

Estimate of environmental expenditure 2019/20

Method and results

October 2022



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October 2022

ISBN

978-0-947517-34-2 (print)

978-0-947517-35-9 (electronic)

Photography

Cover images: Nikau, Ryne Rutherford, iNaturalist; Parliament House, Gordon Haws, Flickr; nikau columns, russellstreet, Flickr.

Chapter header image: *Blechnum filiforme*, kevin_frank, iNaturalist.

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Acknowledgements

This technical paper was prepared by Peter Lee, advisor to the Parliamentary Commissioner for the Environment, Simon Upton, supported by Dr Geoffroy Lamarche, Luka Licul and Dr Edwin Sayes.

The Commissioner would like to acknowledge the following organisations for their time and assistance during the preparation of this technical paper:

- Department of Conservation
- Ministry for Primary Industries
- Ministry for the Environment
- Ministry of Business, Innovation and Employment
- Ministry of Transport
- Office of the Auditor-General
- Stats NZ
- The Treasury.

This paper provides an overview of the method used to compile the estimate of environmental expenditure presented in *Environmental reporting, research and investment: Do we know if we're making a difference?* The Commissioner wishes to thank reviewers of *Environmental reporting, research and investment* for reviewing earlier drafts of this paper. Any errors, omissions or opinions are entirely his own.

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Blechnum filiforme

Estimate of environmental expenditure 2019/20: Method and results

Introduction

This document contains additional information about the estimate of environmental spending presented in chapter three of *Environmental reporting, research and investment: Do we know if we're making a difference?*¹ It opens with an outline of the method, including a brief description of the operational definition of environmental expenditure, the data source and the analytical steps taken to derive the final estimate. This is followed by the headline spending estimates arising from the analysis. Additional results are presented to illustrate the different ways of categorising environmental expenditure according to different frameworks. In each case, a brief description of the framework is provided along with the respective estimate of expenditure. An explanation of the limitations and caveats that apply to these estimates is also provided.

Method

Defining environmental expenditure

In establishing an operational definition of environmental expenditure to guide its classification, existing definitions derived from the System of Environmental-Economic Accounting (SEEA) provide an initial reference point. The SEEA is an international statistical standard for measuring the environment and its relationship with the economy and includes guidance for measuring environmental expenditure.

Although a statistical standard, the SEEA has a set of well-established conceptual definitions to identify and categorise economic activities and transactions related to the environment.² Accordingly, components of the SEEA framework were used to establish and delineate the conceptual scope of this work.

¹ PCE, 2022.

² See <https://seea.un.org/content/seea-central-framework>.

The SEEA defines the scope of environmental activities as “those economic activities whose primary purpose is to reduce or eliminate pressures on the environment or to make more efficient use of natural resources.”³ The SEEA further disaggregates this definition according to two categories.

- Environmental protection activities are those activities whose primary purpose is the prevention, reduction and elimination of pollution and other forms of degradation of the environment.
- Resource management activities are those activities whose primary purpose is preserving and maintaining the stock of natural resources and hence safeguarding against depletion.⁴

These definitions draw a distinction between spending incurred for specific environmental protection and resource management functions, and spending that is more indirectly related to the environment (e.g. spending on transport infrastructure). Although more constrained, adopting this narrow focus provides a useful starting point to assess whether the Government’s response to environmental issues is commensurate with the challenges they pose.

Data source

Data were obtained from the Treasury – Te Tai Ōhanga website as part of the release of documents for Budget 2021.⁵ This includes an accompanying spreadsheet that collates all appropriation data, including appropriations relating to:

- actual government expenditure for the years ended 30 June 2017, 2018, 2019 and 2020
- estimated actual government expenditure for the year ending 30 June 2021
- budgeted government expenditure for the year ending 30 June 2022.

As an additional quality assurance measure, actual government expenditure based on audited figures for the year ended 30 June 2020 was used for the analysis instead of figures from more recent years.

Analysis

In terms of practical implementation, this work closely adhered to a method developed by the Office of the Auditor-General – Tumuaki o te Mana Arotake to identify and estimate government spending on natural hazards.⁶ The method involved establishing procedures to identify, categorise and assess appropriation data. This approach was adapted and applied to the Treasury dataset to identify and categorise environmental expenditure.

The Treasury dataset required some preparation, including introducing additional variables to identify and classify appropriations. Appropriations for the year ended 30 June 2020 were filtered and extracted to provide the relevant dataset for analysis. This process resulted in 1,155 appropriations that required screening.

³ United Nations et al., 2014, p.96.

⁴ United Nations et al., 2014, p.96.

⁵ For the original dataset, see <https://www.treasury.govt.nz/publications/data/budget-2021-data-estimates-appropriations-2021-22>.

⁶ Controller and Auditor-General, 2020.

Each appropriation was reviewed to determine whether it was consistent with the definition of environmental expenditure. This review focused on the contents of the appropriation scope statement. The scope statement includes a brief description of the appropriation and defines the legal boundary in terms of the expenses and expenditure that can be incurred against the appropriation.

An appropriation was tagged as being relevant if the scope statement contained a reference to an environmental protection or resource management activity. This screening step identified 140 relevant appropriations that required further categorisation.

With respect to categorisation, an attempt was made to allocate environmental appropriations to a specific functional category or environmental reporting theme or outcome based on an analysis of keywords within the scope statement.

Supplementary information to assist with the categorisation of appropriations was also obtained from the respective Vote documents. These documents include additional information in the form of:

- a statement outlining what the appropriation intends to achieve
- a set of performance metrics outlining how performance will be assessed against each appropriation.

In many cases, these documents were able to provide additional details that assisted with the categorisation of appropriations. If additional details could not be gleaned from the Vote documents, the appropriation was generally categorised as 'indeterminate'. The indeterminate label was generally used at the more disaggregated level of each of the classification frameworks because of the general nature of the information accompanying the appropriations.

In some cases, the scope statement referenced multiple environmental protection or resource management activities (or a combination of both). A decision was made to classify these appropriations based on the order of keywords in the scope statement.

In the case of multi-category appropriations, these appropriations consist of multiple expenditure categories that contribute to a single overarching purpose. The scope statements relating to each of the individual expenditure categories were analysed to categorise expenditure.

