

## If we adopt LIUDD, what will we measure to tell us how well it worked?

### In this summary:

If councils and communities move to more sustainable forms of urban development, what will they measure to tell them if the investment of everyone's time and money in making the change is paying off?

A great deal of emerging research tells us about the performance of more sustainable urban design and stormwater management devices - and it's monitoring that gives us this information. Monitoring is an essential management tool, and it covers much, much more than simply sampling the chemical and biological characteristics of urban waters.

This summary explores

- LIUDD – why make the change, and how does monitoring come into it?
- monitoring – who, what, where, why, how and when – including by consent holders
- how LIUDD contributes to many outcomes
- integrated monitoring – and a case study of the Styx River in Christchurch
- how to find out more

### 1. ***LIUDD – why make the change, and how does monitoring come into it?***

The motivation for adopting low impact urban design and development (LIUDD) is different for every council. How they define it, why they do it and how they require, promote or enable it are all decisions that vary within and between different jurisdictions.

#### 1.1 **Why make the change?**

Different drivers inform different choices. For example:

- Christchurch City Council has a values-based approach to urban water (and other) infrastructure that emerged from a cost-benefit analysis of conventional with more sustainable urban drainage. It needed to repair the old box drains that had allowed the city to be established on a huge wetland, and discovered it was cheaper and provided multiple additional benefits to replace them with naturalised stream channels
- Kapiti Coast District Council faced a major and extremely expensive upgrade to its community water supply services unless it reduced water demand. Its low rainfall and sandy soils meant that much of the water was used on gardens, so it decided (among other things) to promote the use of rain tanks for supplementary supply, thereby deferring (and possibly avoiding) the need for significant expenditure
- by contrast, North Shore City Council requires rain tanks to be installed in some areas to reduce stormwater runoff volumes in order to alleviate local flooding
- Auckland City Council faces ongoing growth, and can only accommodate it by intensification – but here too the increased impervious area means more stormwater runoff and flooding of properties. It's too expensive to replace stormwater pipes before the end of their normal working life, so new developments must detain the stormwater on site for use or slow release to avoid worsening floods
- Waitakere and North Shore City Councils are concerned to reduce the load of contaminants washing off roads with high traffic volumes into small but high-value urban streams. They are using rain gardens integrated into road and verge design to remove contaminants from the stormwater before it discharges into the streams.

These examples of stream restoration, water supply, flood management and pollutant reduction are among the many and varied reasons why councils and communities choose

LIUDD, often using a range of options from the LIUDD toolbox to achieve multiple outcomes.

## 1.2 What constitutes LIUDD?

Such drivers and choices influence to varying degrees and at a range of scales the aspects of LIUDD of most interest to a council, for example:

- catchment scale, working through integrated catchment management plans (ICMPs) to ensure that development is consistent with integrated management of natural and built water systems and the associated terrestrial and aquatic hydrology
- subdivision scale, working through district and structure plans to look at how the lots fit together in an integrated way within and between developments and what multi-site solutions are available for urban water quantity and quality management
- lot scale, where holistic design enables many environmental solutions including passive solar orientation of new buildings, as well as onsite water solutions
- street and other scales where median strips, verges, parking and other areas can provide safety, amenity and stormwater services in new or existing developments.

The choices and constraints of a council may operate at all these scales in new or existing developments, or focus on a smaller range of measures that meet a particular objective.

## 1.3 How LIUDD contributes to many outcomes

It is clear that LIUDD benefits the natural environment – fresh, underground and coastal water quality and ecosystems as well as terrestrial ecology and biodiversity. Existing or additional state of the environment monitoring should pick this up.

LIUDD also contributes to many other outcomes under the four wellbeings – social, cultural and economic and environmental – of both the Resource Management and Local Government Acts (RMA and LGA), such as resource efficiency, community resilience and improved economic outcomes.

Figure 1 shows how it can also contribute towards outcomes under much other legislation, too, including for reserves, transport and building.

