Well-being and nature: Understanding and tracking the connection

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KEY POINTS

The benefits we get from nature underpins all aspects of people's well-being, demonstrating the importance of protecting and preserving the environment.

To ensure we recognize and acknowledge nature for its role in enhancing the well-being of all New Zealanders, we need to build a tangible understanding on how nature contributes to well-being and track the right information. This will help prioritise budgetary decisions, formulate good policy, and measure and evaluate the impact and performance of policy.

A comprehensive and structured indicator design process was developed for identifying fit-for-purpose indicators to provide meaningful information on the relationship between nature and well-being. The process:

1) **frames** the relationship between nature and people.
2) **prioritises** the relationships that matter most for a particular context.
3) **designs** fit-for-purpose indicators.

This design process helps facilitate a common understanding of the complex relationship between nature and well-being as well as identifying fit-for-purpose indicators. It ensures that all nature's contributions (tangible and intangible) are recognised to avoid unintended consequences and that we move towards a consistent, repeatable, and transparent process on decisions that improve well-being. More explicit decision-making gives people confidence in the transparency of what has been prioritised and considered. The process can be applied in many decision-making contexts and provide the basis for robust discussion across multiple stakeholders.

We have a fundamental relationship with nature: we both depend and impact on it. We impact on nature through how we manage and use nature, causing 'pressures' on and changes in the 'state' of our environment and nature. But we also depend on nature and the benefits nature provides us.

Despite people and nature being deeply intertwined, New Zealand has a paucity of information and data that links changes in nature to its impact on people.[1] Improving the evidence base for how a well-functioning environment contributes to our economy, culture, and wider society will help inform policy decisions on the use and management of our natural resources.

Many frameworks have evolved to describe the complex and multi-dimensional relationship between people and nature with ecosystem services (ES) and the broader concept of nature's contributions to people (NCP) being two of those (See Box 1). As both concepts are being used by practitioners for national and international policies, we hereafter use ES/NCP to refer to "contributions people obtain (positively or negatively) from nature".

A continuing challenge is the ability to identify appropriate indicators we can use to track the relationship between nature and well-being, and thus the success of policies developed to enhance human well-being though improving nature's condition. This policy brief addresses this very challenge by showcasing a process to identify and provide a rationale for fit-for-purpose indicators that can provide meaningful information on well-being for New Zealand.

Box 1: Frameworks that link nature to human well-being.

Ecosystem services (ES), a concept popularised by the Millennium Ecosystem Assessment,[2] are the *benefits people obtain from ecosystems* and are derived from natural capital, both living and non-living natural resources.

Nature's Contributions to People (NCP), from the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES),[3] builds on the ecosystem services concept. NCPs are defined as *all the contributions, both positive and negative, of living nature (diversity of organisms, ecosystems, and their associated ecological and evolutionary processes) to people's quality of life.*[4] This extension of the ecosystem services framing was introduced to reflect a broader range of worldviews and knowledge systems, cultures, and disciplines across the globe.

INDICATOR DESIGN PROCESS

We developed a three-stage process to (1) **frame** the relationship between nature and people, (2) **prioritise** the relationships that matter most for a particular context, and (3) **design** fit-for -purpose **indicators** (Fig. 1). Together, these stages aim to provide a rationale for choosing indicators that can meaningfully track changes in human well-being resulting from changes in the environment. Ideally, each stage would involve people with differing perspectives to ensure there is a rich conversation that captures different viewpoints. This recognises that choosing indicators related to well-being is a social process. Thus, greater societal representation makes sure different viewpoints are considered in the final set of indicators to better represent the multiple views on the relationships between well-being and nature. This process, for example, could be used to continue to improve the indicators used to track well-being for the Living Standards Dashboard.[5]