Scope

With respect to the scope of the analysis, all expenditure for the relevant year was reviewed regardless of the type of appropriation. Accordingly, appropriations relating to both departmental and non-departmental output expenses, multi-category appropriations, capital injections and capital expenditure were included in the analysis.⁷

⁷ For a description of the different types of appropriations, see the Treasury, 2013.

In terms of environmental relevance, the following appropriations were excluded on the basis that they were inconsistent with the definition of environmental protection or resource management:

- appropriations administered by the Department of Conservation – Te Papa Atawhai with respect to recreational infrastructure and the management of historic heritage. While this spending could be dependent on environmental quality, it is unlikely to have any direct implications for environmental protection or resource management
- capital expenditure for agencies with multiple functions (e.g. Ministry of Business, Innovation and Employment – Hīkina Whakatutuki, Ministry for Primary Industries – Manatū Ahu Matua). Note that capital expenditure incurred by agencies engaged solely in the production of environmental quality was deemed relevant (e.g. Department of Conservation, Ministry for the Environment – Manatū Mō Te Taiao, office of the Parliamentary Commissioner for the Environment (PCE))
- appropriations related to natural hazards unless this expenditure had implications for natural resource stocks.

Classifying environmental expenditure

In chapter three of *Environmental reporting, research and investment*, estimates of environmental expenditure were presented according to environmental outcomes based on the domains proposed by PCE for environmental reporting and the priority issues in Environment Aotearoa 2019. However, environmental expenditure can, in principle, be categorised in several different ways. Accordingly, several classification frameworks were used to categorise appropriations and these are described below, with the respective estimates presented in subsequent sections.

Broadly, appropriations can be classified using either a functional or a thematic approach. A thematic approach can be based on categories used in environmental reporting. This includes general environmental themes, general environmental domains, priority issues, and a translation of those themes and issues as environmental outcomes. This approach has been used to structure environmental reports and describe the different and interconnecting elements of the environment as a natural system.

A functional approach involves the use of statistical frameworks to classify expenditure and activity by purpose or objective to support the compilation of environmental-economic statistics.

Thematic approaches

The use of environmental domains, themes and outcomes presents one method for classifying appropriations. These themes were drawn from the various environmental reports produced by the Ministry for the Environment and Stats NZ – Tatauranga Aotearoa and suggested refinements to these themes recommended by PCE. Further, these themes were translated into environmental outcomes in *Environmental reporting, research and investment*. An overview of these different approaches and their alignment is provided in Table 1.

Table 1: Domains, themes and environmental outcomes.

Domain reports	Environment Aotearoa 2019 ⁸		Focusing Aotearoa New Zealand’s environmental reporting system ⁹	Environmental reporting, research and investment ¹⁰
Domains	Themes	Issues	Suggested PCE refinements	Environmental outcomes
Biodiversity*	1. Our ecosystems and biodiversity	1. Our native plants, animals and ecosystems are under threat	Biodiversity and ecosystem functioning	Improving Aotearoa’s biodiversity and ecosystem functioning and resilience
Land	2. How we use our land	2. Changes to the vegetation on our land are degrading the soil and water	Land	Improving Aotearoa’s land and freshwater, including sustainable management of resources
		3. Urban growth is reducing versatile land and native biodiversity		
Freshwater/air	3. Pollution from our activities	4. Our waterways are polluted in farming areas	Pollution and waste	Reducing pollution and waste
		5. Our environment is polluted in urban areas		
Freshwater	4. How we use our freshwater and marine resources	6. Taking water changes flows, which affects our freshwater ecosystems	Freshwater and marine environment	Improving Aotearoa’s land and freshwater, including sustainable management of resources
Marine		7. The way we fish is affecting the health of our ocean environment		Improving Aotearoa’s coastal and marine environment, including sustainable management of resources
Atmosphere and climate	5. Our changing climate	8. New Zealand has high greenhouse gas emissions per person	Climate change and variability	Reducing greenhouse gas emissions
		9. Climate change is already affecting Aotearoa New Zealand		
No direct equivalent				Improving the efficiency and effectiveness of institutions designed to manage human interventions in the environment

* Biodiversity is regarded as a cross-cutting domain and is included in all domain reports (where relevant).

⁸ MfE and Stats NZ, 2019.

⁹ PCE, 2019.

¹⁰ PCE, 2022.

Functional approaches

Two different functional classifications were used to categorise expenditure. The first, the Classification of the Functions of Government (COFOG), is a statistical standard developed by the Organisation for Economic Co-operation and Development to classify government expenditure according to primary purpose. The framework is structured by two hierarchical levels, where the first level consists of ten broad functional divisions that are further disaggregated by up to nine groups in a second level.

One COFOG division relates to environmental protection, which is further disaggregated according to specific environmental functions. This and other relevant COFOG divisions and groups that were used to classify the appropriations are detailed in Table 2.¹¹

Table 2: Classification of the Functions of Government framework.

Divisions	Group
04 – Economic affairs	04.1 – General economic, commercial and labour affairs
	04.2 – Agriculture, forestry, fishing and hunting
	04.3 – Fuel and energy
	04.4 – Mining, manufacturing and construction
	04.5 – Transport
	04.6 – Communication
	04.7 – Other industries
	04.8 – R&D economic affairs
	04.9 – Economic affairs NEC
05 – Environmental protection	05.1 – Waste management
	05.2 – Waste water management
	05.3 – Pollution abatement
	05.4 – Protection of biodiversity and landscape
	05.5 – R&D environmental protection
	05.6 – Environmental protection NEC
06 – Housing and community amenities	06.1 – Housing development
	06.2 – Community development
	06.3 – Water supply
	06.4 – Street lighting
	06.5 – R&D housing and community amenities
	06.6 – Housing and community amenities NEC

Note: NEC = not elsewhere classified; R&D = research and development.

The Classification of Environmental Protection Activities and Expenditure (CEPA) and Classification of Resource Management Activities and Expenditure (CRMA) together provide an alternative functional framework that can be used to classify expenditure.

¹¹ The full COFOG framework is detailed in Eurostat, 2019.

CEPA is a statistical classification that categorises activities aimed at preventing, reducing or eliminating pollution or other forms of environmental degradation.