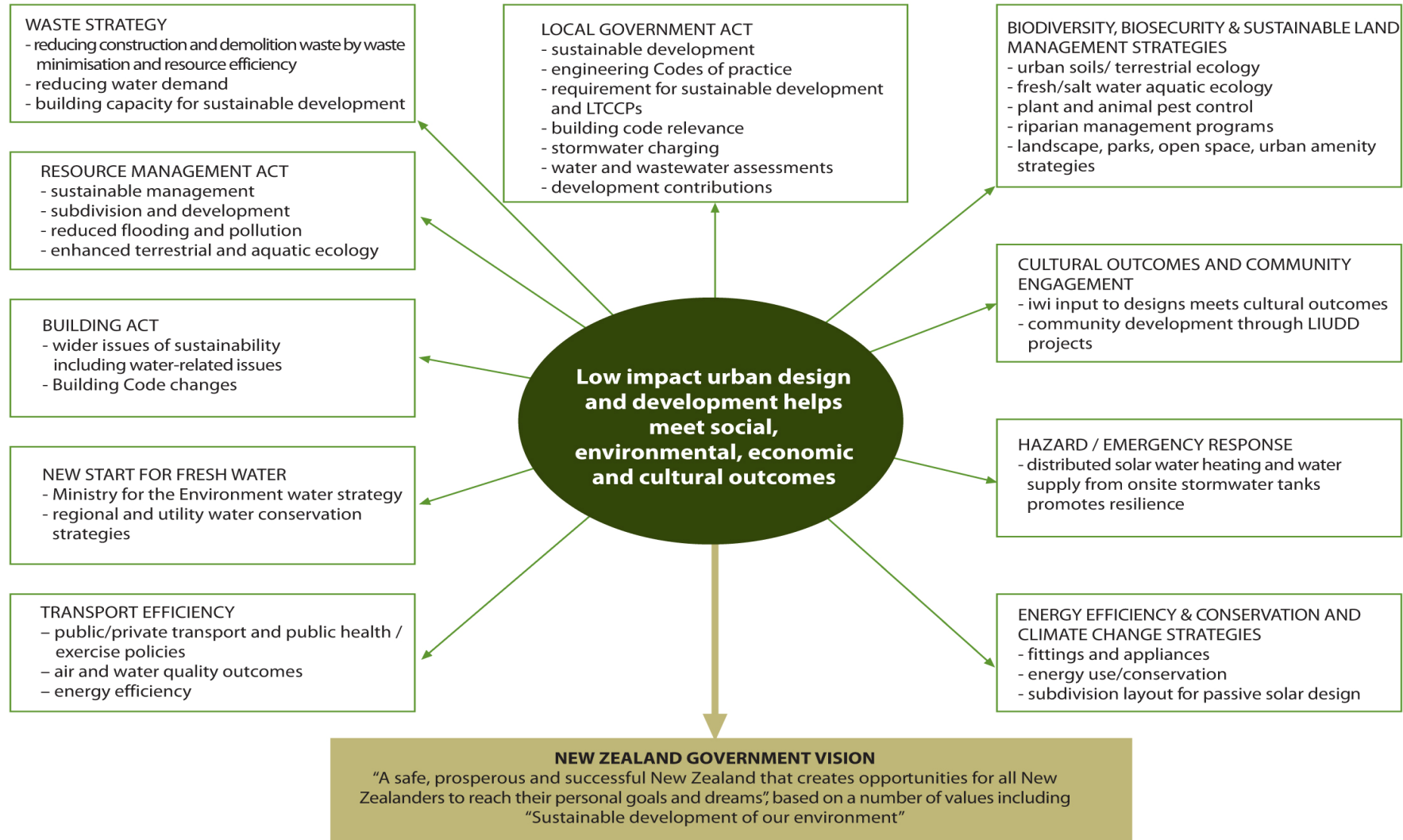
Outcomes under all four wellbeings can often be enhanced by considering the strategic objectives of many of the guiding and requiring documents to which local government gives effect – high level outcomes only some of which may be measurable. These will often relate to matters under both RMA and LGA (and other legislation) such as:

- growth
- infrastructure
- flooding and other aspects of catchment hydrology, including aquifers
- other natural hazards
- community involvement
- Māori outcomes
- amenity values
- water quality in fresh, saline and underground waters
- terrestrial and aquatic ecology.

## 1.4 How do we monitor all these different outcomes?

The monitoring requirements of the RMA and LGA do not mean councils have to monitor absolutely everything. But they should be monitoring a manageable number of parameters relevant to key strategic community outcomes in their policies and plans. Councils' LIUDD choices will inform what they need to monitor so they can work out how well their choices are addressing the identified issues and achieving the desired outcomes.

Figure 1: How low impact urban design and development helps councils to meet many local and national outcomes.  
How many more can you think of?



Bearing in mind all four wellbeings under RMA and LGA will help councils select or adapt LIUDD options so as to contribute to a wider range of outcomes. For example, where riparian restoration is proposed, consultation with Māori could produce beneficial cultural as well as social and environmental outcomes.

Figure 1 shows some of the diverse outcome areas to which LIUDD can contribute. There will be many more for your locality.

Once LIUDD options are selected, measurable operational objectives and indicators can be identified to help measure progress towards resolving issues and achieving outcomes.

Even if they are not going to be formally monitored, such outcomes can be documented in a checklist table which can inform the development of a cost-effective monitoring strategy. Remember that not everything has to be monitored, but some overview of progress towards sustainable management and development must be gained and an overview of broad outcome areas can help develop this.

Remember too that it can be difficult to attribute observed outcomes to a particular intervention, so considerable thought needs to go into defining issues, objectives, outcomes and indicators, and linking in with existing monitoring programmes.

## **2. Monitoring – who does what – and why?**

Common sense and the law both tell us that we need to know if what we are doing is working. Key questions that monitoring needs to answer are:

- did we do what we said we would? (Outputs: how well are we implementing our plans?)
- did it make a difference? (Are the uptake and outcomes as anticipated?)
- what else is going on? (What other trends are present or emerging?)
- does it make sense? (How accurate were our assumptions about cause and effect in selecting our methods in our plan? How well do we understand the environmental, social, cultural and economic systems and processes that we are trying to influence?)
- what should we do next? Should we carry on or change our management strategies?

It is not a small task to set up a monitoring framework that helps us work out if our policies, plans and consents are working as we'd like and are contributing to the outcomes we want. But it is important to collect good data (not too much, just enough) to feed back into, inform and improve what we do.

Table 1 summarises what monitoring the Resource Management and Local Government Acts require regional, city and district councils to do and how often they need to report the results to their communities.

