Waikato Regional Council Technical Report 2014/44

Development of the Waikato Progress Indicators (WPI)

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Te Kaunihera ā Rohe o Waikato

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Executive summary

This report summarises the results from desktop research undertaken throughout 2013-14 as part of the development of the Waikato Progress Indicators (WPI) programme. The aim was to learn from national and international good practice to inform the development of a comprehensive assessment of economic, environmental and social wellbeing conditions and trends for the Waikato region.

Waikato Regional Council's (WRC's) challenge was to develop a framework to present complex issues using summary indicators. The WPI initiative to date has resulted in:

- A thoroughly researched conceptual framework;
- Comprehensive data spreadsheet and analysis of 32 indicators of economic, social and environmental progress; and
- Dashboard of products including regional scorecard, national and regional comparison tables, circles of wellbeing (state and trend), individual indicator report cards and web pages (www.waikatoregion.govt.nz/wpi).

Recommendations from a 'frameworks review' in early 2013 were considered during the development of the WPI framework. The frameworks review resulted in recommendations on the purpose and target audience, indicators and domains, indicator selection process, reporting and presentation of results. The key recommendation of the frameworks review was to build on existing good practice programmes including the WRC environmental indicators and MARCO (monitoring and reporting community outcomes) indicator programme. Subsequent information and peer review also influenced the evolution of the WPI programme.

The frameworks review recommendations included a proposal to develop a composite overall Regional Development Index and sub-indices which could be compared between New Zealand regions (potentially internationally) and tracked over time. Initial results from experimental composite wellbeing indices for the Waikato region are presented as part of this report.

The current WPI framework, indicators and results are a work-in-progress to provide a basis for consultation, sharing of data/information and engagement with stakeholders and the community. Results and a summary of the WPI background and method used are presented in the 2014 WRC Technical Report titled Waikato Progress Indicators – *Tupuranga Waikato*. (Huser and Killerby, 2014).[1]

[1] http://www.waikatoregion.govt.nz/Services/Publications/Technical-Reports/

List of Acronyms

ANDI	Australian National Development Index
CFW	Choosing Futures Waikato
CIW	Canadian Index of Wellbeing
EAAA	Environmental Awareness, Attitudes and Actions survey
EC	European Commission
ESS	European Social Survey
FCA	Full-Cost Accounting
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GOA	Groups of Activities
GPI	Genuine Progress Indicator
GWRC	Greater Wellington Regional Council
HDI	Human Development Index
IISD	International Institute for Sustainable Development
ISEW	Index of Sustainable Economic Welfare
LGA	Local Government Act 2002
LTP	Long Term Plan
MARCO	Monitoring and Reporting Community Outcomes (group of planners)
MfE	Ministry for the Environment
MSD	Ministry of Social Development
OECD	Organisation for Economic Co-operation and Development
NEP	New Ecological Paradigm survey
NMV	Non-Market Valuation
PCA	Principal Components Analysis
PSR	Pressure-State-Response (framework)
QBL	Quadruple Bottom Line (four wellbeings)
QoL	Quality of Life
RPS	Regional Policy Statement
SMART	Specific, Measurable, Available, Relevant and Time-bound
SNZ	Statistics New Zealand
TBL	Triple Bottom Line (three wellbeings)
TLA	Territorial Local Authority
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNISA	Upper North Island Strategic Alliance
WR-GPI	Wellington Region Genuine Progress Index
WRC	Waikato Regional Council
WVS	World Values Survey

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1 Setting the scene

During 2013-14, Waikato Regional Council developed the Waikato Progress Indicators (WPI) monitoring framework to support Council's strategic direction, regional policies and integrated initiatives such as the Waikato Spatial Plan. Key tasks included:

- Establishing a conceptual framework and identifying strategic linkages.
- Selecting suitable indicators across economic, social and environmental dimensions.
- Developing a WPI database that stores the indicator data and enables consistent analysis and regular updating.
- Creating a Waikato Scorecard and other products to provide an overview of regional progress.
- Creating a WPI web presence (www.waikatoregion.govt.nz/wpi).

This report summarises the results of desktop research undertaken throughout 2013-14 as part of the development of the WPI programme. The aim of the research was to learn from national and international good practice.

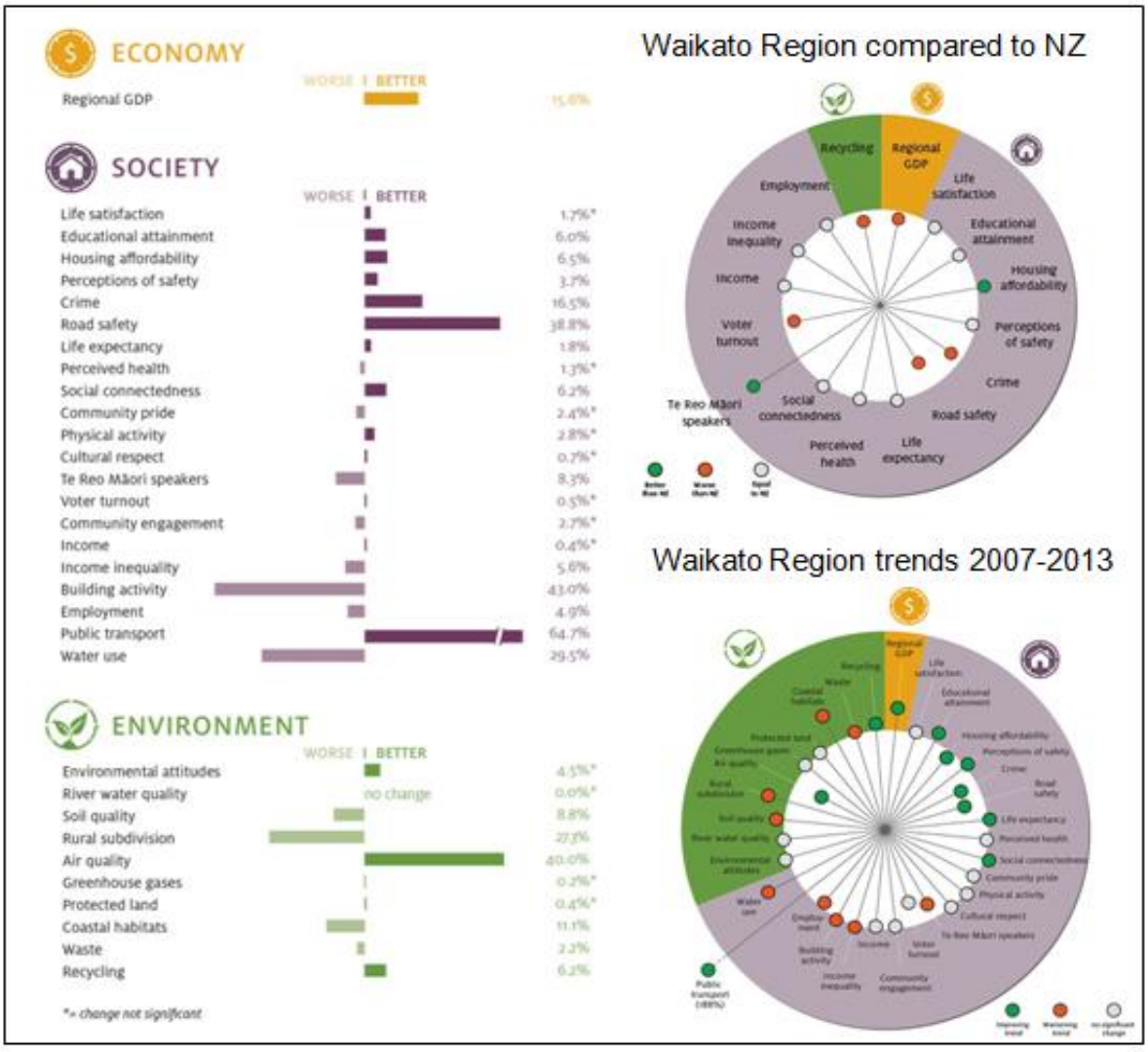


Figure 1: Illustration of sample WPI outputs

Note: For detailed results refer to Huser and Killerby (2014).

1.1 Background

Scientific investigations into the pursuit of health, happiness, quality of life and well-being have been evolving since at least the fifth century BC. This has included monitoring and reporting progress toward holistic wellbeing from both people-centric and environmentally-centred perspectives, as well as a continued mainstream focus on economic indicators such as GDP and human development indicators such as life expectancy and literacy.

International wellbeing monitoring programmes

In 1987, the World Commission on Environment and Development (Brundtland Commission) called for the development of new ways to measure and monitor progress. This sparked a proliferation of new and innovative approaches for defining community wellbeing, identifying relevant indicators, establishing monitoring programmes, creating new surveys and reporting the results in public-friendly ways.

For example, the Bellagio Principles identified in 1996-97 by an international group of measurement practitioners and researchers under the banner of the International Institute for Sustainable Development (IISD) serve as guidelines for the choice and design of indicators and the interpretation and communication of results (refer Appendix A). The spirit of these principles is reflected in international wellbeing monitoring and reporting initiatives by the Organisation of Economic Co-operation and Development (OECD), United Nations (UN), European Commission (EC) and World Bank and various local initiatives such as Statistics New Zealand's Sustainable Development Indicators and more recently the New Zealand Progress Indicators – *Tupuranga Aotearoa*.

Wellbeing monitoring in the Waikato Region

The Waikato Region has a long tradition of monitoring and reporting environmental and community outcomes since at least the early 1990s, including Hamilton City Council becoming an early adopter of Agenda 21 monitoring and reporting; Waikato Regional Council developing and maintaining an extensive environmental monitoring programme; district councils within the Region implementing innovative community outcomes monitoring and reporting practices; and the collaborative Waikato Regional Community Outcomes project (Choosing Futures Waikato) and associated monitoring and reporting community outcomes programme led by Waikato Regional Council (WRC) and the MARCO group of strategic planners following the passing of the Local Government Act 2002.

In March 2011, WRC adopted a new strategic direction.[2] The associated Strategic Direction document identified the need to develop a regional genuine progress indicator or index to assess the state and trends of key economic, environmental and social aspects that together support the 'health' of the Waikato Region and its communities. A Waikato progress indicators framework was subsequently developed during 2013-14. This programme has come to be referred to as WPI, the Waikato Progress Indicators – *Tupuranga Waikato*.

[2] WRC's strategic directions were more recently reviewed and updated for the period 2013-16 – refer http://www.waikatoregion.govt.nz/Council/About-us/WRC-strategy/.

1.2 Monitoring the unobservable

A challenge was for WRC to establish a monitoring and reporting programme that communicates a progress story about abstract concepts that are not directly observable. Examples of such concepts include sustainable development, regional progress, quality of life, community wellbeing, community outcomes, environmental wellbeing, socio-economic wellbeing, business confidence, happiness and life satisfaction. In statistical terms these are known as latent or unobservable variables. Due to their nature, such variables can only be indirectly measured through the use of indicators.

1.3 Pragmatism and the avoidance of false precision

In making recommendations from this research project, the WPI authors sought to take a pragmatic approach to the optimal numbers of indicators and levels of resourcing to apply to the proposed monitoring and reporting programme,. Amongst the national and international exemplars reviewed, there is no apparent correlation between the scale of endeavour behind metadata specification, data collection, framework complexity, detail of measurement, length of reporting, etc and the more salient questions of 'how influential is this information' and 'does it add value to decision making'? A useful quote in this regard is one frequently attributed to the late economist John Maynard Keynes: "It is better to be roughly right than precisely wrong".[3] This sentiment is also reflected in the Bellagio Principles (refer Appendix A), particularly Principle 5 – Practical Focus, i.e. that the assessment of progress toward sustainable development should be based on:

- a limited number of key issues for analysis;
- limited indicators or indicator combinations to provide a clear signal of progress;
- standardising measurement wherever possible to permit comparison; and
- comparing indicator values to targets, reference values, ranges, thresholds or direction of trends as appropriate.

1.4 MARCO guidelines

Due to the nature of sustainable development/community wellbeing/regional progress, specialist practitioners and collaborative groups have formed, such as the MARCO group of strategic planners in the Waikato Region. During 2006, MARCO compiled a Resource Kit for Integrated Monitoring and Reporting to assist councils and other organisations to implement an integrated approach to monitoring and reporting progress toward community outcomes. Guidance from the MARCO Resource Kit with regard to frameworks and reporting is summarised as follows (note these guidelines align closely with the Bellagio Principles listed in Appendix A):

- Indicators and measures must be carefully selected if they are to remain relevant and informative. The acronym SMART is often used as a quick reference (Specific, Measurable, Available, Relevant and Time-bound).
- A key element of data management is the documentation of how, where, when, how often and by whom the monitoring is undertaken (i.e. metadata).

[3] The original quote is from Carveth Read (1898): "It is better to be vaguely right than exactly wrong": http://en.wikiquote.org/wiki/John_Maynard_Keynes (accessed 6 April 2013).

- Monitoring is not an end in itself but part of an ongoing strategic and adaptive cycle. Continuous improvement can only be achieved if monitoring is linked to an ongoing process of strategic planning, review and response.
- Differentiate outcomes monitoring from activity (output) and process monitoring.
- A variety of frameworks can be used to develop an indicator set. The indicator framework defines whether we are measuring the right issues and provides guidance as to the validity of potential indicators. Regardless of which framework is chosen, community or stakeholder consultation is advisable to ensure relevance and validity.

Table 1: Examples of indicator frameworks

Framework	Example	Dimensions
Pressure-State-Response	MfE Environmental Performance Indicators programme	Environmental states, pressures and responses
QBL/Four wellbeings (domains)	Rotorua District Council's social, economic, environmental and cultural monitoring reports	Social, economic, environmental and cultural wellbeing
Quality of Life (domains)	Big Cities Quality of Life project	Knowledge and skills; Standard of living; Economic development; Housing; Health; Natural environment; Built environment; Safety; Social connectedness; Civil and political rights
Community outcomes (goals)	Choosing Futures Waikato regional community outcomes	Sustainable environment; Quality of life; Sustainable economy; Culture and identity; Participation and equity

Source: MARCO Resource Kit (2006).

Note: Meadows (1998) lists a range of additional frameworks including the "Daly Triangle" (ultimate ends, intermediate ends, intermediate means and ultimate means) and the four capitals (economic, natural, human, and social capital).

1.5 Method used for review of frameworks

The frameworks review involved compiling an overview of good-practice case studies of genuine progress indicator frameworks (e.g. GPI Wellington and the Canadian Index of Wellbeing), Sustainable Development and Green Growth frameworks. In terms of the taxonomy described above, most of the examples were developed using a bespoke 'domains' approach underpinned explicitly or implicitly by a triple-bottom-line sustainable development paradigm.

The focus of the frameworks review was not on indicators themselves but on ways in which the results of strategic monitoring have been structured and presented. This encompassed a review of unweighted nominal progress indices, monetary accounting approaches (e.g. initial estimates of Waikato Region GPI) and visual summaries (e.g. MSD Social Report circles of wellbeing and MARCO annual summary diagrams). The choice of exemplars was guided by the experience of the authors. Results from the good-practice frameworks review are presented in Section 3 and Appendix B of this report.

Table 2: Exemplars reviewed (alphabetical)

1. Canadian Index of Wellbeing
2. MARCO – Waikato Regional Community Outcomes Reporting
3. MSD Social Report
4. New Zealand Sustainable Development Indicators
5. OECD Green Growth Indicators
6. Quality of Life Project
7. UNDP Human Development Index
8. Waikato Region GPI (2010)
9. Wellington Region GPI
10. WRC Environmental Indicators Programme

Table 3: Elements of the frameworks review (key questions/topics)

Element/question	Key topics
Purpose and target audience?	• Purpose • Target audience
How many indicators?	• Number of indicators and measures • Framework
How chosen?	• Indicator selection process
How reported?	• Frequency of reporting • Form of reporting
How summarised?	• Metadata and referencing • Key sub-headings (e.g. 'how are we doing?') • Use of composite indices • Use of monetary estimates • Use of qualitative (descriptive) indicators • Comparability (inter-regional, national, international) • Visual representations (graphs, tables, figures, symbols) • Use of time series • Use of future projections/scenarios

1.6 A note on the semantics of indicators and indices

During the peer review process for earlier drafts of this report and the associated Summary Report, there was relatively frequent feedback about inconsistent use of the words indicator and index and related confusion around phrases such as Genuine Progress Indicator and Genuine Progress Index. Examples of peer review feedback include:

- 'Use of Indicator and Index is inconsistent. Genuine Progress Index (when numbers are indexed), Genuine Progress Indicator (for monetary measures, FCA)'.
- '… in the report, the terms 'index', 'indicator' (plural) and 'indicators'(plural) are not always used consistently. However, … although the term Genuine Progress Indicator is used, you could argue that it is an index in the sense that you have a number of component variables which are weighted essentially by monetary values. This is no different from a series of variables which are weighted by other values. The problem is that the literature also is inconsistent in the use of these terms.'

Whilst this report has attempted to be consistent in its terminology, examples of inconsistency may remain. In addition, the words 'measure' and 'indicator' may be used interchangeably in some parts of the report. To help clarify somewhat for the reader, definitions for key words and phrases are provided in the table below.

Table 4: Potentially inconsistent key words and phrases in this report and their usage

Word/phrase	Definition	Source
Progress/wellbeing indicator	Something that helps an organisation, community or other entity understand where it is at, which way it is going and how far it is from where it wants to be. Progress and wellbeing indicators improve the understanding of factors that drive societal progress and enhance evidence-based policy. Progress and wellbeing indicators may include administrative data (eg, counts), survey data, Census data, indices or other measures.	MARCO (2006) OECD (2008a) WPI authors
Index (or composite index)	A summary indicator that averages or otherwise mathematically combines two or more measures. There are many ways to calculate an index. Examples include the Consumers Price Index (CPI) based on the prices of a basket of goods; the New Zealand Deprivation Index (NZDep) based on nine Census items; and many others. An index is both a summary of indicators and a summary indicator in its own right.	WPI authors
Waikato Progress Indicators – *Tupuranga Waikato* (WPI)	A regional integrated monitoring and reporting framework comprising 32 indicators of economic, social and environmental progress and wellbeing. The WPI initiative to date includes experimental composite indices (Section 5).	WPI authors
New Zealand Progress Indicators – *Tupuranga Aotearoa* (NZPI)	The 16 NZPI indicators are a representative subset of 85 indicators developed as a measuring framework for sustainable development (Statistics NZ 2011). The indicators give a picture of how well we are living, how resources are being distributed and used, and what we are leaving for future generations.	Statistics NZ
Genuine Progress Indicator (GPI)	An index/indicator measured in dollar terms that builds on GDP (the value of goods and services produced) and adds or subtracts the estimated value of environmental and social benefits or costs (adjusted GDP). Note that while GPI generally refers to monetary estimates, different frameworks and methodologies are used that do not build on the GDP, see examples below.	Wikipedia and other sources
Nova Scotia Genuine Progress Index (GPI)	A monitoring and reporting framework comprising 20 headline indicators of social, economic, and environmental progress, accompanied by economic estimates for a range of key social and natural assets.	GPI Atlantic (Pannozzo et al 2009)
Wellington Region Genuine Progress Index (WR-GPI)	A monitoring framework for assessing progress towards the wellbeing goals of the Wellington Regional Strategy. Comprising 86 indicators of economic, environmental, social and cultural wellbeing, the WR-GPI framework includes indices that combine trends in specified wellbeing domains using a 100-point 'distance to reference' scale.	WR-GPI website and reports
Canadian Index of Wellbeing (CIW)	Similar to the WR-GPI and the WPI experimental composite indices framework, but with 64 headline indicators and different domains and using a different 'distance to reference' method for index calculation than the WR-GPI.	CIW website and reports

2 Measuring progress and wellbeing

This section provides background and context about why WRC is undertaking the WPI project, what the project aims to achieve and how did we go about doing the project. This includes a discussion on strategic and stakeholder context; what we mean by societal progress; different approaches to measuring progress and wellbeing and lessons learnt. This section is then followed by the results of the 2013 frameworks review.

2.1 Strategic context for wellbeing monitoring and reporting

Economic development is not about growth for growth's sake. It is about working toward and attaining a level and type of development that enables the Region to enjoy a strong economy while retaining a healthy environment and ensuring vibrant communities and a high quality of life. The WPI helps to measure the overall wellbeing of the Region by integrating economic, environmental and social data.

Unlike GDP, there is no internationally standardised method to develop a progress and wellbeing indicator programme. Rather, a plethora of approaches have arisen including monetary approaches such as GPI that adjust GDP by taking into account real benefits and costs (e.g. voluntary work, environmental degradation) and dashboards of largely non-monetary indicators to better assess the social, economic and environmental dimensions of progress and wellbeing of nations, regions and communities (eg, Statistics New Zealand's progress indicators – NZPI).

Taking into account the most recent international and New Zealand work on measuring genuine progress, and building on previous work undertaken in the Waikato Region (e.g. community outcomes identification processes and MARCO indicators), the Council's WPI programme aims to:

- provide an overall picture of progress in the Waikato Region assessed through 32 key measures of economic, environmental and social/cultural aspects;
- identify changes and trends of overall progress of economic, environmental and social/cultural wellbeing, as well as of individual key indicators in the Waikato Region over the last five to ten years; and
- compare and benchmark the overall progress of economic, environmental and social/cultural wellbeing in the Waikato Region with selected other regions, New Zealand and internationally.

How will the WPI be used?

The WPI provides a comprehensive picture of how the Waikato Region is doing with regard to a number of important economic, environmental and social aspects. By using robust and consistent data we can assess changes and trends over time and compare the Waikato with other regions, with New Zealand and internationally. This can assist the identification of challenges and issues and assist in recognising opportunities for working together to resolve current issues and prevent future problems.

The current WPI framework, indicators and results are considered a work-in-progress to provide a starting point for consultation, sharing of data/information and engagement with stakeholders and the community. The purpose of the WPI is not to assess Council's or any other organisation's performance, but rather to track how the region

overall is progressing, to identify challenges and how these can be best addressed (e.g. by working together towards shared goals and solutions). The WPI can also assist as a performance monitoring framework for specific projects such as a Waikato Spatial Plan, the Regional Economic Development Strategy and implementation of the Regional Policy Statement.

Waikato Regional Council strategic direction

Council's strategic direction provided the initial context to begin developing the Waikato Progress Indicators (WPI). The new Council in February 2014 confirmed Council's mission as:

> *"Working with others to build a Waikato region that has a healthy environment, a strong economy and vibrant communities now and for the future."*

To deliver on this mission, the strategic direction prioritises land and water, coastal and marine, regional development, iwi/Māori co-governance and community partnerships. It also identifies six factors that will determine our success: performance, efficiency, innovation, collaboration, resources and alignment.

Managing and enhancing the Waikato Region's natural and physical resources is a big part of WRC's work. Through the use of natural and physical resources, Council provides for some of the necessities of modern life as well as regulating aspects of the comforts and pleasures that come with prosperity. In order to remain prosperous and healthy, Waikato regional communities need continued access to a healthy environment, such as healthy soils to grow food, clean water for drinking and for servicing farms and industries, wetlands to provide flood protection and water purification, and clean air to breathe.

A healthy environment not only provides for people's physical needs, it also influences their sense of wellbeing by having access to natural areas and living in healthy and attractive surroundings. The health, or mauri, of the environment is important to tangata whenua of the Region who view much of the degradation that has occurred, and continues to occur, as unacceptable. Safeguarding the life-supporting capacity of the environment is consistent with a holistic and inter-connected traditional Māori view of the environment and the role of kaitiaki (stewardship).

Regional Collaboration – The Mayoral Forum

A key part of closer strategic partnerships and information sharing is the Waikato Mayoral Forum comprising WRC's chairperson and all of the Region's city and district council mayors. Its role is to:

- provide an opportunity for collective discussion on how to improve the regional community's wellbeing;
- develop a collective vision for the Region; and
- look for more efficient ways of providing local government services.

This includes development of a Waikato Spatial Plan and Economic Development Strategy for the Region.

Waikato Region Spatial Plan

The Spatial Plan is intended to be a 30-year economic, environmental, social and cultural road map. It will contain a shared vision and collective voice on high priority issues that will improve the quality of life for people and communities throughout the Region. The value of a collective voice can be seen in the greater potential for

government investment in the Waikato Region, more consistency in governance and policies, and cost savings for ratepayers by identifying opportunities for sharing information and services.

The WPI initiative should assist in the identification of priorities for the Waikato Spatial Plan and provide a monitoring framework and baseline to track progress on implementation.

Waikato Economic Development Strategy

The Waikato Mayoral Forum has identified the need to take a more strategic and co-ordinated approach to economic development. The Waikato Region contains major industries such as farming, forestry, electricity generation and minerals production, and contributes 8.5 per cent of New Zealand's total GDP. However, there is room for improvement in areas such as income and education levels. The Economic Development Strategy will seek to improve the use of regional resources and promote better collaboration between businesses, central and local government, iwi, education providers and economic development agencies.

The Economic Development Strategy (draft for discussion) was completed in early 2014[4]. Its main goal is to 'Increase median household incomes to above the New Zealand average', with a focus goal that 'Value added per capita will grow by 2.8% per annum'. It is envisaged that the WPI indicators may be incorporated into a monitoring framework to assess implementation of the Economic Strategy. Additional suitable indicators may be added as secondary WPI indicators to broaden the scope and detail of the 32 Waikato Progress Indicators and thereby enhance analysis and interpretation of the WPI.

Upper North Island Strategic Alliance (UNISA)

UNISA is an agreement to establish a long-term collaboration between the Auckland Council, Bay of Plenty Regional Council, Northland Regional Council, Waikato Regional Council, Hamilton City Council, Tauranga City Council and Whangarei District Council (WDC) for responding to and managing a range of inter-regional and inter-metropolitan issues. Priorities for inter-regional collaboration are:

- economic development linkages;
- transport, including rail, roads, freight;
- ports, including inland ports;
- tourism;
- emergency preparedness;
- waste;
- water;
- population and settlement patterns, liveability;
- commercial and industrial land development;
- international connectivity and competitiveness – air, sea, broadband;
- energy security; and
- climate change, including greenhouse gas emission reductions.

WPI is expected to inform the debate about identified priorities by providing an evidence base and ongoing integrated monitoring framework.

[4] http://www.mpdc.govt.nz/pdf/News/MayoralForum/WaikatoMeansBusinesspaper.pdf

2.2 Societal progress and its measurement

This section introduces the concept of societal progress, why it is important and how it can be measured. The things we measure and count tell us what we value as a society. They also help shape policy agendas, sometimes intentionally and other times inadvertently. Indicators summarise complex information to make trends and issues more understandable. They can be an effective means to link scientific knowledge to policy and decision making. There has been increasing focus in recent years on various indicators and indicator sets that have been proposed as necessary and central to the measurement of societal progress in a broad sense, beyond economic and financial indicators such as Gross Domestic Product (GDP).

What does societal progress mean?

Investigations into the pursuit of health, happiness, quality of life and wellbeing have been evolving since at least the time of Aristotle in fifth century BC:

> *'The life of money-making is one undertaken under compulsion since wealth is not the good we are seeking and is merely useful for the sake of something else'* – Aristotle, 350 BC.

The meaning of societal progress is closely linked to the language and concepts of sustainable development, which is often understood in terms of three pillars of well-being: economic, environmental and social (e.g. Strange and Bailey, 2008). Therefore the measurement of societal progress involves the comprehensive measurement of these three domains, bringing together information about quality of life that is not only about economic performance but also complemented by information about other important social and environmental aspects.

Societal progress indicators are developed at different levels (international, national and local) to help focus attention on salient policy problems, to enable evidence-based policy development or to help keep track towards fulfilment of political goals and targets (including indicators to provide information about very broad policy areas and society as a whole).

Interest in societal progress indicators that go beyond economic measures ('beyond GDP') also signals the growing importance of promoting and sustaining wider public awareness of fundamental societal and environmental issues. Hence, broad progress indicators have the potential to be used at different levels of decision making processes and as a communication tool between policy makers and the general public (directly or through the media).

From GDP to genuine progress

Since the Second World War, economic growth statistics based on GDP have been widely used as a proxy for national prosperity. However, GDP-based measures were never meant to be used as a primary measure of progress as they are today. Simon Kuznets, the principal GDP architect, warned 40 years ago that:[5]

> *'The welfare of a nation can scarcely be inferred from a measurement of national income... Goals for "more" growth should specify of what and for what'.*

So what is wrong with GDP? The key issue is that it calculates the total value of all goods and services that are exchanged for money and hence over-values production and consumption and does not reflect improvements in human wellbeing. GDP literally

[5] Report to the US Congress in 1934, cited in http://www.oecd.org/site/worldforum06/38433373.pdf.

does not count some of our greatest sources of wealth, including unpaid household labour, volunteerism and a clean environment. Worse still, GDP does not distinguish between good things and bad things – whether from a human or environmental perspective – for example, by counting the depletion of natural resources as economic gain:

> *'Gross National Product counts air pollution and cigarette advertising, and ambulances to clear our highways of carnage. It counts special locks for our doors and the jails for the people who break them. It counts the destruction of the redwood and the loss of our natural wonder in chaotic sprawl. It counts napalm and counts nuclear warheads and armored cars for the police to fight the riots in our cities. It counts Whitman's rifle and Speck's knife, and the television programs which glorify violence in order to sell toys to our children. Yet the gross national product does not allow for the health of our children, the quality of their education or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country, it measures everything in short, except that which makes life worthwhile ….'* – Robert F. Kennedy (1968).

As GDP makes no distinction between economic activities that create benefit and those that cause harm, it can send misleading signals to policy makers when it is used as a primary measure of progress or societal wellbeing. As a consequence, disease prevention and health promotion initiatives, including for example, those designed to reduce the current high levels of obesity, frequently do not receive the same policy attention and funding support accorded to economic stimulus measures.

Comparatively speaking, the relationship between GDP and GPI is analogous to the relationship between the gross profit and net profit of a company: Net profit is gross profit minus the costs incurred; and similarly GPI is GDP (value of all goods and services produced) minus the environmental and social costs. Accordingly, GPI will be zero if the financial costs of poverty and pollution equal the financial gains in production of goods and services, all other factors being constant. Many researchers have been highly critical of GDP for these reasons, for instance:

> *'GDP is dangerously inadequate as a measure of quality of life'* – Costanza et al, 2014.

These limitations of GDP as a measure of societal wellbeing and sustainability are widely recognised and are being addressed. Alternative measurement concepts are being tested and increasingly used for policy-making at the regional, national and international level, for example:

> *'What if we defined success not by the money we spent and the goods we consumed but by the quality of life we create not only for ourselves but for everyone with whom we share the planet? What if we added up the positives of economic growth and subtracted from them the clear negatives, so we had a better picture of whether we were headed in the right direction?'* – Genuine Progress – Moving Beyond GDP.

In recent years there has been a call for less focus on GDP and more focus on alternative measures of progress to gauge the wellbeing of nations. Opinion polls conducted in the European Union and worldwide have confirmed that a significant majority of citizens want social and environmental indices to be used alongside

economic ones.[6] In the last 20 years, tremendous progress has been made in natural resource accounting, and in developing social indicators, time use surveys, environmental quality measures and other means of assessing wellbeing, sustainability and quality of life. We are now capable of measuring societal progress in better ways that accord with our shared values and tell us whether or not we are moving towards the society we want to create.

The WPI project is about identifying and developing indicators that are as clear and appealing as GDP but more inclusive of environmental and social aspects of progress and wellbeing. Economic indicators such as GDP were never designed to be comprehensive measures of prosperity and wellbeing. We need adequate indicators to address strategic challenges of the 21st century such as environmental degradation and resource depletion, inequality and poverty, health and quality of life.

The global movement towards new measures of progress[7]

While there has been concern as early as the 1960s about the use and interpretation of GDP as a primary measure of societal progress, both from politicians and academics and other indicator-producers, momentum really began gathering around alternative indicators at the beginning of the 21st century.

Since 1972, Bhutan has been developing its concept of Gross National Happiness. The Australian Bureau of Statistics launched its Measures of Australia's Progress in 2002. In 2006, the New Economic Foundation launched the Happy Planet Index, which has worldwide reach. Around 2006, the OECD began a series of international conferences on Measuring of Societal Progress. This included the signing in 2007 of the Istanbul Declaration calling for the developing of alternative indicators of progress of societies in all dimensions, with the ultimate goal of improving policy making, democracy and citizens' wellbeing. The Declaration was signed by leading supra-national organisations including the UN, the European Commission and the World Bank. One of the statements in the Declaration recognises 'an emerging consensus on the need to undertake the measurement of societal progress in every country, going beyond conventional economic measures such as GDP per capita.'

> *'These initiatives were being developed in rich and poor countries, from Britain to Bhutan; and by governments, civil society, academics and the private sector. They all shared one aim: to find a better way to measure the progress of their societies and the wellbeing of their citizens, one which took more account of the quality of life and communities, and of equity and sustainability – the things that mattered to people'* – OECD, 2008a.

In 2007, the European Commission (EC) and European Parliament organised the Beyond GDP conference which kick-started their engagement with this agenda. The conference had an objective of clarifying which indicators and indices are most appropriate to measure progress, and how these can best be integrated into decision making processes and taken up by public debate.

The EC emphasises that GDP is still a key indicator of economic performance and essential in key policy fields. However, it also recognises that GDP cannot be used to measure societal progress in a wider sense. To remedy this, it decided on the need to develop more inclusive indicators to complement GDP, e.g. in environmental and social dimensions. In 2009 the EC released its GDP and Beyond communication, which

[6] Special Eurobarometer Attitudes of European citizens towards the environment, August 2011 and Globescan surveys 2007, 2010 and 2013.

[7] Information in this section is largely from http://www.brainpoolproject.eu/about-2/background/.

identified five key steps to go beyond GDP. The 2009 EC communication on GDP and Beyond — measuring progress in a changing world – outlines actions that the Commission has taken to move towards indicators that can complement GDP, while the European Economic and Social Committee calls for the building and testing of indicators for wellbeing and sustainable progress.

In 2008, French President Nicolas Sarkozy set up the Commission on the Measurement of Economic Performance and Social Progress, led by economists Joseph Stiglitz and Amartya Sen and including three other Nobel Prize winners and many other eminent academics. Its aim was to: 'identify the limits of GDP as an indicator of economic performance and social progress, to consider additional information required for the production of a more relevant picture, to discuss how to present this information in the most appropriate way, and to check the feasibility of measurement tools proposed by the Commission.' The Commission (often called the Stiglitz-Sen-Fittousi Commission) reported in September 2009, calling for the measurement of progress to move from production to wellbeing.

In 2011, the European Parliament adopted its Resolution on GDP and Beyond – Measuring progress in a changing world. By and large, this resolution supports the actions proposed by the Stiglitz-Sen-Fittousi Commission and stresses the need to develop clear and measurable indicators of medium and long term economic and social progress. Meanwhile, several countries, including the United Kingdom, Germany, Italy, Japan and Spain, all began initiatives to consider how to measure wellbeing. The UK's Measuring National Wellbeing programme, which started in November 2010, is particularly notable for the support it has received from Prime Minister David Cameron and a government commitment that it intends to use measures of wellbeing to shape government policy.

In July 2011, the UN General Assembly passed a resolution calling on member states to measure happiness and wellbeing. The Rio +20 Conference in 2012 further confirmed the relevance of this issue and the Rio +20 Summit mandated the UN Security Council to develop indicators complementing GDP.

Particularly relevant for the global movement towards new measures of progress are the OECD's Better Life initiative (measuring wellbeing and societal progress) and Green Growth strategy, the United Nations Environment Programme (UNEP) report 'Towards a Green economy', the UN Millennium Development Goals (MDGs), the UNDP Human Development Index (HDI) and the World Health Organisation (WHO) initiative on measurement of and target-setting for wellbeing. The Europe 2020 strategy commits member countries to annually monitor their situation on the basis of a set of indicators showing overall progress towards the objective of smart, green and inclusive economy delivering high levels of employment, productivity and social cohesion.