CEPA is complemented by CReMA, which classifies activities aimed at enhancing or maintaining natural resource stocks. Both CEPA and CReMA have first-level classes that delineate broad category groupings and a second level that provides a more granular level of disaggregation (see Tables 3 and 4 respectively).

Table 3: Classification of Environmental Protection Activities and Expenditure framework.

First level	Second level (if applicable)
1. Protection of ambient air and climate	1.1 Prevention of pollution through in-process modifications 1.2 Treatment of exhaust gases and ventilation air 1.3 Monitoring and measurement and similar 1.4 Other activities
2. Wastewater management	2.1 Prevention of pollution through in-process modifications 2.2 Sewerage networks 2.3 Wastewater treatment 2.4 Treatment of cooling water 2.5 Monitoring and measurement and similar 2.6 Other activities
3. Waste management	3.1 Prevention of pollution through in-process modifications 3.2 Collection and transport 3.3 Treatment and disposal of hazardous waste 3.4 Treatment and disposal of non-hazardous waste 3.5 Monitoring and measurement and similar 3.6 Other activities
4. Protection and remediation of soil and water	4.1 Prevention of pollutant infiltration 4.2 Cleaning up of soil and water bodies 4.3 Protection from erosion and other degradation of soil and water 4.4 Prevention and remediation of soil and groundwater salinity 4.5 Monitoring and measurement and similar 4.6 Other activities
5. Noise and vibration abatement	5.1 Preventive in-process modifications at the source 5.2 Construction of anti-noise/anti-vibration facilities 5.3 Monitoring and measurement and similar 5.4 Other activities

6. Protection of biodiversity and landscapes	6.1 Protection and rehabilitation of species and their habitats 6.2 Protection of natural and semi-natural landscapes 6.3 Monitoring and measurement and similar 6.4 Other activities
7. Protection against particle radiation	7.1 Protection of ambient media 7.2 Transport and treatment of high-level radioactive waste 7.3. Monitoring and measurement and similar 7.4 Other activities
8. Research and development	–
9. Other environmental protection activities	9.1 General environmental administration, management and regulation 9.2 Education, training and information 9.4 Activities not elsewhere classified

Note: The nonsequential ordering of second-level categories in the ninth classification is a result of revisions to the CEPA framework and is intentional.

Table 4: Classification of Resource Management Activities and Expenditure framework.

First level	Second level (if applicable)
10. Management of water	
11. Management of forest resources	11a Sustainable management of forest areas 11b Minimisation of the intake of timber resources
13. Management of energy resources	13a Production of energy from renewable sources 13b Heat/energy saving and management 13c Minimisation of the intake of fossil energy resources as raw material
14. Management of minerals	
15. Research and development activities for resource management	
16. Other resource management activities	

Note: The nonsequential ordering of first-level categories is a result of revisions to the CReMA framework and is intentional.

Note that Table 5 shows how the different functional and thematic approaches align. An important benefit of disaggregating expenditure by environmental reporting theme and related outcomes is that it provides a direct and explicit link between what we know about the state of the environment (via state of the environment reporting) and a government's revealed expenditure priorities as they emerge from the budget process.

Domains	Themes	Issues	Suggested refinements to domains	Outcomes	CEPA/CReMA classes directly relevant to Environment Aotearoa 2019 themes and issues	CEPA/CReMA classes consistent with Environment Aotearoa 2019 theme only	COFOG divisions and groups
Freshwater/air	3. Pollution from our activities	4. Our waterways are polluted in farming areas	Pollution and waste	Reducing pollution and waste	CEPA 4. Protection and remediation of soil and water		05 – Environmental protection 05.3 – Pollution abatement
		5. Our environment is polluted in urban areas			CEPA 1. Protection of ambient air and climate CEPA 2. Wastewater management CEPA 4. Protection and remediation of soil and water		
Freshwater	4. How we use our freshwater and marine resources	6. Taking water changes flows, which affects our freshwater ecosystems	Freshwater and marine environment	Improving Aotearoa's land and freshwater, including sustainable management of resources	CReMA 10. Management of water		06 – Housing and community amenities 06.3 – Water supply
Marine		7. The way we fish is affecting the health of our ocean environment		Improving Aotearoa's coastal and marine environment, including sustainable management of resources	CEPA 6. Protection of biodiversity and landscapes		04 – Economic affairs 04.2 – Agriculture, forestry, fishing and hunting
Atmosphere and climate	5. Our changing climate	8. New Zealand has high greenhouse gas emissions per person	Climate change and variability	Reducing greenhouse gas emissions	CEPA 1. Protection of ambient air and climate		05 – Environmental protection 05.3 – Pollution abatement

Domains	Themes	Issues	Suggested refinements to domains	Outcomes	CEPA/CRReMA classes directly relevant to Environment Aotearoa 2019 themes and issues	CEPA/CRReMA classes consistent with Environment Aotearoa 2019 theme only	COFOG divisions and groups
		9. Climate change is already affecting Aotearoa New Zealand					
No direct correspondence with environmental reporting domains, themes, issues and outcomes.							
				Improving the efficiency and effectiveness of institutions designed to manage human interventions in the environment	CEPA first-level categories CEPA 8. Research and development CEPA 9. Other environmental protection activities	CEPA first-level categories CEPA 8. Research and development CEPA 9. Other environmental protection activities	COFOG groups 04 – Economic affairs 04.8 – R&D economic affairs 05 – Environmental protection 05.5 – R&D environmental protection 05.6 – Environmental protection NEC
					CRReMA first-level categories CRReMA 15. Research and development activities for resource management CRReMA 16. Other resource management activities		

Note: NEC = not elsewhere classified; R&D = research and development.

Data quality

Once categorised, each appropriation was assigned two data quality ratings to reflect relevant quality dimensions with respect to the identification and categorisation of appropriations. The results of this analysis disaggregated by data quality ratings are presented in the next section.

Conceptual relevance

The first data quality criteria, conceptual relevance, was used to assess how consistent the appropriation was with the definition of environmental expenditure. Although SEEA provided the initial conceptual framing for this analysis, both CEPA and CReMA provided more practical guidance in the form of specific examples of activities within and outside the scope of these definitions.