Figure 2 shows the same information in a different way to illustrate how making good use of monitoring data builds knowledge, understanding and capacity for more sustainable management and development.

Over and above the mandatory requirements shown in Table 1 and Figure 2, considerably more monitoring also goes on. Voluntary community-based monitoring programmes are a tremendous way of building council-community capacity and understanding of natural, built, social and cultural human systems and their interactions, including by:

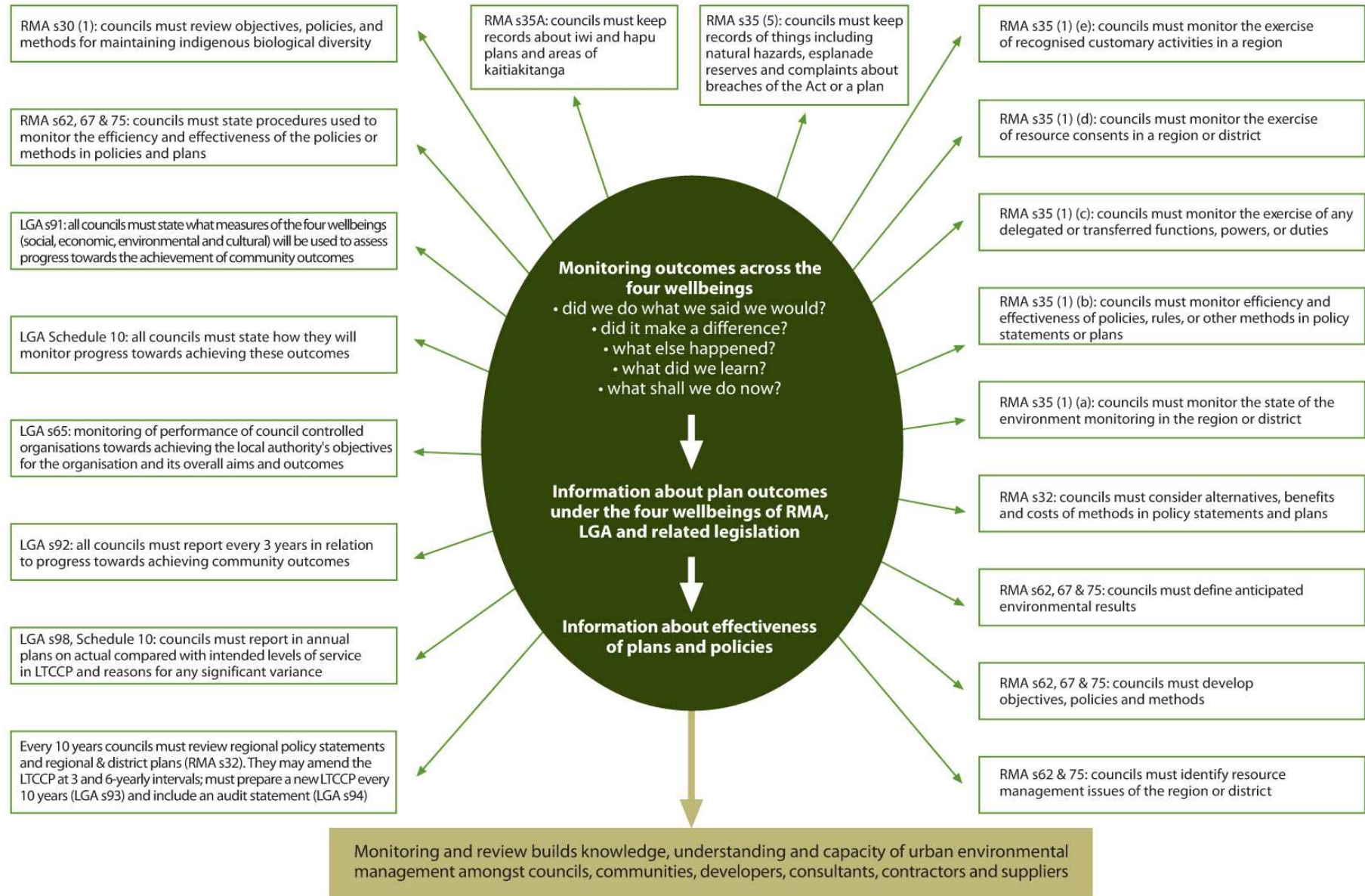
- consent holders, as explained overleaf
- Māori agencies and groups, using a range of tools including the Cultural Health Index for streams
- community groups, using a range of tools including the New Zealand Stream Health Monitoring and Assessment Kit (SHMAK), Waicare
- schools, including programmes such as Waicare and Trees for Survival.