What are the likely impacts on governments and societies as our measurement system shifts emphasis from measuring economic production to measuring people's wellbeing in a context of progress toward sustainability? The Canadian Government's Foresight Unit (Policy Horizons Canada, 2011) postulates that it will change the way we think about and measure the future progress of nations and communities, and will influence the actual progress of nations and the outcomes and life chances for citizens. It will impact on government administration and the nature of public debate, and it may force some reappraisal of our aspirations; but in the process it will present distinct opportunities for better governance and policy-making and a stronger, more engaged democracy through the shaping of a set of agreed and measurable national goals and strategies.

2.3 Approaches to measuring genuine progress and wellbeing

The international and national 'Beyond GDP' initiatives described above have proposed various approaches to alter or complement GDP. The EC distinguishes the development of new measures of societal progress from attempts to adjust GDP to incorporate a variety of economic, social or environmental factors, e.g. Genuine Progress Indicator (GPI). According to Costanza et al (2014), alternative measures of progress can be divided into three broad groups:

- Adjust economic measures to reflect social and environmental factors;
- Subjective measures of wellbeing drawn from surveys; and
- Weighted composite indicators of wellbeing including housing, life expectancy, leisure time and democratic engagement.

Examples of each of these approaches are tabulated in Costanza et al's (ibid) supplementary information. A fourth approach is to complement policy-makers' focus on GDP with a range of alternative measures presented through a dashboard of summary information. This approach recognises the methodological issues and caveats associated with seeking a single measure of wellbeing. In practice, a combination of these approaches may be the most effective means of communicating underlying trends and patterns as well as the complexity of individual measures.

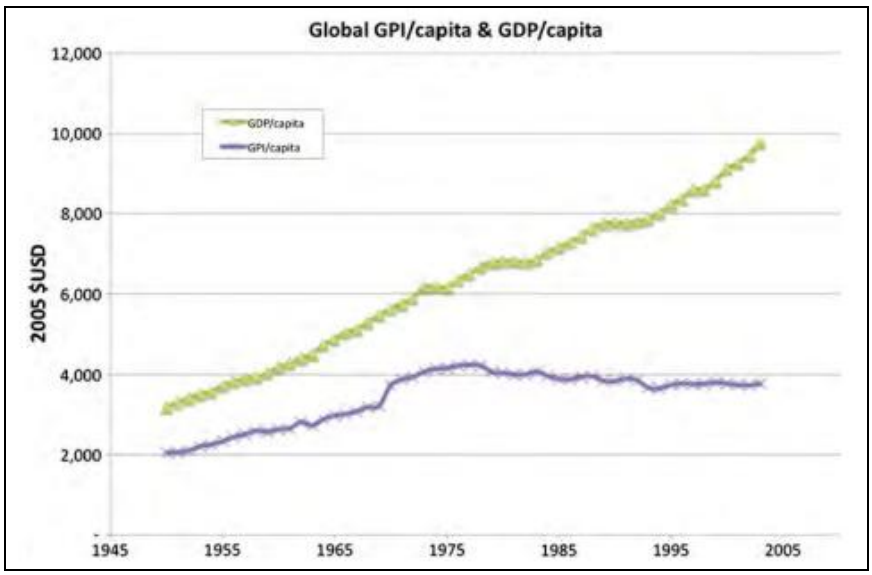
2.3.1 Adjusted GDP measures (GPI)

For well over half a century, the wellbeing of nations has been measured and compared primarily using GDP. GDP is mainly concerned with the total amount of production and consumption flowing in an economy. The more GDP rises, the better the overall welfare of the nation or community is assumed to be. However, there are flaws in relying on GDP to tell us anything about aspects of our wellbeing other than economic elements. Increased spending on hospitals, physicians, pharmaceuticals, and other illness or obesity-related costs, is currently counted as a contribution to our prosperity and therefore our wellbeing. The same is true for production and spending on crime, overwork, toxic pollution, war, car accidents, natural disasters, resource depletion, and other liabilities. So long as money is being spent GDP will continue to grow, regardless of whether that spending signifies an improvement or decline in wellbeing.

The GPI concept is based on a capital accounting framework, in which the value of human, social, and natural capital are recognised along with the manufactured and financial capital that are currently measured. Like conventional capital, this human, social and natural capital is seen as subject to depreciation and requiring re-investment in the event of depletion or degradation. Based on this approach, the GPI approach assesses the economic costs of liabilities like crime, pollution, sickness and natural resource depletion, rather than counting defensive expenditures in these areas as contributions to prosperity (as current measures do).

The term 'uneconomic growth' describes a condition in which the direct benefit of economic growth is outweighed by negative consequences of that growth. This may occur when growth has negative social or environmental consequences, or when the level of growth is unsustainable and leads to future issues that increase expenses. According to Kubiszewski et al (2013), while global GDP has increased more than three-fold since 1950, economic welfare as estimated by the Genuine Progress

Indicator (GPI) has actually decreased since 1978. The authors synthesised estimates of GPI over the 1950–2003 time period for 17 countries for which GPI has been estimated (Austria, Belgium, Germany, Italy, Netherlands, Poland, Sweden, United Kingdom, United States of America, Chile, Australia, New Zealand, China, India, Japan, Thailand and Vietnam). Comparing the GPI with the Human Development Index, Ecological Footprint, Biocapacity, Gini coefficient and Life Satisfaction scores showed some variations among the countries but also major underlying trends.



Source: Kubiszewski et al (2013)

Figure 2: World GDP vs GPI estimates

Kubiszewski et al's results showed that, globally, GPI per capita has not increased beyond around $7000/capita for many developing or recently developed countries. They conclude that the marginal cost of GDP growth appears now to be much higher for poor nations, and hence that the ability of poor nations to increase their economic welfare may now be dependent upon rich countries abandoning their sole policy focus on GDP growth. If wealth was distributed equally around the planet, the current world GDP ($67 trillion/year) could support 9.6 billion people at $7000/capita. The authors conceded that while GPI is not the perfect economic welfare indicator it is far more comprehensive than GDP.

To achieve a sustainable future, there must be a shift in the policy focus from maximising production and consumption (GDP) to improving human wellbeing more generally. This will require taking into consideration environmental protection, full employment, social equity, better product quality and durability, and greater efficiency of resource use.

> *'Gross domestic product is a misleading measure of national success. Countries should act now to embrace new metrics'* – Costanza et al, 2014.

While quantifying the costs and benefits of environmental and social externalities is a difficult task, there is an increasing policy focus on 'internalising externalities' – that is, making companies bear the costs of the pollution they create (rather than having the government bear that cost) by taxing their goods proportionally to their negative eco-impacts. The GPI approach is consistent with this policy direction.

> *'We are in the middle of a paradigm shift occurring around the world. We understand now, better than ever, that our wellbeing as peoples, and our progress as a nation, depends on much more than what economic measurements alone can tell us' – Tim Costello, CEO, World Vision Australia (ANDI testimonial).*

GPI is considered by some as a potential replacement to the more well-known GDP economic indicator. The GPI indicator takes everything the GDP uses into account, but also adds other figures that represent the cost of the negative effects related to economic activity (such as the cost of crime, cost of ozone depletion and cost of resource depletion, among others). The GPI nets the positive and negative results of economic growth to examine whether or not it has benefited people overall. Proponents of the GPI see it as a better measure of the sustainability of an economy when compared to the GDP measure. Since 1995 the GPI indicator has grown in status in Canada and the United States. However, both these countries still report their progress primarily in terms of GDP, to remain in line with the more widespread practice.

The GPI starts with the same personal consumption data that the GDP is based on, but then makes some crucial distinctions. It adjusts for factors such as income distribution, adds factors such as the value of household and volunteer work, and subtracts factors such as the costs of crime and pollution.

Example – Estimation of Waikato Region GPI

Two experimental regional studies were undertaken to estimate a GPI for Auckland and the Waikato Region, based on a Government-funded study (2006-2009) to estimate a prototype National GPI for New Zealand.[8] Both the national study and the regional estimates were conducted by Ecological Economics Research New Zealand and Market Economics Ltd.

The Waikato Region GPI began with a valuation of total personal consumption expenditure. Nineteen additional socio-economic and environmental components of welfare were then included in the GPI, with each component representing either an addition to, or subtraction from, the Region's total personal consumption expenditure (see Appendix B of this report).

The study for the Waikato Region GPI covered the period from 1990 to 2006. Many of the socio-economic component trends experienced in the Waikato Region are closely related to national level trends. The study represented a first and preliminary step in measuring genuine progress in the Waikato Region. There are a number of outstanding theoretical, methodological and empirical issues with the Waikato Region GPI which were beyond the scope of the study and would need considerable future work, including that:

- data was inadequate in a number of components (e.g. cost of overwork, cost of commuting, air quality, water quality, noise pollution and other environmental components); and
- proxies for wellbeing values needed to be used for some components (e.g. climate change, water quality).

These issues require nationally consistent methodologies and adequate resources. While WRC has progressed work on individual priority components (e.g. water quality, degradation of natural capital and associated ecosystem services), the construction of a complete GPI for the Waikato Region is not considered feasible without support from Government.

During the 2013 frameworks review that was undertaken prior to development of the WPI framework and programme, consideration was given to the prospect of full-cost

[8] An overview of the GPI calculation for New Zealand is provided in Forgie and McDonald (2013). In summary, the national GPI measure follows a similar trend to GDP until the 1980s to early 1990s but subsequently grows much less rapidly than GDP.

accounting (FCA). However, existing examples suggest this is a relatively high-cost method. The method appears useful for raising awareness of the importance of specific policy issues and individual indicators but would be too expensive for valuing a wide range of indicators on a regular basis. The resulting recommendation was: 'don't try measuring everything in dollars'.

Merits of a Genuine Progress Indicator

GPI advocates claim that this type of measure can more reliably measure economic progress, as it distinguishes between growth that signifies an improvement in well-being and growth that signifies a decline in wellbeing.

If a river is polluted, if population health declines and if crime rates increase, from an accounting perspective these can be regarded as a depreciation of natural, human and social capital respectively. On the other hand, environmental restoration, health improvements, and a strengthening of social networks and supports can be seen as investments in those capitals.

Because GDP and GPI are both measured in monetary terms, they can arguably be compared on the same scale. The economic valuations that are usually undertaken as part of the GPI function can be seen as a step to overcome the conventional tendency to undervalue the services of unpaid labour, leisure time, natural resources, healthy and safe communities, and other hidden or 'free' assets, in order to make their contribution to prosperity clearly visible.

Given the significant theoretical, methodological and empirical issues, perhaps the primary benefit of a regional GPI is to monitor relative progress over time and to benchmark the Region's progress, rather than treating GPI as an absolute measure.

Criticisms of a Genuine Progress Indicator

The most common criticism of the GPI approach (and of composite progress indices generally) is the seemingly arbitrary inclusion and exclusion of different variables as contributors to or detractors from welfare (e.g. Neumayer, 1999); for instance, correcting for income inequality but not for the degree of political freedom or degree of equality between the sexes. Related criticisms are of a lack of strong theoretical foundation and robust valuation methods, though some researchers seek to refute these criticisms (e.g. Lawn, 2005).

Because the GPI framework requires subjective judgments of what does and does not materially count towards welfare and what does and does not properly count as a defensive expenditure, it cannot purport to be an objective measure of sustainable economic welfare. However, GDP also has a highly value-laden foundation, which is typically under-acknowledged.

In terms of calculation methods, Dietz and Neumayer (2007) take issue with four components in particular of guidance contained in the System of Integrated Environmental and Economic Accounting: (1) valuation of the depletion of non-renewable resources; (2) the cumulative cost of long term environmental damage; (3) the adjustment of personal consumption expenditures for income inequality; and (4) the deduction of defensive expenditures. The critiques here relate to the precise calculation methods, not the basic components. For example, the GPI uses a replacement cost method to value depletion of non-renewable resources, but a resource rent approach may be considered more appropriate (Neumayer 1999; Dietz and Neumayer, 2006; Lawn, 2005).

There have also been a number of criticisms made to the sources of data relied upon for calculating individual GPI sub-accounts. The lack of appropriate data for many GPI components and the need to 'make heroic assumptions ensure the values of these items are likely to be, at best, distant approximations of their correct value' (Lawn, 2005, p 199).

Despite these lingering theoretical and methodological issues, critics of GPI and the closely related ISEW (Index of Sustainable Economic Welfare) approach concede that there is merit in continuing to strive toward improved measures of wellbeing. For example:

> *'...the ISEW's focus on comprehensive current welfare is laudable. Indeed, the emerging sustainable consumption discourse gives the ISEW renewed salience because, according to some, the task of making society's consumption more sustainable is in large part a question of separating out those things that we consume that make us "happier" and those that don't or even make us less happy'* (Dietz and Neumayer, 2006, p 190).

GDP is relatively straightforward to measure compared with GPI, though no less subjective in its underpinning values. By definition, measures like GPI define wellbeing to mean things that are ideologically supported. The development of competing measures such as GPI may be vulnerable to political influence. Therefore, some opponents of GPI claim that it cannot function to objectively measure the diverse goals of a pluralistic society.

Finnish economists Mika Maliranta and Niku Määttänen (2006) note that the problem of alternative development indices is their attempt to combine things which are incommensurable. They use an analogy of calculating the mean of a car's velocity and the amount of fuel left: It is both hard to say what such a measure indicates and difficult to make decisions based on it. They add that it may in fact be the case that economic growth is needed for people to maintain their happiness levels, citing the example of Japan which has had declining happiness levels and slower economic growth since the early 1990s.

2.3.2 Subjective measures of wellbeing using surveys

What is subjective wellbeing?

Subjective wellbeing covers a wider range of concepts. It includes first and foremost measures of how people experience and evaluate their life as a whole, encompassing three elements (OECD 2013):

- *Life evaluation* – a reflective assessment on a person's life or some specific aspect of it.
- *Affect* – feelings or emotional states, typically measured with reference to a point in time.
- *Eudaimonia* – a sense of meaning and purpose in life, or good psychological functioning.

Subjective wellbeing has been highly studied, and has been recommended by some researchers as the most appropriate measure of societal progress (e.g. Layard, 2005), though not all agree that the pursuit of 'happiness' is a convincing basis for setting policy goals (e.g. Duncan, 2005).

The most comprehensive global survey of subjective or self-assessed wellbeing is the World Values Survey (WVS), which covers approximately 70 countries and includes

questions about how satisfied people are with their lives. Another example is the gross national happiness index used in Bhutan. This measure uses elaborate surveys asking how content people feel in nine domains: psychological wellbeing, standard of living, governance, health, education, community vitality, cultural diversity, time use and ecological diversity. A listing and overview of easily accessible population surveys concerning the measurement of wellbeing has recently been produced under the auspices of the Australian National Development Index (ANDI) project (Cummins and Choong, 2012).

Waikato Region Example 1 – MARCO Waikato Regional Perception Survey

MARCO is a collaborative group with members from councils and other agencies with a task to gather, store, analyse, share and report data on environmental, social and economic wellbeing aspects. MARCO selected a set of 75 indicators for ongoing monitoring to track progress on community outcomes (refer www.choosingfutures.co.nz/MARCO-indicators).

Some of these measures are perception-based and hence the data need to be collected via a regional community survey. For these indicators, information is gathered by a telephone questionnaire. The survey is jointly designed, planned and funded by participating councils and coordinated by Waikato Regional Council. The survey measures respondents':

- overall perception of quality of life;
- availability and proximity to schools and other educational facilities;
- availability and proximity to recreational and cultural facilities;
- availability and proximity to primary care;
- feeling of safety (during day and at night);
- job satisfaction;
- respect for other cultures (family and neighbourhood/community);
- engagement with Council (understanding, confidence, participation in decision making); and
- sense of pride in community/district.

The survey is undertaken every three years (to date completed in 2007, 2010 and 2013), hence enabling the monitoring of trends over time.

The results of the surveys are analysed in a number of different ways, including:

- similarities and differences between urban and rural people;
- similarities and differences between territorial authority areas;
- similarities and differences between different demographic groups. For example Māori/non-Māori, young people/older people, high income/low income;
- relationships between different questions. For example, a series of questions relating to trade-offs between the economy and environment are aggregated into an indicator; and
- trend data analysis against the results of previous surveys.

Information products from the surveys include:

- detailed analysis of the results regionally and by territorial authority;

- results published as indicators on MARCO website;
- raw data spreadsheet for further analysis;
- report including all verbatim comments on open-ended questions (by territorial authority); and
- media releases and powerpoint presentations.

The benefits of the Waikato Regional Perception Survey for councils include:

- contribution toward meeting legislative requirements;
- demonstrates collaboration and cost effectiveness (data sharing); and
- provides valuable feedback on community views to assist strategic planning and decision making – by knowing your community.

All the reports can be accessed from www.choosingfutures.co.nz/Publications/.

Waikato Region Example 2 – Environmental Awareness, Attitudes and Actions (EAAA) Survey

Waikato Regional Council recognises that sustainable resource management requires an understanding of environmental perceptions and issues of people who live in the Region. The EAAA survey complements the above MARCO Perception Survey by focussing on the environment and exploring trends in community views. The overall aims of the EAAA survey are:

- track public views, attitudes and priorities about environmental issues over time;
- explore raising awareness of the impact and effects of people on natural resources;
- anticipate public response to environmental policies and programmes;
- evaluate current policies and programmes;
- help the council gain a greater understanding of the underlying worldviews of the public to determine the level of ecological support in the region and the drivers of that support, or lack thereof;
- explore the underlying perspectives of the broader population who may not actively contribute towards making submissions or attend public meetings;
- provide information that is potentially useful to district and city councils; and
- gather public opinion on environmental issues that contribute to policy development.

As a result of a recent review, it was recommended to combine the EAAA survey with Waikato Regional Council's New Ecological Paradigm (NEP) survey. The NEP survey has been kept in its entirety within the combined survey. The NEP scale is one of many tools developed to measure people's environmental attitudes and underlying ecological worldviews. This tool has become one of the most widely-used measures of environmental concern in the world, and has been used in more than 100 studies globally. For report see: http://waikatoregion.govt.nz/EAsurvey

New Zealand example – Sovereign Wellbeing Index survey

The Sovereign Wellbeing Index is the first survey designed specifically to measure the wellbeing of New Zealanders. The aim is to explore both how New Zealanders feel and function in their lives, and how various components contribute to their wellbeing and functioning in various domains of living. The aspects of wellbeing measured include:

- life satisfaction, happiness, optimism, autonomy, hopefulness;
- flourishing, vitality and strengths use;
- meaning and purpose in life, values;
- social relationships, social cohesion and social support;
- engagement, interest, and time use; and
- physical activity and nutrition.

The index includes questions from the Personal and Social Wellbeing module of the European Social Survey (ESS). The ESS has already been used in more than 25 countries. Comparing the results of the Sovereign Wellbeing Index and the ESS will show how New Zealand is doing compared to other countries.

One of the key features of the Sovereign Wellbeing Index is that it will track changes in wellbeing over time. Benchmark measurements were taken during September 2012 and scheduled in 2014 and 2016. More than 10,000 New Zealand adults (aged 18 and over), representing New Zealand's diverse population, have been invited to take part in the research.

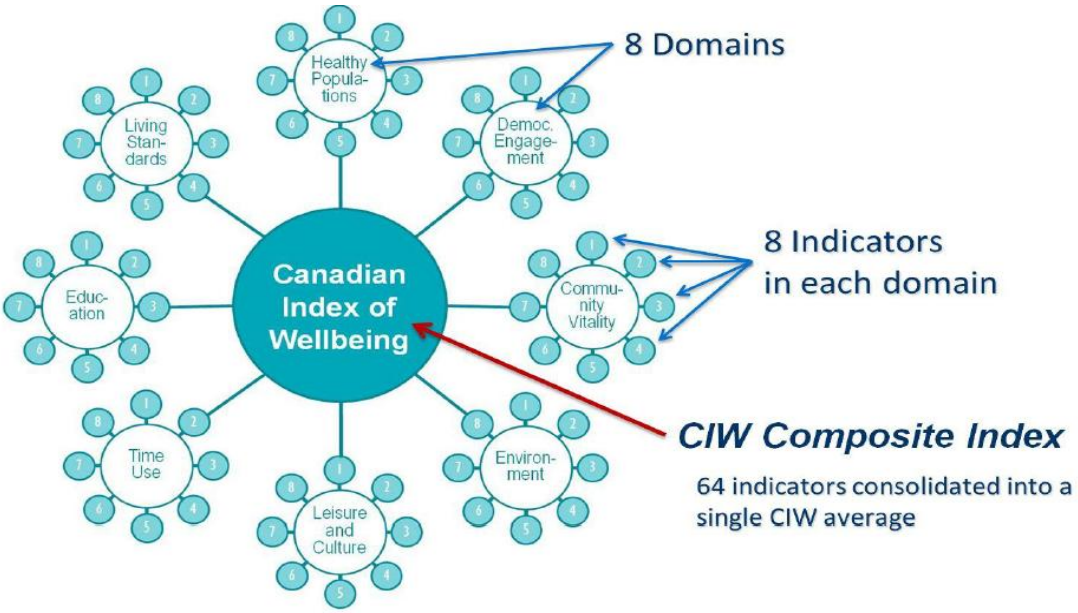
For initial results see www.mywellbeing.co.nz/mw/

2.3.3 Composite indicators of wellbeing (indices)

A composite indicator or index is a mathematical combination of individual indicators (GWRC 2011). Composite indices combine a range of variables, such as income, housing, jobs, health, civic engagement, safety and life satisfaction into a combined number.

Canadian Index of Wellbeing (CIW)

An example of a composite indicator is the Canadian Index of Wellbeing (CIW). Following extensive consultation throughout the 2000s, the first complete version of the CIW composite index was released in 2011 and further reported in 2012 (refer Canadian Index of Wellbeing, 2012). The results showed that between 1994 and 2008, Canada experienced robust economic growth but little progress on other aspects of wellbeing. The report uses eight domains with eight indicators within each domain for a total of 64 indicators. The same framework is now being used for regional and local wellbeing reporting.



Source: Canadian Index of Wellbeing (2012)

Figure 3: Canadian Index of Wellbeing framework

The CIW approach is similar to that adopted for the Wellington Region Genuine Progress Index (WR-GPI) except that the 'distance to reference' scale is different. Rather than taking the highest point in the reference period as being equal to 100 points, the CIW sets a mid 1990s base year to 100 for each of the 64 headline indicators. Starting from a common baseline of 100 points, positive percentage changes for each individual indicator suggest an improvement in wellbeing while negative percentage changes indicate deterioration. This approach applies to all 64 indicators as well as the eight domains, and ultimately, the CIW composite index. Equal weightings are applied to all indicators. Linear imputation has been used to ensure there is a complete time series for each indicator. The same approach as outlined above for the CIW was subsequently adopted for the WPI experimental composite indices (using two different base years: 2001 and 2007).

OECD's Better Life Index

Another example of a composite indicator is the Better Life Index, developed by the Organisation for Economic Co-operation and Development (OECD)[9]. Recently, the OECD has been involved in the global debate on measuring wellbeing. Based on this experience, 11 topics were identified as essential to wellbeing in terms of material living conditions (housing, income, jobs) and quality of life (community, education, environment, governance, health, life satisfaction, safety and work-life balance). Each topic is built on one to four specific indicators, for example, the jobs topic is based on four separate measures: employment rate, personal earnings, long-term unemployment rate and job security.

The OECD Better Life website is an innovative, interactive way to explore data from more than 30 countries, including New Zealand. This allows users to choose how to weight variables, revealing how the emphasis on different variables can influence countries' rankings (and their wellbeing preferences).

Australian National Development Index (ANDI)

In May 2010, Australia launched a new citizens' led initiative on measuring progress: the Australian National Development Index (ANDI). ANDI's partners are a coalition of

[9] OECd Better Life Index http://www.oecdbetterlifeindex.org/

non-government organisations in Australia representing a diverse range of citizen interests and expertise, supported by a team of universities. Partners range from trade unions and business groups, churches and local government agencies to organisations in the environmental, social welfare, human rights and youth fields. ANDI also has some government partners, but funding and governance are provided predominantly from the Australian community.

ANDI is a strong voice in support of the 'paradigm shift' to redefine progress from being primarily about increased economic production to being more about equitable and sustainable wellbeing. The aim of the ANDI project is to introduce a holistic measure of national progress and wellbeing that reflects the values and priorities of Australians. More than just a composite number, ANDI will strive to reflect real life, informed by experts but defined by Australians and designed to promote democracy and citizen voice. ANDI as both an idea and a tool:[10]

- The idea: our wellbeing encompasses a wide variety of aspects of life, far beyond conventional economic measures like Gross Domestic Product (GDP). It is a conceptual framework drawing on a broad spectrum of domains of life and the sustainable wellbeing of our communities.
- The tool: that will measure what matters to Australians. It will track wellbeing outcomes from year to year in an effort to offer clear, valid, and regular information on the quality of life of all Australians. The combination is powerful. It is more than just a number. ANDI will reflect real life.

Source: ANDI website (http://www.andi.org.au/the-index).

Figure 4: ANDI conceptual framework

[10] http://www.andi.org.au/about.

ANDI is guided by a conceptual framework that shifts the focus solely from the economy to include these other critical domains of people's lives that lead to enhanced wellbeing. Key indicators representing each domain will collectively provide the basis for the ANDI composite index. A composite index combines progress measures across many dimensions of wellbeing into one single number to show progress over time. The single number will not stand alone. It will be accompanied by domain results to provide context, and a technical reference guide to detail weightings and processes used to reach the result. ANDI envisages to measure 12 indicators per topic giving a total of 144 indicators.

ANDI's concepts and approach are similar to the WPI experimental composite indices: exploring the feasibility of developing a single Waikato Region Progress Index supported by sub-indices (Economic, Society, Environment) and backed-up by the set of 32 progress indicators for the various topics, plus additional indicators or information to provide more details. Composite indices are discussed further in Section 5.

2.3.4 Dashboards of indicators

Given the significant methodological issues and disadvantages of combining several indicators into one number, many indicator projects decide to present the results of each indicator separately and also collectively as a dashboard of indicators. There is a plethora of such projects around the world (refer, for example, to: www.wikiprogress.org/index.php/Indicator_Projects_around_the_World).

The Waikato Region already has a notable example of this approach in the form of the MARCO regional community outcomes monitoring and reporting initiative. Formed in 2004, MARCO is a partnership between Waikato Regional Council (convener), the 11 territorial authorities within the Waikato Region, the Waikato District Health Board and some central government agencies. The underlying principle of MARCO is to share data to support a common evidence base for planning and decision making across the four wellbeings (including cultural wellbeing) in a cost-effective manner. In 2006, the MARCO group selected a set of 75 key indicators covering environmental, social, cultural and economic aspects. These indicators are annually updated, analysed and reported. The results are published on the Choosing Futures Waikato website in the form of Report Cards for each of the 75 indicators, regionally as well as by district (where data are available); see www.choosingfutures.co.nz/MARCO-indicators.

2.4 Different approaches – lessons learnt

Many projects are under way globally, using a range of different approaches. None of these is perfect but collectively they offer the building blocks for something better than GDP. A comprehensive picture of sustainable societal wellbeing must necessarily integrate a range of indicators.

In the absence of a standardised method to estimate an adjusted (regional) GDP, the results of a Waikato Region GPI are difficult to interpret. Ongoing methodological changes make the tracking and assessment of trends and changes over time challenging. Valuing and estimating the various components needed to adjust the GDP is difficult and costly. The main drawback is that not everything that is important for progress and quality of life can be counted in monetary terms (e.g. people's happiness and life satisfaction, social connectedness, cultural identity, environment and landscapes). Hence, even an adjusted GDP is still an incomplete measure of societal progress and wellbeing.

After nearly a decade of intensive activity on a global scale and at many different levels of community and society, it is now possible to identify some key lessons and agreements derived from numerous reports, conference declarations and research papers. For example, the following six key lessons of the Global Progress Movement are summarised by Salvaris (2013, p 18):

1. GDP may be a good measure of the nature and volume of a nation's economic production, but it is a poor measure of its overall progress and wellbeing.
2. Societies need to develop better and more integrated (holistic) measures of their progress which take account of four interdependent domains of broad societal progress: economy, society, environment and governance.
3. Better measures of progress must also take into account qualitative and not just quantitative dimensions of progress, including subjective wellbeing, community belonging, relationships, life satisfaction and happiness.
4. Essentially the problem we are facing may not primarily be that we use the wrong measures but that we have the wrong model of societal progress. 'Increasing equitable and sustainable wellbeing' may be a better definition of true progress than 'increasing economic production'.
5. Developing a new model and new measures is as much a democratic task as it is a technical or policy task; it requires the engagement of citizens, working with scientists and policy-makers.
6. Societies need to give urgent consideration to the implications of these new progress measures and how they can be best put into practical application, use and understanding. This may involve some significant changes to current practices, but over time, it is likely to bring many benefits in government planning, policy making and transparency, and provide a better guide to long term development than current measures and decision making cycles.

Similarly, key lessons from Beyond GDP progress indicator initiatives may be categorised (e.g. Brainpool, 2012) in the following way:

- Salience for policy-makers: Indicators were successful when they could be demonstrated to be applicable to policy or strategy (e.g. for performance monitoring). This included fitting with an organisational vision or strategy, measuring something that policy-makers believed they could influence, and being low-cost and/or saving money.
- Salience for broader audience, including the public and politicians: Simplicity, presenting complex topics in simple terms; understandability, relating a meaningful concept to audiences; and working with communication experts to ensure successful communication.
- Credibility: This includes balancing the presentation of high-level summary measures against the danger of over-simplification.
- Legitimacy: Being, or appearing, neutral; wielding institutional power; and working with your audience. Initiatives that are developed by or with the users they are intended for tend to demonstrate more success.
- Relationships and process are vital: This includes direct contact with audiences and working through networks. Small is beautiful – Initiatives working in a local context have appeared to have the greatest immediate success, although of course, even these initiatives recognised the need for national action.

Partnerships – working in partnership is often an effective solution to some of the challenges. Identifying allies – several initiatives noted the importance of having allies within the organisations that they are trying to influence.

Barriers to the uptake of 'Beyond GDP' indicators

A recent report by the EC-funded Brainpool project (Bringing Alternative Indicators into Policy) looked at the barriers to, and opportunities for the use of Beyond GDP indicators in policy. The project identified some of the barriers to using alternative indicators to guide policy and some of the ways these barriers can be overcome. The report identified 12 barriers, grouped into five main categories:

1. Resources: budget constraints, data problems.
2. Resistance: natural conservatism, Beyond GDP is redundant.
3. Communication: ignorance or confusion about indicators, lack of a strong narrative that engages the public, language and politics associated with Beyond GDP.
4. Complexity: lack of a single Beyond GDP indicator with the salience of GDP, complexity and uncertainty of Beyond GDP policy analysis.
5. Organisation: lack of 'indicator entrepreneurs', difficulty of working across silos and organisations, human resource shortages.

To overcome some of the barriers listed above, the report also suggests specific recommendations, such as demonstrating the difference that Beyond GDP indicators will make, finding opportunities to communicate about Beyond GDP, developing a database of indicators that facilitates integrated policy-making, and identifying potential users with power and tailoring the indicators to their needs and tries to entrench their use.

3 Results of good-practice frameworks review

3.1 Summary of results

The building blocks are already in place

From the frameworks review it was evident there is considerable variation in possible approaches to wellbeing monitoring and reporting but also many common elements. Programmes such as the Wellington Region Genuine Progress Index (WR-GPI) are not greatly different from pre-existing monitoring programmes in the Waikato Region. For example, there is a clear analogy between the dimensionless 100-point 'distance to reference' scale used by the WR-GPI and the dimensionless circles of wellbeing used by MARCO to summarise key findings. In fact, the information used to generate the MARCO circles of wellbeing could readily be put to use in generating a composite progress index (subject to direction from WRC around imputing missing data and other technical aspects).

A key observation from the frameworks review was that the Waikato Region is already leading the way and adopting good-practice in many aspects of wellbeing monitoring and reporting. For example, the Canadian Index of Wellbeing work programme only recently adopted a subjective wellbeing survey whereas the Waikato Region has access to a historical time series of results from the WRC and MARCO-led

collaborative Waikato Regional Perception Survey since 2007. In developing its WPI monitoring programme, WRC has been able to build on, rather than replace these existing efforts.

Create a programme to match the budget

Budget considerations are a key factor in considering the extent of reporting to be undertaken. At a minimum it was recommended that key findings be presented concisely in the Annual Report and on a specific page of the WRC website. Beyond these minimum reporting recommendations it will be up to WRC to decide what level of resourcing and future development to commit to the WPI monitoring and reporting programme.

Engage with stakeholders

It is important to ensure that iwi, business and other key stakeholders are taken along on the journey when developing a monitoring and reporting programme, including the selection of indicators. In this regard, WRC is anticipating the next steps in the WPI programme development will include communication and engaging with strategic partners and stakeholders.

Keep it simple – aim to influence

Ultimately what is sought is a monitoring and reporting programme that will influence decision making and serve as a benchmark for strategic planning and thinking. From the frameworks review, it was identified that the scale or complexity of the monitoring programme is not necessarily a good indicator of the expected level of influence. If it wishes to reflect global good practice, then WRC should aspire to create a monitoring and reporting programme that is accessible, repeatable and influential.

A key message stemming from the 2013 frameworks review was to keep the monitoring and reporting programme as parsimonious or simple as possible. Guidance around the scope of development and maintenance of the programme ultimately comes from WRC's Long Term Plan and associated budgets. An immediate advantage for WRC in this regard was the ability to build on and integrate with existing programmes such as the WRC Environmental Indicators and MARCO community outcomes indicators.

3.2 Purpose and target audience

The purpose and target audience of a monitoring framework are inter-related. In most cases, the examples in this report have a dual readership of policy makers and community members and one or more of the following aims:

- Assess progress toward societal progress, human wellbeing and/or environmental goals (i.e. provide a frame of reference); and/or
- Identify areas of key concern and provide information to inform strategic thinking and policy development.

The WPI should similarly address these aims though a simple progress assessment tool (e.g. Scorecard) and drilling down to identify specific areas of concern (e.g. individual indicator Report Cards). Recommendations seeking clarification from WRC staff were made to this effect and resulting discussions and decisions informed the development of the WPI programme. Eventually a 'dashboard' approach was the preference and this is reflected in the initial set of WPI outputs.

Table 5: Purpose and target audience – results from a review of exemplars

Example	Purpose	Target audience
Canadian Index of Wellbeing	Provide a monitoring framework for assessing progress towards the well-being of Canadians as a whole.	National and provincial decision-makers, members of the public.
MARCO – Waikato Regional Community Outcomes Reporting	Track progress toward a regional set of community outcomes.	TLAs, regional decision makers, members of the public.
MSD Social Report	Provide a national and regional overview of social wellbeing trends.	Policy makers, key stakeholders and members of the public.
New Zealand Sustainable Development Indicators	Measure environmental, economic and social dimensions of sustainable development.	Academics, policy makers.
OECD Green Growth Indicators	To support policy making and inform the public at large.	National and international policy makers, members of the public.
Quality of Life Project	Provide information to decision-makers to help improve the quality of life in major New Zealand urban areas.	TLAs, key stakeholders, member of the public.
UNDP Human Development Index	Serve as a frame of reference for social and economic development.	Developed and developing countries, world bodies, development agencies.
Waikato Region GPI (2010)	Compile a preliminary regional GPI for the Waikato Region.	Academics, policy makers.
Wellington Region Genuine Progress Index (WR-GPI)	Provide a monitoring framework for assessing progress towards the well-being goals of the Wellington Regional Strategy.	Wellington Regional Strategy Committee, member TLAs, other key stakeholders and members of the public.
WRC Environmental Indicators Programme	Provide information about the state of the regional environment and pressures that affect it.	Council, stakeholders and community members.