While not exhaustive, these example activities were used to guide and assess whether an appropriation was consistent with environmental protection or resource management activities.¹⁵ However, using such an approach imposes a set of pre-established definitions that exclude activities a broader interpretation or understanding of environmental spending may include. Accordingly, each appropriation was assigned one of two ratings.

- An appropriation was classified as narrow if it appeared to be consistent with the activities that were listed as being within the scope of the CEPA and CReMA frameworks.
- An appropriation was classified as broad if the activity was excluded under CEPA/CReMA but was still relevant from an environmental protection or resource management perspective.

For example, afforestation and reforestation with invasive tree species are deemed to be outside the scope of CReMA.¹⁶ However, adhering to these guidelines would likely exclude forestry-related appropriations administered by the Ministry for Primary Industries. Accordingly, appropriations related to forestry were included and classed under the broad rating.

Assessing appropriations based on this broad/narrow distinction consistent with the CEPA and CReMA frameworks provides additional analytical flexibility for interpreting results. If adherence to a generally accepted framework or more conservative estimate is required, then using the narrow estimate of expenditure would be appropriate. If a more comprehensive estimate of environmental expenditure is needed, then the broader estimate of expenditure should be used. Note that the broader estimate of environmental expenditure forms the basis of all the results presented both in chapter three of *Environmental reporting, research and investment* and in this document.

Confidence rating

The second data quality criteria assessed how confident we were that each appropriation was related to either environmental protection or resource management functions. The use of a confidence rating was required because of the somewhat ambiguous and general nature of the appropriation scope statements that formed the basis of this analysis.

¹⁵ For the full list of activities that are included and excluded from CEPA and CReMA, see Eurostat, 2020.

¹⁶ Eurostat, 2020, p.42.

While many appropriations referenced a specific environmental protection or resource management activity, other appropriations were less clear. Some appropriations referred to both environmental and non-environmental activities or only referenced very generic environmental objectives. Assigning a confidence assessment to each appropriation provides a way to account for this ambiguity and communicate the level of uncertainty associated with both the identification and categorisation of environmental expenditure.

Table 6 provides a more detailed overview of the assessment ratings and criteria used to label each appropriation. Ultimately, however, the final rating assigned to each appropriation involved a degree of subjective judgement. Note that the final estimates of environmental expenditure presented in chapter three of *Environmental reporting, research and investment* and in this document include all appropriations regardless of confidence rating.

Table 6: Confidence levels used to assess environmental appropriations and assigned categories.

Category	Description	Criteria
High	High level of confidence that the appropriation relates to the environment.	The appropriation scope statement makes specific reference to an environmental protection or resource management activity and this activity is the sole objective of the appropriation. OR The appropriation description is generic but is administered by an agency that is primarily engaged in the production of environmental quality (e.g. capital expenditure or general regulatory and administrative functions).
Medium	Medium level of confidence that the appropriation relates to the environment.	The appropriation description references a specific environmental protection or resource management activity but the appropriation appears to relate to multiple activities (making it difficult to determine the extent to which the appropriation is environmentally related).
Low	Low level of confidence that the appropriation relates to the environment.	The appropriation description references a generic environmental activity (e.g. “sustainable economy”) but provides no specific details. OR The appropriation appears to be only vaguely related to the environment.

Results

This section presents the results of our analysis of appropriations data, including headline estimates of environmental expenditure, together with additional results not included in chapter three of *Environmental reporting, research and investment: Do we know if we're making a difference?*

Primary results

In total, central government expenditure on the environment was estimated to be \$2.6 billion for the year ending 30 June 2020.¹⁷ This equates to 2.0% of central government spending authorised through appropriations for that year. Figure 1 shows this estimate of expenditure relative to other broad areas of government spending.

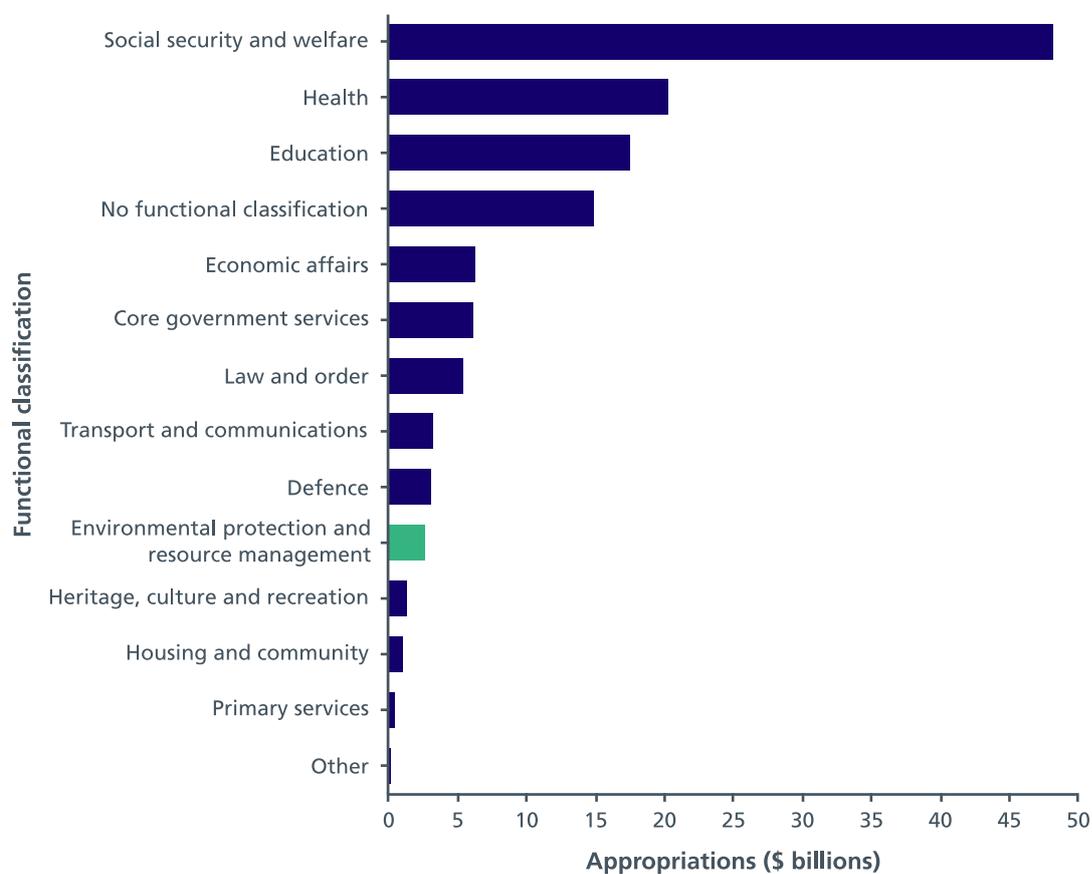


Figure 1: Total central government expenditure, disaggregated by function for the year ended June 2020. Relative to other functions, government spending on the environment represents a tiny fraction of total expenditure.