**Table 1 The monitoring that the RMA and LGA require councils to do**

<p align="center"><b>Resource Management Act (RMA) 2003 Amendment</b></p> <p align="center"><i>For the purposes of sustainable management of natural and physical resources</i></p>	<p align="center"><b>Local Government Act (LGA) 2002</b></p> <p align="center"><i>Promoting the social, economic, environmental, and cultural well-being of communities, taking a sustainable development approach</i></p>
<b>Reviewing</b>	
<ul style="list-style-type: none"> <li>• review all regional policy statements and regional and district plans every 10 years (s32)</li> <li>• review of objectives, policies, and methods for maintaining indigenous biological diversity (s30 (1)) but the interval is not specified</li> </ul>	<ul style="list-style-type: none"> <li>• identify community outcomes not less than once every 6 years for the intermediate and long-term future of its district or region (s91)</li> <li>• prepare a new Long Term Council Community Plan (LTCCP) every 10 years (s93) and include an audit statement (s94)</li> </ul>
<b>Monitoring</b>	
<ul style="list-style-type: none"> <li>• the state of the whole or part of the environment appropriate to the council's RMA functions (s35)</li> <li>• the efficiency and effectiveness of policies, rules or other methods in policy statements or plans (s35, 62, 67, 75)</li> <li>• the exercise of any functions, powers or duties delegated or transferred by the council (s35)</li> <li>• the exercise of any resource consents (s35)</li> <li>• the exercise of a recognised customary activity in a region (s35)</li> </ul>	<ul style="list-style-type: none"> <li>• all councils must state what measures of the four wellbeings (social, economic, environmental and cultural) will be used to assess progress towards the achievement of community outcomes (s91)</li> <li>• all councils must state how they will monitor progress towards achieving these outcomes (Schedule 10) and include an audit statement (s94) and a funding impact statement (Schedule 10)</li> <li>• councils must monitor the performance of council controlled organisations towards achieving the local authority's objectives for the organisation and its overall aims and outcomes (s65)</li> </ul>
<b>Reporting</b>	
<ul style="list-style-type: none"> <li>• reporting is required every 5 years in relation to policy and plan efficiency and effectiveness (S35 (2A))</li> </ul>	<ul style="list-style-type: none"> <li>• every 3 years in relation to progress towards achieving community outcomes (s92)</li> <li>• in annual plans on actual compared with intended levels of service in the LTCCP and the reasons for any significant variance (s98, Schedule 10)</li> </ul>

Figure 2: Monitoring, reviewing and reporting: what do we have to do under the RMA and LGA?

NB: Please note that this diagram is only a summary and is not a substitute for reading the detailed requirements of the two Acts



## The monitoring requirements of consent holders

This section overviews some general answers to questions that developers taking part in the LIUDD project have asked, including:

- how does your monitoring of the operation of your resource consent help the council?
- can you get a preview of likely monitoring and other consent conditions?
- how much monitoring is it reasonable for a council to ask you to do?

### *How does your monitoring of your resource consent help the council?*

To check that their plans are working, councils need to monitor, among other things, the effects of consented activities and their effects on the environment. Councils monitor when consents are approved, taken up or lapsed. They also monitor how well holders of certain consents are complying with some of their conditions. Because consents are site-specific they can provide some very useful information about the success of councils' policies, plans and rules.

Consent holders will usually have to tell the council when they have completed certain tasks and requirements. For buildings and similar developments, this requirement is usually met and then ceases when the development is signed off by the council. However, certain consents require ongoing monitoring. For example, if you pump water out of a river, lake or aquifer or discharge wastewater into water or onto land, you need to regularly report on this to the council.

For this reason, consent holders are often required to monitor their activities (self-monitoring) and to forward the results to the council. The council may also carry out its own monitoring to check that the consent holder is complying with the conditions of the consent (compliance monitoring). A compliance monitoring site visit from the council can also be triggered by a complaint. So for example, if a public complaint or a routine inspection of a site undergoing development reveals that erosion and sediment controls are inadequate or low impact devices wrongly installed, the council will require this to be fixed.

For large sites or complex activities or innovative practices such as those associated with LIUDD, councils will usually opt for a mix of self- and compliance monitoring.

Under section 108 of the RMA, a consent authority may require the holder of the resource consent (at the holder's own expense) to do one or more of the following:

- take and record measurements, samples, analyses or other specified tests
- carry out specified surveys, investigations or inspections
- provide this information to the council as and when specified.

In granting a resource consent for a low impact development, the council:

- can legitimately require information on what was built and how it was built (e.g. as-built drawings)
- may also require information about who is responsible for operation and maintenance of key services which are not going to be taken over by the council (as public stormwater piped infrastructure usually is) but which are unlikely to be maintained by the householder (e.g. septic tanks, for which many councils have taken responsibility and recover the costs via rates)
- in the case of some innovative techniques, may require the consent holder to do ongoing monitoring of their performance for a specified timeframe in order to make sure they perform as intended, so that any problems can be identified and remedied in a timely manner before council takes over the infrastructure or for ongoing operation by the consent holder.

*Can you get a preview of likely monitoring and other consent conditions?*

All consent applicants should be able to see a draft report so they can check that the proposed conditions are understandable and practicable, before the council issues the consent.

By the same token, councils need to check that the conditions they are proposing to attach to resource consents are:

- doable by the consent holder
- monitorable by the council
- clearly relevant to the issues and objectives in the relevant statutory documents
- able to deliver monitoring results that, where relevant or possible, are compatible with state of the environment and other monitoring (e.g. community outcomes or asset performance and levels of service in activity plans under the LGA).

*How much monitoring is it reasonable for a council to ask you to do?*

The demarcation between what a consent holder should monitor and what a council should monitor varies depending on the local context and needs. Monitoring data from consent holders tells the council what measures are built, and for innovative methods, how well they perform. However, the collection of information on the overall outcomes they produce is more of a council responsibility.

