers” for effective buy-in, which will require facilitation competent in conflict management
- the most effective way to encourage change in landowner behaviour and the adoption of preferred management practices is for agency staff to work one-on-one with the people involved
- good relationships are important. This requires time and therefore reliable resourcing (i.e. funding).

Economic benefits and costs:

- restrictions in farmer’s ability to intensify production represents a large financial limitation to them, this being the primary means available to them to maintain short-term profitability in the face of continually rising costs and variable product prices
- economic drivers are not the only determinant of goals and the adoption of new management practice: factors such as lifestyle, competence, social norms are also important
- the cost-effectiveness of all best management practices varies greatly depending on the context in which they are applied – i.e. soil types, existing management systems, sensitivity of the receiving environment and financial drivers; and depending on the rigour with which they are applied
- the costs to catchment communities of encouraging land use change can be considerable, but are seldom fully assessed (e.g. school closures as populations move away).

Research at catchment scales:

- one research discipline cannot undertake a catchment research project. Taking a balanced multi-disciplinary approach underpins catchment-scale research

- water quality monitoring data sets of at least 5 years are required to make meaningful statements about trends
- having a defined structured process for engaging a range of stakeholders (incl. governance, research, education) is a critical part of an integrated approach
- non-researcher participants are often unaware of the environment in which science operates, and need to appreciate aspects of this environment to ensure their expectations are realistic. Conversely researcher participants need to appreciate that there are other ways of gaining, and sources of, knowledge
- catchment-scale research is better placed to contribute to positive outcomes when it embraces new ways of managing science beyond the traditional hypothesis-testing replicated, controlled experiments and the linear extension processes familiar to biophysical scientists. Key concepts include trans- disciplinary programmes, collaborative learning and adaptive research.

The report also included the following recommendations:

- a complementary analysis of non-research focused ICM projects should be conducted to gain a more complete picture of key lessons for the application of ICM to sustainable land and water management [this report partly addresses this need though not in a quantitative way]
- policy development must recognize and account for key features of the spatial and temporal dynamics operating at catchment scales, specifically the variability of driving processes in space and time and the existence of spatial and temporal lags. These dynamics imply the need to avoid policies aimed at standards or targets applied everywhere at all times and which address a localized or immediate issue but ignore known remote impacts
- an ICM initiative needs to incorporate five fundamental tasks in the project design:
 1. understand the issues, associated social dynamics and the drivers for change
 2. develop a catchment strategy
 3. precipitate action to bring about solutions
 4. monitor and evaluate implementation
 5. run an effective program in order to achieve the first four objectives.
- in planning ICM projects, funding time frames should be aligned with realistic time scales for running an effective program to achieve the objectives – for example assessing the impacts of land use change took 10 years after the commencement of the Whatawhata project
- future catchment-scale research should address some gaps – filling the long-term research gap and balancing effort across sustainability domains (i.e. more focus on economic, social and cultural)
- social research within catchment research projects should go beyond the behaviour of individual landowners and their practices to the way those individuals behave when they are interlinked to their communities of geography or interest.

It can be seen that these findings echo those of others in this report.