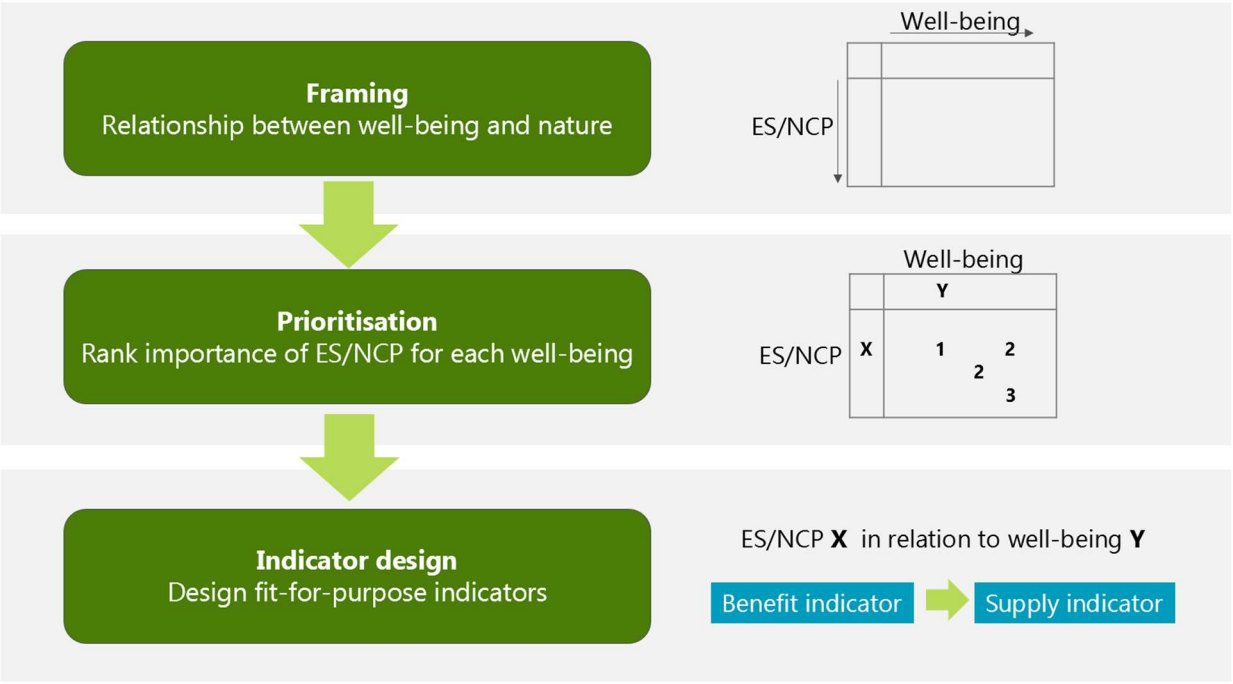

Figure 1. Indicator design process.

Framing the relationship

Exploring the relationship between people and nature relies on using frameworks that are well understood, easy to communicate, and/or commonly used. Using a structured approach helps ensure important relationships between people and nature are not inadvertently overlooked. In this step, ES/NCP and well-being frameworks are chosen to ensure terminology is well understood, and all aspects of both well-being and ES/NCP are well represented. The process we outline could use any well-being or ES/NCP framework.

Prioritisation of the most relevant relationships

Budgetary and time constraints mean resources need to focus on the most important aspects of any decision. With this mind, the prioritisation stage aims to determine which ES/NCPs are most relevant to each constituent of well-being, and thus investigated further in terms of needing an indicator to track the status of the relationship. Two criteria are proposed to help rank the importance of each nature–well-being relationship:

- **Nature of the relationship and extent of impact**: The relationship between nature and people maybe direct (e.g. food production and jobs and earnings) or indirect (e.g. erosion control is indirectly linked to work-life balance through slips impacting on roads, walkways, etc.), with the size of impact being small or large. The relationship may also differ across locations and different segments of the population.
- **Substitutability:** If there are substitutes for nature's contribution to a well-being then the importance of that ES/NCP may be lower. The criteria we used for substitutability relates to the cost-effectiveness of substitutes (e.g. seawalls substituting for the coastal protection provided by mangroves) or the availability of alternative options (e.g. a nearby pool that could be used for swimming).

Those ES/NCP – well-being relationships that are direct, larger in size and have few substitutes are likely to have greater relevance for people's well-being. A scoring system was developed with various options to help rank the importance of these relationships (Annex 1).

Indicator design

No single indicator can cover the complex relationship between people and nature. Even breaking this complex relationship into individual constituents of well-being and ES/NCP mean multiple indicators are likely needed to capture each relationship.