Most councils are familiar with ponds and wetlands as part of low impact developments: there are usually only a few of them and they are reasonably straightforward to inspect and maintain as part of their asset management plans. However, many are less confident about the performance of other devices that may be more widespread, like swales, tree pits or rain gardens, or are on private land, such as rain gardens or tanks. In these cases, they will be more cautious and put more responsibility on the consent holder to show they will work in the long term. Consent conditions may therefore require monitoring for several years.

LIUDD devices are new to many councils, and they are understandably conservative about taking on responsibility for something that may cost the community a lot of money if it doesn't work, or if the operation and maintenance are more expensive than estimated.

As more data on the performance of LIUDD is accumulated over time, it is likely that the monitoring responsibilities of developers adopting more "tried and true" LIUDD measures will gradually diminish.

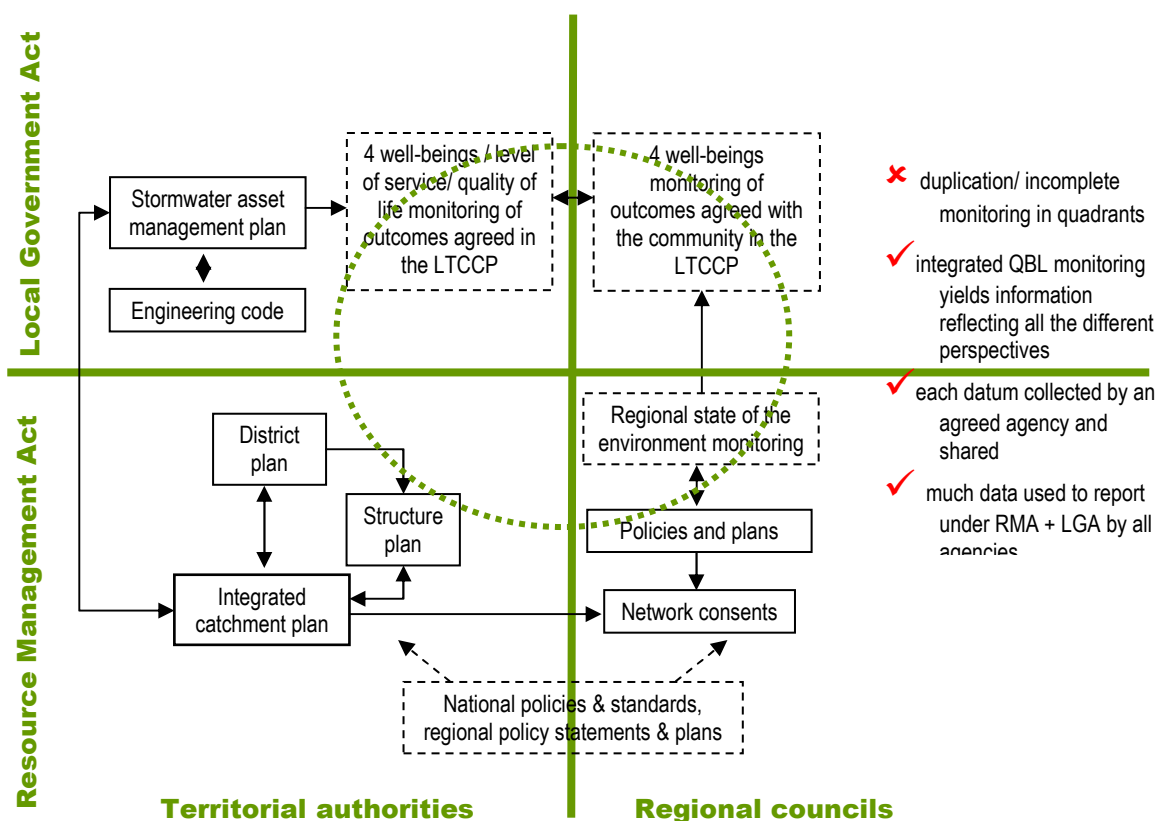
#### **4. *Integrated monitoring: pulling it all together***

LIUDD delivers benefits across the social, economic, environmental, and cultural well-being (the four wellbeings) under both the RMA and LGA (as well as other legislation and a host of other statutory and non-statutory strategies). It also helps both regional and territorial councils carry out their responsibilities under RMA, LGA and other Acts.

Its outcomes are therefore best captured in an integrated monitoring programme, and while this is difficult to achieve, councils that make the effort can make significant savings of time and money as well as learning a great deal by working together.

A process showing some of the interactions that make this desirable is in Figure 3.

**Figure 3 How monitoring of LIUDD can integrate overlapping responsibilities**



## 5. A case study for the Styx River

### The Styx Living Laboratory Trust

The Styx Living Laboratory Trust was established to achieve vision three of the overall “Styx Vision 2000 – 2040”, specifically to develop a “living Laboratory” that focuses on both learning and research as envisioned by Dr Leonard Cockayne (1885 – 1934). The Trust works closely with Christchurch City Council, Environment Canterbury, NIWA, Landcare Research, and Lincoln University under a Memorandum of Understanding. The vision evolved from the need for the CCC to develop asset management plans for its assets associated with the surface water environment, resulting in the waterways and wetlands asset management strategy.