Source: Based on review of source material.

3.3 Indicators and domains

The number of domains, indicators and measures and the way in which they are selected and structured is very much a matter of context. Of the examples reviewed, the UNDP Human Development Index has the smallest number of measures (four indicators across three dimensions of wellbeing underlying a single abstract concept) and is used primarily as a frame of reference or cross-country benchmark for social and economic development.[11] The Quality of Life Project has the largest number of measures (186 measures underpinning 68 key indicators across 11 domain areas) and seeks to present a detailed and nuanced progress story for participating member territorial local authorities (TLAs), highlighting key findings as well as presenting comprehensive analyses.

It should be reiterated that amongst these exemplars there is no apparent correlation between the scale of resourcing and extent of influence on decision making. For example, the level of influence of the UNDP HDI appears high according to its broad

[11] The HDI is also frequently used in cross-country statistical research to help inform policy development, e.g. as a dependent or explanatory variable in regression analysis.

acceptance as an alternative to traditional measures of cross-country comparison (e.g. GDP growth), its adoption by many countries and its extensive use in academic research. The level of influence of the Quality of Life Project is also high at the regional and sub-regional level in New Zealand, underpinned by buy-in from participating TLAs. Whereas the HDI is constructed from just four key measures using secondary data, the QoL Project encompasses 186 measures including primary survey data commissioned by the participating TLAs, and hence is associated with a potentially higher cost.

Table 6: Number of indicators and domains – results from a review of exemplars

Example	Indicators/ measures	Domains/ themes
Canadian Index of Wellbeing	64	8
MARCO – Waikato Regional Community Outcomes Reporting	75	5
MSD Social Report	43	10
New Zealand Sustainable Development Indicators	16	4
OECD Green Growth Indicators	25	5
Quality of Life Project	186	11
UNDP Human Development Index	4	1
Waikato Region GPI (2010)	20	1
Wellington Region Genuine Progress Index (WR-GPI)	86	9
WRC Environmental Indicators Programme	70	10

Source: Based on review of source material.

The choice of indicators and domains for the WPI was initially guided by WRC's 2010-2013 vision, flagship goals and underlying consultation and information. WRC's 2010-2013 Strategic Direction document specifically mentioned the development of a regional progress index as an opportunity for collaboration between WRC, iwi and other key stakeholders. In other respects, the document left considerable scope for identifying indicators and measures.

In developing the WPI monitoring and reporting framework during 2013-14, Council also needed to be cognisant of the existing MARCO regional community outcomes monitoring and reporting programme and WRC's own environmental monitoring programme. Whatever was developed needed to build on these existing frameworks, avoid duplication and be clear on how the various programmes related to each other. [12]

Following an iterative discussion with the WRC project manager and WPI internal project teams, a triple-bottom-line framework of economy, society and environment indicators was identified. The adopted framework considers that societies are based on two linked systems: the Human system (Society) and the Ecosystem (Environment), with human wellbeing at the centre. Within this framework, having a strong economy, effective governance and vibrant culture are considered to be key supporting pillars to human wellbeing rather than important for their own sake.

In parallel with further development of the WPI initiative, discussions are occurring between WRC, GWRC, SNZ and others around the potential for improved harmonisation and integration between existing international, national and regional progress monitoring programmes. These discussions remain at an exploratory stage.

[12] Forgie (2014) recently analysed ten indicator frameworks to determine whether there is a core set of indicators commonly used to measure wellbeing/progress, and concluded that indicator frameworks varied depending on the 'value base' they are designed to reflect. Similar conclusions were reached in Peterson's (2008) comparative analysis of sustainable community frameworks.

Table 7: Wellbeing frameworks – results from a review of exemplars

Example	Framework
Canadian Index of Wellbeing	Eight wellbeing domains identified through extensive public consultation.
MARCO – Waikato Regional Community Outcomes Reporting	Choosing Futures Waikato framework – Five collaboratively developed community outcome themes and 27 sub-themes (identified with extensive stakeholder and community input).
MSD Social Report	Eight social wellbeing outcomes identified by MSD.
New Zealand Sustainable Development Indicators	Sustainable development/TBL framework.
OECD Green Growth Indicators	Four aspects of Green Growth identified by OECD: Environmental and resource productivity; The natural asset base; Environmental quality of life; Economic opportunities and policy responses. Also indicators of socio-economic context and characteristics of growth (i.e. a separate fifth group).
Quality of Life Project	11 domain areas selected within a TBL/QBL/QoL paradigm.
UNDP Human Development Index	Human development – health, education and living standards.
Waikato Region GPI (2010)	Full-cost accounting framework (personal consumption + socio-economic benefits – socio-economic costs – environmental costs).
Wellington Region Genuine Progress Index (WR-GPI)	QBL/four wellbeings overlaid on nine wellbeing sub-themes (e.g. 'connected community'), five of which relate to social wellbeing.
WRC Environmental Indicators Programme	Pressure-state-response (PSR).
WRC Strategic Direction 2010-2013	Three flagship goals underpinned by QBL/sustainable development paradigm.

Source: Based on review of source material.

3.4 Indicator selection process

The indicator selection process is underpinned by two questions – who and how? With regard to the method (how) of selection, this was addressed as a subsequent part of the WPI development project using indicator selection criteria such as:

- relevance to the concept being measured;
- timeliness with regard to both an annual reporting cycle and availability of an historical time series;
- comparability with New Zealand, other regions and overseas jurisdictions; and
- other criteria such as measurability, availability, avoidance of duplication within the indicator set, interpretational ambiguity, etc.

Indicator selection criteria could be applied either weighted or with equal weighting to many of hundreds of indicators that have been identified in the Waikato Region for environmental and community outcomes monitoring. Depending on the degree of selectivity applied, this could then result in any number of key indicators being included in the WPI indicators set. The number of indicators could also be guided by considerations of the purpose, audience and budget.

The more important question for the initial frameworks review was 'who', i.e. what person or persons would select the indicators? A review of exemplar programmes showed that this usually involved a collaborative effort by planners and researchers. Indicator programmes can also be developed with assistance from community members and community group representatives, although the specialised nature of the task means this can be time-consuming and expensive and may not add value unless done in a well-considered and meaningful manner. Stakeholder engagement should be conducive to enhancing social capital and adding value to the project. Recommendations were made to this effect for consideration by WRC.

Table 8: Indicator selection processes – results from a review of exemplars

Example	Indicator selection process
Canadian Index of Wellbeing	Collaborative working group of academics. Indicator election based around alignment with wellbeing framework identified through public consultation.
MARCO – Waikato Regional Community Outcomes Reporting	MARCO group (collaboration of TLA strategic planners) – SMART analysis, including consideration of availability of data at sub-regional level for TLA purposes.
MSD Social Report	Developed by MSD through consultation.
New Zealand Sustainable Development Indicators	Statistics New Zealand through collaboration and consultation.
OECD Green Growth Indicators	OECD experts.
Quality of Life Project	TLA collaborative process.
UNDP Human Development Index	Selected by academics on the basis of extensive research.
Waikato Region GPI (2010)	Literature review (FCA).
Wellington Region Genuine Progress Index (WR-GPI)	Collaborative working group. Indicator election based around alignment with outcomes framework identified through public consultation.
WRC Environmental Indicators Programme	Selected by WRC based on scientific understanding currently available about the region's environment and with input from key stakeholders and interest groups.

Source: Based on review of source material.

For the WPI project, initial indicator selection was undertaken during 2013-14 through an iterative process involving the WRC project manager and internal project groups. An indicative set of indicators was first selected and then refined, resulting in 32 indicators reflecting elements of the economy, society and environment. This process involved multiple rounds of feedback aided by internal discussion documents and initial data outputs. The current WPI framework, indicators and results are considered a work-in-progress to provide a starting point for consultation, sharing of data/information and engagement with stakeholders and the community.

3.5 Reporting

A review of good-practice exemplars suggests that most monitoring and reporting programmes have a website (or web pages within an organisational website) and a pdf report of the findings. Reports vary in length depending on the level of detail being provided, with some being more than 200 pages and provided online through individual pdf chapters. Many are also accompanied by comprehensive technical reports. Some websites have been developed to include interactive graphs and other elements to generate visual interest and engagement. A typical monitoring and reporting programme from within the exemplar selection would cost at least tens of thousands of dollars per annum to resource. Possible exceptions are those ‘close to home’, with the WRC environmental programme reporting being generated in-house and the annual MARCO updates being commissioned at a relatively low fee and generating online publications (pdf and Excel) and website text and static graph updates.

At a minimum there is an expectation that WRC will report the findings from its well-being monitoring through its Annual Report. Hence, the frequency of updates and reporting should be annual. It would also be a relatively low-cost option to create a web page on the WRC website describing the monitoring and reporting programme and providing a summary of the findings and links to further information. This could be further enhanced later, subject to budget and WRC intentions. Any additional reporting would be subject to the level of resourcing, visibility and promotion that WRC may wish to attribute to the new monitoring and reporting programme.

WRC should develop a Strategic Communication Plan for the new monitoring and reporting programme to explicitly budget and plan for further development. By giving the programme an elevated status over time, it would become more branded and be

recognised and valued by communities, iwi and other stakeholders. This need not necessarily entail a significant investment. Often a simple report can be influential. For example, Statistics New Zealand's Sustainable Development Indicators Key Findings Report 2011 (24 pp) has a simple look and feel which effectively conveys the results for a range of key indicators.

The links between WRC activities, outputs and strategic outcomes must also be expressed clearly in Council's Annual Report. Killerby (2006) and related papers provide insights and recommendations for attributing community progress to council performance, i.e. reporting the council performance story, the separate community progress story and possibly the 'attribution story' and logic that connects these two parallel monitoring and reporting programmes. Note this advice was within the context of a pre-amendment version of the LGA which gave a much greater focus to the links between council activities, outputs and strategic outcomes.

Depending on decisions made by WRC as part of the development of the WPI programme, and the 'Groups of Activities' agreed for the LTP and Annual Report, there may be scope to link regional wellbeing findings to aspects of Council's annual performance reporting. A simple link between Council's activities and achievements of outcomes assists strategic thinking and effective communication to stakeholders and communities. There are already overlapping strategic frameworks in place across the Waikato, and some rationalisation may be desirable to provide greater clarity. Accordingly, the recommendations from the frameworks review sought to take a pragmatic and relatively minimalist approach.

Table 9: Frequency and form of reporting – results from a review of exemplars

Example	Frequency of reporting	Form of reporting
Canadian Index of Wellbeing	Annually to date (2011 and 2012 reports).	Website and report (82 pp).
MARCO – Waikato Regional Community Outcomes Reporting	Annual data updates.	Report (200+ pp), website.
MSD Social Report	Now triennial (previously annual).	Website and report (184 pp) plus Regional Indicators report and links.
New Zealand Sustainable Development Indicators	Last updated February 2011 (website and report).	Statistics New Zealand website, Key Findings report (24 pp) and other reports.
OECD Green Growth Indicators	The OECD provides only a framework and indicators. Reporting against this framework is undertaken by individual countries using the Green Growth indicators and framework as a starting point.	Online database, links and further information.
Quality of Life Project	Biennial reporting based on survey cycle.	Report (200+ pages), biennial Survey Results reports and website.
UNDP Human Development Index	Currently biennial.	Reported online and through Human Development Report (200+ pages).
Waikato Region GPI (2010)	One-off study (2010).	Summary results report (51 pp) and technical report (114 pp).
Wellington Region Genuine Progress Index (WR-GPI)	The June 2011 report states that indicator data will be updated on an annual basis and progress reported biennially. However, due to the delay in census data, the Wellington Regional Strategy (WRS) Committee agreed at its February 2013 meeting to delay the next publication until early 2014. Individual indicator trend graphs on the website were updated in July 2012.	Website and report (164pp) along with individual chapter reports and background reports.
WRC Environmental Indicators Programme	Updated annually as new data becomes available.	Web pages within WRC website.

Source: Based on review of source material.

3.6 Technical elements

This section presents a range of more technical elements of summary frameworks based on the review of exemplars.

3.6.1 Metadata and referencing

Sitting behind all monitoring and reporting programmes and more-or-less invisible to the reader is a range of metadata that assists with ensuring reliability and ease of updating. The MARCO programme and WRC environmental indicators programme have adopted similar approaches to metadata management and referencing which have now been adopted by the WPI programme.

Table 10: Metadata and referencing – results from a review of exemplars

Example	Metadata and referencing
Canadian Index of Wellbeing	Standard referencing.
MARCO – Waikato Regional Community Outcomes Reporting	Comprehensive technical information and links to source data.
MSD Social Report	Extensive technical notes are provided in a report Appendix. Technical details are also provided through website links.
New Zealand Sustainable Development Indicators	Standard referencing.
OECD Green Growth Indicators	Extensive referencing and online links.
Quality of Life Project	Extensive referencing.
UNDP Human Development Index	Detailed technical information is available about the indicators and the composite index method.
Waikato Region GPI (2010)	Standard referencing.
Wellington Region Genuine Progress Index (WR-GPI)	Website referencing is provided in a 'Technical Information" tab for each individual indicator/measure including an indicator definition, hyperlink to the data source and notification of most recent update. Report referencing is standard.
WRC Environmental Indicators Programme	Comprehensive technical information available online.

Source: Based on review of source material.

3.6.2 Sub-headings

Some reports make use of a standardised format for each section with sub-headings such as 'how are we doing' and 'why is this important'.

Table 11: Main sub-headings – results from a review of exemplars

Example	Key sub-headings
Canadian Index of Wellbeing	Nil.
MARCO – Waikato Regional Community Outcomes Reporting	Why is this important? What are the indicators? How are we doing?
MSD Social Report	Definition, Relevance, Current level and trends, Age and sex differences, Ethnic differences, Socio-economic differences, International comparisons.
New Zealand Sustainable Development Indicators	Nil.
OECD Green Growth Indicators	Nil.
Quality of Life Project	Why is this important? Key points. What is this about? What did we find?
UNDP Human Development Index	Nil.
Waikato Region GPI (2010)	Nil.
Wellington Region Genuine Progress Index (WR-GPI)	Overview, Findings (wellbeing theme summary), Outcome definition (outcome sub-theme), Discussion. Additional sub-headings used in the website presentation include: Measurable outcomes/What is [sub-theme]; Why is this indicator important; Findings/What this means; Did you know (fast facts).
WRC Environmental Indicators Programme	Key points, Report card, Technical information, Data.

Source: Based on review of source material.

3.6.3 Use of composite indices

The use of composite indices such as HDI and WR-GPI is becoming increasingly accepted, subject to transparency in understanding how the indices were created. A discussion of the pros and cons of composite indicators is included in Section 5 of this report, along with preliminary experimental results using WPI data.

Table 12: Use of composite indices – results from a review of exemplars

Example	Use of composite indices
Canadian Index of Wellbeing	Summary graphs are expressed on a 'distance to reference' scale, with the baseline (mid 1990s) for each indicator set to 100.
MARCO – Waikato Regional Community Outcomes Reporting	No use of composite indices but these could be readily calculated using available data and metadata.
MSD Social Report	No use of composite indices.
New Zealand Sustainable Development Indicators	No use of composite indices.
OECD Green Growth Indicators	No use of composite indices.
Quality of Life Project	No use of composite indices.
UNDP Human Development Index	The HDI is a composite index.
Waikato Region GPI (2010)	Full-cost GPI estimate (composite index).
Wellington Region Genuine Progress Index (WR-GPI)	Summary graphs are expressed on a 100-point 'distance to reference' scale – overall, for each of the wellbeing themes and for each of the sub-themes.
WRC Environmental Indicators Programme	No use of composite indices.

Source: Based on review of source material.

3.6.4 Use of monetary estimates

Some studies have sought to quantify the value of certain indicators, or of genuine progress overall in a summarised dollar figure (GPI). This can be termed full-cost accounting (FCA). An example included in Appendix B alongside the exemplar monitoring and reporting programmes is that of the Regional Physical Activity FCA commissioned as a proof-of-concept by WRC, Greater Waikato Regional Council and Auckland Council, and also the earlier 2010 Waikato Region GPI project by WRC. In the authors' view, the cost involved in undertaking indicator-level FCA could not be justified in the case of a broadly based wellbeing monitoring programme. The method appears useful for raising awareness of the importance of specific policy issues but would be too expensive for valuing a wide range of indicators on a regular basis.

Table 13: Use of monetary estimates (FCA) – results from a review of exemplars

Example	Use of monetary estimates (FCA)
Canadian Index of Wellbeing	No use of FCA. Full cost assignment of monetary values has not been signalled as a future development.
MARCO – Waikato Regional Community Outcomes Reporting	No use of FCA.
MSD Social Report	No use of FCA.
New Zealand Sustainable Development Indicators	No use of FCA.
OECD Green Growth Indicators	No use of FCA.
Quality of Life Project	No use of FCA (although calculation of the 'ecological footprint' uses an analogous method).
Regional Physical Activity FCA	Proof-of-concept regional estimates of the total costs of physical inactivity in New Zealand in 2010 dollar terms.
UNDP Human Development Index	No use of FCA.
Waikato Region GPI (2010)	FCA with all sub-components (socio-economic and environmental indicators) expressed in 2006 New Zealand dollar terms.
Wellington Region Genuine Progress Index (WR-GPI)	No use of FCA. Full cost assignment of monetary values has been signalled as a further development forthcoming.

Example	Use of monetary estimates (FCA)
WRC Environmental Indicators Programme	No use of FCA (although calculation of the 'ecological footprint' uses an analogous method).

Source: Based on review of source material.

3.6.5 Comparability (inter-regional, national, international)

Inter-regional comparability is a key consideration in the selection of indicators. The ability to compare progress in relative terms, for example between the Waikato Region and Auckland Region, New Zealand overall, with other countries and groups of countries (e.g. OECD), adds substantial value to the WPI programme.

Decisions underpinning how many indicators are selected for the programme will affect the issue of comparability, as it would be relatively easy and cost-effective to calculate a comparable composite index for other regions and countries using a small number of indicators (depending on the choice of indicators) but becomes cost-prohibitive as additional indicators are introduced (with the exception of the OECD Green Growth and UNDP HDI sets of indicators, for which international frameworks are already provided).

Table 14: Comparability between regions – results from a review of exemplars

Example	Comparability
Canadian Index of Wellbeing	National index scores are shown over time but do not permit comparisons between regions or provinces or with other countries. Due to the large number of indicators, it may not be cost-efficient to compile comparable wellbeing indicators for other areas.
MARCO – Waikato Regional Community Outcomes Reporting	Most of the results are compared with regional (sometimes sub-regional) and national equivalent results, including some of the Waikato Region Perception Survey items. However, many of the environmental indicators are not set up in such a way that they can be compared with other regions or nationally.
MSD Social Report	Comprehensive regional comparisons are provided in a separate report and separate part of the website. Comparisons with OECD and Australia for all available and comparable indicators are shown in circle diagrams for easy visual assessment.
New Zealand Sustainable Development Indicators	National trends are shown over time but are not compared with other countries. International comparisons (e.g. OECD) would have been relatively easy to compile for many of the selected indicators (e.g. unemployment rate, life expectancy).
OECD Green Growth Indicators	The basis of the initiative is around comparability between countries and over time.
Quality of Life Project	The basis of this project is around inter-city and national comparability. Occasional references are also made throughout the report to international benchmarks (e.g. OECD averages) where applicable.
UNDP Human Development Index	The basis of this indicator is inter-country comparisons.
Waikato Region GPI (2010)	Regional GPI scores are shown over time but are not directly compared with other regions or nationally. Development of comparable FCA values for other areas would be expensive.
Wellington Region Genuine Progress Index (WR-GPI)	Regional index scores are shown over time but are not directly compared with other regions or nationally. Due to the indexation method, with benchmarking for each indicator based on the optimal condition of that indicator over the reporting period, it is unclear whether comparisons between regions could be accurately interpreted. The Results Report does provide national/regional comparisons for individual indicators.
WRC Environmental Indicators Programme	Many of the indicators are measured in a unique way for the Waikato Region or do not readily permit aggregation or comparison with other regions (e.g. forest fragmentation, river water quality ratings).

Source: Based on review of source material.

3.6.6 Visual representations

Effectively communicating complex information is an art. All of the exemplars walk a fine line between over-simplifying the results and over-burdening the reader with technical details. Use is made of a variety of communication tools including state and trend symbols (smiley/sad faces and up/down arrows), line and bar graphs, tables, maps, figures, circle diagrams, infographics and other methods of summarisation. WRC should choose a small selection of communication tools, such as line graphs, bar graphs, tables and 'traffic light' symbols and diagrams to convey key information. Care should be taken that the reporting does not become cluttered or distract the reader from engaging with key messages.

Table 15: Visual representations – results from a review of exemplars

Example	Visual representations
Canadian Index of Wellbeing	Composite index time series line graphs (report and website). Red/green up/down trend arrows and infographic tables (report and website).
MARCO – Waikato Regional Community Outcomes Reporting	Circle diagrams (state and trend), state and trend symbols (smiley/sad faces and up/down arrows), line and bar graphs, tables, maps, figures.
MSD Social Report	Time series line graphs for individual indicators and measures (varying time periods). Tables and bar graphs are also used extensively. Circles of wellbeing are used to summarise overall trends since mid 1990s and for other purposes (e.g. social wellbeing for Māori trends since mid 1990s; snapshot comparison of social wellbeing in New Zealand compared to OECD average; etc). No use is made of simplifying symbols such as up/down arrows.
New Zealand Sustainable Development Indicators	Lines, bar graphs and symbols. No use of tables.
OECD Green Growth Indicators	The online database contains customisable tables, bar graphs, line graphs and scatter plots. No use is made of interpretational symbols.
Quality of Life Project	Tables, bar graphs, occasional line graphs and photographs for visual interest. No use of state/trend summary symbols.
UNDP Human Development Index	Some use is made of scatter plots, line graphs, stacked graphs etc, however the majority of the reporting done through extensive tables and interpretive text.
Waikato Region GPI (2010)	Line graphs, bar graphs, tables, text.
Wellington Region Genuine Progress Index (WR-GPI)	Index time series line graphs (report and website). Indicator time series bar graphs (report and website). Index and indicator trend symbols (report only).
WRC Environmental Indicators Programme	Mostly bar graphs, line graphs and tables. Limited use of other symbols. Website navigation has additional visual appeal through drawings with embedded links. Also some use of photographic imagery to add appeal.

Source: Based on review of source material.

3.6.7 Time series, composite indices and data imputation

Comparability over time is a fundamental element of measuring progress. Existing data sets do not generally precede the early-mid 1990s. The later the starting point the less long-run trends are visible, but starting at a later date does have the benefit of greatly broadening the pool of potential candidate indicators for inclusion in the monitoring programme. This is of particular importance given the desire to develop a composite indicator, although some monitoring programmes mitigate this issue by imputing data. Feedback was sought from WRC in this respect.

The existing MARCO monitoring and reporting community outcomes and WRC environmental indicators programmes do not include imputed data. Additional outputs could be generated from the MARCO programme using imputed data (e.g. extended circles of wellbeing), however it should be recognised that this would give a false sense

of precision as there would be no additional information *per se* added to the programme to achieve these outputs.

A limited amount of imputation has been applied to enable the calculation of experimental WPI composite indices. However, only actual indicator measurements (with no imputation) are presented in WPI Report Cards and other products with regard to individual indicators. Using limited data imputation, key WPI composite index trends can be traced back to around 2007. A long time series commencing 2001 can be constructed but this involves more extensive imputation of missing historical data for many indicators.

Table 16: Use of time series – results from a review of exemplars

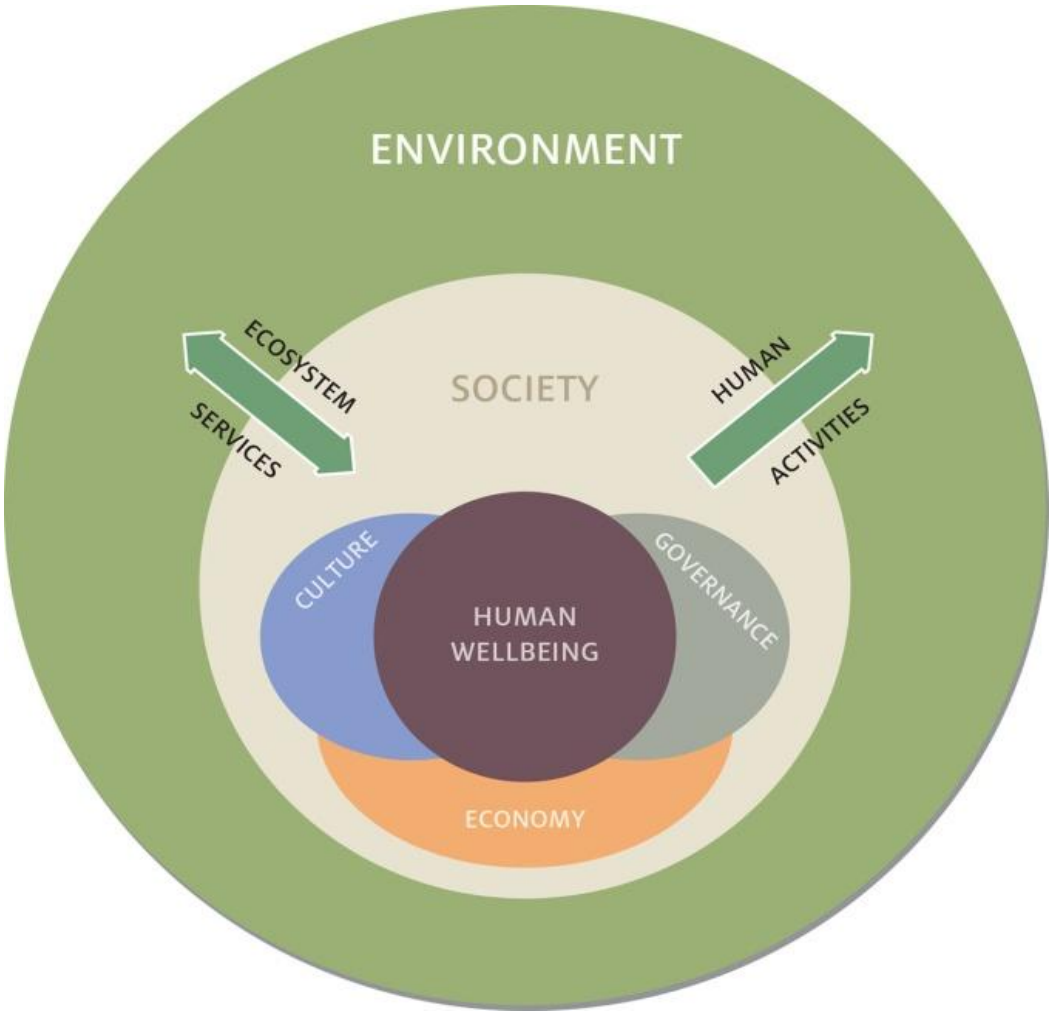
Example	Use of time series
Canadian Index of Wellbeing	Historical series mid 1990s to 2010, with some data imputed.
MARCO – Waikato Regional Community Outcomes Reporting	Historical time series, predominantly mid 1990s to early 2010s depending on the indicator/measure, no data imputed.
MSD Social Report	Historical series mid 1990s to late 2000s (no data imputed).
New Zealand Sustainable Development Indicators	Historical series, varying time frames subject to data availability (start points range from 1980s to 2000s and no data has been imputed).
OECD Green Growth Indicators	Time period and frequency varies for each indicator depending on the nature of underlying data, but typically includes from the mid 1990s to early 2010s.
Quality of Life Project	Time series presented are generally for a relatively short period, presumably to avoid clutter. The main purpose of the report is to compare inter-city.
UNDP Human Development Index	Subject to retrospective updating to reflect data improvements and methodological changes. Trends using consistent data calculated at five-year intervals for 1980–2012 are presented.
Waikato Region GPI (2010)	Historical series mid 1990 to 2006, with some components imputed for the Waikato Region where only available nationally.
Wellington Region Genuine Progress Index (WR-GPI)	Historical series 2001 to 2010, with some data imputed.
WRC Environmental Indicators Programme	Historical time series, predominantly mid 1990s to early 2010s depending on the indicator/measure, no data imputed.

Source: Based on review of source material.

4 WPI conceptual framework

The WRC Technical Report 2014: Waikato Progress Indicators – *Tupuranga Waikato* – presents a summary WPI conceptual framework. The WPI builds on existing work and the experiences and lessons learnt from other similar work in New Zealand (MARCO, WR-GPI, SNZ) and overseas (CIW, ANDI, OECD) The starting point was a review of international good practice used for monitoring and reporting on progress and well-being (see Part A of this report). A conceptual framework was subsequently adapted from OECD (2010). Combined with people's aspirations (what matters most to our communities and stakeholders) this framework provided the basis for the selection of suitable indicators.

This framework considers that societies are based on two linked systems: the Human system (Society) and the Ecosystem (Environment). Human wellbeing is at the centre: an increase in human wellbeing is seen as the final goal of progress and includes both individual wellbeing (e.g. one's own state of health, living standard and knowledge) and social wellbeing (e.g. family and community support and connectedness, shared values).



Source: Adapted from Hall et al (2010).

Figure 5: WPI development – conceptual framework

Within this conceptual framework, three foundations support human wellbeing: economy, culture and governance. Having a strong economy, effective governance and vibrant culture are considered key supporting pillars to human wellbeing rather than seen as goals in their own right. The societal system as a whole is embedded within the natural environment. Ecosystem or environmental wellbeing may be seen as important in its own right or, in terms of a more human-focused view, primarily because it provides resources and services. Irrespective of these viewpoints, the two systems are inextricably linked through the positive and negative effects of human activities on the ecosystem and the benefits and costs that humans accrue from their relationship with the natural world around them.

Links between the two systems (environment and society) include:

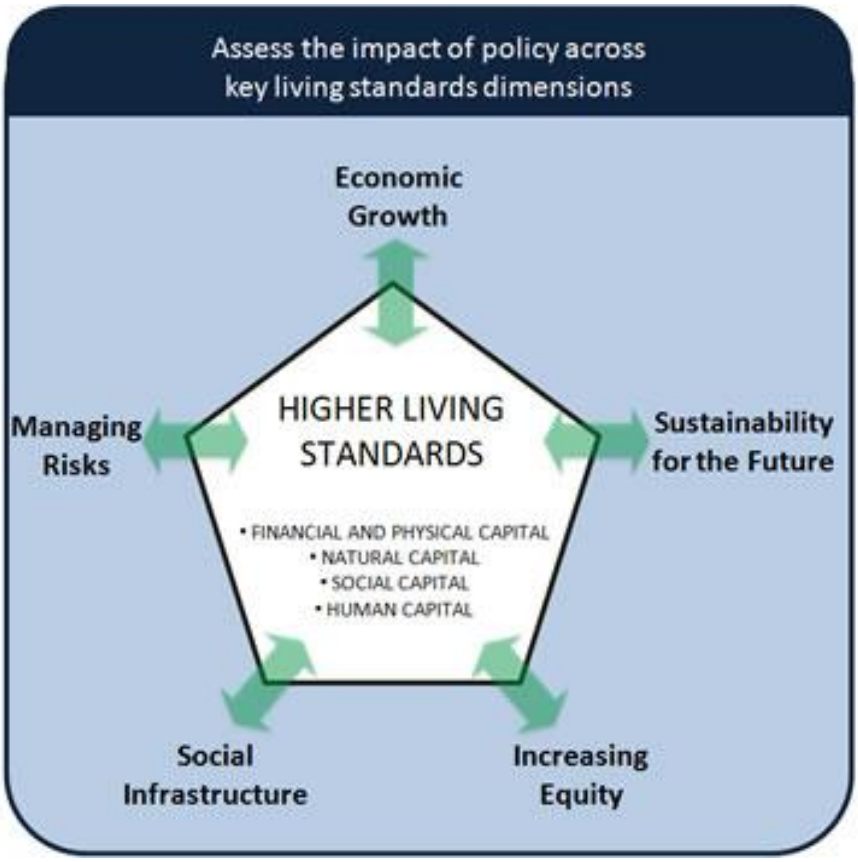
- Human activities:
  - Protection and conservation of natural assets and services;
  - Management and use of natural resources: extraction and consumption; and
  - Pollution.
- Ecosystem services:
  - Resources and processes provided (natural capital and associated ecosystem services); and
  - Impact of natural events on society (e.g. storms, flooding, earthquakes).

Finally, the framework includes an implicit key cross-cutting perspective that the well-being of society depends on the way in which various factors that shape people's lives are distributed in society now and for future generations. This encompasses:

- Intra-generational aspects: equity and inequality; and
- Inter-generational aspects: sustainability, vulnerability and resilience.

This framework is broadly consistent with a Māori world view. However, matauranga Māori and toha (indigenous knowledge and indicators) are not specifically included in this first version of Waikato Progress Indicators – *Tupuranga Waikato*. It is envisaged that once the findings of current research to track progress towards the Waikato River Strategy and Vision are known, this knowledge may be included (e.g. Cultural Health Index).

Sitting alongside the conceptual framework above, WRC is also working with the New Zealand Treasury to use and apply the Living Standards Framework illustrated below. This encompasses a broad range of both material and non-material factors which impact on wellbeing (such as trust, education, health and environmental quality), and hence are important factors to be considered achieving higher living standards.



Source: Treasury website - http://www.treasury.govt.nz/abouttreasury/higherlivingstandards.

Figure 6: New Zealand Treasury's Living Standards Framework

5 Composite wellbeing indices

The 2013 frameworks review recommended that developing an unweighted composite regional progress index using a method similar to that of the Canadian Index of Wellbeing should be feasible, with (say) the mid 1990s chosen as a starting benchmark.[13] Using available datasets, it was recommended that WRC could adopt something similar to the CIW approach to summarise relative changes and compare this with available estimates of Waikato regional GDP growth. WRC could also compile and construct comparable national and international indices to enable a visual comparison of the Waikato Region's relative level of wellbeing (and trends in some cases) with regard to each of the domains between New Zealand regions and with other countries.

As a basis for the development of composite indices, feedback was sought from WRC staff around their preferences for national and international comparability, preferred starting date for historical reporting and preferred approach toward the treatment of missing data.[14] Experimental composite indices were then developed as a possible WPI core product but the results have been 'parked' on the basis of sensitivity testing and in response to internal and external peer review feedback. Further efforts are required to advance robust approaches and methodologies to develop credible composite indicators that provide meaningful information and are sensitive to change over time. For example, how scientifically valid is the idea of a regional Waikato Progress Index? What are the technical difficulties in constructing such an index (e.g. weighting of individual indicators? How could such indices be used, and what value would it add to the dashboard of individual indicators?

This section discusses the advantages and disadvantages of composite wellbeing indices and provides an overview of initial results from the WPI experimental composite indices, including initial sensitivity analyses. It should be emphasised that these indices are experimental only to demonstrate their potential for future adoption. In response to peer reviewers' feedback, a 'dashboard' of indicator information is the main mechanism of WPI reporting rather than the composite indices described below.

5.1 Advantages/disadvantages of composite well-being indices

There is much discussion in the literature around the advantages and disadvantages of a composite wellbeing indicator or index (refer OECD, 2008b). In a recent review of progress indicator projects by Brainpool (2012), all of the official initiatives reviewed led to dashboards of individual indicators and only three 'unofficial' initiatives (the Happy Planet Index, Progress Index and Wellbeing of Nations initiative) combined individual indicators into a composite index. The main advantages and disadvantages of composite indices identified in the literature can be summarised as follows.

[13] In practice, it was found that data are only reliably available for the majority of WPI indicators from the early to mid 2000s – refer WRC Technical Report 2014.