One way to conceptualise these relationships is using a well-established causal chain framework, the Driver-Pressure-State-Impact-Response (DPSIR).[6] 'Impact' is a broad term representing the complex relationship between nature and human well-being that can be represented through the notion of ES/NCP, where nature contributes to people through materials, processes, and cognitive experiences. More specifically, the nature–well-being relationship can be represented through a cascading supply-benefit logic chain mediated by many factors (Fig. 2). The **benefit** reflects an explicit change in human well-being and in what people value in relation to a given change in ES/NCP.[7] It may be affected by the substitutes available and the vulnerability of different groups (e.g. socio-economic sectors or communities) to a change in an ES/NCP.

The **supply** of an ES/NCP, on the other hand, represents the ability of nature to contribute to well-being through well-functioning ecosystems.[7] Aspects such as accessibility (e.g. road access to a recreational area) and anthropogenic assets (e.g. infrastructure and machinery to harvest crops) may affect the potential supply of an ES/NCP.

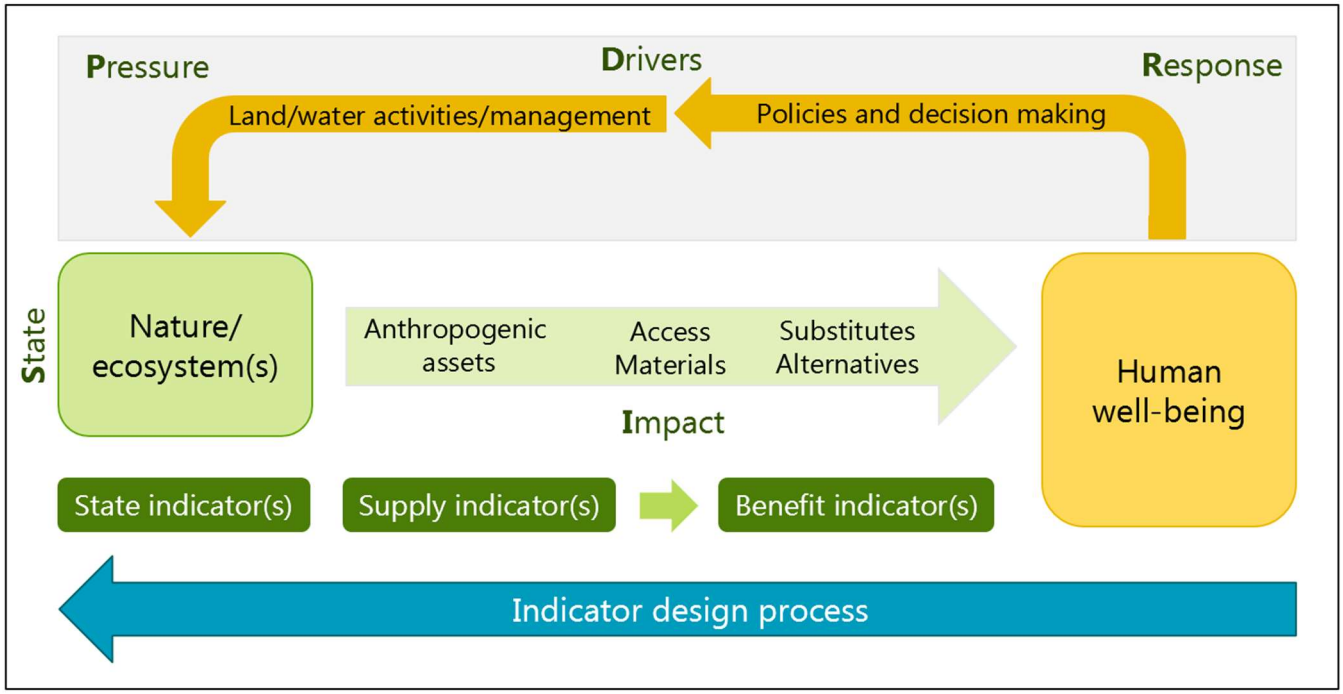

Figure 2. Pressure-state-impact diagram and indicator design process.

To adequately describe the relationship between nature and well-being, we found that starting the process from the human well-being point-of-view, looking at indicators that capture, in order, the benefit, supply, and then the state of ecosystem(s) helped drive the discussions from the desired outcome and values that are sought by our society and therefore fit-for-purpose indicators.

To help identify SMART fit-for-purpose benefit, supply, and state indicators (Box 2) we formulated and tested the following 4 steps (Annex 1).[8] These steps would be applied to each of the prioritised ES/NCP–well-being relationships.