Table 7 shows the results disaggregated by enduring and specific environmental outcome. Of the \$2.6 billion of expenditure identified, about \$815 million was allocated towards reducing greenhouse gas emissions. A further \$613 million was allocated towards improving Aotearoa’s biodiversity and ecosystem functioning and resilience.

¹⁷ This estimate includes about \$357 million of expenditure that appeared to be only marginally related to the environment. It also includes an appropriation of about \$650 million related to the allocation of New Zealand Units to eligible sectors of the economy that are subject to the New Zealand Emissions Trading Scheme.

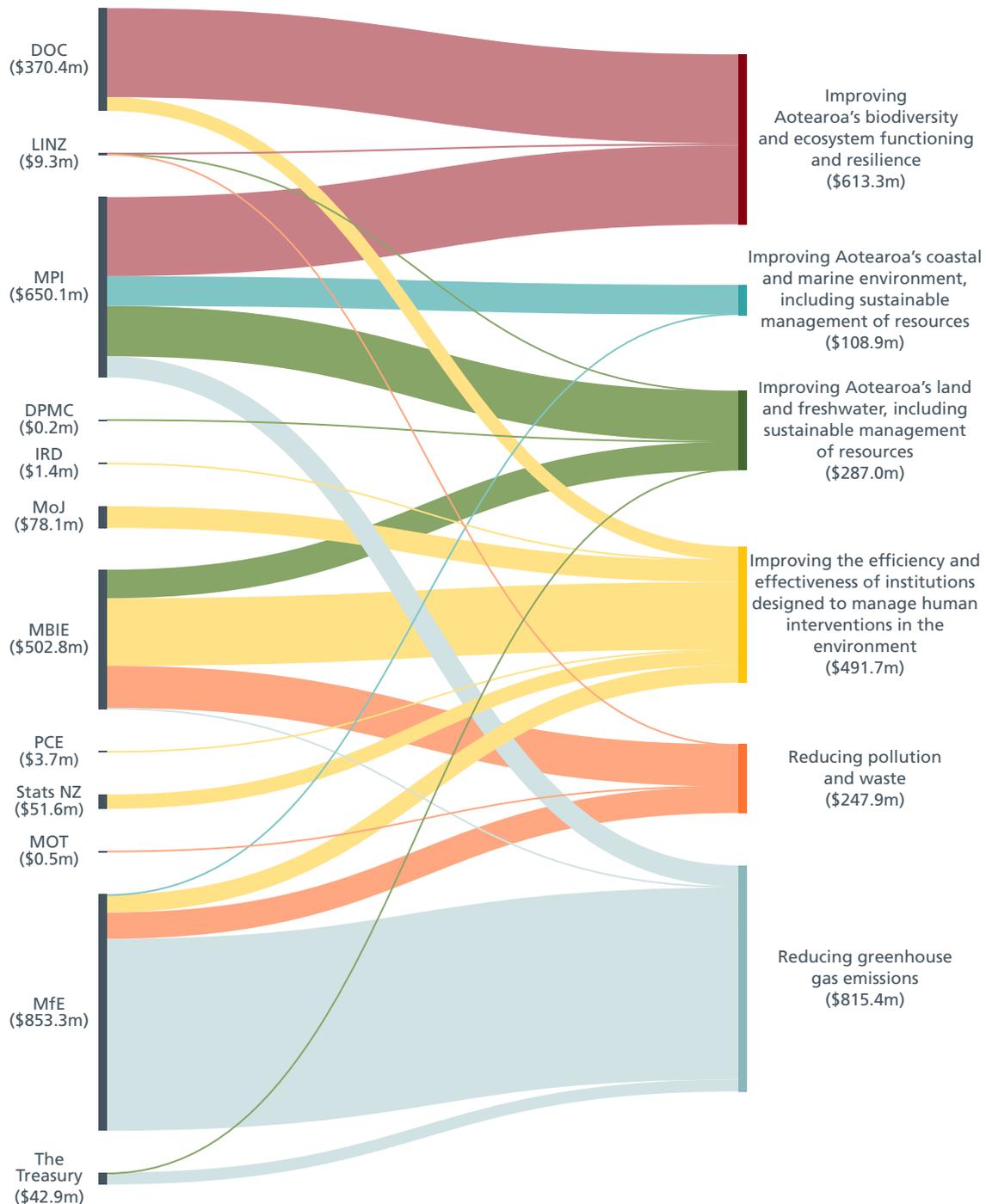
Table 7: Disaggregation of environmental expenditure by enduring and specific outcomes.

Environmental expenditure 2020	Sum of amount \$ ('000)
Disaggregated by enduring and specific outcomes	
Reducing greenhouse gas emissionsⁱ	\$815,411
New Zealand's per person emissions are declining	\$813,326
Indeterminate	\$2,085
Improving Aotearoa's biodiversity and ecosystem functioning and resilience	\$613,337
Our native plants, animals and ecosystems are thriving	\$613,337
Improving the efficiency and effectiveness of institutions designed to manage human interventions in the environment	\$491,722
–	\$491,722
Improving Aotearoa's land and freshwater, including sustainable management of resourcesⁱⁱ	\$287,021
Land management is improved to enhance soil and water quality	\$168,904
Mineral and energy resources are managed sustainably	\$102,908
Management of water takes is improved to ensure sustainability of our freshwater ecosystems	\$15,209
Reducing pollution and waste	\$247,885
Indeterminate	\$152,428
Pollution in farming areas is reduced and waterways in farming areas are cleaned up	\$52,484
Waste and pollution in urban areas are reduced	\$42,973
Improving Aotearoa's coastal and marine environment, including sustainable management of resources	\$108,897
Fish stocks are managed sustainably to improve the health of our oceans	\$107,291
Indeterminate	\$1,606
Total	\$2,564,273

Notes:

- i The analysis of appropriations did not identify any expenditure related to the specific outcome 'New Zealand is effectively adapting to the impacts of climate change'.
- ii The analysis of appropriations did not identify any expenditure related to the specific outcome 'urban growth is managed without affecting versatile land and native biodiversity'.