[14] Regarding preferences for national and international comparability, these may vary for each composite indicator. For example, a headline Regional Development Index could be designed to be compared across New Zealand regions; an environmental index could be developed for comparison with a composite index of Green Growth OECD indicators; a socio-economic ('competing globally, caring locally') index might simply be the UNDP Human Development Index for comparison with New Zealand and approximately 180 other countries (the number differs slightly each year); and a bicultural/co-governance index to be comparable across New Zealand regions.

Advantages:

- Provides a means of simplifying and summarising complex or multi-dimensional issues;
- Easier to visually represent and interpret than trying to see trends in many separate indicators;
- Facilitates the task of ranking in benchmarking exercises;
- Can track progress over time on complex issues;
- Can facilitate communication with the community, media and decision-makers because a single numerical value is a good communications tool; and
- Can provide a means of comparing diverse aspects of wellbeing, on the basis of some common scale of measurement.

Disadvantages:

- Can over-simplify complex issues, which may result in simplistic or misleading conclusions;
- On its own it may have no clear meaning;
- Variations within individual indicators can be buried in composite figures, masking real trends in key areas. This includes changes in indicator variables that significantly increase or decrease composite figures; and
- Requires all data to be comparable.

Reflecting on the advantages and disadvantages of composite indicators/indices, the WPI Project Team decided that composite indices would be experimentally developed at the overall level and at a 'wellbeing' level (Economy, Environment and Society indices). Note that, whilst composite indices enable alternative ways of representing, interpreting and communicating results, the results should be used in combination with analysis of individual indicators to ensure that particular issues are not masked in the composite figures.

Table 17: Advantages and disadvantages of a composite indicator/index

Advantages	Disadvantages
• A single composite index yielding a single numerical value is an excellent communications tool for use with practically any constituency, including the news media, general public, and elected and unelected key decision-makers. • Such indices provide simple targets facilitating the focus of attention. • The simplicity of a composite index facilitates necessary negotiations about its practical value and usefulness. • Reduced transaction costs of negotiations with such indicators increase the latter's efficiency and effectiveness, probably leading to the development of better policies and programs. • Such indices provide a means for simplifying complex, multi-dimensional phenomena and measures. • They make it easier to measure and visually represent overall trends in several distinct indicators over time and/or across geographic regions and/or population	• A single index can oversimplify complex issues. • A single index requires all issues to be significantly comparable. • Oversimplified messages may give misleading policy directions, leading to poor policies and programs. • Oversimplified measures may encourage invidious comparisons among communities, provinces/states, nations, and regions. • There will be an ad hoc selection of domains, variables, weighting, and aggregation functions. • Ad hoc selections will increase the influence of statisticians and technically trained people at the expense of democratically elected representatives and ordinary citizens. • There will still be politically motivated, biased selections. • Redundant variables and double-counting will

Advantages	Disadvantages
groups. • Increases in the ease of measuring and representing trends increases our ability to predict and possibly manage future trends. • They provide a means of comparing diverse phenomena and assessing their relative importance, status or standing on the basis of some common scale of measurement, across time and space. • Increases in the comparability of phenomena lead to increases in the capacity to make holistic assessments and balanced judgements about them. • Increases in the capacity to make such holistic assessments and judgements reduce the likelihood of a public agenda being unduly influenced by relatively narrow interests of a few at the expense of broader interests of many. • Because they require construction based on conventions agreed upon by potential users, inventors have considerable flexibility for including desired and excluding undesired features. • Because the aim is to construct comprehensive indices ranging over diverse phenomena, researchers will tend to cast their exploratory resources and conceptual nets broadly, leading to greater collaboration among disciplines and richer explanatory scientific theories.	occur. • Particular issues will be buried in composite figures, including changes in component variables that significantly increase or decrease the composite figures. • Variation and inequalities will be buried in average figures. • If an alternative composite is found, it will lead to the same sort of group-think that surrounds GDP. • Index values have no clear meaning. • Values of domains, variables, and indices vary over time. • Ends and means will be improperly mixed. • Composite figures lack practical value, resulting from all their difficulties. • Worse, the search for composite measures may lead to political paralysis while the search goes on.

Source: CIW Technical Report (Michalos et al, 2011).

Note: Based on discussions in 2012 with the CIW team, the authors note additional disadvantages including lack of policy relevance and link; expensive to develop, update and maintain; using equal weightings (fixed); no spatial dimension; and lack of local focus.

5.2 Experimental composite wellbeing indices for the Waikato region

5.2.1 Data collection and analysis overview

Data for most of the 32 WPI indicators are available from readily accessible official data sources and surveys which have been conducted for a number of years (particularly since around 2006/07). This has provided us with the confidence that these indicators have been validated in various ways, and therefore measure what they are supposed to measure.

Readily available data were collated from the MARCO spreadsheet and annual reports (www.choosingfutures.co.nz/Publications/) and updated to most recent. Additional data were requested from SNZ, other agencies and internally from WRC. Trends were analysed visually and WPI indices were calculated using average standardised changes from base year (2007/08).

5.2.2 WPI experimental composite indices – development

A number of possible indices have been explored using the WPI indicators. This includes an overall WPI index and economic, societal and environmental sub-indices.

The method used for the WPI index is similar to the Canadian Index of Wellbeing and Wellington Region Genuine Progress Index (WR-GPI). A 'distance to reference' method is used in which a benchmark is chosen against which longitudinal raw data

are compared and converted to a numeric wellbeing score with a baseline of 100.[15] The benchmark in this case is 2007 data for each indicator. For example, recent changes in life expectancy are benchmarked against a 2007 life expectancy estimate. The higher the index score raises above 100, the greater the improvement in wellbeing. Conversely, if an index falls below 100 points this suggests a decline in wellbeing for that indicator. In summary:

- Baseline year 2007 = 100 points for each indicator. An alternative baseline (year 2001 = 100 points) was also used for some indicators with a longer consistent data record.
- Most recently available data for 2013 or nearest year.
- Starting from a common baseline of 100 points, annual percentage changes for each individual indicator suggest an improvement or deterioration in wellbeing. Negative interpretations are applied where relevant, for example crime trends.
- Equal weightings are applied to all indicators.
- Imputation has been applied where relevant: that is, for all indicators with missing data within the time series, values have been imputed using linear interpolations between actual data points.
- Extrapolation backward to 2007, for individual indicators where required, assumes there is no change from the value of the oldest available data point for each indicator (e.g. 2007 the same value as 2008 or 2009). This is due to the absence of any prior information to suggest otherwise and is the same imputation method used for the WR-GPI in such cases.
- Extrapolation forward to 2013 for each indicator assumes continuation of the previous trend in a linear fashion. This was particularly spurious for Census data in the initial stages of WPI analysis due to the most recently available data being for 2006; however, this was rectified once 2013 Census data became available. An alternative approach would be to repeat the latest available data (e.g. 2006) for all subsequent years up to the latest, as per the WR-GPI method for missing values. A third alternative would be to compromise and assume that a proportion (e.g. half) of the preceding trend continues. Guidance was sought from the Project Team on this aspect of imputation for missing data.

By adopting a 'dimensionless' or scale-free approach based on annual percentage changes, progress on each of the individual indicators can arguably be compared with each other and aggregated. However, the extent to which such aggregation is meaningful remains a subject of debate.

Following consideration, it was decided to use real GDP per capita as a single summary measure of economic development, against which the following three WPI indices are compared:

1. WPI Society Index compiled from standardised levels of change in 21 measures of social wellbeing, for example life satisfaction, education, crime, employment and social connectedness;
2. WPI Environment Index compiled from 10 measures of environmental health including river water quality, soil quality, urban air quality and greenhouse gas emissions; and

[15] Consideration was given to principal components analysis (PCA) as an alternative means of calculating WPI indices, however initial results suggest that this is not feasible.

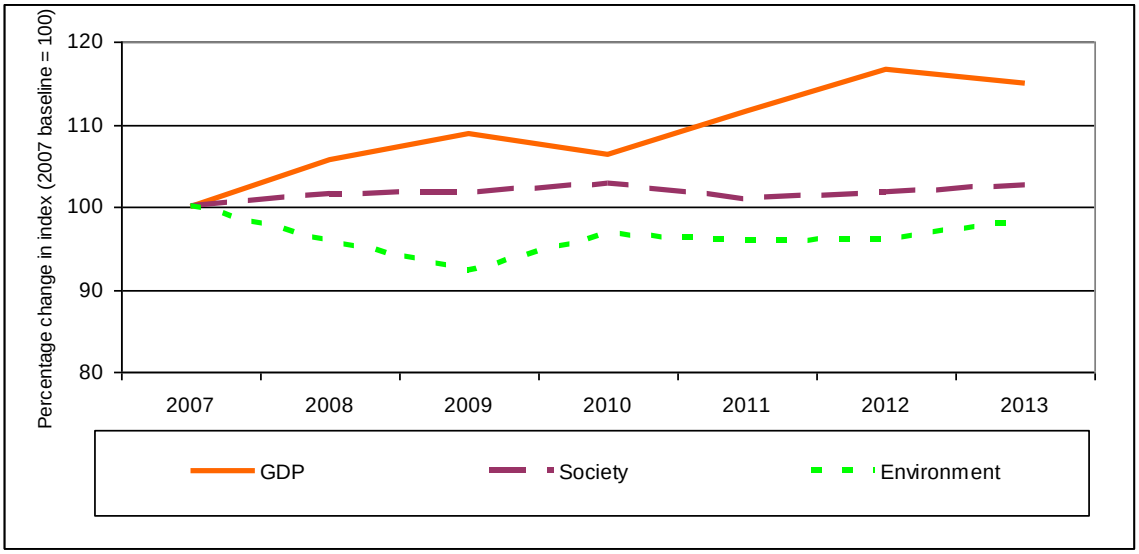
3. WPI Overall Index (GDP, Society and Environment indices combined) summarising the Waikato region's overall progress.

While the simplicity of a single index has considerable appeal, there are also some significant methodological issues and caveats. Therefore we consider the WPI index and sub-indices experimental at this stage to demonstrate their potential for future adoption once further work and consultation has been undertaken.

5.2.3 WPI experimental composite indices – initial results

The first WPI report tracks the current condition and trends (predominantly 2007 to 2012-13), providing a snapshot of the Waikato Region's overall state of wellbeing. For a more restricted set of indicators, changes over a longer time period were also assessed (2001 to 2012-13).

The graph below show Waikato regional GDP per person against two alternative measures of progress over the period 2007 to 2013: the WPI Society Index and WPI Environment Index.



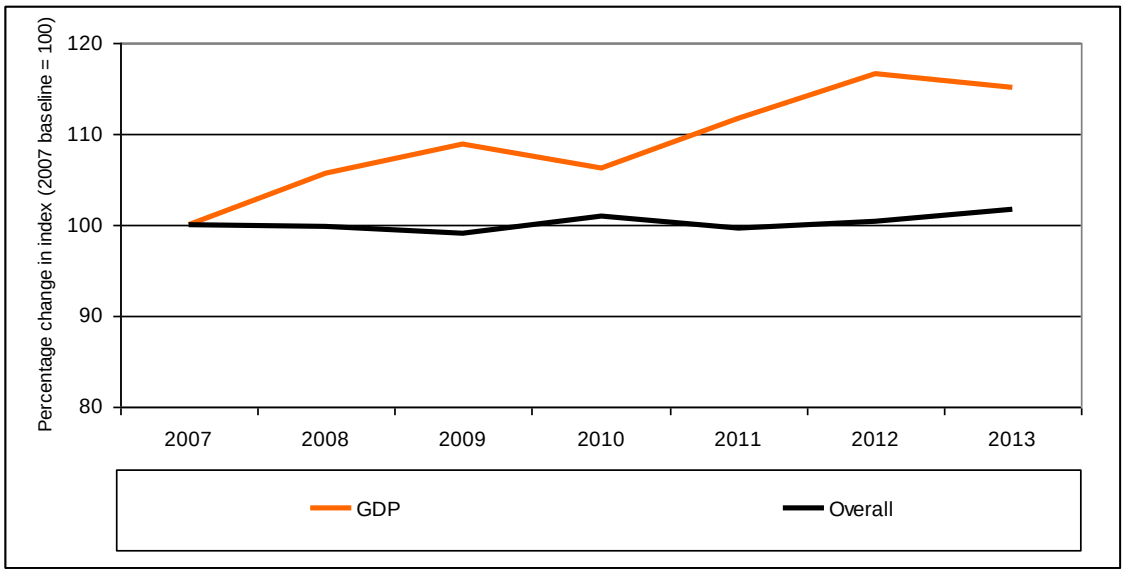
Source: WPI Monitoring Programme database (Waikato Regional Council) as at 3 August 2014.

Figure 7: Waikato real GDP per person, Society Index and Environment Index

An interpretation of this information is as follows:

- In the wake of the Global Financial Crisis (GFC), estimates of real (inflation-adjusted) regional GDP per person for the Waikato Region showed a moderate decline in 2010 and again in 2013. However, the underlying increase over time has resulted in an overall change from $37,166 per person in 2007 to $42,968 in 2013 in real terms (2013 prices).
- The overall trend portrayed by the WPI Society Index is of a region making little progress in socio-economic terms over recent years. Socio-economic indicators such as building activity, employment and income have dragged down the Society index during the post-GFC period. Other WPI Society Index indicators have shown little change over time, for instance cultural respect and community engagement measures.
- The WPI Environment Index was negatively influenced by urban air quality issues in the period 2007-2009 and subsequently by declining soil quality and an increasing rate of rural subdivision. The 2013 Environment Index score was lower than in 2007.

The WPI Overall Index (below) summarises the Waikato Region's progress. Growth in this combined index has been subdued over the past six year period, influenced in part by the economic slowdown. Future monitoring will help signal whether or not we are succeeding in our pursuit of genuine progress and sustainable development.



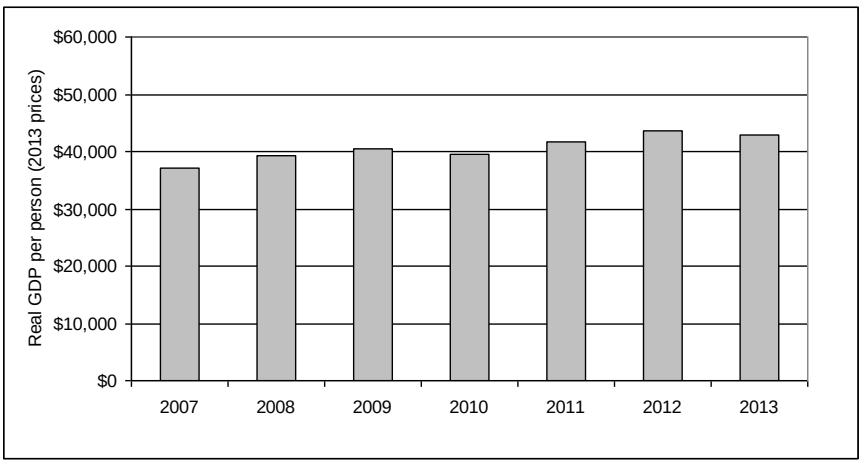
Source: WPI Monitoring Programme database (Waikato Regional Council) as at 3 August 2014.
Note: WPI Overall Index is a combination of GDP, Society Index and Environment Index.

Figure 8: Waikato real regional GDP per person vs WPI Overall Index

5.2.4 WPI Economic Index (Regional GDP)

This indicator is an estimate of real (inflation adjusted) regional Gross Domestic Product (GDP) per capita. GDP is an internationally accepted measure of economic activity. It provides a basis for monitoring economic growth and making economic decisions. Statistics New Zealand has estimated regional GDP per person for the period 2007-2013.

Estimates by Statistics New Zealand indicate that Waikato Regional GDP per person is typically around 10% lower than the national average. This is largely due to the influence of higher average GDP per person in Auckland and Wellington. There was moderate overall growth in real GDP between 2007 and 2013. In the wake of a slowdown in economic growth following the GFC, estimated real Waikato regional GDP per person grew moderately from $37,166 in 2007 to $42,968 in 2013. This is an increase of around 16% in real terms.

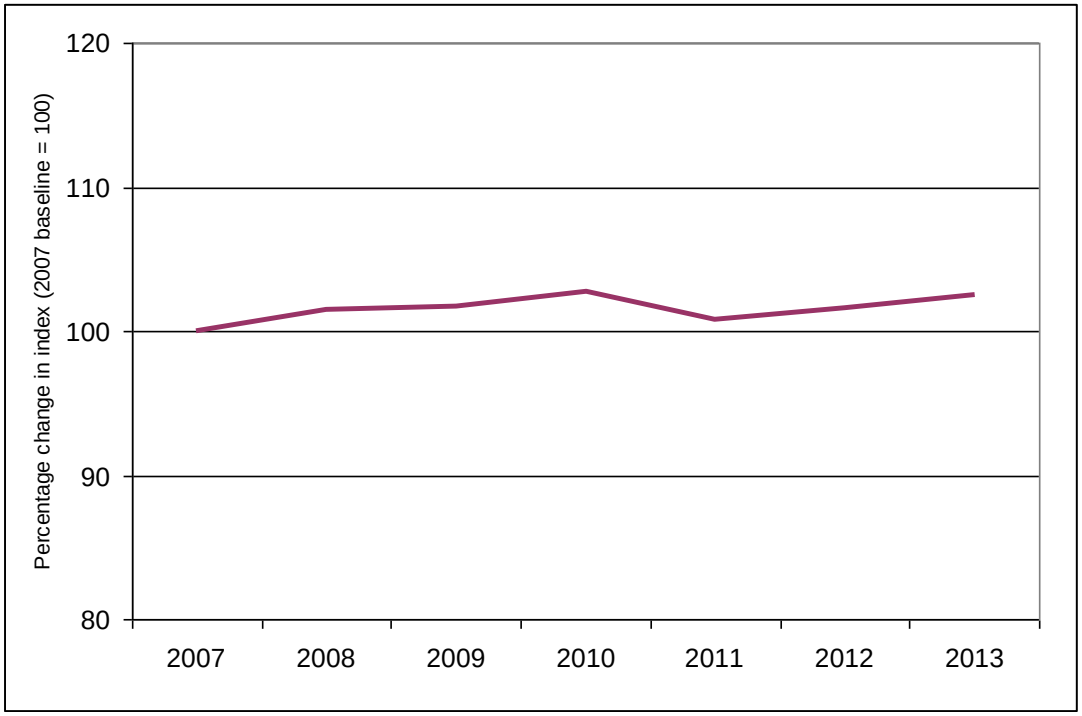


Source: Statistics New Zealand estimates.

Figure 9: Real GDP per person (2013 dollars) for the Waikato Region

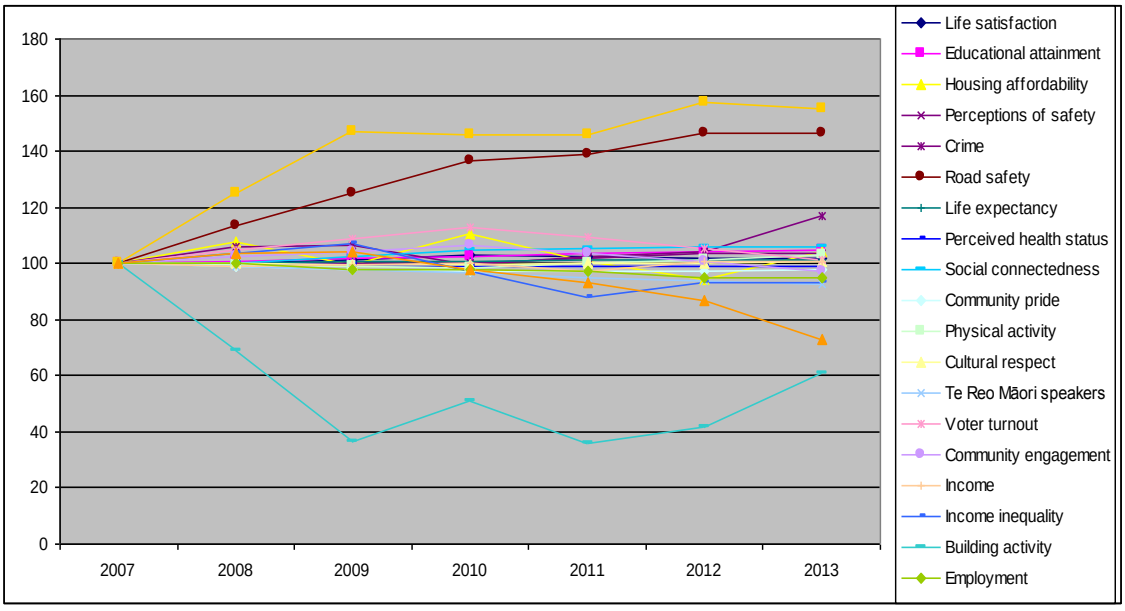
5.2.5 WPI Society Index

The Society Index has grown gradually since 2007. Society indicators that have been improving over time include crime reduction, longer life expectancy, less sense of loneliness and increased use of public transport. Indicators that have been worsening include a slump in building activity, declining employment rate and increasing allocation of water. The overall effect has seen little change to the index.



Source: WPI Monitoring Programme database (Waikato Regional Council) as at 3 August 2014.

Figure 10: WPI Society Index

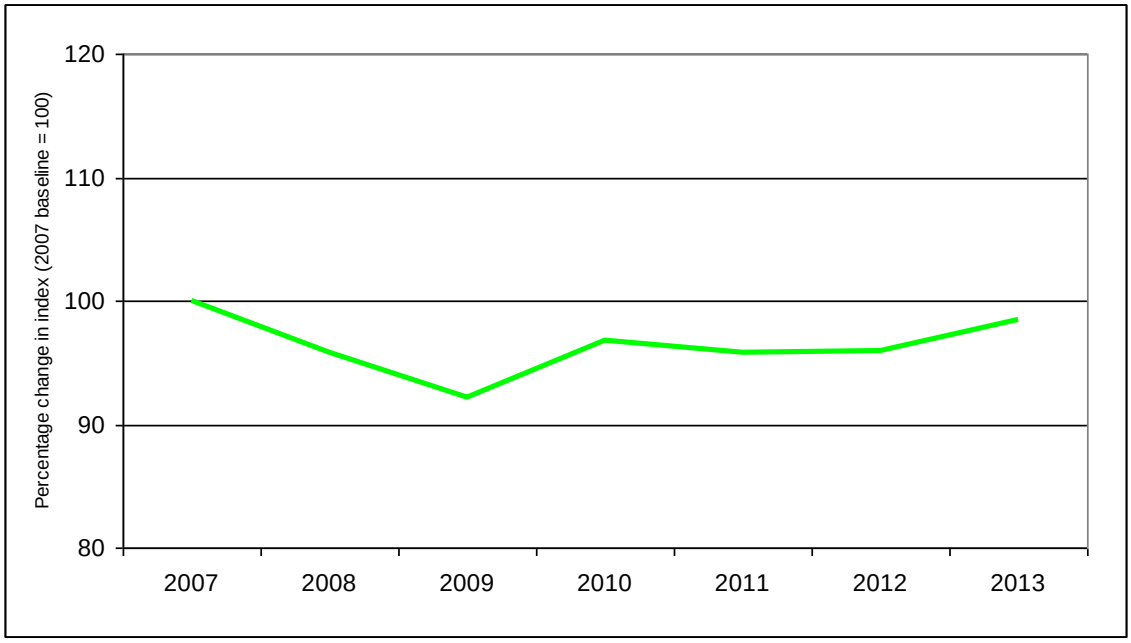


Source: WPI Monitoring Programme database (Waikato Regional Council) as at 3 August 2014.

Figure 11: WPI Society Index – indicator trends

5.2.6 WPI Environment Index

The Environment Index has ebbed and flowed but overall worsened since 2007. Environment indicators that have been improving over time include increased reported levels of household recycling. Indicators that have been worsening include a rise in the percentage of productive land failing two or more soil quality targets and an increasing rate of rural subdivision. The overall effect has been some fluctuation in the index but it is currently just below the level of 2007.



Source: WPI Monitoring Programme database (Waikato Regional Council) as at 3 August 2014.

Figure 12: WPI Environment Index

Source: WPI Monitoring Programme database (Waikato Regional Council) as at 3 August 2014.

Figure 13: WPI Environment Index – indicator trends

5.2.7 Sensitivity of WPI indices – alternative base year (2001)

The subdued pattern of development following the GFC provides little clue as to the pattern for future development. The 2007 WPI baseline year occurs at the end of an economic boom and just before the GFC. Hence, the starting point is not an 'average' or typical year. However, it is only from 2007 that we have a robust regional data set to cover all of the WPI indicators.

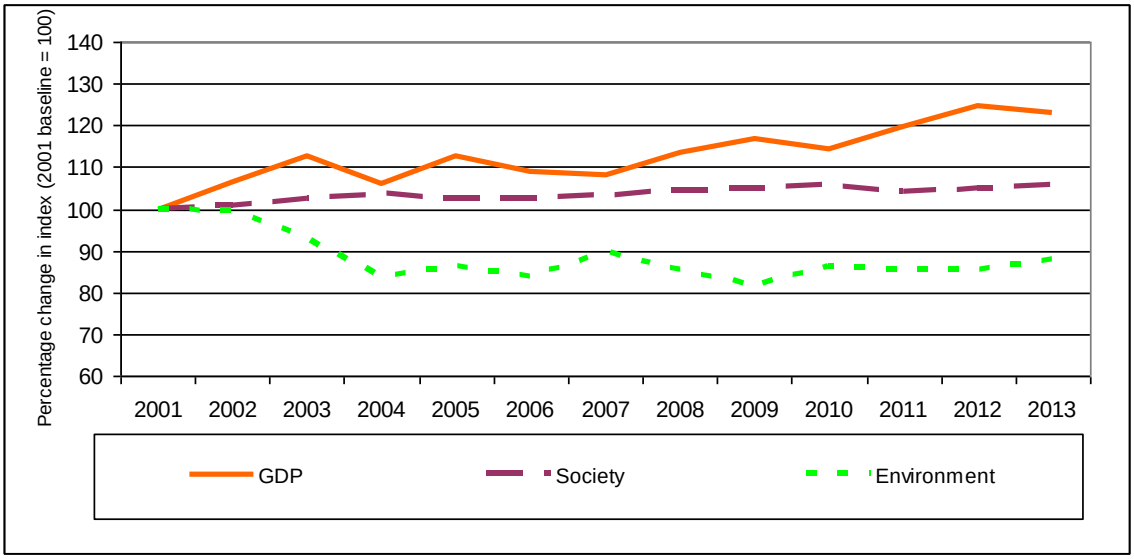
By imputing and estimating data for some indicators prior to 2007, we can back-cast and see what the WPI measures and indices might have looked like from a starting point of 2001. The general approach for this exercise, in the absence of further information, has been to set each earlier figure at the level of the most recent data. For example, life satisfaction data is from the New Zealand General Social Survey which commenced in 2008, so all data from 2001 to 2007 has been set to the 2008 value of 83.1%. In the case of real GDP per capita, pre-2007 estimates are from a series compiled by Market Economics Ltd (supplementing more recent SNZ estimates).

The drawback of imputing data like this is that the older it gets, the less reliable and the more influenced by just a small number of indicators. In the case of the Environment Index, only four of the ten indicators have data available from 2001 or prior. It is likely that pre-2007 GDP growth was more rapid than is indicated below.

Taking into account the limitations above, the 2001 baseline version of the WPI illustrates that:

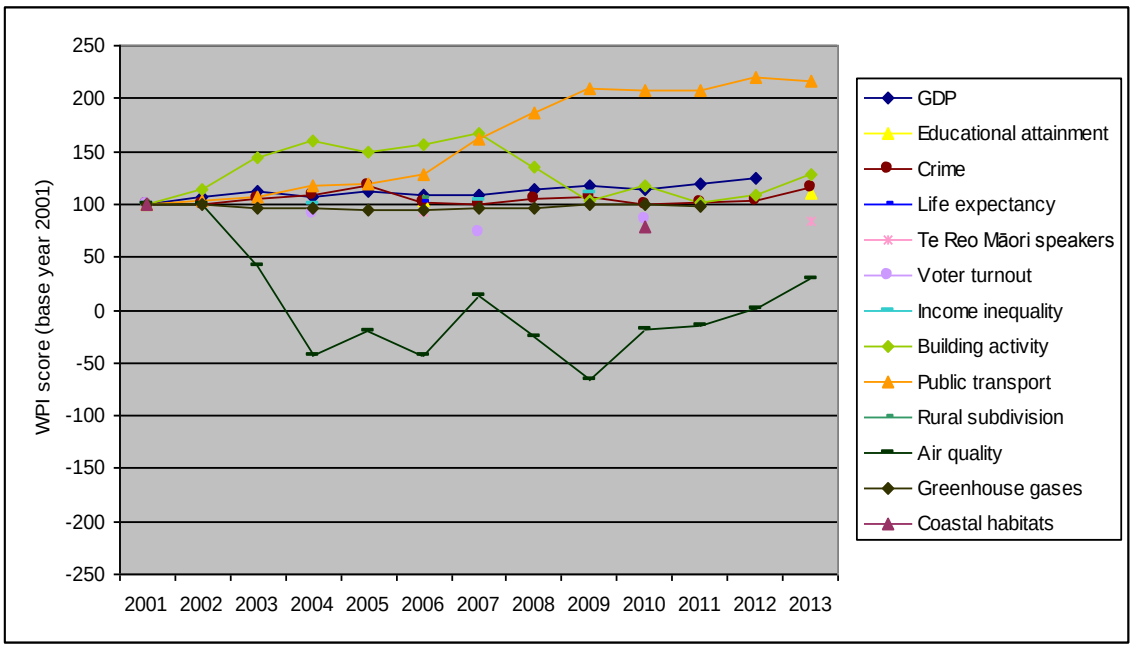
- Even using conservative estimates of pre-2007 GDP growth and allowing for the challenges of the GFC on post-2007 levels, it is clear that real GDP per person has been growing substantially faster than improvements in social and environmental indicators.
- The Environment Index was dragged down over this period by a spike in air quality exceedances, increasing rate of rural subdivision, increasing rate of national greenhouse gas emissions and deterioration in other environmental measures. Over the same period, the Society Index grew moderately.
- The latter half of the period from around 2007-08 reflects a flat economy and very gradual improvements in the Society and Environment indices.

The results of this and other sensitivity analyses suggest that a small number of indicators with relatively larger variance over time may be disproportionately influencing the index results.



Source: WPI Monitoring Programme database (Waikato Regional Council) as at 3 August 2014.

Figure 14: GDP, Society Index and Environment Index over longer period (2001-2013)



Source: WPI Monitoring Programme database (Waikato Regional Council) as at 3 August 2014.
Note: WPI scores shown for only those indicators with actual measured data in 2001 or prior.

Figure 15: Selected WPI trends – base year 2001

5.2.8 Sensitivity of WPI indices – alternative averaging methods

As part of initial stakeholder feedback during the development of the WPI programme and associated experimental indices, input was sought by WRC from external peer reviewers. This included questions about how best to present the results.

Feedback included (extract only):

> ***Trends***
>
> *Have a question re measuring always from 2007 (a year you have later said as not typical). A common practice is to index against the best/worst year to see trends overtime. It can be very misleading if you say that water quality has increased significantly if 2007 was for some reason an outlier and not good to be comparing with (just an eg not what you have done).*

There is also a statistical way to take into account trends overtime that allow for the ups and downs between 2 different points – have used it before but would have to check out how it is done. Actually gives a more accurate change over time than comparing 2 years outright….

Further related feedback from the same reviewer was received on 26 March 2014:

The method of calculating change overtime I mentioned is shown in the attached spreadsheet. I was wanting to extrapolate over a longish time period and had data that fluctuated up and down. When I didn't have enough data points to do a regression analysis I took the average of the percentage change. I checked it out with the LCR statistician who was ok with this method.

An internal WPI Discussion Paper subsequently explored both elements of the feedback above; that is, an alternative to the construction of WPI indices, and an alternative averaging method for reporting trends over time in the Scorecard. This resulted in the following recommendations:

11. That WRC seek feedback from a range of internal and external stakeholders regarding index construction preferences – either 2007 baseline method or best-year method – in terms of practical output differences and also the ease of communicating the method and results.
12. The WRC seek internal feedback regarding preferences for the reporting of Scorecard values – either a percentage difference between the start and end years or an 'average annual average' percentage change over the full time series.

The content of the 'alternative averaging methods' discussion document is presented below due to its relevance to the topic of assessing the robustness of composite well-being indices in the first instance, and secondarily to the technical issue of calculating Scorecard values.

Alternative approach to index construction

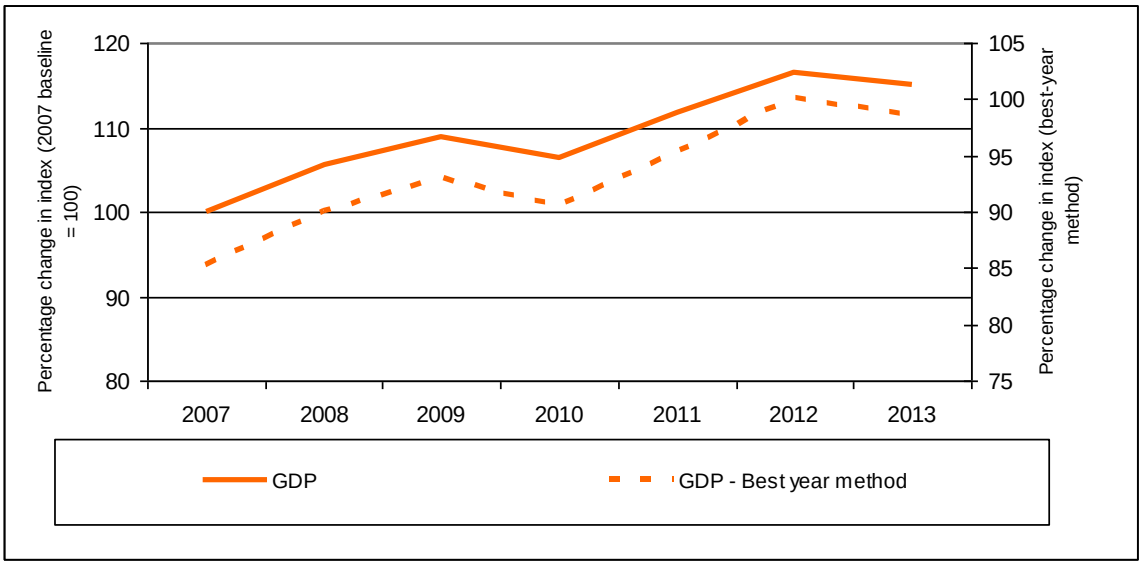
The current approach to the WPI index is from the Canadian Index of Wellbeing (CIW) framework. The approach is similar to that adopted for the WR-GPI except that the 'distance to reference' scale is different. Rather than taking the highest point in the reference period as being equal to 100 points, the WPI sets 2007 as the base year to 100. Starting from a common baseline of 100 points, positive percentage changes for each individual indicator suggest an improvement in wellbeing while negative percentage changes indicate deterioration. Equal weightings are applied to all indicators. Linear imputation has been used to ensure there is a complete time series for each indicator.

The graphs below show how the WPI indices would look using the current method compared with an alternative 'best year' method.[16] Alternative indices were constructed by first identifying the maximum for each indicator over the period 2007 to 2013 inclusive (or the minimum value in the case of indicators with a negative interpretation) and then calculating the percentage difference of the value for each other year from this best-year value (or inverse percentage difference in the case of indicators with a negative interpretation), then using an unweighted average to construct each index. If this alternative method was adopted then there may be methods for automating the process more, to assist with annual updates and mitigate the scope for human error. This is not such an issue using the WPI's 2007 baseline approach as it has a more simple construction.