1) Describe the context for how an ES/NCP affects the constituents of well-being

This step is about decision-makers familiarising themselves with the definition of the specific ES/NCP and constituents of well-being before describing the relationship. The prioritisation stage will provide some context that can be drawn upon. Describing the relationship includes thinking about ***who*** is impacted by changes in the ES/NCP for that constituent of well-being and ***how***. The ***symptoms*** that reflect the change(s) in the well-being constituent that would come from a change (either positive and/or negative) in the ES/NCP is listed.

2) Identify the benefit indicator(s)

Benefit indicator(s) reflect the ***desired outcome*** from improving the relationship between the ES/NCP and well-being constituent and is based on the symptoms described in Step 1.

3) Identify the supply indicator(s)

Supply indicator(s) reflect the ecosystem process(es) that drive the change in the ES/NCP that affects a constituent of well-being. Accessibility should also be considered.

4) Identify the state indicator(s)

State indicator(s) describe the condition and extent of the ecosystem(s) providing the ES/NCP.

Some indicators could be appropriate for multiple ES/NCP–well-being constituent relationships and there may be multiple benefit, supply, and state indicators needed to represent some relationships. For any ES/NCP–well-being constituent relationship, specifying the ecosystem(s) (e.g., forests) supplying the ecosystem service (e.g., forest fire prevention) for a well-being constituent (e.g., population next to forests) is needed to identify SMART indicators.

APPLYING THE INDICATOR DESIGN PROCESS

The indicator design process was applied at a national level to prioritise ES/NCP–well-being relationships and to identify a potential set of fit-for-purpose indicators for use in various government scenarios, e.g. environmental reporting or budget decisions.

Box 2. SMART indicators

Good indicators reflect the state and trend over time of a phenomenon, are clearly formulated and simple to apply. Choosing an indicator should be transparent and ideally involve multiple stakeholders. **SMART** indicators are:

- **Specific**: understandable in a clear and consistent manner
- **Measurable:** observed, counted, or analysed
- **Accurate**: specific enough to reflect the process or function
- **Relevant**: easy to understand and relevant to the end-users
- **Trackable**: able to be monitored over time

Framing: While the process we developed can be applied using any ES/NCP and well-being framework, we used the terminology of the MEA ecosystems service framework (Annex 2) to represent nature and the Living Standards well-being Framework (LSF; Annex 3) to represent people. The LSF framework is based on the OECD well-being framework[9] and reflects people's well-being or the 'capability of people to live lives that they have reason to value'. The LSF is being used across governmental agencies to build New Zealanders' well-being into various decision-making processes.

Prioritisation: Figure 3 provides an example of the ranking process used to assess the importance of the ES/NCP–well-being relationship. This process was applied across all combinations of ES/NCPs and well-being constituents, with findings shown in Annex 4.[10] ES/NCP–well-being constituents given a high score were prioritised for indicator development, as were those with a medium score where the relationship was expected to be important for stakeholders, was an existing/emerging issue, or was changeable over time. Environmental quality, cultural identity, and health well-being constituents rely most on nature. Ethical and spiritual and recreation services were relevant to several constituents of well-being.