The strategy is underpinned by a philosophy that incorporates values, visions, and partnerships. The values are:

- landscape
- drainage
- ecology
- recreation
- culture
- heritage.

There has been extensive community consultation and participation since its inception. There have also been a number of research investigations undertaken to provide supporting information on the catchment. This consultation and research has highlighted both concerns and opportunities presented by the Styx River and its catchment.

### **The Styx Vision 2000-2040**

From these issues, five interrelated visions have evolved – to:

1. achieve a viable springfed river ecosystem to complement the other representative protected ecosystems of Christchurch
2. create a “source to sea experience” through the development of an urban national reserve
3. develop a “living laboratory” that focuses on both learning and research as envisaged by Dr Leonard Cockayne
4. establish The Styx as a place to be through maintaining and enhancing the special character and identity of the area
5. foster partnerships through raising the quality of relationships as we move forward together.

The document *Vision 2000-2040 The Styx Waterways, Wetland and Surface Water* describes in more detail the main issues and then indicates a series of key actions associated with each vision.

Monitoring of the Styx has been done for some time by:

- the Christchurch City Council
- Environment Canterbury (the Regional Council)
- the Styx Living Laboratory Trust, through its community volunteers.

Over that time, it had become clear that although there has been some sharing of data, better understanding and use of resources could be achieved through the development and implementation of an integrated monitoring strategy.

### **Statutory and non-statutory basis of a monitoring strategy**

The Styx integrated monitoring strategy was based around the explicit and implicit requirements of:

- what the Resource Management Act 1991 (sustainable management of natural and physical resources) requires the two councils to do (see Table 1)
- what the Local Government Act 2002 requires the two councils to do to progress community outcomes in terms of economic, social, environmental and cultural wellbeing
- the Styx Vision 2000 – 2040 and the aspirations of the Styx Living Laboratory Trust, in particular the community volunteer monitoring programme
- the council’s integrated catchment management plans (ICMPs). Although ICMPs for the Styx are yet to be drafted, the Draft ICMP for South West Christchurch was used to provide guidance.

### **Monitoring progress towards the visions**

In 2008, a project team, with members from relevant departments of the City and Regional Council together with representatives of the Styx Living Laboratory Trust was established and a brief was prepared for a consultant to develop an integrated monitoring programme for the Styx. The programme aimed to:

- assess progress towards achieving the Styx visions
- help both the Christchurch City and Environment Canterbury to achieve their statutory monitoring responsibilities
- raise public awareness and understanding of the Styx River ecosystem and associated values and their participation in resource, catchment and River management processes.

Specific objectives aim to increase the extent, quality, timeliness and relevance of the information about the Styx and therefore lead to more informed decision-making, by:

- building on / rationalising / integrating the monitoring activities being undertaken by different organisations and agencies in the Styx catchment
- developing protocols for the use, management and reporting of information to ensure more cost-effective use of resources and data collected and knowledge gained
- understanding the trends and changes associated with waterways and wetlands in the Styx catchment as these affect the Styx Vision 2000 – 2040 and the associated environmental, social, cultural and economic wellbeings
- communicating back to relevant Council agencies any changes in management that warrant further consideration by them, thereby helping them to adapt to changing needs and as more is understood about the Styx.

It is clear that such a programme would enable the two councils to meet the statutory obligations set out in Table 1, including monitoring state of the environment; the effectiveness of the councils' respective plans and policies and the associated consenting; and progress towards achieving the four community wellbeings. The councils are already spending money on monitoring, so the strategy will help them maximise the value to be gained from the data.

The key steps in the process are discussed below, and involved:

1. identifying existing statutory and non statutory objectives
2. identifying monitoring parameters
3. identify environmental values and pressures
4. collate existing monitoring programmes

### **Step one: identify existing statutory and non statutory objectives**

Objectives relevant for the Styx were identified from key planning documents such as:

- Environment Canterbury's Regional Policy Statement, Waimakariri River Regional Plan, Proposed Natural Resources Regional Plan and LTCCP
- Christchurch City's LTCCP, District Plan, Asset Management Plans, the Draft ICMP for South West Christchurch, the Waterways and Wetlands Natural Asset Management Plan and the Styx Vision.