[16] Other methodologies also exist, for example the Human Development Index (HDI) uses a 'goalposts' approach (maxima and minima) to calculate a proportionate difference from the minimum on a 0 to 1 scale.

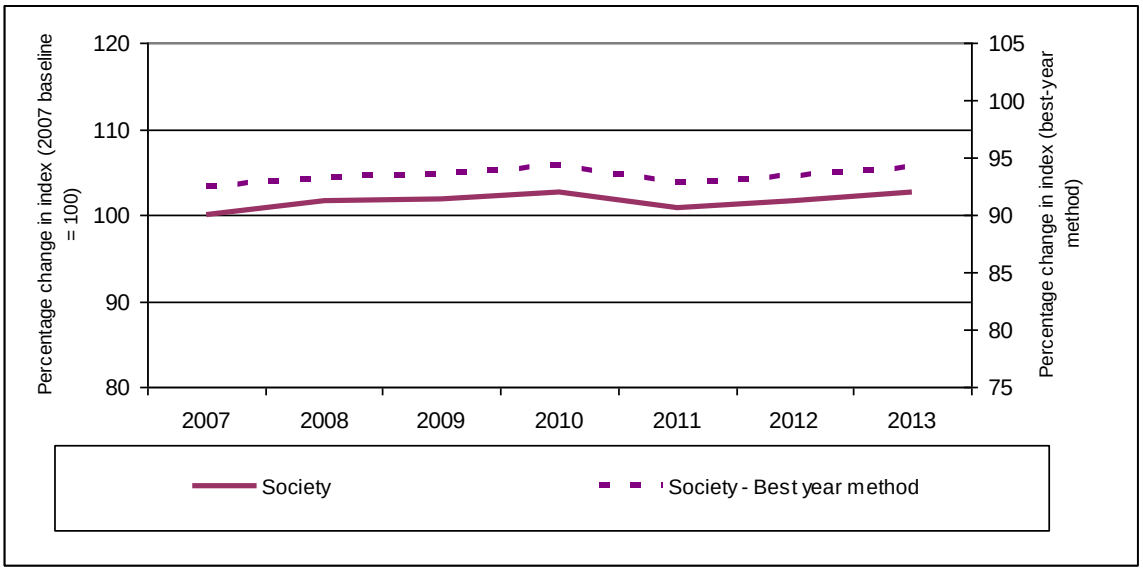
Aspects to note from the results include:

- Both approaches have conceptual merit. The CIW method is a relatively transparent approach which can be readily communicated to the layperson (including caveats). An alternative 'best-year' method may mitigate the potential for setting the baseline for all indicators at what might be described as an outlier year within a time period, but could also be perceived as more complex, less intuitively interpreted and more prone to error during data updates.
- The graphs below illustrate that both methods result in a similar overall pattern over time for each index but shifted either up or down (depending on the difference between the baseline year and 'best year'). Hence, from a practical perspective there may be little difference between the outputs of each method.



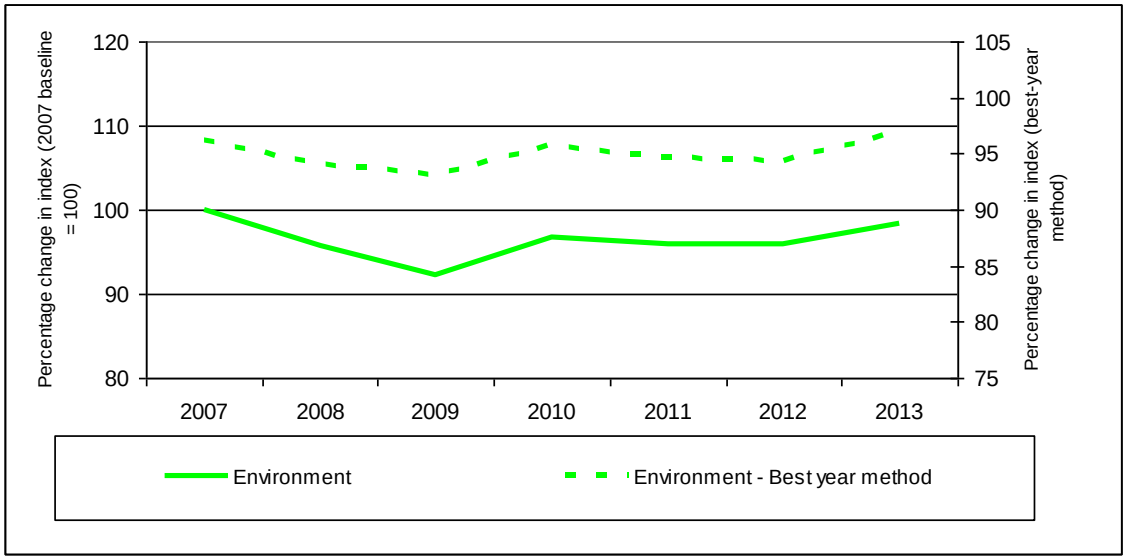
Source: WPI Monitoring Programme database (Waikato Regional Council). Note: Best-year indices relate to second y-axis.

Figure 16: Alternative index – GDP



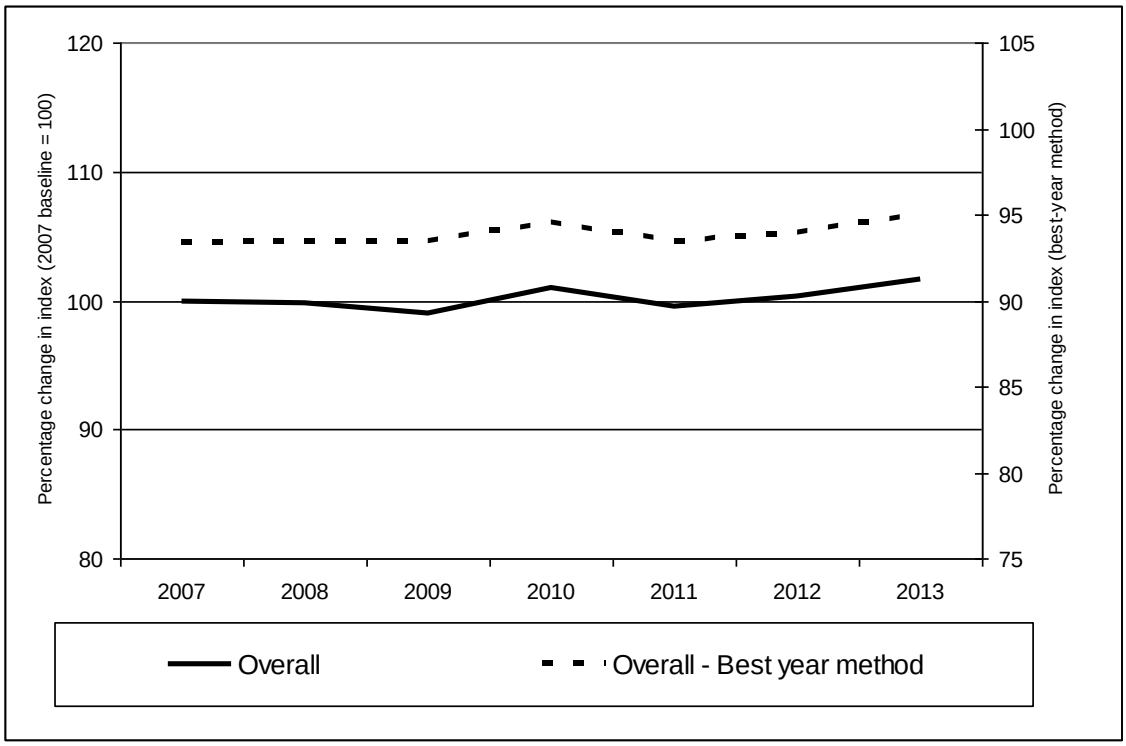
Source: WPI Monitoring Programme database (Waikato Regional Council). Note: Best-year indices relate to second y-axis.

Figure 17: Alternative index – Society



Source: WPI Monitoring Programme database (Waikato Regional Council). Note: Best-year indices relate to second y-axis.

Figure 18: Alternative index – Environment



Source: WPI Monitoring Programme database (Waikato Regional Council). Note: Best-year indices relate to second y-axis.

Figure 19: Alternative index – Overall

Alternative scorecard calculations

Most composite indices for wellbeing monitoring use a simple unweighted formulation. Some, such as the HDI or WR-GPI set baseline upper and lower indicator limits. An added complexity of this approach with regard to monitoring over time is that the baseline may need to be reset from time-to-time and the index retrospectively updated. We preferred to set the baseline for a specific year at 100 points, and all subsequent measurements are relative to this baseline in real terms over time (e.g. CIW).

Table 18: Scorecard results using alternative calculation method

ECONOMY	Interpretation	Assessment	Adjusted Scorecard values	Alternative values (average annual averages)
Regional GDP	Positive	improving trend by	2.60%	2.50%
SOCIETY				
Life satisfaction	Positive	no significant change	0.28%	0.43%
Educational attainment	Positive	improving trend by	1.00%	0.86%
Housing affordability	Negative	improving trend by	-1.08%	-0.70%
Perceptions of safety	Positive	improving trend by	0.62%	1.85%
Crime	Negative	improving trend by	-2.75%	-2.77%
Road safety	Negative	improving trend by	-6.46%	-9.26%
Life expectancy	Positive	improving trend by	0.29%	0.25%
Perceived health	Positive	no significant change	-0.21%	-0.32%
Social connectedness	Positive	improving trend by	1.03%	1.52%
Community pride	Positive	no significant change	-0.40%	-0.40%
Physical activity	Positive	no significant change	0.47%	0.48%
Cultural respect	Positive	no significant change	0.12%	0.12%
Te Reo Māori speakers	Positive	worsening trend by	-1.38%	-1.18%
Voter turnout	Positive	no significant change	0.09%	0.35%
Community engagement	Positive	no significant change	-0.46%	-0.36%
Income	Positive	no significant change	0.06%	0.08%
Income inequality	Negative	worsening trend by	0.93%	0.38%
Building activity	Positive	worsening trend by	-7.17%	-6.51%
Employment	Positive	worsening trend by	-0.82%	-0.83%
Public transport	Positive	improving trend by	10.78%	9.23%
Water use	Negative	worsening trend by	4.92%	4.55%
ENVIRONMENT				
Environmental attitudes	Positive	no significant change	0.76%	0.91%
River water quality	Negative	no significant change	0.00%	0.00%
Soil quality	Negative	worsening trend by	1.47%	1.79%
Rural subdivision	Negative	worsening trend by	4.55%	3.90%
Air quality	Negative	improving trend by	-6.67%	-2.67%
Greenhouse gases	Negative	no significant change	-0.40%	-0.53%
Protected land	Positive	no significant change	0.06%	0.12%
Coastal habitats	Negative	worsening trend by	1.85%	2.11%
Waste	Negative	worsening trend by	0.37%	0.37%
Recycling	Positive	improving trend by	1.03%	1.58%
WPI INDEXES				
WPI Society Index	Positive	improving trend by	0.27%	0.50%
WPI Environment Index	Positive	worsening trend by	-0.68%	1.11%
WPI Overall Index	Positive	no significant change	0.05%	0.74%

Source: WPI Monitoring Programme database (Waikato Regional Council) as at 3 August 2014.

Note: Assessment of the trends is based on relatively arbitrary threshold values which will be reviewed over time.

WPI individual indicator trends between 2007 and 2013 (Scorecard) are currently rated 'better by' or 'worse by' according to the simple percentage difference between two time series points. A benefit of this approach is that it gives a simply calculated and communicated summary snapshot of the net trend. A drawback is that it gives no information about the sub-trends between these two points. Two indicators can show a similar or identical score despite very different histories. For example, one indicator could slump for a considerable period during a specified time period and recover in the last period, while another shows a slight gradual improvement each year. A simple percentage value shows each of these in an equal light.

An alternative is to try and convey historical trend information in the summary statistic by averaging the percentage change for each interim period. The number of data points in this calculation could vary for each indicator, depending on the frequency of measurement and reporting. If a significant number of percentage differences within these interim periods were (for example) negative then this would be reflected in the summary measure even if the final year was higher than the start year.

Table 18 above shows the results of this alternative approach compared with the current approach. Note that: (a) Where data exist for 2007 then these are reported, otherwise either 2006 or 2008 data are reported (depending on the measurement cycle of each indicator) and similarly, if 2013 data are available then these are reported, otherwise data for the most recently available year; (b) Both approaches use no imputed data (all actuals) for individual indicators with the exception of life expectancy and coastal habitats due to missing relevant data for these calculations. Imputed values are also used behind the calculation of index scores (e.g. WPI Society Index) for which trends scores have subsequently been calculated; and in the table presented here, the positive/negative column is provided to assist with interpretation. The values shown are actual statistics, so a negative value for (say) GDP can be interpreted as negative but a negative value for (say) crime can be interpreted as an improvement.

In summary:

- From a technical perspective, the averaging is quite complex. The example provided through peer reviewer feedback used a simple single triennial data series and calculated averages across these consistent periods. The resulting average percentage score could then be interpreted as average triennial growth/decline over the period as whole. However, the WPI time series comprises a range of data reported annually, biennially, triennially or with other cycles, including uneven cycles (e.g. latest educational attainment data are over a seven year period due to Census delay). Hence, to arrive at a meaningful calculation, each interim average has been expressed as an average annual figure by dividing through by the data measurement period. The resulting annual average scores are then averaged across all years to arrive at a comparable 'average annual average' estimate for each indicator and index.
- For comparison in the table below, current Scorecard values have all been divided by six (i.e. the approximate average number of years in the total time period). In some cases this is not an appropriate comparison as noted below.
- The table illustrates a similar overall assessment using both calculation methods. The biggest proportionate positive differences relate to:
  - substantially higher score for perceptions of safety using the alternative method. However, this is because only two data points are available to date (2010 and 2012). If the adjusted current method was adjusted only

across two years instead of six, then this difference is mathematically eliminated;

- substantially higher score for protected land. Again this is due to the presence of only two data points (2006 and 2009);
- relatively higher life satisfaction due to the influence of a mid-period peak in 2010. Higher score for recycling, which also had a mid-period peak. Similar results for some other indicators, e.g. greenhouse gases, soil quality; and
- due to the relatively high proportion of Environment indicators which exhibited a 2009-2010 improvement, and the resulting impact on the 'average annual average' scores, the Scorecard value for the WPI Environment Index is considerably more optimistic using this alternative method than under the current method.

- The biggest proportionate negative differences relate to:
  - relatively lower air quality score due to influence of a spike in emission exceedances in 2008-2009; and
  - relatively lower income inequality score due to a peak in 2011.
- Overall, the alternative approach has tended to result in higher annual average scores over this period than the current approach but the 'better by/worse by' assessment is unaffected. The GDP indicator receives a similar score over this time period regardless of which method is used.

5.2.9 Future directions for the experimental composite indices

A range of benefits and limitations have been identified with regard to the current experimental approach to index construction (using the CIW method) and the underlying philosophy of seeking to measure broad latent concepts using a small number of summary indices.

Indicator 'scaling' issues

Sensitivity analyses have revealed that a small number of WPI indicators have a disproportionate effect on the WPI indices due to their higher level of variability over time, particularly if they have markedly increased/decreased or 'spiked' during the monitoring period. Further consideration is needed of the possible exclusion or replacement or alternative measures for some indicators. For example, there may be an alternative air quality construct which conveys the same information but with a less disproportionate impact on the Environment Index.

A further significant key issue identified through peer review was the assumption that all WPI indicators are simplistically assumed to have equal weighting in the indices. Alternative approaches are briefly discussed below.

Expert-based subjective weightings

During the data collation stage, the FEEM SI method was flagged as an area of further investigation.[17] In summary (from the FEEM SI website and associated links):

(a) Normalisation – The indicators are normalised before comparison and aggregation, i.e. brought to a common scale 'according to a step-wise linearised function ranging between 0 and 1'…. 'FEEM SI indicators have been translated

[17] Refer http://www.feemsi.org/.

into a 0-1 scale using an indicator-specific normalisation grid (benchmarking) which is based on either relevant sustainability policy targets or an average-based criterion. The FEEM SI indicators are normalised according to a benchmarking function passing through five reference levels. Each one of the five reference levels corresponds to a given level of sustainability, moving from extremely unsustainable (0) to fully sustainable (1).'

(b) Aggregation – Based on experts' judgements. The aggregation procedure is in two steps: first a questionnaire is used to elicit experts' subjective judgements on the relative importance of each indicator and their possible interactions, and secondly a method based on the 'Choquet Integral' is used to aggregate the experts' evaluations to derive a composite measure.

The impression from this quick review is that the FEEM SI method is very reliant on the subjective assessments of 'experts' and appears to be quasi-scientific, i.e. using seemingly scientific equations and graphs to give a false sense of precision, with many underlying assumptions unstated. While there may be merits in adopting an alternative to the assumption of equal weightings, whatever subjective weighting system is used will (by definition) be a reflection of the decision-makers' values and hence the measurement results will be influenced accordingly.

Principal components analysis (PCA)

The WPI indexes are calculated using a method similar to that of the Canadian Index of Wellbeing and WR-GPI, i.e. a 'distance to reference' method in which longitudinal raw data are compared and converted to a numeric wellbeing score with a baseline of 100. An alternative approach in the longer term may involve using principal components analysis (PCA), i.e. orthogonal transformation that assumes the presence of an underlying unobservable variable and uses eigenvalue decomposition of the covariance (or correlation) matrix to derive an index which explains a high proportion of variance in the overall data set. While this approach would be more theoretically appealing, at the least it requires a much larger WPI dataset than is currently available, particularly with 2007 as the base year. Moreover, even if a larger dataset were available, there may be other aspects of this dataset which mean that PCA cannot be meaningfully applied.

The assumption of equal weightings was challenged by one peer reviewer in particular who was an advocate of PCA. This caused the WPI authors to briefly re-visit this possibility in May-June 2014. The reviewer provided two examples in which PCA had played a central part in analysis, namely Salmond et al's (2007) construction of the NZDep2006 Index of Deprivation and Jollands et al's (2004) construction of aggregate eco-efficiency indices for New Zealand. However, following consideration of these examples the WPI authors are still not convinced that PCA may be feasible for the WPI. In particular, it appears that the examples provided by the peer reviewer are conducive to PCA due to the nature of their datasets but these have different attributes from the WPI dataset:

- The NZDep index is calculated from meshblock Census data across a range of items. Every meshblock has geocoded data for all items and there are many meshblocks in the dataset. In addition, the NZDep is a point-in-time measure at each Census and does not have a time series interpretation (i.e. relative scores are re-based following each Census).
- The paper on aggregate eco-efficiency indices is more similar to the WPI situation, particularly in terms of the number of variables. However, the dataset

is based on sector estimates (x 46 sectors) for which the WPI has no equivalent.

The attributes of the WPI dataset are dissimilar to both the NZDep dataset and the eco-efficiency dataset and much less amenable to covariance analysis. The dataset has only a single observation per year per indicator, is presented as a time series for each indicator, and makes use of imputed data to account for systematic and non-systematic data gaps.

Further investigation is required to advance the approach to index construction for the experimental WPI indices, particularly with regard to the issues of scaling (e.g. sensitivity of individual indicators over time, even after normalisation) and weighting.

6 Peer reviewers' feedback

During the development of the WPI programme and associated WPI Technical Report 2014, input was sought from a range of peer reviewers including:

- Prof Murray Patterson and Vicky Forgie, EERNZ, Massey University;
- Melanie Thornton (and other staff), GWRC;
- Kerstin Maurus (and other staff), SNZ; and
- Internal review by various staff from the Science and Strategy Directorate, WRC.

This section summarises a selection of key feedback from these peer reviewers on the draft Technical Report and WPI outputs (including internal discussion papers) along with the WPI authors' brief responses to each feedback point.

Much of the peer reviewers' feedback was positive, along with critical feedback of a technical or minor nature (eg, better clarity of definition and consistency of usage between references to monetary GPI measures, progress indicators and composite indices). The authors have sought to take all such feedback fully into account in this frameworks review report and in the Summary Report (Waikato Progress Indicators – *Tupuranga Waikato* (WRC 2014)).

However, there was also more substantial critical feedback, mainly around some of the conceptual background and structure and logic flow in the initial draft Technical Report. As a result of this feedback, large parts of the initial draft Technical Report were deleted, summarised or relocated into this now-expanded report. The table below focuses on key remaining feedback which has not been fully incorporated into the amended reports or otherwise merits a specific mention.

Table 19: Selection of key feedback from peer reviewers

Summary of feedback	Response
The 'progress' of the Waikato has been measured using a very comprehensive and balanced set of indicators. This report, even as it stands now, compares very favourably with other progress indicators reports both domestically and internationally…The results section with the individual scorecards is particularly good, and obviously these scorecards have been carefully assembled, interpreted and referenced.	Positive feedback noted.
I would like to commend you for attempting to construct the composite indicator and the sub-	

Summary of feedback	Response
indices … That said, there are a number of weaknesses in the way in that Waikato composite indicator is constructed: (a) There is an assumption of equal weighting of the component variables – there are a number of approaches you could have used to overcome this problem.… Probably the most rigorous approach is to use one of the statistical methods such as 'principal components analysis'…; (b) There are scaling issues – … you can't validly convert the individual variables to a so-called 'dimensionless' scale prior to aggregation. This is because the underpinning data are still measured in different units… Furthermore, as you point out, if you use external criteria (eg, policy targets, worst years) for scaling the data your results can be very sensitive to the actual choice of external criteria. In order to get the best advice on these statistical matters [(a), (b)], I've recommended four possible courses of action in my response. (c) Possible double counting – some of the indicators that you use overlap with each other. For example, building activity will already be included in the GDP, which is not a problem if you consider them as separate entities, but it is a problem should you combine them into a composite indicator. 4. Further to the above point, it is recommended that: (a) at this stage, simply state that your composite indicators/indices are 'exploratory' or 'experimental'; (b) dashboard approach should be highlighted as the main mechanism of reporting approaches. This emphasis can be achieved by a number of mechanisms – eg, you could move the exploratory composite indicators to an appendix.	PCA has been considered but was not thought to be feasible at this stage. Further comment later in response. 'Dimensionlessness' relates to percentage changes, with each indicator's percentage change measured with regard to its own scale. However, we agree that each indicator has a different degree of variability and that its scale can have a big impact on this in percentage terms (e.g. the air quality measure). Noting four possible courses of action recommended for further investigation. Possible double-counting issue noted for further consideration. Agree – Dashboard of indicator results is the main WPI output, with experimental composite indices supporting this but secondary.
The report has a number of theoretical limitations and mistakes that need correction before publication…. There is too much 'clutter' in the conceptual discussion which in many cases clouds what the main purpose of the report is…. It is fair to say, that in the progress indicator literature, clichés and throwaway comments are often encountered, many of which have been introduced by the 'economically uninformed'.	A broad-ranging GPI-related literature review has been incorporated into this Technical Report but this is not overtly reflected in the Summary Report or WPI results. The initial Technical Report has been summarised and focused around presentation of the WPI purpose and initial results. More technical and conceptual information has been transferred into this frameworks review report.
A number of unjustifiable 'value judgements' are made in your summary tables and text.… For example, you claim that the upward/downward movement of variables are intrinsically 'negative', 'positive', 'worse' and 'better'. To demonstrate this point you suggest that a downward movement in rural subdivision is 'better'…. There are a number of other value judgements like this, particularly in	Noted and agree. Value judgements are inherent. Current value judgements are as defined by the WRC project team. Discussion on various aspects of subjectivity and economic interpretation have been a feature of the indicator selection process (e.g. income inequality).

Summary of feedback	Response
your summary tables, but also in the text, which I think gives the impression that this report has a 'green' bias….	
A very significant weakness in these progress indicators is a total lack of iwi (cultural) indicators – with the exception of the Te Reo Maori indicator… That said, this is not the type of thing you could parachute into the Waikato, without appropriate engagement with Waikato iwi…. I think this is something that you will need to give some serious consideration to in Phase 2.	Noted and agree. WRC is aware of the need for development of iwi indicators.
'If you have 8 environmental indicators and 17 socio-economic indicators do you have some weighting? Does each individual environmental indicator have twice the impact on the trend as each socio-economic indicator?.... It's not clear to me exactly how you applied the weightings in the composite index.	Investigation of alternative weightings may be undertaken at a future stage.
My recommendations for the future (Phase 2) would be to search the literature for examples of how others have addressed the issue of 'scaling' and 'weighting' in constructing composite indexes – I would be highly surprised if you didn't find an example that you could immediately apply – you might need to search other literatures apart from (progress and environmental indicators) – for example, psychologists use such indicators.	Principal components analysis has been considered for this data but is not considered feasible at this time. There are known examples of datasets which are conducive to PCA (eg, NZDep index and eco-efficiency index datasets) but the attributes of the WPI dataset are dissimilar to these and much less amenable to covariance analysis. In particular, the WPI dataset has only a single observation per year per indicator and is presented as a time series for each indicator.

7 Where to next?

It is envisaged that the Waikato Progress Indicators (WPI) will form the basis for ongoing monitoring of Waikato Regional Council's strategic direction and other region-wide initiatives (e.g. Waikato Spatial Plan). The results and products of the WPI programme provide a robust basis for discussing regional challenges and opportunities and identifying priorities for closer collaboration and partnerships.

Engaging with strategic regional partners will be a focus, including Iwi/Waikato River Authority, Hamilton City Council, district councils, Waikato District Health Board, New Zealand Transport Agency, Trust Waikato, Statistics NZ, Ministry for the Environment, Ministry of Social Development, Ministry of Business, Innovation and Employment, business and sector groups, non-government organisations, etc). Presentations to the Regional Planning Manager, the Strategic Planners Network and the Waikato Spatial Plan team are also planned.

It is anticipated that this Phase 1 of the WPI project (initial development) will be followed by a Phase 2 that will include:

- communication and engagement with strategic partners and stakeholders;
- data management, including confirming the ongoing needs and timeframes for regularly reporting on the WPI, and to explore availability of additional city/district level data;
- data sharing, for example to explore opportunities for sharing data and services with other agencies, particularly the Waikato Region territorial authorities, district health boards, other regions and Central Government; and
- WPI website: an interactive, user-friendly and easily understandable website to search, discover and explore the results and stories about the Waikato Progress Indicators.

Phase 2 of the WPI development project will examine possible next steps, including:

- further refining the approach to developing a composite overall Regional Development Index and sub-indices which can be compared between regions (potentially internationally) and tracked over time;
- building on existing good practice programmes including the WRC environmental indicators and MARCO community outcomes monitoring and reporting programmes;
- involving iwi and other key stakeholders through meaningful engagement in the development of the Strategic Direction monitoring framework and selection of indicators;
- at a minimum, reporting the results through WRC's Annual Report and on a dedicated page of the WRC website, and developing a clear plan and budget for future development of the monitoring and reporting programme; and
- taking a pragmatic approach to monitoring and reporting which is preceded by WRC budget decisions regarding annual updates of the underlying data and composite indices.

Phase 2 of the WPI project, addressing the above items, will begin in 2014/2015.

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Appendix A: Bellagio Principles

During 1996-97 a set of principles was identified by an international group of measurement practitioners and researchers under the banner of IISD to serve as guidelines for monitoring and reporting progress toward sustainable development. The resulting 'Bellagio Principles' deal with four aspects of assessing progress toward sustainable development: [18]

- Principle 1 deals with the starting point of any assessment – establishing a vision of sustainable development and clear goals that provide a practical definition of that vision in terms that are meaningful for the decision-maker. In WRC's case, this has been done through the 2010-11 identification of a vision and flagship goals;
- Principles 2 to 5 deal with the content of any sustainable development assessment and the need to merge a sense of the overall system with a practical focus on current priority issues;
- Principles 6 to 8 deal with key issues of the process of assessment; and.
- Principles 9 and 10 focus on the necessity for a continuing capacity for assessment.

The Bellagio Principles serve as guidelines for the whole of the assessment process including the choice and design of indicators, their interpretation and communication of the result. They are interrelated and should be applied as a complete set.[19]

Principle 1: Guiding Vision and Goals

Assessment of progress toward sustainable development should be guided by a clear vision of sustainable development and goals that define that vision.

Principle 2: Holistic Perspective

Assessment of progress toward sustainable development should:

- include review of the whole system as well as its parts;
- consider the wellbeing of social, ecological, and economic sub-systems, their state as well as the direction and rate of change of that state, of their component parts, and the interaction between parts; and
- consider both positive and negative consequences of human activity, in a way that reflects the costs and benefits for human and ecological systems, in monetary and non-monetary terms.

Principle 3: Essential Elements

Assessment of progress toward sustainable development should:

- consider equity and disparity within the current population and between present and future generations, dealing with such concerns as resource use, over-consumption and poverty, human rights, and access to services, as appropriate;
- consider the ecological conditions on which life depends; and

[18] www.iisd.org/measure/principles/progress/bellagio.asp.
[19] www.iisd.org/measure/principles/progress/bellagio_full.asp.

- consider economic development and other, non-market activities that contribute to human/social wellbeing.

Principle 4: Adequate Scope

Assessment of progress toward sustainable development should:

- adopt a time horizon long enough to capture both human and ecosystem time scales thus responding to needs of future generations as well as those current to short term decision-making;
- define the space of study large enough to include not only local but also long distance impacts on people and ecosystems; and
- build on historic and current conditions to anticipate future conditions – where we want to go, where we could go.

Principle 5: Practical Focus

Assessment of progress toward sustainable development should be based on:

- an explicit set of categories or an organizing framework that links vision and goals to indicators and assessment criteria;
- a limited number of key issues for analysis;
- a limited number of indicators or indicator combinations to provide a clearer signal of progress;
- standardizing measurement wherever possible to permit comparison; and
- comparing indicator values to targets, reference values, ranges, thresholds, or direction of trends, as appropriate.

Principle 6: Openness

Assessment of progress toward sustainable development should:

- make the methods and data that are used accessible to all; and
- make explicit all judgments, assumptions, and uncertainties in data and interpretations.

Principle 7: Effective Communication

Assessment of progress toward sustainable development should:

- be designed to address the needs of the audience and set of users;
- draw from indicators and other tools that are stimulating and serve to engage decision-makers; and
- aim, from the outset, for simplicity in structure and use of clear and plain language.

Principle 8: Broad Participation

Assessment of progress toward sustainable development should:

- obtain broad representation of key grass-roots, professional, technical and social groups , including youth, women, and indigenous people – to ensure recognition of diverse and changing values; and
- ensure the participation of decision-makers to secure a firm link to adopted policies and resulting action.

Principle 9: Ongoing Assessment

Assessment of progress toward sustainable development should:

- develop a capacity for repeated measurement to determine trends;
- be iterative, adaptive, and responsive to change and uncertainty because systems are complex and change frequently;
- adjust goals, frameworks, and indicators as new insights are gained; and
- promote development of collective learning and feedback to decision-making.

Principle 10: Institutional Capacity

Continuity of assessing progress toward sustainable development should be assured by:

- clearly assigning responsibility and providing ongoing support in the decision-making process;
- providing institutional capacity for data collection, maintenance, and documentation; and
- supporting development of local assessment capacity.

Appendix B: Review of Good-practice Frameworks

Canadian Index of Wellbeing

Web link

https://uwaterloo.ca/canadian-index-wellbeing

Summary

Attributes	Summary
Purpose	Provide a monitoring framework for assessing progress towards the wellbeing of Canadians as a whole.
Target audience	National and provincial decision-makers, the public.
Number of indicators and measures	64 indicators across 8 domains.
Indicator selection process	Collaborative working group of academics. Indicator election based around alignment with wellbeing framework identified through public consultation.
Framework	Eight wellbeing domains identified through extensive public consultation.
Frequency of reporting	Annually to date (2011 and 2012 reports).
Form of reporting	Website and report (82 pp).
Metadata and referencing	Standard referencing.
Key sub-headings (e.g. 'how are we doing?')	Nil.
Use of composite indices	Summary graphs are expressed on a 'distance to reference' GPI scale, with the baseline (mid 1990s) value for each indicator set to 100 points.
Use of monetary estimates	No use of FCA. Full cost assignment of monetary values has not been signalled as a future development.
Use of qualitative (descriptive) information	All indicators have been selected on the basis of measurability, including ability to be aggregated or disaggregated. Descriptive information is provided for interpretation and context but there are no qualitative (only) indicators.
Comparability (inter-regional, national, international)	National index scores are shown over time but do not permit comparisons between regions or provinces or with other countries. Due to the large number of indicators, it may not be cost-efficient to compile comparable wellbeing indicators for other areas.
Visual representations (graphs, tables, figures, symbols)	Composite index time series line graphs (report and website). Red/green up/down trend arrows and

Attributes	Summary
	infographic tables (report and website).
Use of time series	Historical series mid 1990s to 2010, with some data imputed.
Use of future projections/scenarios	Nil.

Source: Based on review of source material.

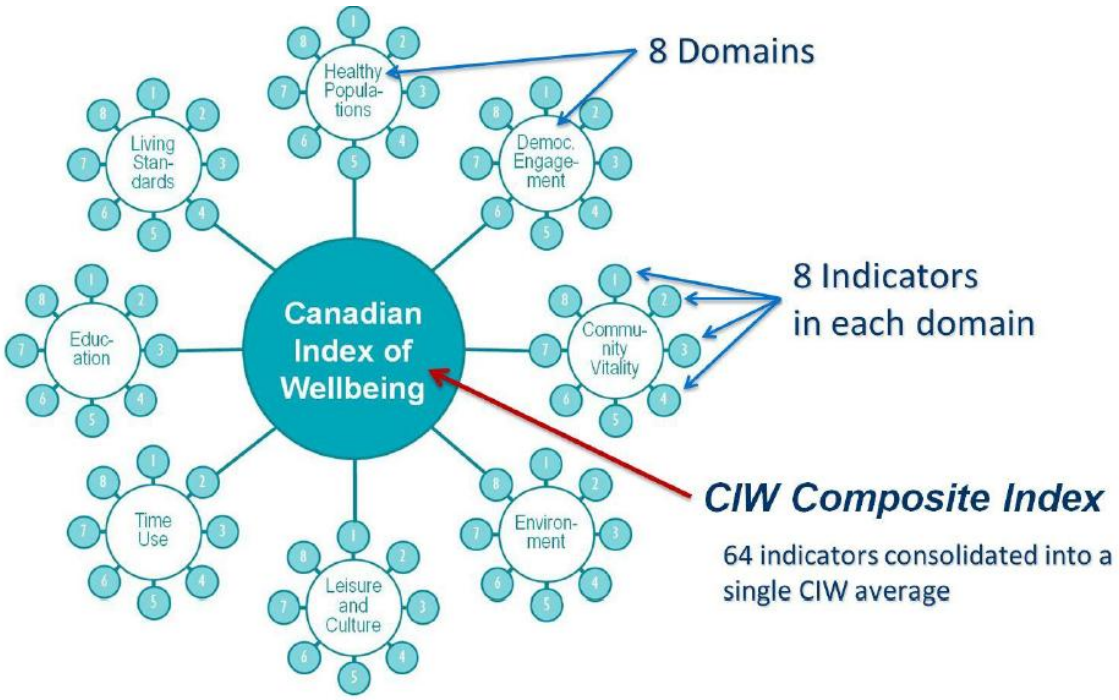
Introduction

Canada has a long history of social indicator monitoring and reporting. In the 1990s there was renewed interest in using broad measures of wellbeing such as regional and provincial GPI work. However, it is only in more recent years that there has been a co-ordinated national/federal effort to measure progress for the whole of Canada, to create a tool that measured Canadian overall wellbeing. Throughout the 2000s consultation was undertaken and frameworks developed, culminating in a series of reports in 2009 and 2010 and release of the first complete version of the Canadian Index of Wellbeing composite index in October 2011 (updated October 2012).