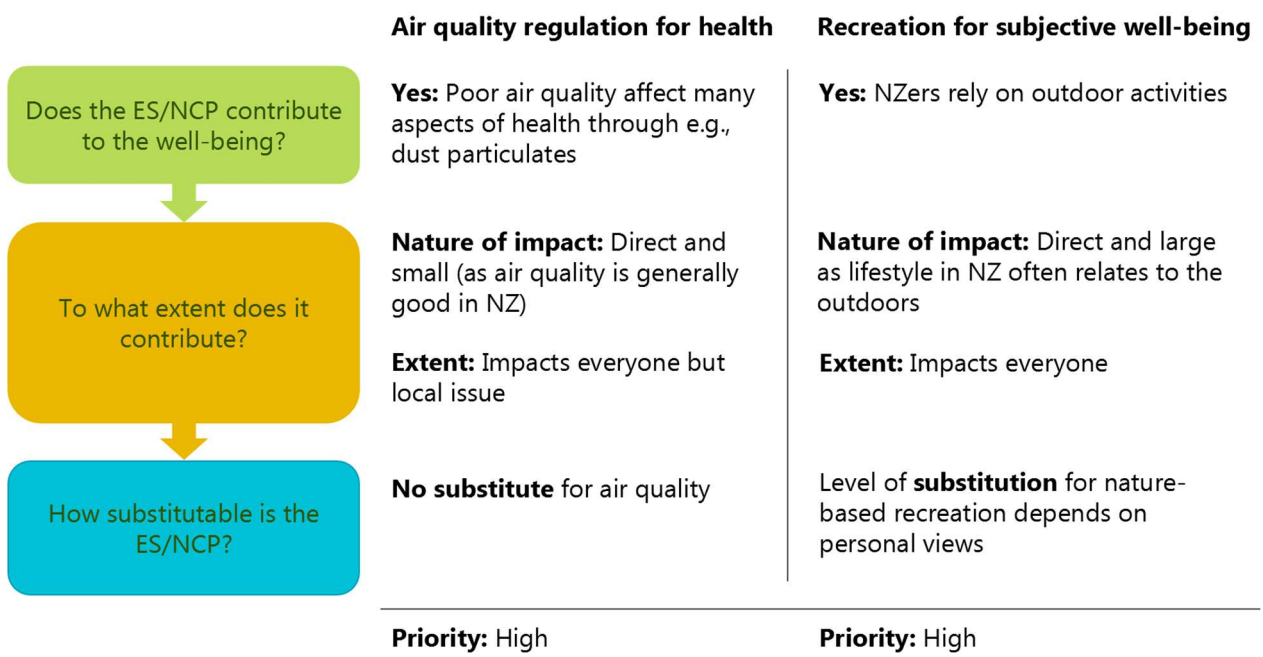

Figure 3. Prioritisation criteria and example of its application.

Indicator design: Figure 4 shows an example of applying the indicator identification steps to the regulation of natural hazards (e.g. floods) by ecosystems (the ES/NCP) and personal security (one of the well-being constituents identified in the LSF) relationship.[11] While the logic chain from benefit–supply–state is useful to help understand the connections between most aspects of nature and well-being, we found during testing that there may be some instances where the causal relationship between supply and a well-being benefit may be weak (e.g. water purification for improving civic engagement). In this instance, it may be difficult to identify a clear logic chain from benefit to supply.

Figure 4. An example of indicators identified to describe and track the natural hazard (flood) regulation service and personal security well-being relationship.

INFORMING POLICY DECISIONS

The aim with any indicator is to inform people's decisions. Sound policy decisions, for example, rely on good information to support the choices being made. Policy decisions where this indicator identification process could be helpful include:

- **Prioritising budgetary decisions** based on the full range of benefits and risks to society and nature. This process can help identify nature's hidden contributions that may be affected or improved by strategic project or investment decisions. For example, the process was used to provide conceptual evidence of the importance of nature during the COVID-19 economic recovery.[12]
- **Identifying targets and limits** during the reform of the Resources Management Act (RMA). The RMA reform will involve setting up a new framework for ensuring that future activities do not cause further deterioration of the environment while ensuring the long-term vision for people's well-being is being met. This process could help monitor progress over time towards goals set for key nature–well-being relationships.
- **Improve reporting on state of the environment**. Reporting on the state of the environment is a legal requirement under the Environmental Reporting Act 2015. A preliminary analysis of the current reporting indicators found a gap in the "impact" indicators (e.g. impact of a change in the environment for the economy and society) compared with "pressures" and "state" of the environment indicators.[13] Using the indicator design process can help identify fit-for-purpose indicators to report on, facilitate robust cross-government discussions when applying the process, and create a structured way to narrate linkages between nature and people's well-being.
- **Identifying essential data** to collect to inform future decisions. StatsNZ is currently reviewing and prioritising future data needs for New Zealand. Knowing how and where nature contributes to well-being will allow increased visibility of what data need to be collected to ensure strong sustainability for New Zealand's future.

ACKNOWLEDGEMENTS

The testing and refinement of the prioritisation was undertaken with staff from the Ministry for the Environment, Department of Conservation, Ministry for Primary Industries, Parliamentary Commission for the Environment, The Treasury, and Manaaki Whenua – Landcare Research. The steps to identify fit-for-purpose indicator steps were formulated, tested, and refined with the Ministry for the Environment. We thank all these people for their invaluable thoughts and pragmatic suggestions for improving this indicator design process.