Figure 2 links environmental expenditure to the agencies that administer it. This provides an indication of the magnitude of spending across various agencies and the outcomes this spending is being directed towards.



Note: DOC = Department of Conservation; DPMC = Department of the Prime Minister and Cabinet; IRD = Inland Revenue; LINZ = Land Information New Zealand; MBIE = Ministry of Business, Innovation and Employment; MfE = Ministry for the Environment; MoJ = Ministry of Justice; MOT = Ministry of Transport; MPI = Ministry for Primary Industries; PCE = Parliamentary Commissioner for the Environment.

Figure 2: Environmental expenditure by government agencies attributed to enduring environmental outcomes. The left side of the figure provides a sense of total environmental spending; the right side provides a sense of where that spending is focused. Flows capture the contributions of individual agencies.

Additional results

Here we present additional results disaggregated by data quality variables and other classification frameworks that can be used to categorise expenditure. The estimates should be regarded as supplementary to and consistent with the preceding estimates and those presented in chapter three of *Environmental reporting, research and investment*.

Data quality: conceptual relevance

Table 8 shows the total estimate of environmental expenditure disaggregated according to conceptual relevance. About \$2.1 billion of environmental expenditure was consistent with the activities deemed to be within the scope of CEPA/CreMA. Approximately \$457 million was directed towards activities that did not fall within the scope of CEPA/CreMA but was consistent with a broader interpretation of environmental expenditure.

Table 8: Environmental expenditure disaggregated by conceptual relevance.

Environmental expenditure 2020	Sum of amount \$ (000)
Disaggregated by conceptual relevance	
Narrow	\$2,107,403
Broad	\$456,870
Total	\$2,564,273

Data quality: confidence rating

Table 9 shows environmental expenditure disaggregated by confidence rating. About \$1.6 billion of expenditure was assigned a high confidence rating, whereas about \$357 million was assessed as having a low confidence rating. This expenditure consisted of appropriations that reference environmental protection or resource management activities in very general terms. This includes a diverse array of appropriations relating to scientific research, the operation of the Environment Court and other miscellaneous administrative and regulatory expenses.

Table 9: Environmental expenditure disaggregated by assessed confidence rating.

Environmental expenditure 2020	Sum of amount \$ (000)
Disaggregated by assessed confidence rating	
High	\$1,569,362
Medium	\$637,631
Low	\$357,280
Total	\$2,564,273

Thematic classification: environmental reporting domains

Table 10 provides an overview of environmental expenditure disaggregated according to environmental reporting domains. Approximately \$746 million could not be allocated to a specific domain. This expenditure included appropriations related to more generic regulatory and administrative functions or issues that do not neatly align with a particular domain (e.g. management of energy and mineral resources).

Table 10: Environmental expenditure disaggregated by environmental reporting domains.

Environmental expenditure 2020	Sum of amount \$ (000)
Disaggregated by environmental reporting domains	
Atmosphere and climate	\$815,411
Biodiversity*	\$613,337
Freshwater	\$73,567
Land	\$206,098
Marine	\$109,389
Indeterminate	\$746,471
Total	\$2,564,273

* Biodiversity is regarded as a cross-cutting domain and is included in reports where appropriate.

Thematic classification: Environment Aotearoa 2019 themes and issues

Table 11 shows expenditure disaggregated according to the themes and priority issues used to structure Environment Aotearoa 2019.

Table 11: Environmental expenditure disaggregated by Environment Aotearoa 2019 themes and associated issues.

Environmental expenditure 2020	Sum of amount \$ (000)
Disaggregated by Environment Aotearoa 2019 themes and associated issues	
1. Our ecosystems and biodiversity	\$613,337
1. Our native plants, animals and ecosystems are under threat	\$613,337
2. How we use our landⁱ	\$161,118
2. Changes to the vegetation on our land are degrading the soil and water	\$136,083
Indeterminate	\$25,035
3. Pollution from our activities	\$255,671
4. Our waterways are polluted in farming areas	\$58,358
5. Our environment is polluted in urban areas	\$42,973
Indeterminate	\$154,340
4. How we use our freshwater and marine resources	\$124,106
6. Taking water changes flows, which affects our freshwater ecosystems	\$15,209
7. The way we fish is affecting the health of our ocean environment	\$107,291
Indeterminate	\$1,606
5. Our changing climateⁱⁱ	\$815,411
8. New Zealand has high greenhouse gas emissions per person	\$813,326
Indeterminate	\$2,085
Indeterminate	\$594,630
Total	\$2,564,273

Notes:

- i The analysis of appropriations did not identify any expenditure related to the third issue, 'urban growth is reducing versatile land and native biodiversity'.
- ii The analysis of appropriations did not identify any expenditure related to the ninth issue, 'climate change is already affecting Aotearoa New Zealand'.

Thematic classification: PCE-suggested themes and priority issues from Environment Aotearoa 2019

Table 12 disaggregates expenditure using a hybrid approach that combines the themes suggested in our review of the environmental reporting system and the priority issues contained in Environment Aotearoa 2019.

Table 12 highlights some of the tension involved in categorising expenditure according to general environmental themes and issues. For example, expenditure relating to the management of pollution can be categorised according to the specific receiving environment (e.g. freshwater and the marine environment) or a more generic category relating to the generation of pollution and waste products (e.g. pollution and waste).