Results Report

The latest update of the Canadian Index of Wellbeing Report ('How are Canadians Really doing?') was published in October 2012. This is written for a general or academic audience with an accessible Executive Summary. A focus of the presentation is in comparing more holistic wellbeing results with the traditional focus on GDP as a key measure. The report makes use of trend line graphs for the period 1994 to 2010, figures, symbols and interpretation across eight domains, with eight indicators within each domain for a total of 64 indicators.

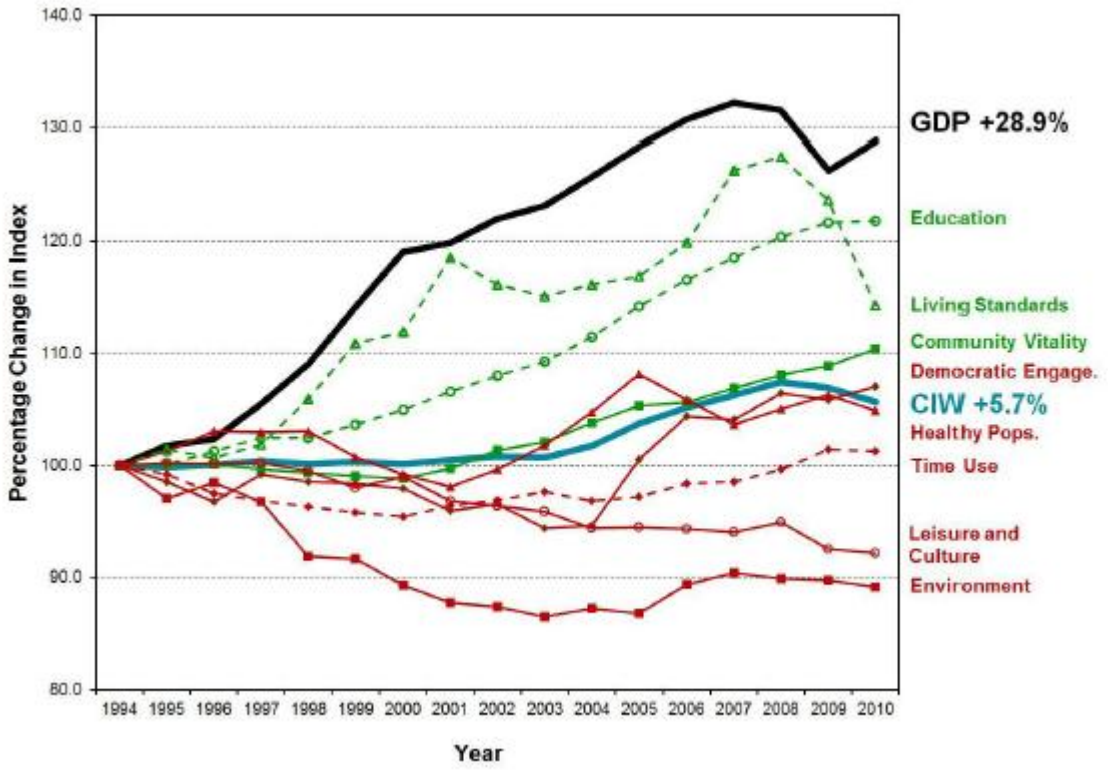
Figure 20: Canadian Index of Wellbeing framework



Source: Canadian Index of Wellbeing (2012).

The CIW makes use of composite indices for overall wellbeing and each of its eight wellbeing domains, for comparison with a GDP time series index to highlight the genuine growth gap between 1994 and 2010. The approach is similar to that adopted for the Wellington Region Genuine Progress Index (WR-GPI) except that the 'distance to reference' scale is different. Rather than taking the highest point in the reference period as being equal to 100 points, the CIW sets a mid 1990s base year to 100 for each of the 64 headline indicators.

Figure 21: Canadian Index of Wellbeing with eight domains and compared with GDP



Source: Canadian Index of Wellbeing (2012).

Starting from a common baseline of 100 points, positive percentage changes for each individual indicator suggest an improvement in wellbeing while negative percentage changes indicate deterioration. This approach applies to all 64 indicators as well as the eight domains, and ultimately, the CIW composite index. Equal weightings are applied to all indicators. According to the accompanying technical paper, linear imputation has been used to ensure there is a complete time series for each indicator.

The Results Report uses GDP/CIW line graphs, text, symbols and illustrative photographs to describe trends for each indicator and wellbeing area. Tables of numbers are avoided throughout the report. Symbols are used to denote each well-being area (e.g. a stylised house for 'Living Standards') and trends are denoted in percentages and by green up/down arrows (good change) and red up/down arrows (bad change). Percentage changes are summarised for the overall time series 1994 to 2010 as well as the post-recession period 2008 to 2010. Long run indicator trends within each wellbeing theme are illustrated in one-page infographic tables. A subjective wellbeing survey is also being undertaken by CIW to contribute to the programme in future years.

Table 20: Imputation of data for CIW Healthy Populations composite index

Year	Headline Indicators for Healthy Populations*							
	1p	2n	3p	4n	5n	6p	7p	8p
1994	**63.1**	**3.0**	**78.2**	**20.9**	**5.3**	84.4	47.9	**85.3**
1995	63.3	3.1	78.4	21.3	4.7	84.4	47.9	86.2
1996	**63.4**	**3.2**	**78.6**	**21.6**	**4.1**	84.4	**47.9**	**87.1**
1997	64.3	3.4	78.8	20.5	4.3	84.4	50.9	84.7
1998	**65.2**	**3.5**	**79.0**	**19.4**	**4.5**	84.4	53.9	**82.2**
1999	63.9	3.7	79.2	19.2	5.4	84.4	57.0	82.1
2000	62.7	3.9	79.4	18.9	6.3	84.4	60.0	81.9
2001	**61.4**	**4.1**	**79.6**	**18.7**	**7.2**	**84.4**	**63.0**	**81.7**
2002	59.9	4.4	79.8	16.8	6.6	85.6	62.7	82.8
2003	**58.4**	**4.6**	**79.9**	**14.9**	**5.9**	**86.8**	**62.4**	**83.9**
2004	59.3	4.8	80.2	13.5	5.6	86.0	64.5	82.9
2005	**60.1**	**4.9**	**80.4**	**12.1**	**5.2**	**85.2**	**66.5**	**82.0**
2006	59.9	5.4	**80.8**	12.1	5.6	86.0	65.4	82.0
2007	**59.6**	**5.8**	80.8	**12.0**	**6.0**	**86.8**	**64.3**	82.0
2008	**58.9**	**5.9**	80.8	**11.4**	6.0	86.8	64.3	82.0

* *Key:* 1p = Percentage self-rated health as excellent or very good
2n = Percentage with self-reported diabetes
3p = Life expectancy at birth, years
4n = Percentage of daily or occasional smokers among teens aged 12 to 19 years
5n = Percentage with probable depression
6p = Percentage rating patient health services as excellent or good
7p = Percentage aged 65 years or more getting influenza immunization
8p = Avg. number of remaining years expected to be lived in good health (avg. HALE 15+)

* Data which are *not* in bold were obtained by imputation. See text for Table 2a.

Source: CIW Technical Report (Michalos et al, 2011).

Figure 22: Infographic table for Living Standards

Source: Canadian Index of Wellbeing (2012).

In addition to presenting the results from monitoring Canadian well-being trends, the report also has sections on mobilising knowledge to effect societal change.

Technical Report

As with the WR-GPI work, the CIW is accompanied by a comprehensive Technical Report describing the rationale and methodological issues underlying their composite index. An overview of the CIW's perspective on the advantages and disadvantages of a single composite index is tabulated earlier in this report (Table 17).

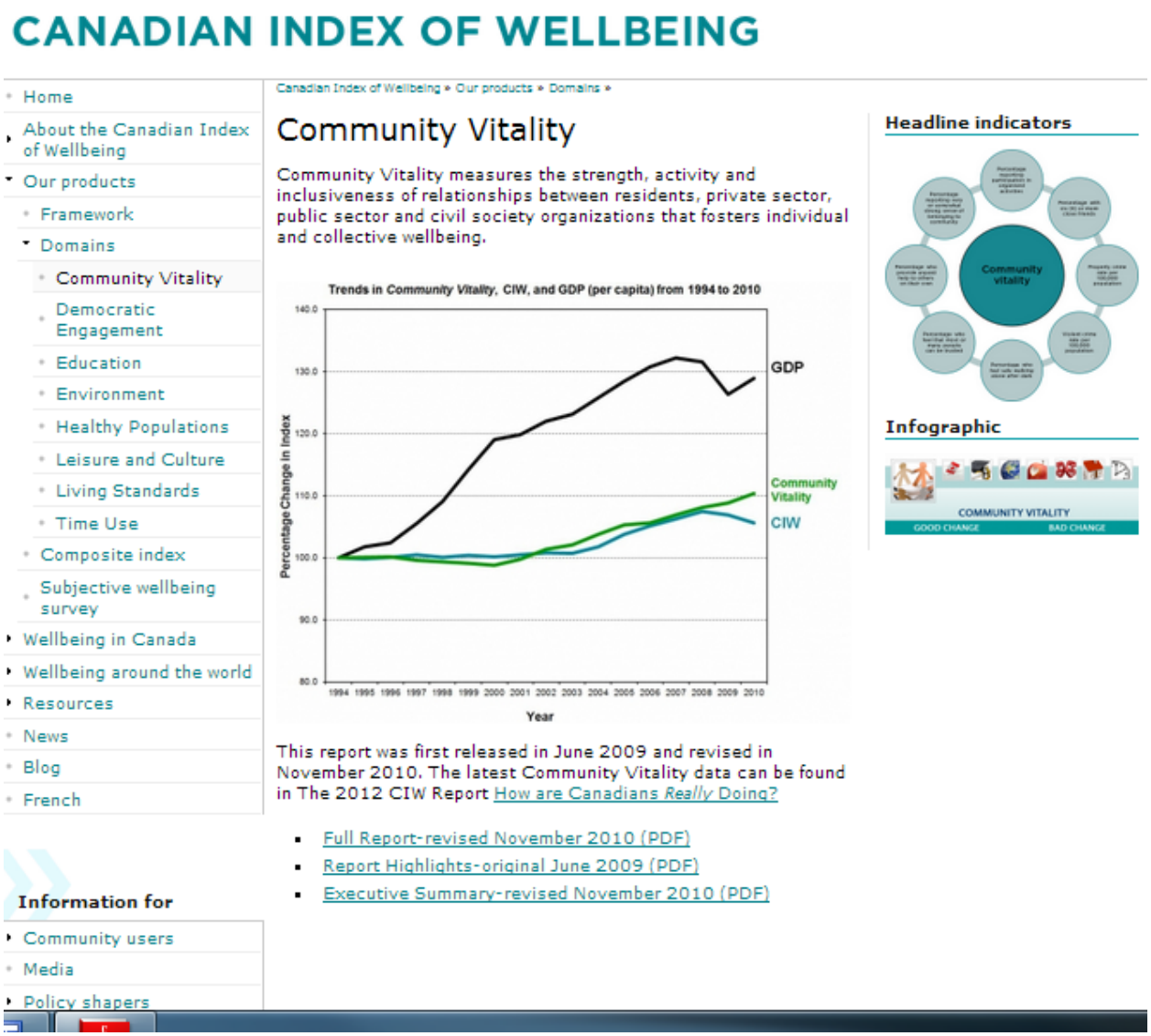
The Technical Report also gives useful insight into the CIW indicator selection process:

> "Broadly speaking, one may distinguish three relatively ideal types of approaches to the development of indicators and indices of wellbeing, each beginning from a different strategic point of departure, but never entirely independent of the others. We may name and characterize them as: (1) Top-Down, where one begins by constructing a conceptual scheme of some sort describing one's understanding of wellbeing, including its constituents and determinants; (2) Bottom-Up, where one begins by exploring the great variety of available data that might be relevant to most people's understanding of well-being; and (3) Bi-Directional, where one begins by constructing and exploring somewhat simultaneously; that is, one begins by building a framework and at the same time exploring available data sets for items that could populate the framework.
>
> One might characterize the Top-Down approach as theoretical, the Bottom-Up approach as empirical, and the Bi-Directional approach as pragmatic. Of these three approaches, it is fair to say that the development of the CIW has been and will probably remain pragmatic. Practically speaking, that means that we proceed patiently, transparently, and flexibly, testing any ideas presented both against the hard evidence yielded by empirical research and against the common sense of the Working Group and as broad a constituency beyond it as our resources allow."
>
> *CIW Technical Report (Michalos et al, 2011)*

Website

The CIW homepage makes use of photographs, text, links to key documents, links to the eight-domain framework, a news section and discussion-starter video. It also has links to interactive tools including infographics pages for each domain (GDP/CIW summary line graph and one-page symbol infographics), multimedia (e.g. lectures), fact sheets and other resources. The website has a high visual interest factor and is relatively intuitively navigated. Pages for individual wellbeing domains concisely summarise progress and provide links to drill down into more detailed results in the full report.

Figure 23: CIW website screen capture example



Source: https://uwaterloo.ca/canadian-index-wellbeing/our-products/domains/community-vitality (accessed 29 March 2013).

MARCO – Waikato Regional Community Outcomes Reporting

Web link

www.choosingfutures.co.nz

Summary

Attributes	Summary
Purpose	Track progress toward a regional set of community outcomes.
Target audience	TLAs, regional decision makers, members of the public.
Number of indicators and measures	75 measures (including Waikato Region Perception Survey items) across 27 indicator sub-themes and five outcome themes.
Indicator selection process	MARCO group (collaboration of TLA strategic planners) – SMART analysis, including consideration of availability of data at sub-regional level for TLA purposes.
Framework	Choosing Futures Waikato framework – Five collaboratively developed community outcome themes and 27 sub-themes (identified with extensive stakeholder and community input).
Frequency of reporting	Annual data updates.
Form of reporting	Report (200+ pp), website.
Metadata and referencing	Comprehensive technical information and links to source data.
Key sub-headings (e.g. 'how are we doing?')	Why is this important? What are the indicators? How are we doing?
Use of composite indices	No use of composite indices but these could be readily calculated using available data and metadata.
Use of monetary estimates	No use of FCA.
Use of qualitative (descriptive) information	A small number of indicators do not have quantitative data associated with them and are considered to be still under development (e.g. surface water availability and use). However the intention is that all indicators should be measurable.
Comparability (inter-regional, national, international)	Most of the results are compared with regional (sometimes sub-regional) and national equivalent results, including some of the Waikato Region Perception Survey items. However, many of the environmental indicators are not set up in such a way that they can be compared with other regions or nationally.
Visual representations (graphs, tables, figures, symbols)	Circle diagrams (state and trend), state and trend symbols (smiley/sad faces and up/down arrows), line and bar graphs, tables, maps, figures.
Use of time series	Historical time series, predominantly mid 1990s to early 2010s depending on the indicator/measure, no data imputed.
Use of future projections/scenarios	Very limited use of projections (visitor expenditure forecasts).

Source: Based on review of source material.

Introduction

The MARCO (Monitoring and Reporting Community Outcomes) programme of regional community outcome indicators monitoring and reporting was developed in parallel with a collaborative review of global good-practice examples, bringing together elements of the Choosing Futures Waikato collaborative regional outcome identification process, MSD Social Report, New Zealand Sustainable Development Indicators Project, Big Cities Quality of Life Project, overseas GPI and sustainable development work, Hamilton's long running Sustainability Indicators work and other examples.

MARCO, with support and leadership from WRC, produces an annual Data Analysis Report and undertakes a 2-3 yearly Waikato Regional Perception Survey. This involves a core regional sample of participants plus opportunities for local over-sampling by individual TLAs. Results from the survey feedback into the MARCO indicators programme and some of the questionnaire items were selected accordingly.

Background aspects are documented on the CFW website and through specific publications such as the MARCO Resource Kit, annual indicator update reports and presentations (e.g. Killerby, 2009). Since its formation in 2004, the MARCO group has gleaned positive attention from government departments, local authorities and other stakeholders throughout New Zealand.

Website

Outputs from the MARCO programme were initially integrated into the CFW website and now dominate the site. Navigation is aided by a TLA map of the Waikato Region on the home page. Latest data is incorporated annually using a content management system. Readers can search for an indicator/measure by council area, topic or keyword. Extensive background material is also available including archived reports and MARCO Perception Survey reports.

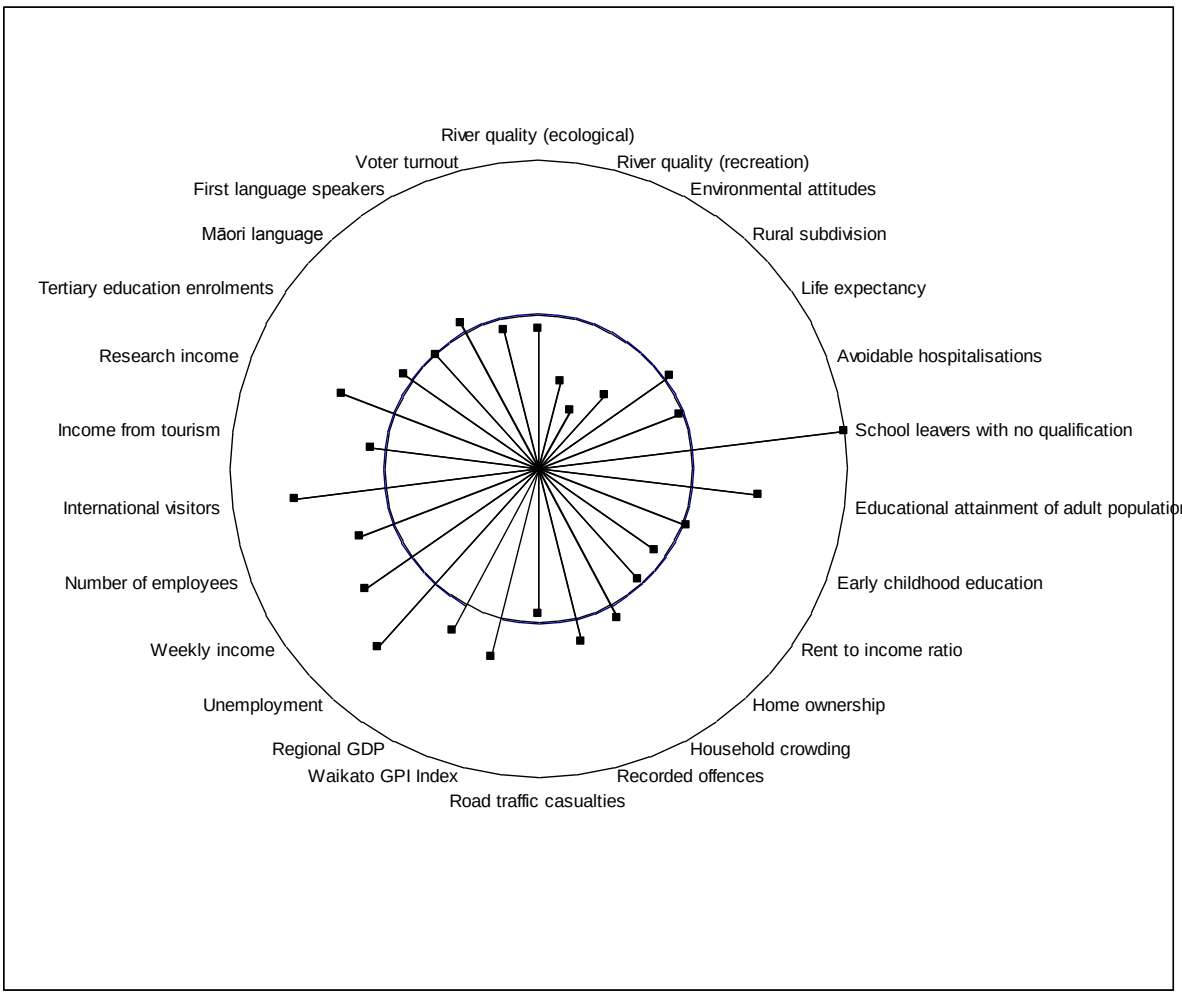
Results Report

The annual results report makes use of a number of good-practice elements, building on an extensive collection of data, metadata, survey results and a collaboratively developed framework. Key results are summarised in to a one-page bullet list each year. Highlights are reported including recent noticeable exceptions (e.g. rapid uptake in engagement with online networks) and key underlying trends (e.g. decline in water quality).

All data and metadata are also contained in a searchable spreadsheet which can be downloaded from the website. The spreadsheet, report and website elements are updated each year for a consultancy fee of between $2,000 and $5,000 depending on the number of indicators to be updated (i.e. due to cyclical timing associated with the five-yearly Census and other non-annual collections such as MARCO Perceptions Survey, Quality of Life Survey and others).

A key aspect of the MARCO programme was its development in parallel with sub-regional community outcomes monitoring and reporting programmes. Prior to recent LGA amendments, all TLAs were required to monitor and report on progress toward local community outcomes not less than once every three years. For many this was seen as an un-resourced imposition. Hence, the MARCO programme was developed to enable smaller councils in particular to piggy-back of the regional indicator and metadata development.

Figure 24: MARCO circle diagram example – wellbeing trends 1996-2005 to 2006-2011



Source: MARCO Data Analysis Report 2012.

Table 21: Sub-regional community outcomes monitoring as at 2008-09

Council	Community outcomes (CO) framework	Number of progress indicators monitored	Monitoring programme linked to MARCO indicators?
Franklin	7 themes, 25 CO statements	Baseline data still being developed, report due 2011	?
Hauraki	9 themes, 22 CO statements	66 indicators/measures	Yes
Hamilton	7 themes, 38 CO statements	117 indicators/measures	Yes
Otorohanga	8 themes, 60 CO statements	100 indicators/measures	Limited
Rotorua	9 themes, 77 CO statements	88 indicators/measures	Limited (also linked to Bay of Plenty regional indicators)
South Waikato	5 themes, 35 CO statements	161 indicators/measures	Yes
Taupo	5 themes, 25 CO statements	165 indicators/measures	Yes (also linked to 2020 Taupo-nui-a-Tia indicators)
Matamata-Piako	9 themes, 33 sub-themes, 116 CO statements	190 indicators/measures	Yes (also linked to MPDC District Plan monitoring)
Thames-Coromandel	7 themes, 30 CO statements	119 indicators/measures	Yes
Waikato District	9 themes, 39 CO statements	43 indicators/measures	Yes
Waipa	4 themes, 37 CO statements	43 indicators/measures	Yes
Waitomo	21 CO statements	Monitoring programme not yet commenced	?

Source: Killerby, 2009.

MSD Social Report

Web link

http://socialreport.msd.govt.nz

Summary

Attributes	Summary
Purpose	Provide a national and regional overview of social wellbeing trends.
Target audience	Policy makers, key stakeholders and members of the public.
Number of indicators and measures	43 social wellbeing indicators across 10 outcome domains.
Indicator selection process	Developed by MSD through consultation.
Framework	Eight social wellbeing outcomes identified by MSD.
Frequency of reporting	Now triennial (previously annual).
Form of reporting	Website and report (184 pp) plus Regional Indicators report and links.
Metadata and referencing	Extensive technical notes are provided in a report Appendix. Technical details are also provided through website links.
Key sub-headings (e.g. 'how are we doing?')	Definition, Relevance, Current level and trends, Age and sex differences, Ethnic differences, Socio-economic differences, International comparisons.
Use of composite indices	No use of composite indices.
Use of monetary estimates	No use of FCA.
Use of qualitative (descriptive) information	All indicators have been selected on the basis of measurability, including ability to be aggregated or disaggregated. Descriptive information is provided for interpretation and context but there are no qualitative (only) indicators.
Comparability (inter-regional, national, international)	Comprehensive regional comparisons are provided in a separate report and separate part of the website. Comparisons with OECD and Australia for all available and comparable indicators are shown in circle diagrams for easy visual assessment.
Visual representations (graphs, tables, figures, symbols)	Time series line graphs for individual indicators and measures (varying time periods). Tables and bar graphs are also used extensively. Circles of wellbeing are used to summarise overall trends since mid 1990s and for other purposes (e.g. social wellbeing for Māori trends since mid 1990s; snapshot comparison of social wellbeing in New Zealand compared to OECD average; etc). No use is made of simplifying symbols such as up/down arrows.
Use of time series	Historical series mid 1990s to late 2000s (no data imputed).
Use of future projections/scenarios	Some use is made of projections for illustrative context purposes (e.g. projected population growth).

Source: Based on review of source material.

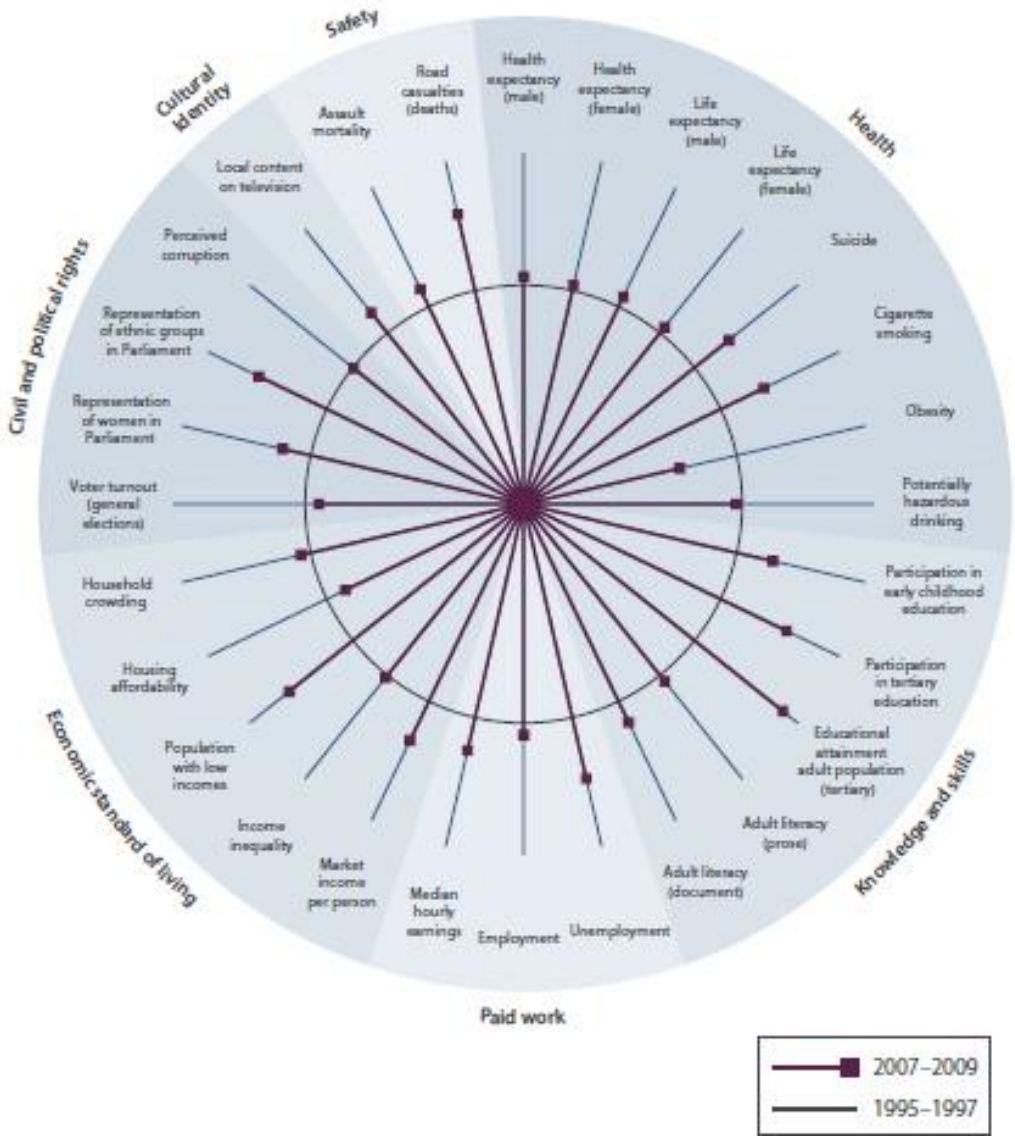
Introduction

The MSD Social Report was published annually from 2001 to 2010 and is now scheduled to be updated triennially (with the next update possibly expected this year). The MSD Social Report is a global good-practice example of social wellbeing reporting and was influential in the MARCO work in the Waikato Region. Of particular interest for this review is the use of 'circles of wellbeing' rather than composite time series indices.

Website and Report

There is a high level of correspondence between the website and report formats. The Social Report is structured around on a ten-outcome social wellbeing framework established by MSD in 2000-01 (e.g. health, knowledge and skills, paid work). These are not diagrammatically represented in a generic sense in the report or website, but are tabulated fully in the report can be seen (partially, subject to data availability) written around the edges of innovative 'circle of wellbeing' diagrams such as the one below.

Figure 25: Changes in New Zealand social wellbeing mid 1990s to late 2000s



Source: MSD Social Report 2010.

The interpretation of this diagram is summarised as follows. Note that, subject to data availability, similar diagrams can be created for time series involving sub-groups (e.g. male vs female) and comparisons between countries (e.g. New Zealand vs OECD median values for each indicator) with similar interpretations. These types of diagram are updated for the Waikato Region community outcomes each year as part of the annual MARCO indicators report. All data is divided by the base to achieve a unit circle and spokes. A simplistic form of the calculation of spoke length is simply percentage change from the base. However in some cases (e.g. educational attainment rate in New Zealand) this can result in a spoke length becoming relatively long compared to others. This can be mitigated by either setting a cap on the maximum spoke length or introducing a more complex non-linear element to the calculation so that incremental spoke length diminishes as it gets further from the unit circle.

> "The circle represents average outcomes for each indicator between 1995 and 1997, and the spokes represent outcomes between 2007 and 2009. Where possible, the data is averaged over the three years in each period. Where a spoke extends beyond the circle, this means the outcome for this indicator has improved between the two periods. The further the spoke is outside the circle, the greater the improvement. Where a spoke falls within the circle, the outcome for this indicator has deteriorated over the decade. The further the spoke is inside the circle, the more pronounced the deterioration. An important limitation on this style of presentation is that we cannot directly compare the size of changes for different indicators. Also, the absence of longer-term trend data for some indicators limits the number of indicators we can display."
>
> *MSD Social Report 2010*

Annual publications of the MSD Social Report were quite influential in stimulating discussions and policy development around social issues in New Zealand. For example, the very short spoke for obesity in the diagram above clearly highlights a particular concern. Aspects of the MSD Social Report have been influential and helped inform other regional and sub-regional social monitoring and reporting programmes throughout New Zealand.

Table 22: Comparison and contrast of composite index vs circle of wellbeing

Composite index	Circle of wellbeing
• Simplifies time series for multiple indicators in a single diagram. • Can be created for individual sub-components (e.g. outcome themes). • Summarises relative overall trends in a single line – shows peaks and troughs but does not show information about individual indicators. • Interpretation depends on selection of specific indicators and start-finish period. • Doesn't require FCA. • All indicators are given equal weighting in the index.	• Simplifies time series for multiple indicators in a single diagram. • Can also be used for non-time series information (e.g. benchmarking against other countries). • Can be created for individual sub-components (e.g. outcome themes). • Summarises relative overall trends in a circle plus spokes – shows information about individual indicators but does not show peaks and troughs over the intervening period. • Interpretation depends on selection of specific indicators and start-finish period. • Doesn't require FCA. • All indicators are given equal weighting diagrammatically.

Source: Based on a review of source material.

New Zealand Sustainable Development Indicators[20]

Web link

www.stats.govt.nz/browse_for_stats/snapshots-of-nz/Measuring-NZ-progress-sustainable-dev-%20approach.aspx

Summary

Attributes	Summary
Purpose	Measure environmental, economic and social dimensions of sustainable development.
Target audience	Academics, policy makers.
Number of indicators and measures	16 key indicators reflecting the three wellbeings, presented around four 'concepts' of sustainable development (e.g. meeting needs).
Indicator selection process	Statistics New Zealand through collaboration and consultation.
Framework	Sustainable development/TBL framework.
Frequency of reporting	Last updated February 2011 (website and report).
Form of reporting	Statistics New Zealand website, Key Findings report (24 pp) and other reports.
Metadata and referencing	Standard referencing.
Key sub-headings (e.g. 'how are we doing?')	Nil.
Use of composite indices	No use of composite indices.
Use of monetary estimates	No use of FCA.
Use of qualitative (descriptive) information	All indicators have been selected on the basis of measurability. Descriptive information is provided for interpretation and context but there are no qualitative (only) indicators.
Comparability (inter-regional, national, international)	National trends are shown over time but are not compared with other countries. International comparisons (e.g. OECD) would have been relatively easy to compile for many of the selected indicators (e.g. unemployment rate, life expectancy).
Visual representations (graphs, tables, figures, symbols)	Lines, bar graphs and symbols. No use of tables.
Use of time series	Historical series, varying time frames subject to data availability (start points range from 1980s to 2000s and no data has been imputed).
Use of future projections/scenarios	Nil.

Source: Based on review of source material.

[20] The NZ Sustainable Development (key indicators) have recently been reviewed, updated and published as New Zealand Progress Indicators – *Tupuranga Aotearoa*, see http://www.stats.govt.nz/browse_for_stats/snapshots-of-nz/nz-progress-indicators/Home.aspx.

Introduction

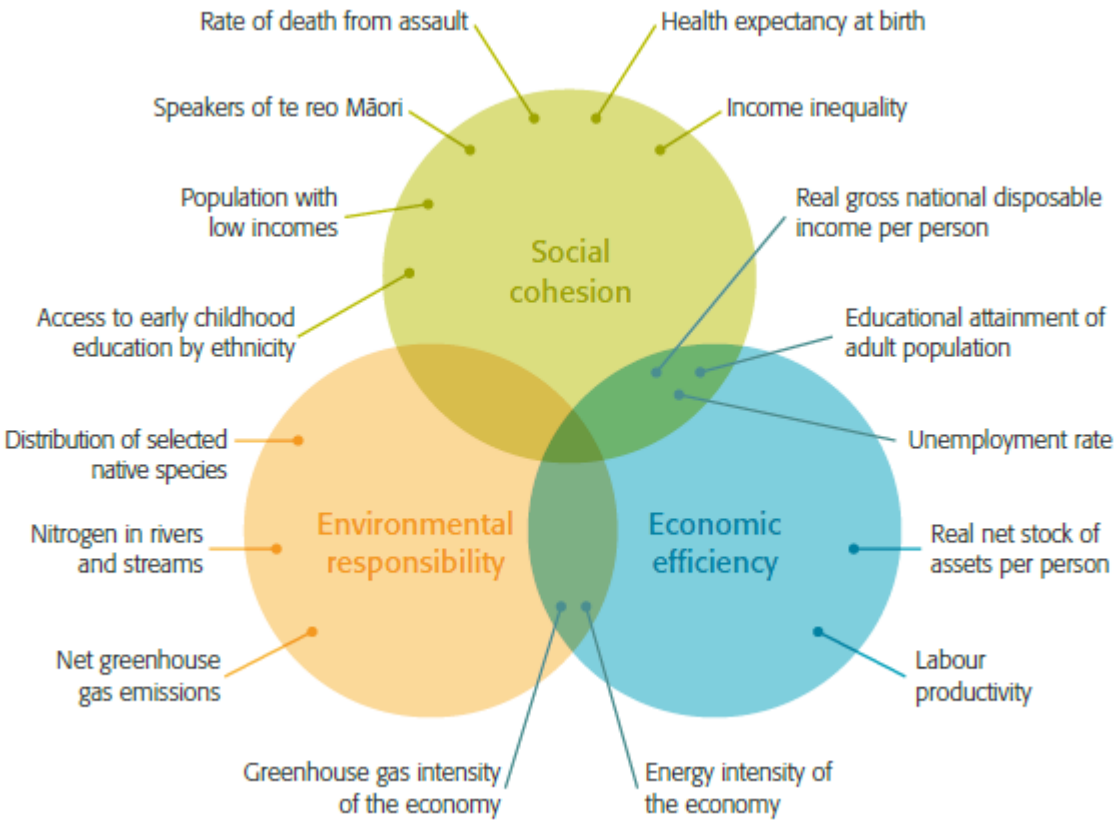
The Statistics New Zealand website includes a page summarising and linking to various resources for measuring progress using a sustainable development approach. Some of this may be relevant or informative for the WRC strategic directions indicator work. The background work for New Zealand's Sustainable Development Indicators began in the early 2000s and culminated in a series of framework and results reports in 2008 and 2009 (findings updated in 2011 for key indicators).