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Annex 1. Scoring system for prioritisation and questions/steps to guide indicator identification

Table A1. Scoring system for prioritising the importance of each ES/NCP for each well-being domain

Rating	Impact $I = \frac{N + \max(G,P)}{2}$			Substitutability S = T or A	
	Nature of the impact (N)	Extent of impact		Cost-effective substitutes – how hard and costly is it to fix? (T)	Alternative options similarity and how far away (A)?
		Spatial geographical range of Impact (G)	Proportion (%) of population affected per region (P)		
1	No importance	1–3 regions	<10%	Yes, low cost and affordable for individuals	Many alternative options available of similar quality (or experience) within close proximity
2	Indirect and small	4–6 regions	10–30%	Yes, affordable for communities or user groups	Some alternative options available of differing quality (or experience) within proximity
3	Indirect and large	7–10 regions	30–50%	Yes, but needs regional council intervention	Some alternative options available of similar quality some distance away
4	Direct and small	11–13 regions	50–75%	Yes, but needs central government intervention	Some alternative options available but of different quality (or experience) some distance away
5	Direct and big compared with national	14–16 regions	>75%	No substitutes	No alternative options available

Steps and questions to help identify fit-for-purpose indicators

Step 1: Describe the context

- Read the description of the [ES/NCP] and the [well-being constituent] and familiarise yourself with why an [ES/NCP] and well-being constituent relationship was ranked highly in the prioritisation process.
- Describe the relationship between the [ES/NCP] and [well-being constituent] including who is affected and how.
- Identify and list the symptoms of the [well-being constituent] affected by the change in the [ES/NCP].

Step 2: Identify benefit indicator(s)

- What is the desired outcome(s) from improving the relationship between the [ES/NCP] and the [well-being constituent]?
- Think about: How does the [well-being constituent] change if we improve or degrade the [ES/NCP]? What does success look like? What improvement in the [well-being constituent] are we trying to achieve?
- What indicator(s) best describe(s) the desired [well-being] outcome(s)? (Multiple indicator(s) may be identify based on the symptom(s) noted in the context).

Step 3: Identify supply indicator(s)

- What ecosystem(s) supply this [ES/NCP]? (Refer to well-being symptoms to help identify the relevant ecosystems).
- How does this ecosystem(s) provide the [ES/NCP] for the [well-being constituent]?
- What aspects of the [ES/NCP] maintains the [well-being constituent]?
- What change(s) to the [ES/NCP] would improve the [well-being constituent]? Is accessibility a factor?
- What indicator(s) best represent(s) the supply of the [ES/NCP] to maintain and/or improve the [well-being constituent]? (The flow of questions will help identify fit-for-purpose indicators).

Step 4: Identify state indicator(s)

- What indicators represent the extent and condition of the ecosystem(s) that supply the [ES/NCP]?

Test the robustness of indicators

- Are there any additional or alternative ways to represent the relationship between the [ES/NCP] and the [well-being constituent] that have not already been considered?
- Using shock cards (e.g., market prices change, increased frequency/intensity of flooding) see how the benefit and supply indicator(s) change in response to these external shocks? Are there other shock(s) we should consider?

Annex 2. Ecosystem services terminology used (from MEA)[3]

Provisioning (MEA) *Products obtained from ecosystems*	**Regulating (MEA)** *Benefits from regulation of ecosystem processes*	**Cultural (MEA)** *Non-material benefits obtained from ecosystems*
Food and fibre Freshwater Wildfoods Fuel Biochemical, natural medicines & pharmaceuticals Genetic resources Ornamental resources	Air quality maintenance Climate regulation Water regulation Water purification & waste treatment Erosion control Disease regulation Biological control Pollination Natural hazard regulation	Recreation & ecotourism Ethical & spiritual values • Aesthetic values • Cultural heritage values • Cultural diversity • Sense of place • Spiritual & religious values • Social relations Inspirational & educational values • Inspiration • Knowledge systems
Provision of habitat *Services necessary for the production of all other ecosystem services*		

Annex 3. Living Standards Framework well-being domains [constituents][7]