In practice, this tension was addressed by apportioning expenditure according to whether the appropriation related to resource management or environmental protection functions. Accordingly, expenditure related to environmental protection was primarily categorised under the following themes: biodiversity and ecosystem functioning; climate change and variability; and pollution and waste. Expenditure relating to natural resource management was allocated to freshwater and the marine environment (freshwater and fish stocks), land (soil and forestry stocks) and energy and minerals (energy and mineral stocks).

Table 12: Environmental expenditure disaggregated by PCE-suggested themes and priority environmental issues.

Environmental expenditure 2020	Sum of amount \$ (000)
Disaggregated by PCE-suggested themes and Environment Aotearoa 2019 priority issues	
Biodiversity and ecosystem functioning	\$613,337
1. Our native plants, animals and ecosystems are under threat	\$613,337
Climate change and variabilityⁱ	\$815,411
8. New Zealand has high greenhouse gas emissions per person	\$813,326
Indeterminate	\$2,085
Freshwater and marine environment	\$124,106
6. Taking water changes flows, which affects our freshwater ecosystems	\$15,209
7. The way we fish is affecting the health of our ocean environment	\$107,291
Indeterminate	\$1,606
Landⁱⁱ	\$163,030
2. Changes to the vegetation on our land are degrading the soil and water	\$136,083
Indeterminate	\$26,947
Pollution and waste	\$253,759
4. Our waterways are polluted in farming areas	\$58,358
5. Our environment is polluted in urban areas	\$42,973
Indeterminate	\$152,428
General administrative, training, research, education, management and regulatory functions	\$491,722
–	\$491,722
Energy and minerals	\$102,908
–	\$102,908
Total	\$2,564,273

Notes:

- i The analysis of appropriations did not identify any expenditure related to the ninth issue, 'climate change is already affecting Aotearoa New Zealand'.
- ii The analysis of appropriations did not identify any expenditure related to the third issue, 'urban growth is reducing versatile land and native biodiversity'.

Functional classification: COFOG

Table 13 presents estimates of environmental spending disaggregated by the COFOG framework at both division and group levels. Under COFOG, environmental protection spending is captured under the environmental protection division. By contrast, resource management expenditure was captured across multiple divisions.

Table 13: Environmental expenditure disaggregated by the COFOG framework.

Environmental expenditure 2020	Sum of amount \$ (000)
Disaggregated by COFOG framework	
04 – Economic affairs	\$303,654
04.2 – Agriculture, forestry, fishing and hunting	\$244,305
04.21 – Agriculture	\$15,000
04.22 – Forestry	\$122,083
04.23 – Fishing and hunting	\$107,222
04.3 – Fuel and energy	\$38,565
Indeterminate	\$38,565
04.4 – Mining, manufacturing and construction	\$19,584
04.41 – Mining of mineral resources other than mineral fuels	\$19,584
04.8 – R&D economic affairs	\$1,200
04.83 – R&D fuel and energy	\$1,200
05 – Environmental protection	\$2,210,762
05.1 – Waste management	\$41,792
05.3 – Pollution abatement	\$1,017,387
05.4 – Protection of biodiversity and landscape	\$613,406
05.5 – R&D environmental protection	\$270,706
05.6 – Environmental protection NEC	\$267,471
06 – Housing and community amenities	\$49,857
06.1 – Housing development	\$49,648
06.3 – Water supply	\$209
Total	\$2,564,273

Note: NEC = not elsewhere classified; R&D = research and development.

Functional classification: CEPA and CReMA

Table 14 presents the estimate of environmental expenditure disaggregated by the CEPA and CReMA frameworks. Relative to COFOG, CEPA and CReMA provide a more detailed and granular assessment of environmental protection and resource management expenditure.

Table 14: Environmental expenditure disaggregated by CEPA and CReMA.

Environmental expenditure 2020	Sum of amount \$ (000)
Disaggregated by CEPA and CReMA	
Environmental protection	\$2,317,984
1. Protection of ambient air and climate	\$794,598
1.3 Monitoring and measurement and similar	\$3,458
1.4 Other activities	\$791,140
3. Waste management	\$41,792
3.6 Other activities	\$41,792
4. Protection and remediation of soil and water	\$227,853
4.1 Prevention of pollutant infiltration	\$151,841
4.2 Cleaning up of soil and water bodies	\$7,642
4.3 Protection from erosion and other degradation of soil and water	\$44,755
4.6 Other activities	\$23,615
6. Protection of biodiversity and landscapes	\$720,628
6.1 Protection and rehabilitation of species and their habitats	\$536,153
6.2 Protection of natural and semi-natural landscapes	\$1,586
6.4 Other activities	\$182,420
Indeterminate	\$469
8. Research and development	\$264,793
9. Other environmental protection activities	\$268,320
9.1 General environmental administration, management and regulation	\$84,154
9.2 Education, training and information	\$61,799
9.4 Activities not elsewhere classified	\$122,367
Resource management	\$246,289
10. Management of water	\$15,209
11. Management of forest resources	\$122,083
11a Sustainable management of forest areas	\$14,899
Indeterminate	\$107,184
13. Management of energy resources	\$82,124
13a Production of energy from renewable sources	\$2
13b Heat/energy saving and management	\$79,724
Indeterminate	\$2,398
14. Management of minerals	\$19,584
15. Research and development activities for resource management	\$1,200
16. Other resource management activities	\$6,089
Total	\$2,564,273

Consistency

In addition to the results compiled using the method described above, Box 3.3 in chapter three of *Environmental reporting, research and investment* presents several alternative estimates of environmental spending from various sources. It is important to note that due to differences in data sources and method, direct comparisons between these estimates should be avoided.

The estimate of environmental protection expenditure from Stats NZ uses accounting principles and conventions from the SEEA framework. This framework integrates environmental and economic information using accounting standards and classifications consistent with the System of National Accounts. Accordingly, expenditure estimates are presented in the form of final consumption expenditure and are compiled on a different basis relative to expenditure authorised through appropriations. In addition, the scope of these estimates is limited to environmental protection expenditure. Our estimate includes spending related to both environmental protection and resource management activities.

The coverage and method used to compile estimates of central government expenditure under the SEEA framework differ from our own. The data underpinning the Stats NZ estimate of central government expenditure are sourced from government financial statistics. Coverage is restricted to expenditure incurred by agencies whose primary purpose relates to environmental protection.¹⁸ This estimate is unable to be disaggregated by environmental function due to data quality considerations.¹⁹ In contrast, our estimate is broader in coverage and includes appropriations administered by government agencies that have multiple functions and responsibilities.