Website and Report

Unlike other initiatives such as the Wellington Region Genuine Progress Index (WR-GPI) and Canadian Index of Wellbeing, New Zealand's sustainable development indicators are presented within an existing website rather than as a separate stand-alone web presence. This does not overly detract from the presentation of information in a user-friendly way. The website is aligned with the report but more comprehensive. The latest report (24 pp) has a clear, concise and user-friendly format.

The 'home page' provides introductory comments and links to key reports as well as external links (e.g. to UN measurement initiatives). The most recent report is dated February 2011. The programme's framework is based around a TBL/three wellbeings approach as illustrated below.

Figure 26: Sustainable development dimensions and key indicators



Source: www.stats.govt.nz/browse_for_stats/environment/sustainable_development/key-findings-2010/further-discussion-sustainable-development.aspx (accessed 29 March 2013).

The results are presented in terms of four 'concepts' of sustainable development:

- Meeting needs – How well do we live?
- Fairness – How well are resources distributed?
- Efficiency – How efficiently are we using our resources?

- Preserving resources – What are we leaving behind for our children?

Trends in the indicators illustrate positive or negative changes in relation to sustainable development. The results for each indicator are presented as a time series line or bar graph along with summary descriptions and symbols:

Figure 27: Trend symbols used for New Zealand Sustainable Development Indicators

Symbol	Explanation
	Upward target trend.
	Downward target trend.
	The result is in line with the target trend (towards sustainable development).
	The result is opposite to the target trend (away from sustainable development).
	There is no overall trend (in terms of sustainable development the result is neutral).

Source: www.stats.govt.nz/browse_for_stats/environment/sustainable_development/key-findings-2010/main-concepts-sustainable-development.aspx (accessed 29 March 2013).

Results for indicators span the period since 1987, when the common definition of sustainable development was first adopted by the World Commission on Environment and Development. In general, indicators were selected because there was adequate data available to assess changes since 1987. However, in some cases the period analysed is shorter.

The latest findings report on 16 key indicators only. These indicators were selected by Statistics New Zealand as being representative of the 85 indicators in the original report and are consistent with the earlier key findings booklet. An advantage of using only 16 indicators (in addition to cost savings) is that the summary results can be presented symbolically on a single page as shown below.

Figure 28: Progress toward sustainable development in New Zealand

Meeting needs

How well do we live?	Target trend	Assessment	Page
Unemployment rate	↓	✗	6
Disposable income	↑	✓	7
Health expectancy	↑	✓	8
Physical safety	↑	✓	9

Fairness

How well are resources distributed?	Target trend	Assessment	Page
Access to early childhood education	↑	✓	10
Income inequality	↓	✗	11
Economic hardship	↓	≈	12

Efficiency

How efficiently are we using our resources?	Target trend	Assessment	Page
Greenhouse gas intensity	↓	✓	13
Energy intensity	↓	✓	14
Labour productivity	↑	✓	15

Preserving resources

What are we leaving behind for our children?	Target trend	Assessment	Page
Distribution of selected native species	↑	✗	16
Greenhouse gas emissions	↓	✗	17
Nitrogen in rivers	↓	✗	18
Adult educational attainment	↑	✓	19
Assets and infrastructure	↑	✓	20
Speakers of te reo Māori	↑	≈	21

Source: Statistics New Zealand (2011) 'Key findings on New Zealand's progress using a sustainable development approach'.

OECD Green Growth Indicators

Web link

www.oecd.org/greengrowth/greengrowthindicators.htm

Summary

Attributes	Summary
Purpose	To support policy making and inform the public at large.
Target audience	National and international policy makers, members of the public.
Number of indicators and measures	Approximately 25 indicators structured into five groups (including socio-economic context). Depending on level of economic development and natural resource use, countries may choose to prioritise different sets of indicators.
Indicator selection process	OECD experts.
Framework	Four aspects of Green Growth identified by OECD: Environmental and resource productivity; The natural asset base; Environmental quality of life; Economic opportunities and policy responses. Also indicators of socio-economic context and characteristics of growth (i.e. a separate fifth group).
Frequency of reporting	The OECD provides only a framework and indicators. Reporting against this framework is undertaken by individual countries using the Green Growth indicators and framework as a starting point.
Form of reporting	Online database, links and further information.
Metadata and referencing	Extensive referencing and online links.
Key sub-headings (e.g. 'how are we doing?')	Nil.
Use of composite indices	No use of composite indices.
Use of monetary estimates	No use of FCA.
Use of qualitative (descriptive) information	All indicators have been selected on the basis of measurability. Data and a framework are provided for countries to undertake their own analysis and interpretation. Minimal interpretation is provided.
Comparability (inter-regional, national, international)	The basis of the initiative is around comparability between countries and over time.
Visual representations (graphs, tables, figures, symbols)	The online database contains customisable tables, bar graphs, line graphs and scatter plots. No use is made of interpretational symbols.
Use of time series	Time period and frequency varies for each indicator depending on the nature of underlying data, but typically includes from the mid 1990s to early 2010s.
Use of future projections/scenarios	Nil.

Source: Based on review of source material.

Introduction

According to Wikipedia, Green Growth is a term used to describe "a path of economic growth which uses natural resources in a sustainable manner". In this regard it is analogous to the concept of sustainable development, and is used to provide an alternative to the focus on standard economic growth. The term has been used to describe national and international strategies for achieving sustainable development by "overhauling the economy in a way that synergizes economic growth and environmental protection, building a green economy in which investments in resource savings as well as sustainable management of natural capital are drivers of growth" (Wikipedia, accessed 6 April 2013).[21]

As part of its own Green Growth Strategy, the OECD has developed a framework and indicators to help governments monitor progress towards green growth. Work is under way across a variety of countries to apply the framework and indicators to assess their state of green growth, identify key areas of national concern and scope for improving policy.

Website

The Green Growth Indicators page on the OECD website contains a database of selected indicators for monitoring progress towards green growth. The indicators draw upon the OECD's expertise with statistics, indicators and measures of progress. The dataset covers OECD countries as well as BRIICS economies (Brazil, Russian Federation, India, Indonesia, China and South Africa), Argentina and Saudi Arabia for a time period from 1990 to the most recent years available.

Figure 29: Screen capture from OECD Green Growth Indicators online database

Source: http://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH (accessed 6 April 2013).

The indicators were selected according to specified criteria and embedded in a conceptual framework structured around four groups to capture the main features of green growth:

1. Environmental and resource productivity, to indicate whether economic growth is becoming greener with more efficient use of natural capital and to capture aspects of production which are rarely quantified in economic models and accounting frameworks;

[21] http://en.wikipedia.org/wiki/Green_growth.

2. the natural asset base, to indicate the risks to growth from a declining natural asset base;

3. environmental quality of life, to indicate how environmental conditions affect the quality of life and wellbeing of people; and

4. economic opportunities and policy responses, to indicate the effectiveness of policies in delivering green growth and describe the societal responses needed to secure business and employment opportunities.

According to the web page, the proposed set of indicators comprises about twenty-five indicators but not all of them are measurable today. "The multi-dimensional nature of green growth requires a sufficient number of indicators to do justice to the various aspects of the issue at hand. But a large dashboard also carries the danger of losing a clear message that speaks to policy makers and helps communicating with the media and with citizens. A small set of 'headline' indicators is therefore being selected. These indicators should be able to track central elements of green growth and be representative of a broader set of green growth issues."

Table 23: Overview of OECD Green Growth Indicators

1	The environmental and resource productivity of the economy	• Carbon and energy productivity • Resource productivity: materials, nutrients, water • Multi-factor productivity
2	The natural asset base	• Renewable stocks: water, forest, fish resources • Non-renewable stocks: mineral resources • Biodiversity and ecosystems
3	The environmental dimension of quality of life	• Environmental health and risks • Environmental services and amenities
4	Economic opportunities and policy responses	• Technology and innovation • Environmental goods and services • International financial flows • Prices and transfers • Skills and training • Regulations and management approaches
	Socio-economic context and characteristics of growth	• Economic growth and structure • Productivity and trade • Labour markets, education and income • Socio-demographic patterns

Source: www.oecd.org/greengrowth/greengrowthindicators.htm (accessed 6 April 2013).

The website notes that while there is a substantive amount of economic and environmental data it is often difficult to combine due to differences in classifications, terminology or timeliness. Part of the project is therefore to develop a common measurement framework to maximise consistency and international comparability. Particular efforts are identified as being needed to fill gaps in environmental-economic data at the industry level, improve information on biodiversity and other specific gaps.

Given its nature as an international-level endeavour, there is evidently a large amount of resourcing that sits behind the OECD Green Growth work programme. The website includes links to a variety of related work programmes both within and outside of the OECD. Further information on the Green Growth Indicators method is contained in a technical report (Towards Green Growth: Monitoring Progress: OECD Indicators) which can be purchased for a small fee.

Quality of Life Project

Web link

www.qualityoflifeproject.govt.nz

Summary

Attributes	Summary
Purpose	Provide information to decision-makers to help improve the quality of life in major New Zealand urban areas.
Target audience	TLAs, key stakeholders, member of the public.
Number of indicators and measures	The 2007 report included 68 key QoL indicators encompassing 186 individual measures across 11 domain areas (predominantly social/cultural areas as reflecting values important to urban areas).
Indicator selection process	TLA collaborative process.
Framework	11 domain areas selected within a TBL/QBL/QoL paradigm.
Frequency of reporting	Biennial reporting based on survey cycle.
Form of reporting	Report (200+ pages), biennial Survey Results reports and website.
Metadata and referencing	Extensive referencing.
Key sub-headings (e.g. 'how are we doing?')	Why is this important? Key points. What is this about? What did we find?
Use of composite indices	No use of composite indices.
Use of monetary estimates	No use of FCA (although calculation of the 'ecological footprint' uses an analogous method).
Use of qualitative (descriptive) information	Limited use is made of qualitative indicators (e.g. lists of local natural environmental issues by city).
Comparability (inter-regional, national, international)	The basis of this project is around inter-city and national comparability. Occasional references are also made throughout the report to international benchmarks (e.g. OECD averages) where applicable.
Visual representations (graphs, tables, figures, symbols)	Tables, bar graphs, occasional line graphs and photographs for visual interest. No use of state/trend summary symbols.
Use of time series	Time series presented are generally for a relatively short period, presumably to avoid clutter. The main purpose of the report is to compare inter-city.
Use of future projections/scenarios	Limited use of projections (e.g. population, ethnic profile).

Source: Based on review of source material.

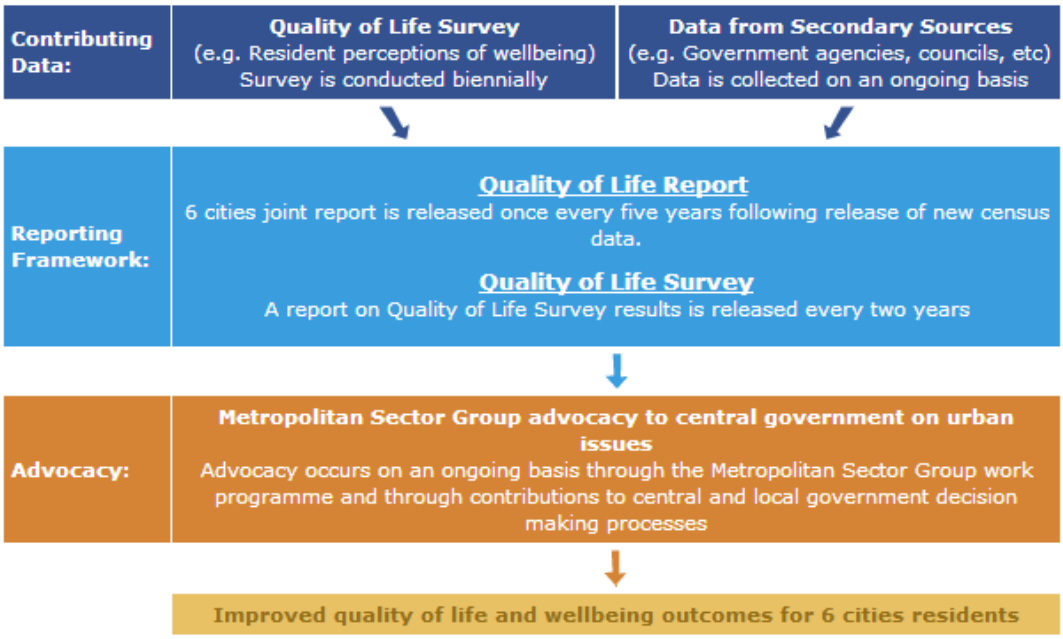
Introduction

The Quality of Life Project (initially called the Big Cities Quality of Life Project) was kicked off in 1999 in response to growing pressures on urban communities and effects on the wellbeing of residents. The project was initiated by a group of city council and established using a TBL/QBL/QoL sustainable development-based paradigm. The project has evolved over time to include up to 12 cities at any given time but this has changed due to restructuring and withdrawals (including the withdrawal of Hamilton between 2010 and 2012).[22] Current core members are Auckland, Christchurch, Wellington, Dunedin, Hutt City and Porirua, with a combined population of around 2.1 million people.

The Quality of Life Project comprises two related programmes: a biennial survey on aspects of perceived quality of life; and a Quality of Life Report incorporating survey results and secondary data. The first report was developed in 2001 and updates were released in 2003 and 2007. The current update has been delayed in order to include results from the 2013 Census. Subsequent updates are likely to be five-yearly to align with the Census cycle.

Due to their frequency, accessibility and comprehensive nature, the two-yearly Quality of Life Survey results have become a key output of the programme. Results reports are available through the Quality of Life website including latest 2012 survey results which have been reported extensively in the media, have influenced individual councils' decision making, and will feed into the 2013 MARCO monitoring programme through comparisons with selected results from the Waikato Region Perception Survey. In addition, the results are used for collective advocacy to central government on key local government and community issues. In its heyday, the Quality of Life Project was a key deliverable for helping to fulfil participating TLAs' community outcomes monitoring and reporting requirements under the LGA (prior to amendment).

Figure 30: Quality of Life Project Structure



Source: www.qualityoflifeproject.govt.nz (accessed 1 April 2013).

[22] Hamilton City Council did not participate in the 2012 survey for cost reasons, i.e. "value for money was the key consideration" (correspondence between Beat Huser WRC and Paul Gower HCC, 3 April 2013).

Website

The QoL website is the key portal for accessing Survey Results reports and five-yearly comprehensive update reports, and is easily navigable for gleaning an overview of the results without downloading the entire reports. The home page makes use of photographs, diagrams, links, pop-up information and interactive graphs to stimulate interest and attention. Readers can navigate quickly to a specific domain area (theme) for a chapter summary and key results, and can download the individual chapter in pdf format to drill down into more detailed results for specific indicators and measures.

The interactive graphs section of the website is a relatively new innovation. This allows the viewer to select a city (e.g. Hamilton) and compare its results on a specific item (e.g. perceptions of happiness or recorded offences) with the overall sample results for all participating cities. The graph will refer to latest available information for that item, including historical results for cities that are not currently participating in the project.

Figure 31: Example of interactive online graph

Source: www.qualityoflifeproject.govt.nz/charts/happiness.php (accessed 1 April 2013).

Results Report

Five-yearly reporting is undertaken through a comprehensive, colourful and professionally developed document. Key results and points of action are summarised concisely. Each domain is assigned a specific chapter, which enables people with specific interest areas to navigate and access relevant chunks of information. Results for survey items and secondary data are displayed using tables, graphs and text as appropriate to each indicator/measure. The overall product provides a substantial mount of information. The flipside is that this is an expensive exercise which is only made possible by the collaboration of major cities.

Figure 32: Example page from QoL Report 2007

Participation in early childhood education

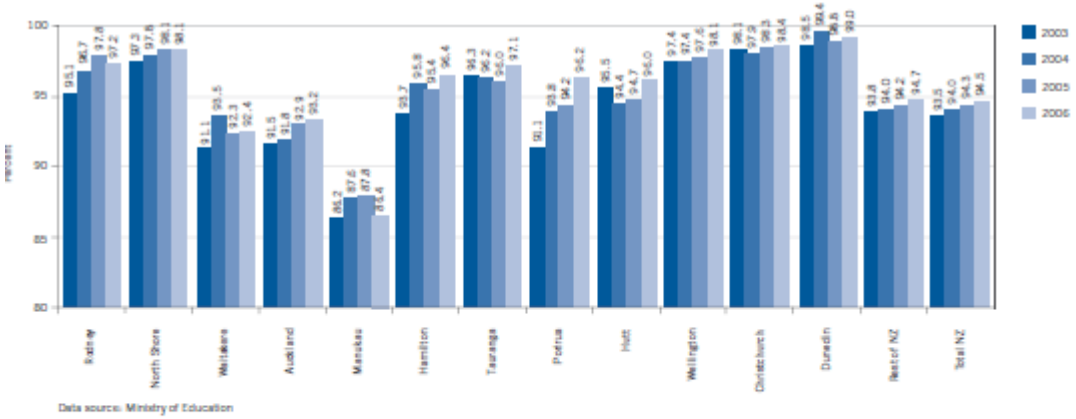
- Participation levels in early childhood education have increased in the 12 cities over the last five years.
- Manukau has the lowest attendance level of the 12 cities.
- The majority of early childhood education participation takes place in a kindergarten, playcentre, education and care service or home-based locations.
- Almost one in five Pacific Islands children do not attend an early childhood education centre.

What this is about

Early childhood education (ECE) is a critical first step in building the foundation for a child's ongoing learning and development.[1] The stimulation of learning at an early age has an important bearing on future educational achievement. Social interaction with other children at pre-schools is beneficial and is likely to make the transition to formal schooling easier.

This indicator shows early childhood education participation rates from 2003 to 2006. It reflects the number of children aged five years and under enrolled in early childhood education centres or home-based education programmes as a proportion of all children aged five years and under.[2]

Percentage of year one students who had attended an early childhood education centre (2003 to 2006)



Data source: Ministry of Education

What did we find?

Participation levels in early childhood education have increased in the 12 cities over the last five years.

Participation levels increased nationally from 2003 to 2006, with the largest increase in attendance of the 12 cities occurring in Porirua (5.1%).

Differences were apparent between cities in 2006. Dunedin had the highest attendance level with 99.0% of children attending an ECE centre, while Manukau had the lowest attendance level with 86.4% of children attending an ECE centre. This was still higher than the rest of New Zealand figure of 83.5%.

Source: Quality of Life Report 2007.

Regional Physical Activity Full-Cost Accounting

Web link

www.wrs.govt.nz/assets/WRS/Publications/The-Costs-of-Physical-Inactivity-Toward-a-regional-full-cost-accounting-perspective.pdf

Introduction

WRC has been working with Greater Waikato Regional Council and Auckland Council on development a method for full-cost accounting (FCA). As a proof-of-concept, the three councils recently commissioned Market Economics Ltd to complete a FCA for a single indicator: Physical Inactivity. The lessons from this is discrete project can help inform decisions around whether or not to undertake a more comprehensive FCA exercise for broader concepts such as WRC's flagship goals.

Results Report

The results report is not an example of broadly based wellbeing monitoring and reporting but has been summarised here for completeness. The report's audience is regional policy makers and health and physical activity stakeholders. The report makes use of tables, occasional graphs and comprehensive explanations to describe the approach and detailed results. The highest-level summary is a table of estimated direct, indirect and other costs attributed to physical inactivity across each of the three participating regions and nationally, including an estimate of the theoretical annual number of premature deaths per annum attributable to physical inactivity. This suggests that:

- Physical inactivity in the Waikato Region is associated with a direct cost of approximately $54 million per annum plus a similar amount of indirect and 'other' costs. The total cost is estimated at $106 million per annum in 2010 dollar terms.
- An estimated 18 deaths per annum (equivalent) are attributable to physical activity in the Waikato Region.

Table 24: Example of FCA estimates (costs of physical inactivity in 2010 dollars)

Summary of Direct, Indirect and Other Costs attributed to Physical Inactivity $_{2010}$$ mil					
	Direct costs	Indirect costs	'Other' costs*	Total costs	Premature Deaths
Auckland	179	213	10	**402**	**73**
Waikato	54	48	4	**106**	**18**
Wellington	74	62	5	**141**	**21**
New Zealand	614	661	30	**1,306**	**246**
*Note: 'Other' costs are preliminary estimates ** Totals may not equal, due to rounding					

Source: Market Economics Ltd (2013).

FCA Method

Market Economics Ltd was commissioned to demonstrate the applicability of an FCA framework for an individual indicator, by estimating the regional costs of physical inactivity, and incorporating the approach taken by GPI Atlantic in Canada (e.g. by estimating costs for a specific timeframe, such as a year, rather than estimating lifetime costs in net present value terms). According to the report (p 8):

> "A full cost appraisal of an indicator requires the articulation of the consequences of particular economic, socio-cultural and environmental effects. FCA has been defined as 'a systematic approach for identifying, summing and reporting in an on-going fashion the full costs of particular programmes, services and decisions over a given time. In addition to obvious and direct costs, full cost accounting aims to include any hidden as well as overhead costs involved' (GWRC, 2011). Adopting a FCA framework requires a holistic and systemic analysis of the indicator. The 'accounting' side of FCA requires establishing a thorough causal model (e.g. cause and effect), then selection and justification of measurement of these causes and effects, and finally the estimation of associated costs. FCA does not overcome the barriers that economic analyses traditionally face – such as valuation techniques and available data…."
>
> *Market Economics Ltd (2013)*

The approach initially involves the development of an outcomes monitoring programme including specification of effects (e.g. wellbeings) and influencing factors (indicators). However FCA then attempts that take these general relationships to a higher level of specificity by seeking to establish and quantify causal effects through an extensive review of theory and empirical evidence. The 2013 report admits that in many cases "the link is not so easy to determine" (ibid, p 9), both in terms of confirming causality and quantifying the effects in dollar terms or otherwise. "Arguably, it is never possible to include all costs, as not all causal effects are discernible" (ibid, p 12).

A report more than 100 pages long to summarise the results for a single indicator suggests the FCA approach can easily become a comprehensive and expensive exercise. The value in undertaking such an exercise is that it seeks to describe costs and benefits in ways that can be more easily integrated into decision-makers' paradigms. The aim of valuing intangible costs and benefits in dollar terms is to provide better information and have greater influence on decisions. Certainly there is evidence that such methods can result in awareness-raising benefits for specific policy issues and provide additional estimates to be included in advocacy, policy and research documents.

Questions around the costs and benefits of the regional physical activity FCA proof-of-concept were put to WRC's Programme Manager Sustainability as shown below. Based on these responses, the consultant has concluded that FCA would be prohibitively expensive for the purpose of broadly based wellbeing monitoring but may continue to add value by raising awareness around specific policy issues.

Table 25: Indicative benefits and costs of regional physical activity FCA

Questions	Responses
1. What sort of reception did the report receive from key decision-makers (e.g. elected members, health officials)?	Lots of feedback from national and local media, see attachment. Health officials (Waikato DHB) want to be involved in any follow-up work. Regional Transport Committee and WRC Policy and Strategy Committee received report for their information only. Transport staff and councillors feel that there is already a lot of relevant policy and activities included in current policy and strategy documents (e.g. for active transport modes and public transport).
2. What effect did the report have on influencing decision-making around regional physical activity?	This has not been surveyed or monitored. No specific actions, so impact mainly through increased awareness and enhanced evidence-base for future planning and decision-making by WRC and other agencies (WDHB, Sports Waikato, Hamilton City etc).
3. Is there an expectation that these figures will be used by policy-makers in coming years to support their decision making (including for advocacy purposes by health officials)?	Yes.
4. What was the cost of the report (ballpark)?	30k, i.e. about 10k for each council.
5. What lessons were learnt from the project that would be applied to future similar projects?	Clearly differentiate development of method (FCA) and specific results (case study/example).
6. What is the likelihood that a similar project would be commissioned in future for a different indicator?	Auckland Council, GWRC and WRC are continuing a joint programme of work to develop and implement FCA method. Since the physical activity work a couple of meetings have been held to discuss and prioritise future topics/indicators. It is likely that further work will be undertaken this financial year.

Source: Personal correspondence, Dr Beat Huser, 8 April 2013.

UNDP Human Development Index

Web link

http://hdr.undp.org/en/statistics/hdi

Summary

Attributes	Summary
Purpose	Serve as a frame of reference for social and economic development.
Target audience	Developed and developing countries, world bodies, development agencies.
Number of indicators and measures	Four indicators across three dimensions of socio-economic well-being.
Indicator selection process	Selected by academics on the basis of extensive research.
Framework	Human development – health, education and living standards.
Frequency of reporting	Currently biennial.
Form of reporting	Reported online and through Human Development Report (200+ pages).
Metadata and referencing	Detailed technical information is available about the indicators and the composite index method.
Key sub-headings (e.g. 'how are we doing?')	Nil.
Use of composite indices	The HDI is a composite index.
Use of monetary estimates	No use of FCA.
Use of qualitative (descriptive) information	All indicators were selected on the basis of measurability. The results are reported alongside extensive qualitative interpretation.
Comparability (inter-regional, national, international)	The basis of this indicator is inter-country comparisons.
Visual representations (graphs, tables, figures, symbols)	Some use is made of scatter plots, line graphs, stacked graphs etc, however the majority of the reporting done through extensive tables and interpretive text.
Use of time series	Subject to retrospective updating to reflect data improvements and methodological changes. Trends using consistent data calculated at five-year intervals for 1980–2012 are presented.
Use of future projections/scenarios	2013 report includes detailed projections and scenarios.

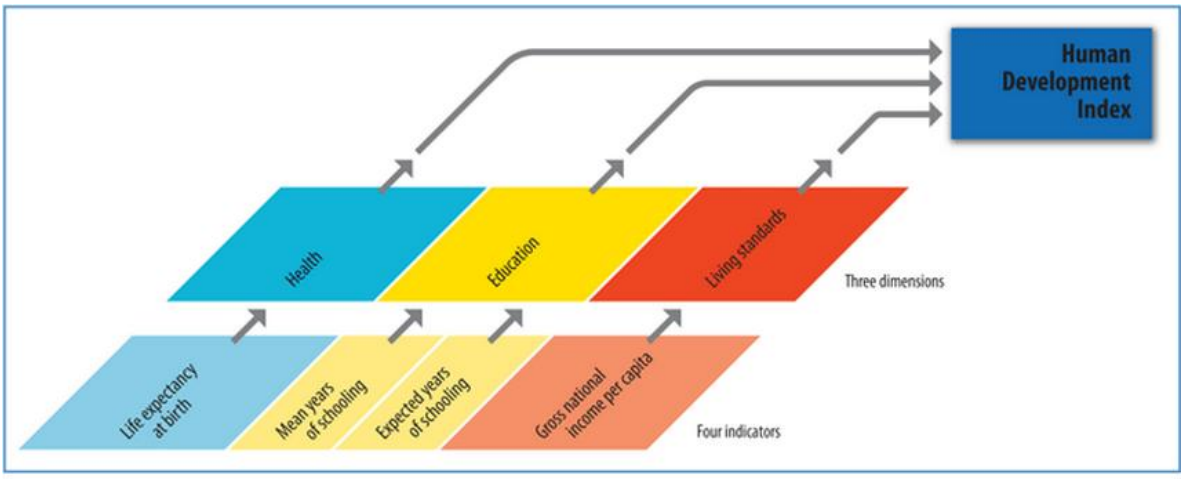
Source: Based on review of source material.

Introduction

The Human Development Index (HDI) is a composite statistic of health (life expectancy), education and income indices to rank countries into four tiers of human development. It was created by economists Mahbub ul Haq and Amartya Sen in 1990, and is published biennially by the United Nations Development Programme (UNDP).

The HDI was introduced in the first Human Development Report in 1990 as an alternative to purely economic assessments of progress such as GDP growth. According to the UNDP website, the HDI soon became the most widely accepted and cited measure of its kind, and has been adapted for national use by many countries. HDI values and rankings in the global Human Development Report are calculated using latest available internationally comparable data. Previous HDI values and rankings are retroactively recalculated using the same updated data sets and current methodologies.

Figure 33: Components of the HDI



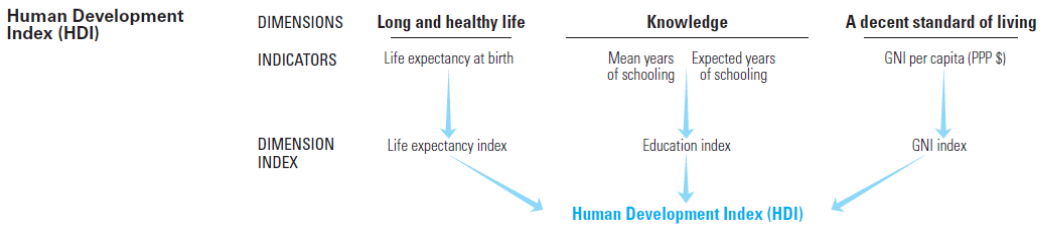
Note: The indicators presented in this figure follow the new methodology, as defined in box 1.2.

Source: http://hdr.undp.org/en/statistics/hdi (accessed 31 March 2013).

Method

According to technical notes to the Human Development Report, the HDI measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living. It is constructed as a geometric mean of normalised indices from each of these three dimensions.

Figure 34: Calculating the HDI



Source: HDI technical notes: http://hdr.undp.org/en/media/HDR%202013%20technical%20notes%20EN.pdf (accessed 6 April 2013).

Creation of the index is a two-step process and quite mathematically detailed, but the essence of it bears similarities to other more simple summary indices such as the WR-GPI and Canadian Index of Wellbeing. Step 1 is to create indices for the three dimensions. "Minimum and maximum values (goalposts) are set in order to transform

the indicators into indices between 0 and 1. The maximums are the highest observed values in the time series (1980–2012). The minimum values can be appropriately conceived of as subsistence values. The minimum values are set at 20 years for life expectancy, at 0 years for both education variables and at $100 for per capita gross national income (GNI). The low value for income can be justified by the considerable amount of unmeasured subsistence and nonmarket production in economies close to the minimum, not captured in the official data." Just to reiterate, maximum values are observed from the data and set to 1; minimum values are established theoretically and set to 0. This provides a basis for subsequent measurement of all actual observed values between 0 and 1 in a standardised manner.

Table 26: 'Goalposts' (maxima and minima) for the 2013 HDI

Indicator	Observed maximum	Minimum
Life expectancy (years)	83.6 (Japan, 2012)	20.0
Mean years of schooling	13.3 (United States, 2010)	0
Expected years of schooling	18.0 (capped at)	0
Combined education index	0.971 (New Zealand, 2010)	0
GNI per capita (PPP $)	87,478 (Qatar, 2012)	100

Source: HDI technical notes: http://hdr.undp.org/en/media/HDR%202013%20technical%20notes%20EN.pdf (accessed 6 April 2013).

More specifically, the dimension indices are calculated as proportionate difference from the minimum on a 0 to 1 scale:

$$\text{Dimension index} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$$

Some additional variations are made to reflect the nature of the indicators:

- The education index is combined from two indicators: mean years of schooling and expected years of schooling. Hence the equation above is applied to each of the two sub-components, then a geometric mean of the resulting indices is created and, finally, the standardising equation above is reapplied to the geometric mean of the sub-indices using 0 as the minimum and the highest geometric mean of the resulting indices for the time period under consideration as the maximum. According to the technical notes, this is equivalent to applying the equation above directly to the geometric mean of the two subcomponents.
- Because each dimension index is a proxy for capabilities in the corresponding dimension, the transformation function from income to capabilities is likely to be concave (based on economic theory and evidence). Thus, for the income index, the natural logarithm of the actual, minimum and maximum values is used.

Step 2 is to aggregate the sub-indices to create an overall summary HDI. This is simply the geometric mean of the three individual dimension indices. The calculation results in a scale within a 0 to 1 range.

$$\left(I_{Life}^{1/3} \cdot I_{Education}^{1/3} \cdot I_{Income}^{1/3}\right).$$

The technical notes provide an example to help illustrate each step as follows.

Table 27: HDI example calculation (Ghana)

Indicator	Value
Life expectancy at birth (years)	64.6
Mean years of schooling	7.0
Expected years of schooling	11.4
GNI per capita (PPP $)	1,684

Note: Values are rounded.

$$\text{Life expectancy index} = \frac{64.6 - 20}{83.6 - 20} = 0.701$$

$$\text{Mean years of schooling index} = \frac{7.0 - 0}{13.3 - 0} = 0.527$$

$$\text{Expected years of schooling index} = \frac{11.4 - 0}{18.0 - 0} = 0.634$$

$$\text{Education index} = \frac{\sqrt{0.527 \cdot 0.634} - 0}{0.971 - 0} = 0.596$$

$$\text{Income index} = \frac{\ln(1{,}684) - \ln(100)}{\ln(87{,}478) - \ln(100)} = 0.417$$

$$\text{Human Development Index} = \sqrt[3]{0.701 \cdot 0.596 \cdot 0.417} = 0.558$$

Source: HDI technical notes: http://hdr.undp.org/en/media/HDR%202013%20technical%20notes%20EN.pdf (accessed 6 April 2013).

Additional technical notes are provided around inflation-adjusting the income dimension and imputing data for missing indicators for a small number of countries.

Website

The HDI home page is situated within UNDP's website. It presents background and technical information about the HDI and links to current and past Human Development Reports and other publications in a variety of languages.

Results Report

The Human Development Report and associated publications present extensive results and interpretation, including tables such as that below.