Well-being domain	**Definition**
Quality of life well-beings	
Health	Our mental and physical health
Time use	The quality and quantity of people's leisure and recreation time (that is, people's free time where they are not working or doing chores)
Knowledge and skills	People's knowledge and skills
Social connections	Having positive social contacts and a support network
Civic engagement and governance	People's engagement in the governance of their country and their civic responsibilities, how 'good' New Zealand's governance is perceived to be, and the procedural fairness of society
Environment	The natural and physical environment and how it impacts people today
Safety and security	People's safety and security (both real and perceived) and their freedom from risk of harm and lack of fear
Subjective well-being	Overall life satisfaction and sense of meaning and self
Cultural identity	Having a strong sense of identity, belonging and ability to be oneself, and the existence value of cultural taonga
Material conditions	
Income and consumption	People's disposable income from all sources, how much people spend, and the material possessions they have
Jobs and earnings	The quality of people's jobs (including monetary compensation) and work environment, people's ease and inclusiveness of finding suitable employment, and their job stability and freedom from unemployment.
Housing	The quality, suitability, and affordability of the homes we live in.

Annex 4. Prioritisation of ecosystem services for each well-being constituent

Well-being constituent & Ecosystem service	Health	Time use	Knowledge & skills	Social connections	Civic engagement & governance	Environment	Safety & security	Subjective well-being	Cultural identity	Income & Consumption	Jobs & earnings	Housing	Total
Erosion control													2
Natural hazard regulation													9
Water regulation													5
Air quality regulation													4
Climate regulation													7
Pollination													1
Water purification													5
Biological control													2
Disease regulation													3
Rec. & Ecotourism													9
Ethical & spiritual													8
Inspiration & education													6
Food													6
Fibre													5
Wild food													3
Freshwater													4
Biochemical, natural medicines and pharmaceuticals													2
Fuel and energy													1
Ornamental resources													2
Genetic resources													3
Habitat provision													8
Total (number of high or medium)	**13**	**6**	**5**	**1**	**6**	**17**	**2**	**8**	**15**	**9**	**8**	**5**	

High score – **priority** list for indicators

Medium score – **secondary** priority list for indicators

Low score – **low evidence** of a relationship between ecosystem services and the well-being domain

[1] Parliamentary Commissioner for the Environment 2019. Focusing Aotearoa New Zealand's environmental reporting system. Available at: www.pce.parliament.nz/publications/focusing-aotearoa-new-zealand-s-environmental-reporting-system

[2] Millennium Ecosystem Assessment 2005. Millennium ecosystem assessment synthesis report. Washington, DC: Island Press.

[3] IPBES 2019. Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S Díaz, J Settele, ES Brondízio ES, et al. (eds.). Bonn, Germany: IPBES secretariat. Available at: https://ipbes.net/sites/default/files/2020-02/ipbes_global_assessment_report_summary_for_policymakers_en.pdf

[4] Díaz S, Pascual U, Stenseke M et al. 2018. Assessing nature's contributions to people. Science 359: 270–272.

[5] The Treasury 2019. Our country, our future, our people. The living standards framework: dashboard update. Wellington, NZ: The Treasury.

[6] The (d)PSI(R) framework is the basis for Environmental Reporting in New Zealand. Drivers (d) are the phenomena that provide context for changing pressures (economics, population growth…); pressures (P) are the direct natural or human influences that can explain changes in the state; state (S) represents the physical, chemical, and biological characteristics of the environment and how these change over time; impacts (I) are the consequences of changes in the state of the environment; and responses (R) are the actions taken by institutions, government, and communities.

[7] Mandle L, Shields-Estrada A, Chaplin-Kramer R et al. 2021. Increasing decision relevance of ecosystem service science. Nature Sustainability 4: 161–169.

[8] The steps to identify fit-for-purpose indicators were tested and refined with staff from the Ministry for the Environment.

[9] OECD. Better Life Index. Available at: www.oecdbetterlifeindex.org

[10] The prioritisation stage was tested with staff from central government agencies. The prioritisation was undertaken by three of the authors using a pairwise comparison to compare between authors' scoring and to agree on the evidence to support the scores.

[11] The design of indicators stage was tested with staff from the Ministry for the Environment.

[12] Ausseil AG, Collins A 2021. Codifying the relationship between nature and people. Available at: https://www.pmcsa.ac.nz/topics/environment-and-wellbeing

[13] Ausseil AG, Collins A, Greenhalgh S, Booth P, Samaringhe O 2021. Environmental stewardship and well-being. MWLR contract report LC3901 for Ministry for the Environment.