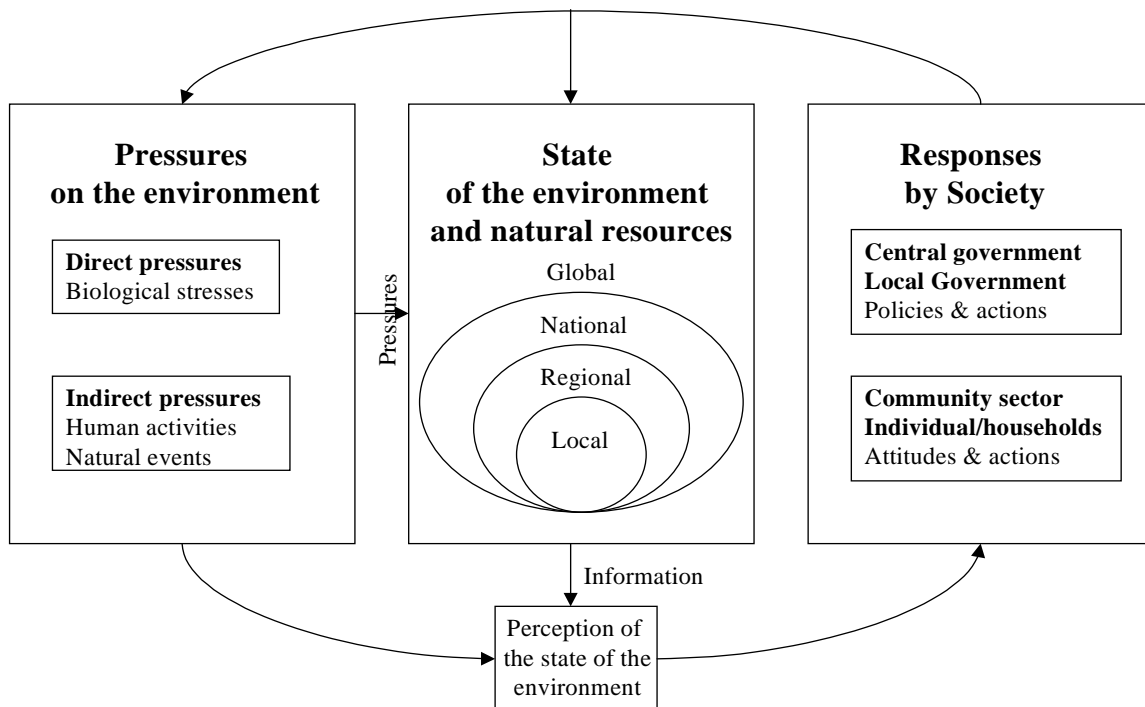
It is important to focus on these resource management and community development objectives and get clear about the anticipated results of the actions taken to meet them, to make sure the information gathered is relevant and useful to the people who review these key documents. These objectives need to be framed in ways that the project team can monitor – with monitoring focused on indicators that will yield the most relevant and useful information.

### **Step two: identify monitoring parameters**

The objectives helped the project team identify what parameters it should be monitoring, as well as what parameters were already being monitored and by whom. While many parameters reflect the environmental outcomes envisioned by the six Styx visions, others are also needed to reflect other benefits to the councils, the Trust and the community.

A decision was made to use the Pressure-State-Response (PSR) framework in Figure 4.

**Figure 4 The Pressure-State-Response (PSR) framework**



In any given locality, the parameters in the framework are informed by a vision and measurable benchmarks of the desired state of the environment (as well as outcomes in the other wellbeings), and leads resource managers to ask the following questions:

- what is the current quality/quantity of the environment and its natural resources (state)?
- what activities may change the environment (pressures)?
- what are we doing about those activities (response)?

### **Step three: identify environmental values and pressures**

So step three was to identify pressures on the natural environment and associated values and what the project team should be measuring to detect the impact of these pressures on environmental states of interest. This sounds simple – but in reality, a huge amount of work was needed.

The pressures of interest will vary according to locality, but for the Styx, they include population growth and the associated changes in people's needs and activities, including settlement and travel patterns, and climate and economic changes. Some of those identified include land uses and changes, point and non-point sources of pollution (including from stormwater systems), building permits, stormwater and other asset construction, resource consents, water demand and aquatic and terrestrial plant and animal pest invasion.

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State indicators need to indicate the effects of these pressures as well as other indicators of interest, and included terrestrial and aquatic habitat availability and quality (including

wetlands and riparian areas), stream bank erosion, the species present, water quality, groundwater and aquifer levels, stream flow characteristics and cultural, recreational and landscape / natural character / amenity indicators.

Response indicators include pollution and other complaint response, compliance and enforcement and “closing the loop” back to inform the verification or alternation of existing policies and methods and the need for new ones.

#### **Step four: collate existing monitoring programmes**

Then the team needed to identify:

- all current monitoring initiatives relevant to the Styx, including an appreciation of what is happening in other Christchurch catchments and any other relevant New Zealand based programmes
- what attributes/indicators are currently being monitored, including methodologies
- gaps, incompatibilities, duplications, and any other flaws in the information being gathered from the monitoring programmes
- where the information is held, who uses it and how it is reported or otherwise conveyed to the different interest groups and stakeholders.

Both councils and the Styx volunteers have been very actively monitoring a wide range of parameters, so this process yielded a vast amount of information that had to be collated in order to take step five, which was to work out where better monitoring information is needed, including data compatibility, better co-ordination of data bases, which organisations are best placed to fill these gaps and how monitoring information is best conveyed to them in order that this monitoring is incorporated into their annual work programmes and the reviews of the relevant guiding documents.

#### **Step five: prepare monitoring strategy and action plan**

Finally, a monitoring strategy and action plan was prepared. It includes actions related to all the project findings, the list of parameters (indicators) and frequency / method / responsibility for monitoring and reporting. Timing links in with the regular reporting and review requirements related to statutory obligations under the Resource Management and Local Government Acts. The strategy includes the costs and resourcing needed to carry out the monitoring in the action plan – and this resourcing also provides for the support needed by the community volunteers taking part in the strategy.

The strategy itself will also monitor the learnings of all the people involved in its development and implementation, as this is an invaluable aspect of building the technical and collaborative capacity of councils and communities.