Figure 35: Example page from Human Development Report 2013

TABLE 2

Human Development Index trends, 1980–2012

	Human Development Index (HDI)								HDI rank		Average annual HDI growth			
	Value								Change		(%)			
HDI rank	1980	1990	2000	2005	2007	2010	2011	2012	2007–2012[a]	2011–2012[a]	1980/1990	1990/2000	2000/2010	2000/2012
VERY HIGH HUMAN DEVELOPMENT														
1 Norway	0.804	0.852	0.922	0.948	0.952	0.952	0.953	0.955	0	0	0.59	0.79	0.32	0.29
2 Australia	0.857	0.880	0.914	0.927	0.931	0.935	0.936	0.938	0	0	0.27	0.37	0.23	0.22
3 United States	0.843	0.878	0.907	0.923	0.929	0.934	0.936	0.937	0	–1	0.40	0.33	0.29	0.27
4 Netherlands	0.799	0.842	0.891	0.899	0.911	0.919	0.921	0.921	2	0	0.52	0.56	0.31	0.28
5 Germany	0.738	0.803	0.870	0.901	0.907	0.916	0.919	0.920	5	0	0.85	0.81	0.53	0.47
6 New Zealand	0.807	0.835	0.887	0.908	0.912	0.917	0.918	0.919	–1	0	0.34	0.60	0.33	0.29
7 Ireland	0.745	0.793	0.879	0.907	0.918	0.916	0.915	0.916	–3	0	0.62	1.04	0.42	0.35
7 Sweden	0.792	0.823	0.903	0.905	0.909	0.913	0.915	0.916	0	0	0.38	0.93	0.11	0.12
9 Switzerland	0.818	0.840	0.882	0.898	0.901	0.912	0.912	0.913	3	0	0.27	0.49	0.33	0.29
10 Japan	0.788	0.837	0.878	0.896	0.903	0.909	0.910	0.912	1	0	0.61	0.48	0.35	0.32
11 Canada	0.825	0.865	0.887	0.906	0.909	0.909	0.910	0.911	–4	–1	0.48	0.25	0.24	0.22
12 Korea, Republic of	0.640	0.749	0.839	0.875	0.890	0.905	0.907	0.909	4	0	1.58	1.14	0.76	0.67
13 Hong Kong, China (SAR)	0.712	0.788	0.815	0.857	0.877	0.900	0.904	0.906	10	1	1.02	0.34	1.00	0.89
13 Iceland	0.769	0.815	0.871	0.901	0.908	0.901	0.905	0.906	–4	0	0.58	0.67	0.34	0.33
15 Denmark	0.790	0.816	0.869	0.893	0.898	0.899	0.901	0.901	–2	0	0.33	0.63	0.34	0.30
16 Israel	0.773	0.809	0.865	0.885	0.892	0.896	0.899	0.900	–2	0	0.45	0.68	0.34	0.33
17 Belgium	0.764	0.817	0.884	0.884	0.891	0.896	0.897	0.897	–2	0	0.67	0.79	0.14	0.12
18 Austria	0.747	0.797	0.848	0.867	0.879	0.892	0.894	0.895	2	0	0.66	0.62	0.51	0.46
18 Singapore	..	0.756	0.826	0.852	..	0.892	0.894	0.895	7	0	..	0.89	0.77	0.67
20 France	0.728	0.784	0.853	0.877	0.885	0.891	0.893	0.893	–1	0	0.75	0.85	0.44	0.38
21 Finland	0.766	0.801	0.845	0.882	0.890	0.890	0.892	0.892	–5	0	0.45	0.54	0.52	0.45
21 Slovenia	..	..	0.842	0.876	0.888	0.892	0.892	0.892	–3	0	..	..	0.58	0.48
23 Spain	0.698	0.756	0.847	0.865	0.874	0.884	0.885	0.885	1	0	0.80	1.15	0.43	0.37
24 Liechtenstein	..	..	..	..	..	0.882	0.883	0.883	..	0	..	..	..	..
25 Italy	0.723	0.771	0.833	0.869	0.878	0.881	0.881	0.881	–2	0	0.64	0.78	0.56	0.46
26 Luxembourg	0.735	0.796	0.861	0.875	0.879	0.875	0.875	0.875	–5	0	0.81	0.78	0.16	0.14
26 United Kingdom	0.748	0.784	0.841	0.865	0.867	0.874	0.875	0.875	2	0	0.47	0.70	0.39	0.33
28 Czech Republic	..	..	0.824	0.862	0.869	0.871	0.872	0.873	–1	0	..	..	0.56	0.48
29 Greece	0.726	0.772	0.810	0.862	0.865	0.866	0.862	0.860	0	0	0.62	0.48	0.67	0.50
30 Brunei Darussalam	0.765	0.782	0.830	0.848	0.853	0.854	0.854	0.855	0	0	0.22	0.59	0.28	0.25
31 Cyprus	0.715	0.779	0.808	0.817	0.827	0.849	0.849	0.848	4	0	0.86	0.36	0.50	0.41
32 Malta	0.713	0.757	0.801	0.827	0.829	0.844	0.846	0.847	2	1	0.59	0.57	0.52	0.46
33 Andorra	..	..	..	..	..	0.846	0.847	0.846	..	–1	..	..	..	..
33 Estonia	..	0.728	0.786	0.830	0.841	0.839	0.844	0.846	–2	1	..	0.76	0.65	0.62
35 Slovakia	..	0.754	0.795	0.814	0.830	0.836	0.838	0.840	–1	0	..	0.40	0.64	0.57
36 Qatar	0.729	0.743	0.801	0.828	0.833	0.827	0.832	0.834	–3	0	0.18	0.76	0.32	0.33
37 Hungary	0.709	0.714	0.790	0.820	0.826	0.829	0.830	0.831	1	0	0.07	1.02	0.48	0.42
38 Barbados	0.706	0.760	0.790	0.798	0.808	0.823	0.824	0.825	2	0	0.73	0.38	0.41	0.37

Source: Human Development Report 2013.

Waikato Region GPI (2010)

Web link

www.choosingfutures.co.nz/PageFiles/147/Waikato%20GPI-Summary%20Report%20(EERNZ%20June%202010).PDF

Summary

Attributes	Summary
Purpose	Compile a preliminary regional GPI for the Waikato Region.
Target audience	Academics, policy makers.
Number of indicators and measures	20 indicators (including total personal consumption expenditure).
Indicator selection process	Literature review (FCA).
Framework	Full-cost accounting framework (personal consumption + socio-economic benefits – socio-economic costs – environmental costs).
Frequency of reporting	One-off study (2010).
Form of reporting	Summary results report (51 pp) and technical report (114 pp).
Metadata and referencing	Standard referencing.
Key sub-headings (e.g. 'how are we doing?')	Nil.
Use of composite indices	Composite index.
Use of monetary estimates	FCA with all sub-components (socio-economic and environmental indicators) expressed in 2006 New Zealand dollar terms.
Use of qualitative (descriptive) information	All indicators have been selected on the basis of measurability, including ability to be aggregated or disaggregated. Descriptive information is provided for interpretation and context but there are no qualitative (only) indicators.
Comparability (inter-regional, national, international)	Regional GPI scores are shown over time but are not directly compared with other regions or nationally. Due to the nature of FCA, the development of comparable indices for other areas could be prohibitively expensive.
Visual representations (graphs, tables, figures, symbols)	Line graphs, bar graphs, tables, text.
Use of time series	Historical series mid 1990 to 2006, with some components imputed for the Waikato Region where only available nationally.
Use of future projections/scenarios	Nil.

Source: Based on review of source material.

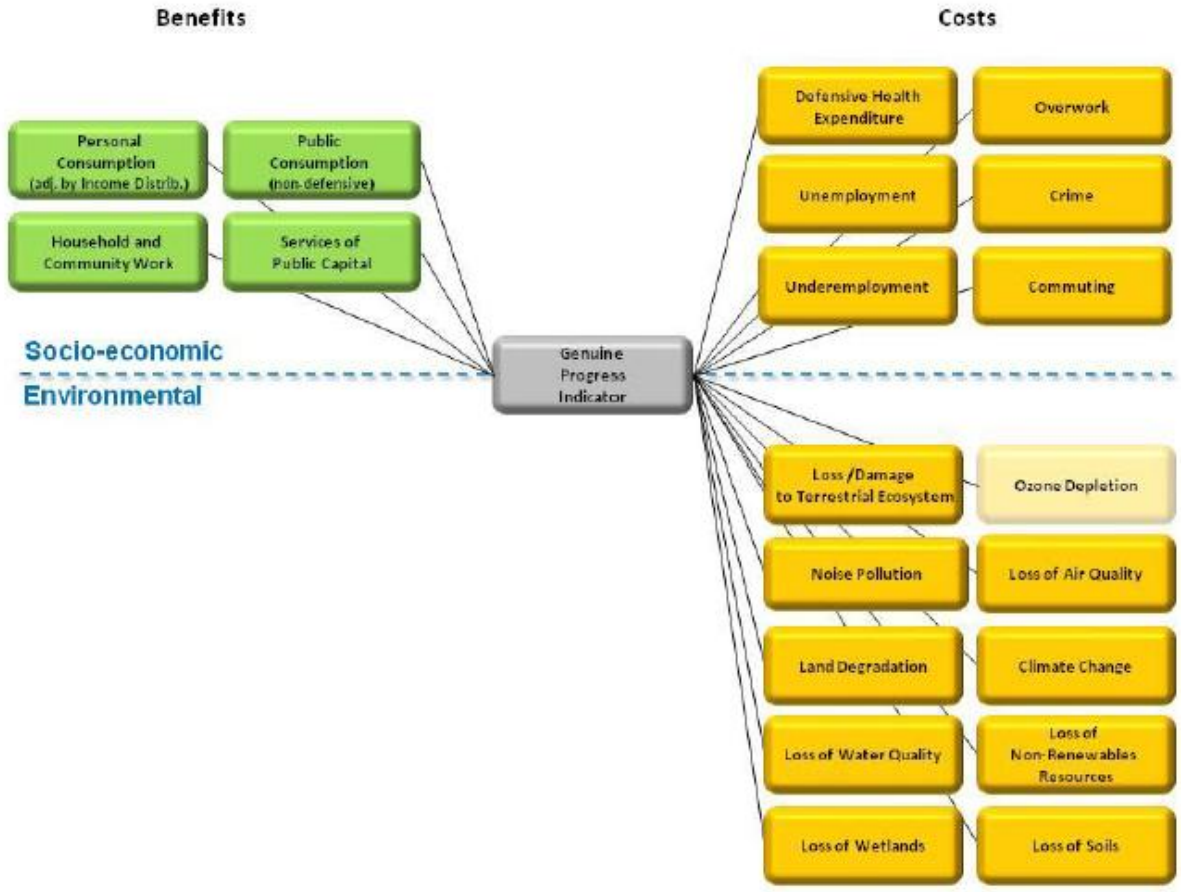
Introduction

During 2009-10, WRC (formerly Environment Waikato) commissioned Market Economics Ltd and Ecological Economics Research New Zealand (EERNZ) to prepare a GPI for the Waikato Region (refer McDonald et al, 2010a and 2010b).

Results Report

The regional GPI construct began with a valuation of total personal consumption expenditure (similar to GDP). Nineteen additional socio-economic and environmental components of welfare were then included, with each component representing either an addition to, or subtraction from, the Region's total personal consumption expenditure, all reported in 2006 dollar terms. The Waikato GPI covered the period 1990 to 2006 and represented only a first and preliminary step in creating a GPI for the Waikato Region.

Figure 36: Components of the Waikato Region GPI

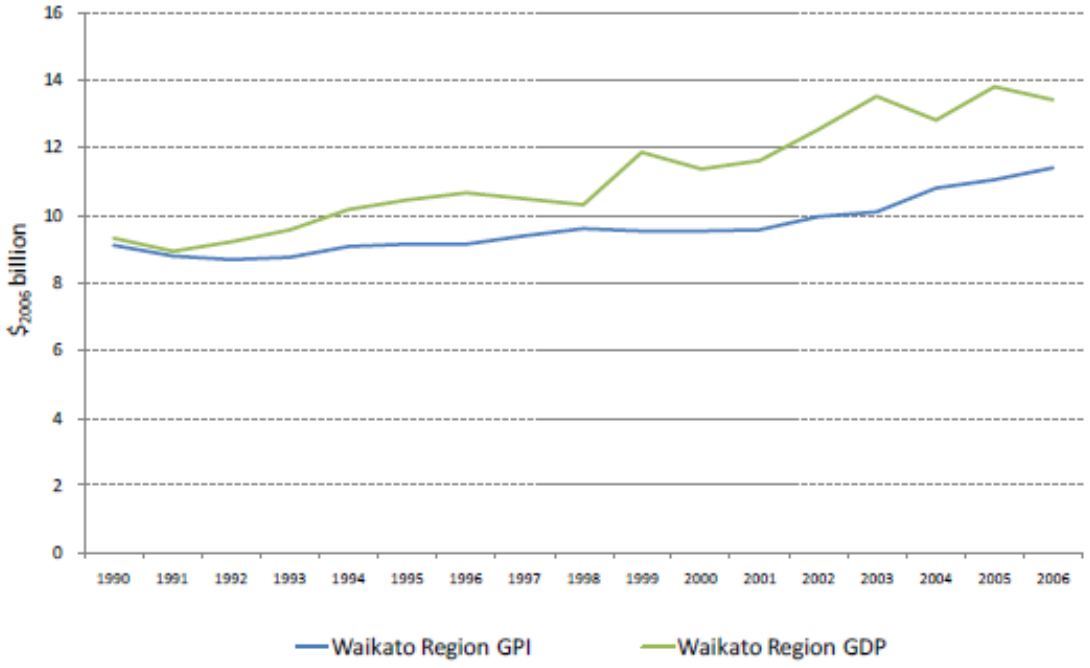


Source: McDonald et al (2010a).

The headline GPI is compared with the Waikato Region GDP estimates (Figure 37).

The results report provides information about each of the indicators underlying the headline results but gives little indication as to how the dollar values of non-market components were derived.

Figure 37: Waikato Region GPI vs Waikato Region GDP 1990-2006



Source: McDonald et al (2010a).

Technical Report

The method for the Waikato Region GPI built on pre-existing work to develop a National GPI and a previously released Auckland Region GPI study, and implicitly on international research on the key components of genuine progress and full-cost accounting. According to McDonald et al (2010b), with regard to valuing all non-GDP components:

> "The methodologies used to value these components principally rely on region specific 'bottom-up' data, but are supplemented with regionalised 'top-down' data from the national study in the absence of data specific to the Waikato Region."
>
> *Waikato Region GPI Technical Report 2010*

The valuation process is unique for each component, based on an understanding of underlying costs and benefits for each aspect and a review of available literature on valuation estimates (including results from NMV studies). The overall approach is very complex and no attempt is made here to try and summarise it. Despite an attempt to be as transparent as possible with regard to underlying assumptions, the method ultimately appears to be a 'black box' from a public perspective and gives a false sense of precision as illustrated below.

Table 28: Waikato Region GPI (2010) estimates of loss of water quality

Calendar Year	Non-point source river pollution	Point source river pollution	Lakes pollution	Total cost of water degradation
	(NZ_{2006}$ mil)	(NZ_{2006}$ mil)	(NZ_{2006}$ mil)	(NZ_{2006}$ mil)
1990	142	30	9	181
1991	145	35	9	189
1992	150	27	10	187
1993	164	27	11	201
1994	175	25	11	212
1995	187	23	12	222
1996	189	19	12	220
1997	186	20	12	218
1998	191	16	12	220
1999	198	14	13	225
2000	209	17	13	239
2001	227	15	14	256
2002	246	19	16	280
2003	257	18	16	291
2004	264	18	17	299
2005	272	16	17	306
2006	260	15	17	291
Total				4,036

Source: McDonald et al (2010b).

Wellington Region Genuine Progress Index (WR-GPI)

Web link

www.gpiwellingtonregion.govt.nz

Summary

Attributes	Summary
Purpose	Provide a monitoring framework for assessing progress towards the wellbeing goals of the Wellington Regional Strategy.
Target audience	Wellington Regional Strategy Committee, member TLAs, other key stakeholders and members of the public.
Number of indicators and measures	86 indicators across nine sub-themes.
Indicator selection process	Collaborative working group. Indicator election based around alignment with outcomes framework identified through public consultation.
Framework	QBL/four wellbeings overlaid on nine wellbeing sub-themes (e.g. 'connected community'), five of which relate to social wellbeing.
Frequency of reporting	The June 2011 report states that indicator data will be updated on an annual basis and progress reported biennially. However, due to the delay in census data, the Wellington Regional Strategy (WRS) Committee agreed at its February 2013 meeting to delay the next publication until early 2014. Individual indicator trend graphs on the website were updated in July 2012.
Form of reporting	Website and report (164pp) along with individual chapter reports and background reports.
Metadata and referencing	Website referencing is provided in a 'Technical Information" tab for each individual indicator/measure including an indicator definition, hyperlink to the data source and notification of most recent update. Report referencing is standard.
Key sub-headings (e.g. 'how are we doing?')	Overview, Findings (wellbeing theme summary), Outcome definition (outcome sub-theme), Discussion. Additional sub-headings used in the website presentation include: Measurable outcomes/What is [sub-theme]; Why is this indicator important; Findings/What this means; Did you know (fast facts).
Use of composite indices	Summary graphs are expressed on a 100-point 'distance to reference' scale – overall, for each of the wellbeing themes and for each of the sub-themes.
Use of monetary estimates	No use of FCA. Full cost assignment of monetary values has been signalled as a further development forthcoming.
Use of qualitative (descriptive) information	All indicators have been selected on the basis of measurability, including ability to be aggregated or disaggregated. Descriptive information is provided for interpretation and context but there are no qualitative (only) indicators.

Attributes	Summary
Comparability (inter-regional, national, international)	Regional index scores are shown over time but are not directly compared with other regions or nationally. Due to the indexation method, with benchmarking for each indicator based on the optimal condition of that indicator over the reporting period, it is unclear whether comparisons between regions could be accurately interpreted. The Results Report does provide national/regional comparisons for individual indicators.
Visual representations (graphs, tables, figures, symbols)	Index time series line graphs (report and website). Indicator time series bar graphs (report and website). Index and indicator trend symbols (report only).
Use of time series	Historical series 2001 to 2010, with some data imputed.
Use of future projections/scenarios	Nil.

Source: Based on review of source material.

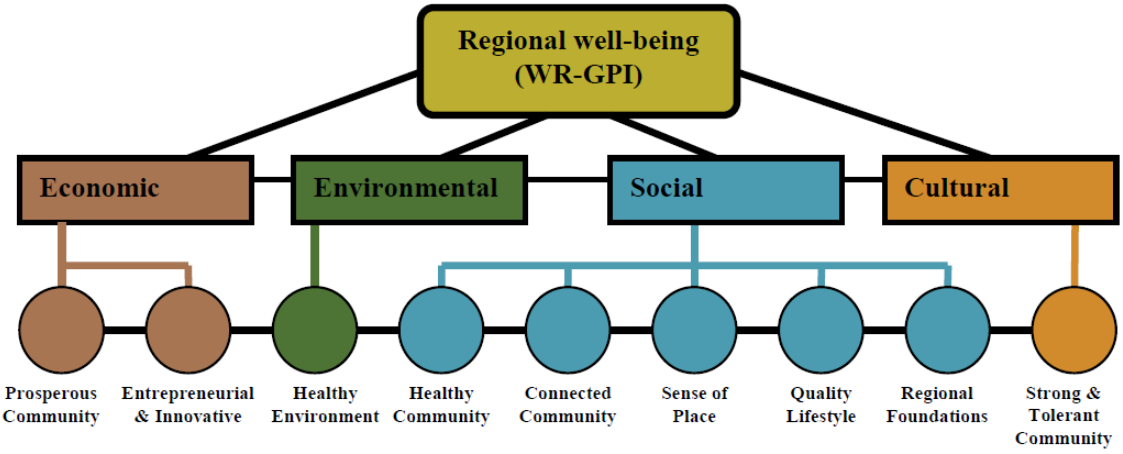
Introduction

The Wellington Region Genuine Progress Index (WR-GPI) is a monitoring framework for assessing progress towards the wellbeing goals of the Wellington Regional Strategy. It enables Greater Wellington Regional Council to put measures around the quality of life and wellbeing of residents in the Region, as well as the condition of the environment and the economy. The WR-GPI is a holistic measurement tool used to measure whether regional growth, increased production of goods and expanding services have actually resulted in improvement of the welfare (or wellbeing) of people in the Region. It counts beneficial activities as positive, harmful activities as negative, and provides a systematic way to integrate economic issues with environmental, social and cultural concerns.

Greater Wellington Regional Council and all eight territorial authorities in the Region are partners in the development of the WR-GPI.

The overall WR-GPI measure is a composite of various constituent and stand-alone measures estimated through a cascading or hierarchical manner as per the framework of themes and sub-themes and associated indicators.

Figure 38: WR-GPI themes (wellbeings) and sub-themes (outcomes)



Source: 'The Approach to the Wellington Region Genuine Progress Index (WR-GPI) 2001-2010'.

Website

The home page shows a time series line graph (2001-2010) of annual regional well-being WR-GPI levels summarised across all four wellbeings. This indicates that overall regional WR-GPI has improved by 5% since 2001. The graph is accompanied by a 'What this means' concise interpretational text box.

The home page includes:

- Link to a newly released collaborative report on an aspect of wellbeing (regional physical activity costs);
- visual interest though a five-image revolving slideshow that summarises the context and importance of genuine progress monitoring; and
- a 'Did you know' fast fact at the bottom of the page to highlight differences between GDP and WR-GPI measurement (i.e. the treatment of cigarette consumption as a benefit vs a cost).

The WR-GPI website is navigated by clicking on aspects of the framework (themes and sub-themes as illustrated above).

Within each theme, there is a relatively standardised presentation format summarised as follows:

- Theme name;
- theme summary description (1-2 sentences);
- progress summary (1-2 paragraphs);
- link to the theme chapter (pdf) from the latest WR-GPI report;
- sub-heading 'Measurable Outcomes' – name and 1-2 sentence description of each sub-theme;
- time series graph of specific theme component of the WR-GPI index along with a 'What this means' concise interpretation; and
- a 'Did you know' fast fact at the bottom of the page.

Within each sub-theme, there is a relatively standardised presentation format summarised as follows:

- Sub-theme name;
- sub-theme summary description (1-2 sentences);
- sub-heading 'What is [sub-theme]' with a description and progress summary;
- time series graph of specific theme component of the WR-GPI index along with a 'What this means' concise interpretation;
- a 'Did you know' fast fact;
- links to more detailed information about each indicator/measure making up the sub-theme;
- an embedded time series graph for each indicator (activated by clicking on the list of indicator names) along with 'Why is this indicator important' (1-2 paragraphs) and 'Findings' (concise bullet points) and a separate 'Technical Information' tab with key metadata; and
- a disclaimer in small print.

Overall there are 86 individual indicators/measures underlying the WR-GPI indicator. There is some imbalance between the number of indicators per theme, which is likely driven by varying levels of data availability along with other selection criteria.

There is also a FAQ page providing a range of useful background information.

Approach Report

The background to the overall approach is documented separately from the results report, which is itself available as both a single download (1.5MB) and a series of four individual QBL chapters. The challenge in developing a composite index is summarised as follows:

"The challenge in devising a framework for measuring wellbeing is to match the multiplicity and dynamism of what constitutes and contributes to people's wellbeing with what actually gets measured. This may appear to be a relatively simple task, but as developers of GPI's from around the world have discovered, this is not the case. To illustrate this, try to imagine using the count of a single bird species as representing the diversity of the region's fauna. Technically speaking to create a single composite index of the region's wellbeing is to construct a uni-dimensional scale to represent a multi-dimensional construct of the region's wellbeing.

Development of the WR-GPI is based on the knowledge that prosperity in the region means more than monetary wealth. It is about ensuring quality of life for all members of society."

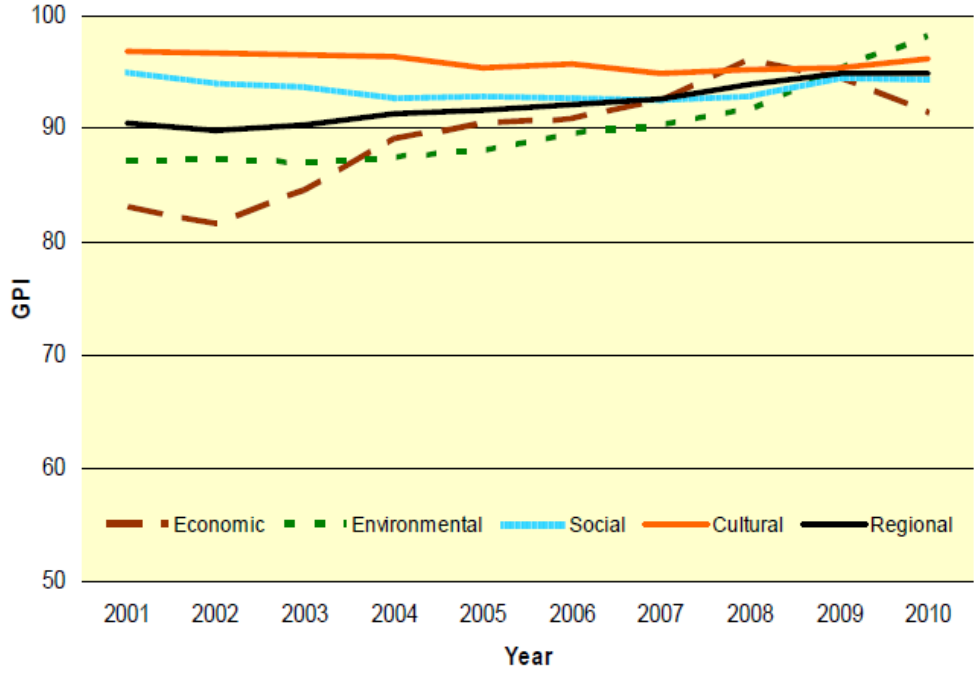
The Approach to the Wellington Region Genuine Progress Index (WR-GPI) 2001-2010'

The Approach report contains an informative review of the advantages and disadvantages of developing a single composite index. Reflecting on these advantages and disadvantages, the Working Group decided that composite indices would be developed for the WR-GPI at the overall regional level, the wellbeing level and the community outcome area level (i.e. themes and sub-themes). It was also decided that, whilst composite indices make representing, interpreting and communicating results easier, the composite index results be used in combination with analysis of the individual indicators, to ensure that particular issues identified as important to the Region are not buried in the composite figures. Note that the graph below does not show GDP separately but this could be done subject to the availability of a reliable regional GDP time series.

The Approach report goes into some detail about how the composite indicator is calculated. In summary:

- Missing values – For all indicators with missing data, values have been imputed using linear interpolations if the data is missing between two real data points. If the first year with real data available was after 2001 (the first year in the framework), the value of the first year with available data was used for previous years. If the last year of real data is before 2010 (the last year in the framework), the most recent value of real data is repeated for all following years up to 2010.

Figure 39: WR-GPI trend (overall level and four wellbeings level)



Source: Wellington GPI Report, June 2011.

- Normalisation or Indexing – A 'distance to reference' method was employed in which a benchmark is chosen against which longitudinal raw data are compared and converted to a numeric wellbeing score from 0 to 100. This method takes a unique benchmark for each indicator based on the optimal condition of that indicator over the reporting period. For example, an indicator for life expectancy would select the longest life expectancy achieved over the reporting period as the benchmark and all other data points for life expectancy would then be compared with the optimum life expectancy by dividing the actual raw data in any given year by that benchmark. The closer the index score is to 0 the worse the condition of that indicator; conversely, the closer the index score to 100 the better the condition of wellbeing. A score of 100 suggests the best or optimum condition of wellbeing over the reporting period. The report lists a number of caveats associated with this approach.
- Weighting – Following consideration of pros and cons, an equal weighting method has been adopted for all indicators.
- Aggregation – Indices are calculated from a simple mean (average) of the index value for all indicators.

The Approach report states that a full-cost accounting method to assign monetary values to the themes and sub-themes is under development. However, as at 27 March 2013 there was no further information available online about progress on this further development. On the face of it, it would appear that undertaking full-cost accounting with such a large number of themes and indicators would be expensive. To clarify the progress being made on this aspect, the Wellington Regional Strategy Office was emailed in March 2013 with the following response.

Table 29: Greater Wellington Regional Council intentions for future FCA

Questions	Responses
1. Please advise if there are plans to publish an updated report (as per the 2011 report) either this year, next year or further out - and expected frequency of updates going forward?	At the time the WR-GPI was published it was proposed to update the index biannually. However, due to the delay in census data, the Wellington Regional Strategy (WRS) Committee agreed at its February 2013 meeting to delay the next publication until early 2014. This will follow the release of 2013 census data information and 2013 figures for other statistical datasets which will also be available then.
2. Where are things at with plans to develop a full-cost accounting method and apply this to the WR-GPI reporting programme?	The WR-GPI was set up as two components: an indicator framework to assess trends over time, and a set of Full Cost Accounts. The first of these is the FCA on Physical Inactivity which was undertaken jointly with Waikato Regional Council and Auckland Council and reported to the WRC in March. It is anticipated that further FCAs will be undertaken on an on-going basis.

Source: Personal correspondence, Melanie Thornton, 8 April 2013.

Results Report

The 2011 WR-GPI Report describes the background, method and summary results (overall and four wellbeings) followed by more detail results for individual indicators/measures in the appendices. Each index component and individual indicator/measure is assigned its own page(s), with hard page breaks delineating between indicators. Sub-headings include:

- Overview;
- findings; and
- discussion.

Symbols are provided to summarise the time series trend for each indicator (improvement or decline), with separate symbols used to denote similar information for WR-GPI trends (improvement or decline). These symbols are not used in the website, presumably to avoid too much visual clutter.

Summary metadata for each indicator is tabulated within the report. All graphs and tables for individual indicators/measures are referenced to the data source.

According to the June 2011 WR-GPI report, the monitoring framework will be subject to continuous revision, improvement in methodologies and inclusion of additional variables. It states that, if available, indicator data will be updated on an annual basis with progress reported biennially. Individual indicator trend graphs on the website were last updated in July 2012. The various indices have not yet been updated on the website. There is an implicit expectation that the WR-GPI indices would be updated biennially as part of a reporting cycle.

Figure 40: Trend symbols used in the WR-GPI report

Table 1. Indicator trend symbols

Symbol	Explanation
	The indicator data trend indicates an improvement in well-being
	The indicator data trend indicates no clear well-being progress
	The indicator data trend indicates a decline in well-being
	Uncertain, no or insufficient trend data available to assess well-being progress

Table 2. GPI trend symbols

Symbol	Explanation
	The GPI trend indicates an improving condition over the study period
	The GPI trend indicates no significant trend or insufficient information to assess conditions
	The GPI trend indicates a declining condition over the study period

Source: Wellington GPI Report, June 2011.

WRC Environmental Indicators Programme

Web link

www.waikatoregion.govt.nz/Environment/Environmental-information/Environmental-indicators

Summary

Attributes	Summary
Purpose	Provide information about the state of the regional environment and pressures that affect it.
Target audience	Council, stakeholders and community members.
Number of indicators and measures	Approximately 70 environmental indicators/measures across 10 environmental subject themes.
Indicator selection process	Selected by WRC based on scientific understanding currently available about the region's environment and with input from key stakeholders and interest groups.
Framework	Pressure-State-Response (PSR).
Frequency of reporting	Updated annually as new data becomes available.
Form of reporting	Web pages within WRC website.
Metadata and referencing	Comprehensive technical information available online.
Key sub-headings	Key points, Report card, Technical information, Data.
Use of composite indices	No use of composite indices.
Use of monetary estimates	No use of FCA (although calculation of the 'ecological footprint' uses an analogous method).
Use of qualitative (descriptive) information	All indicators have been selected on the basis of measurability, including ability to be aggregated or disaggregated. Descriptive information is provided for interpretation and context but there are no qualitative (only) indicators. A number of indicators are still under development (e.g. sulphur dioxide levels in air; social and economic wellbeing; protected native vegetation areas). Many of the indicators are measured in a way that does not permit comparability.
Comparability (inter-regional, national, international)	Many of the indicators are measured in a unique way for the Waikato Region or do not readily permit aggregation or comparison with other regions (e.g. forest fragmentation, river water quality ratings).
Visual representations (graphs, tables, figures, symbols)	Mostly bar graphs, line graphs and tables. Limited use of other symbols. Website navigation has additional visual appeal through drawings with embedded links. Also some use of photographic imagery to add appeal.
Use of time series	Historical time series, predominantly mid 1990s to early 2010s depending on the indicator/measure, no data imputed.
Use of future projections/scenarios	Nil.

Source: Based on review of source material.

Introduction

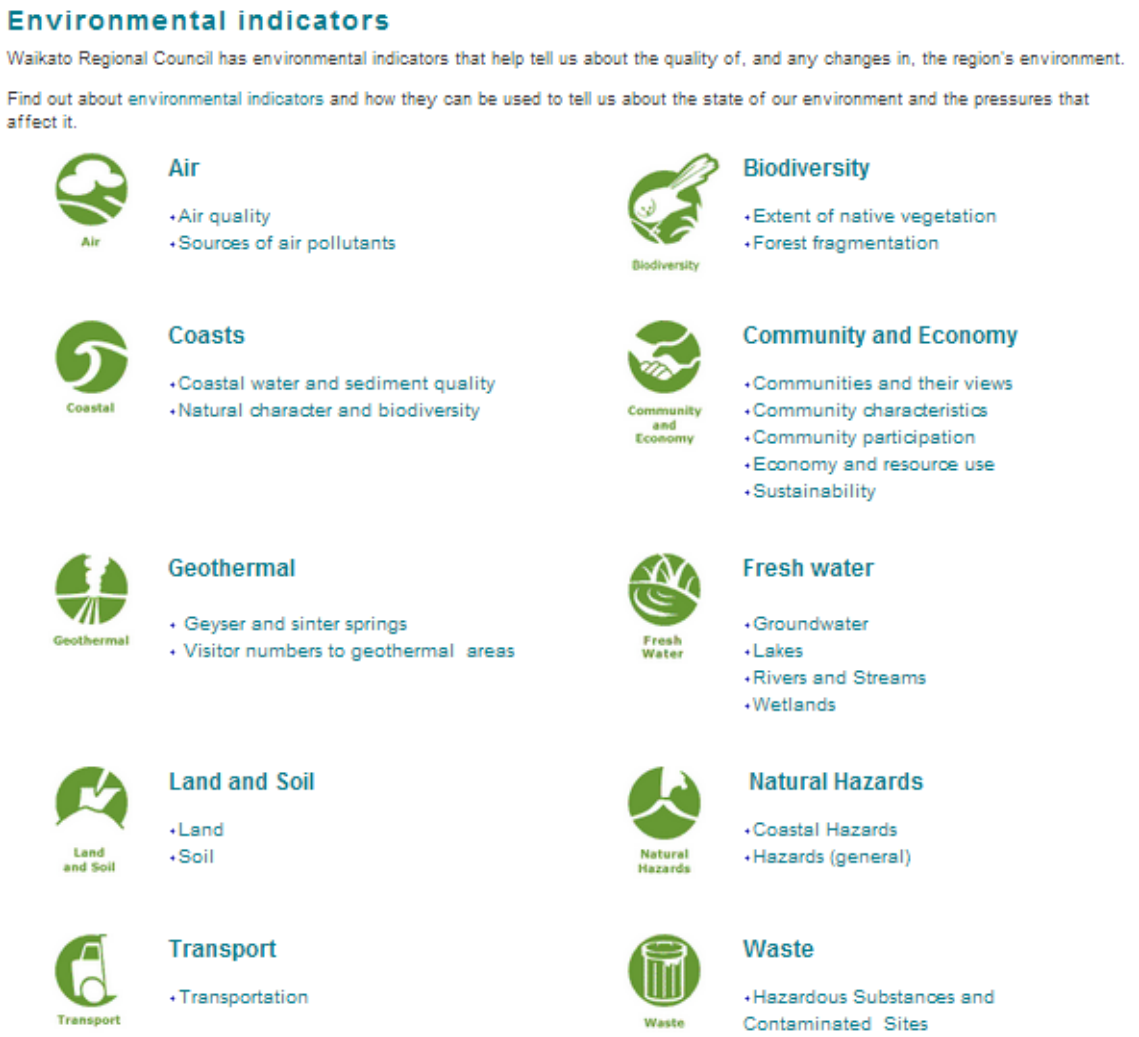
The WRC Environmental Indicators programme is an example of global good-practice, not least because of the longevity of the monitoring programme. The programme was originally developed as part of WRC's State of the Environment Report 1998 and has been continuously updated and modified since then. The monitoring programme encompasses a wide variety of indicators, with particularly detailed information and data provided for environmental indicators that are monitored by WRC itself (e.g. water quality monitoring).

Website

The environmental indicator web pages within WRC's website are easily navigable based on the key indicator themes. Results are presented clearly and concisely, with more detailed Report Cards, additional data downloads and technical information readily available.

There is no separate regular reporting associated with this website, nor an attempt to summarise the information into composite indices or identify overall key states or trends. The website information is presented in the form of a data repository rather than an over-riding progress story.

Figure 41: Screen capture from WRC environmental indicators web pages



Source: www.waikatoregion.govt.nz/Environment/Environmental-information/Environmental-indicators (accessed 30 March 2013).