Estimates of local government expenditure compiled under SEEA are derived from a survey of regional councils, unitary authorities, city councils and district councils. Financial information is collected by activity and is disaggregated according to functional categories.²⁰ As a result of differences in institutional coverage, data and method, estimates of local government expenditure should not be compared or aggregated with our estimate of central government spending.

The Treasury's estimate of environmental protection spending using appropriation data is derived from the same data source as the results presented here. The Treasury assigns each appropriation a functional classification according to broad areas of government activity. Accordingly, this estimate provides a high-level aggregate account of environmental protection spending.

Even though our estimate uses the same data source, its coverage differs in several respects to ensure consistency with the definition of environmental expenditure used for this analysis. Our estimate includes various primary industry-related appropriations concerning the management of natural resource stocks (fisheries and forestry) and environmental protection. Expenditure relating to the management of mineral and energy resources is also included. Appropriations administered by the Department of Conservation related to recreational spending and historic heritage have been excluded.

¹⁸ Expenditure sourced from government finance statistics is classified by Stats NZ according to the COFOG framework. Accordingly, this estimate is based on the expenditure of those agencies that has been classified under the Environmental Protection COFOG category.

¹⁹ Stats NZ, 2020.

²⁰ Estimates of local government environmental protection expenditure include spending on five environmental protection categories: wastewater; solid waste/refuse; air and water quality; land and soil management; and river control and pest management (Stats NZ, 2020).

The estimate of environmental research funding presented in *A review of funding and prioritisation of environmental research in New Zealand* was compiled using a different approach from the one for the present estimate.²¹ The review developed an estimate of research funding using data supplied from various agencies, including regional councils. The Australian and New Zealand Standard Research Classification framework was used to categorise funding based on broad environmental classes. Depending on the definition used, investment in environmental research ranged from \$427 million to \$516 million.

In terms of consistency, the estimate of environmental expenditure presented here includes appropriations related to the funding of environmental research. However, some appropriations linked to funding programmes identified in our previous estimate of research funding were excluded based on the contents of their scope statement. In these instances, the appropriation description did not contain a specific reference to environmental research. The exclusion of these appropriations creates a potentially significant discrepancy between the two sets of estimates. Accordingly, our previous estimate of environmental research funding should not be directly compared with or considered a subset of this broader estimate of environmental spending.

Limitations

Both the method and the underlying data bring with them important limitations. Accordingly, the numbers presented both in chapter three of *Environmental reporting, research and investment* and in this document should not be regarded as a definitive or precise estimate of environmental expenditure.

One limitation potentially stems from the definition of environmental expenditure employed for this analysis. Conceptually, this estimate is not of environmental expenditure in a general sense but of environmental protection and resource management expenditure. Accordingly, the analysis does not include appropriations that could be considered environmentally beneficial in terms of indirect impacts (e.g. appropriations related to certain types of transport infrastructure). Identifying appropriations based on environmental impacts is more closely associated with 'green budgeting' practices and is beyond the scope of this exercise.²²

A key limitation of the analysis relates to the often vague and general nature of the scope statements that describe the appropriations. Appropriations were identified and categorised based on these statements and supporting information contained in the relevant Vote documents. However, the limited and general nature of this information ensured an inherent degree of imprecision (and subjectivity) was present in the process of identifying and categorising appropriations.

²¹ PCE, 2020.

²² For additional details regarding green budgeting, see OECD, 2021.

It should be noted that there were also issues associated with categorising appropriations according to the various thematic and functional approaches. These issues have two main causes.

- The nature of the appropriation description is vague relative to the more detailed and precise nature of the classification frameworks. While we can have a high level of confidence in the classifications of appropriations at the broad category level (e.g. COFOG division level and CEPACReMA first-level categories), assessment confidence decreases as appropriations are assessed and categorised at a more granular level. A similar issue also applies to categorising appropriations according to Environment Aotearoa 2019 priority issues. The generic description of each appropriation often ensures that it does not neatly align with the very specific nature of the priority issues reported.
- The functional classifications (i.e. CEPACReMA and COFOG) have been developed by international agencies and there are issues relating to their transferability to the New Zealand context. These issues include an existing emphasis on categories relating to industrial pollution (e.g. vibration, noise, hazardous waste and radiation), which appear to be well developed conceptually. In contrast, categories relating to pollution and degradation from agricultural and primary sector activities appear to be less well developed conceptually.

It is difficult to determine whether the results derived from this analysis represent an underestimate or overestimate of the real extent of environmental expenditure. There are two factors that make the impact of this error ambiguous in terms of direction and magnitude, at least at the whole of government level.

- The scope statements associated with many environmentally relevant appropriations reference multiple activities without any indication of relative weighting. The inclusion of these appropriations will overestimate environmental spending as no attempt was made to adjust the appropriated amounts to reflect the relevant share of expenditure. In these cases, we do not know what share of an appropriation was actually spent on environmental protection or resource management activities.
- To the extent that environmental spending was incurred against appropriations that had generic descriptions, these appropriations will have been omitted from the analysis by the initial screening process. This could potentially result in a significant undercount of environmental protection and resource management spending. This issue may be particularly pronounced for agencies with multiple responsibilities, as environmental activities are often incurred against generic appropriations intended to fund a range of different functions.

Conclusion

This document has provided an overview of the general method used to compile the estimate of environmental spending and presented additional results. While these results reflect an attempt to provide a more comprehensive and systematic estimate of environmental spending, the accompanying limitations should not be downplayed. Therefore, these estimates should be interpreted with caution.

Regarding the capacity of existing systems to enable parliamentary and public scrutiny and accountability, these limitations represent an important finding. If it is difficult to categorise appropriations as environmental spending using publicly available information (and even more so their correspondence to broad areas of the environment, priority issues or environmental outcomes), then it is surely difficult for parliamentarians and the public to scrutinise public expenditure or hold governments to account for their spending.

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October 2022

ISBN

978-0-947517-32-8 (print)
978-0-947517-33-5 (electronic)