#### **How will the information help?**

The information derived will therefore be useful for:

- the environmental and programme monitoring required by the RMA
- the community outcome monitoring required by the LGA
- ensuring the monitoring reflects all the necessary requirements and information sources to help make sure that consent conditions are aligned with policies and outcomes in government and council plans and strategies
- linking and co-ordinating the information collected under both the RMA and LGA by both the regional and territorial council
- pulling information collected by community volunteer groups into the councils’ monitoring framework.

#### **Achievements and challenges**

The task was bigger than Christine and the project team had envisaged – and this is to be expected: the process set out in Beanland and Huser (1999) and the data difficulties

encountered in the early Quality of Life surveys (see references at end) indicate the scope of the mission. That said, the Styx team now have a monitoring strategy that they can implement, and doing it will help them build on what they all learn when they review the strategy in a year or two. This is what most integrated monitoring strategies recommend – start small, build confidence, then tackle a bit more next time.

Things that Christine and the team will be considering as they go forward will include:

- incorporating more explicit LGA objectives, outcomes, indicators and reporting
- developing a better understanding of the support that is needed within councils and community groups for developing truly integrated monitoring programmes
- reviewing the six visions and the Styx and monitoring strategy objectives so that it is easier to monitor progress towards their achievement
- better managing the tension between private property rights and common good outcomes
- better informing and clarifying the alignment of the planning documents, management plans and consenting processes that manage the effects of land use on environmental and other community outcomes.

Considerations for further pushing the boundaries include looking at the maintenance of public and private assets, both natural and built: the City Council invests considerable effort into its existing maintenance activities associated with waterways, wetlands, stormwater infrastructure, and riparian reserves in the Styx catchment. Maintenance activities therefore also need to be brought within the scope of the policy, planning, consenting and monitoring activities of all the parties to the monitoring strategy.

There is more information in the paper by Clare Feeney and Christine Heremaia referenced at the end of this summary (and which is also on this LIUDD website).

## **6. How to find out more**

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### **Information elsewhere on the LIUDD website**

Monitoring of LIUDD: notes for consent holders

Integrated resource monitoring: the PowerPoint presentation to the Auckland and Wellington workshops

Summary of proceedings at the Auckland workshop on 15 June 2007

Summary of proceedings at the Wellington workshop on 18 September 2007

Conference papers on monitoring by Clare Feeny, Alison Greenaway, Will Allen and others: go to <http://www.landcareresearch.co.nz/research/built/liudd/> and look under Publications and Presentations in 2006, 2007 and 2008

### Links to Government websites

Local Government New Zealand workshop presentation

[http://www.lgnz.co.nz/library/files/store\\_011/Monitoring\\_and\\_Reporting\\_DIA\\_Outcomes\\_Workshop.pdf](http://www.lgnz.co.nz/library/files/store_011/Monitoring_and_Reporting_DIA_Outcomes_Workshop.pdf)

Local Government New Zealand, with the support of the Department of Internal Affairs and Statistics New Zealand, have provided a series of regional training seminars, followed by intensive practitioner workshops on the topic Local Government Monitoring and Reporting. Presentations and hand-out notes from the seminars and workshops are downloadable from

<http://www.lgnz.co.nz/projects/MonitoringAndReporting/>

Office of the Auditor General <http://www.oag.govt.nz/> 2007 reports on waste and LTCCPs (see "Local government" sector).

Quality Planning website [www.qualityplanning.org.nz](http://www.qualityplanning.org.nz): this website has a great deal of guidance on setting up a monitoring strategy and also contains very many case studies.

Statistics New Zealand website <http://www.stats.govt.nz/environment/default.htm>

### Links to other websites

AnewNZ: this website has some good ideas on monitoring indicators of wellbeing at

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

anzea, the Aotearoa New Zealand Evaluation Association: <http://www.anzea.org.nz/>

Integrated catchment management for the Motueka River: <http://icm.landcareresearch.co.nz/>

The LIUDD case study portal highlights case studies from around New Zealand that demonstrate the application of sustainable development and design practices. It provides information for practitioners on how it has been done by others and is relevant to land developers, policy makers, planners, engineers, surveyors, scientists, home owners and anyone else with an interest in urban design and development. <http://cs.synergine.com>

LearningForSustainability.net: An on-line guide to improving social learning for environment & development <http://learningforsustainability.net/>

Mark Friedman presentation 23 June 2008 on indicators vs. performance measures, with a focus on Wellbeing. To find the PowerPoint on the web, go to <http://www.fiscalpolicystudies.com/Powerpoint/RBA101%20Powerpoint%20Version%201.7.ppt#23>. See also [http://www.fiscalpolicystudies.com/mark's\\_page.htm](http://www.fiscalpolicystudies.com/mark's_page.htm)

Ministry for the Environment: stream cultural health index

<http://www.mfe.govt.nz/publications/water/cultural-health-index-jun03/html/page7.html>

NIWA: SHMAK <http://www.niwa.co.nz/our-science/freshwater/tools/#SHMAK>

Planning under co-operative mandates research programme: this website has a great deal of useful information on preparing, implementing and monitoring good plans at <http://www.waikato.ac.nz/igci/pucm/>

Trees for Survival" <http://www.tfsnz.org.nz/billiontrees.cfm>

TUSC (Tool for Urban Sustainability Code of Practice) <http://www.tusc.org.nz/>

Waicare: <http://www.waicare.org.nz/>