

In Confidence

Office of the Minister for the Environment

Office of the Minister of Statistics

Chair, Cabinet Economic Growth and Infrastructure Committee

Policy approval for proposed topics for the regulations under the Environmental Reporting Act 2015

Proposal

1. We are seeking final policy approval for proposed topics to be set in regulations under the Environmental Reporting Act 2015, which will identify the areas of interest to be covered in reports produced under that Act.

Executive summary

2. The Environmental Reporting Act 2015 (the Act) was passed in September 2015 and mandates regular, independent reporting on the state of New Zealand's environment. Before reporting under the Act can begin, topics for reporting must be set in the environmental reporting regulations.
3. The proposed regulations will comprise a list of topics that the Ministry for the Environment and Statistics New Zealand can report on under the Act. This paper outlines our final recommended pressure and state topics for each of the five environmental domains and the impact topics for all domains, aligning with the reporting framework established by the Act.
4. The Act outlines three criteria to ensure the topics are relevant and are able to be measured using robust statistical methods. The Act also requires that the public be consulted when developing topics. We are confident that the final proposed topics, set out in paragraph 17, meet the criteria set out in the Act and take into account views of submitters.
5. We consider that as well as meeting the requirements of the Act, the topics are broad enough to provide direction without limiting the independence of the reports, and will ensure that reports cover issues relevant to New Zealanders.
6. We recommend that the committee agree to the proposed final topics and authorise the Minister for the Environment and Minister of Statistics to issue drafting instructions to the Parliamentary Counsel Office to give effect to the decisions in this paper.
7. To assist with interpretation and application of the topics, non-statutory guidance will be issued by the Ministry for the Environment and Statistics New Zealand to support the proposed regulations.

Background

8. The Environmental Reporting Act 2015 (the Act) mandates regular, independent national reporting on the state of New Zealand's environment. For the purpose of environmental reporting, the Act organises the environment into five domains; air, atmosphere and climate, freshwater, land and marine. Under the Act, the Secretary for the Environment and the Government Statistician will jointly develop and publish a report on each of the domains every six months, and a synthesis report every three years
9. Topics for reporting must be set in regulations before reporting under the Act can begin. Recent environmental reports, *Environment Aotearoa 2015* and the *Air Domain Report 2014*, were produced in the spirit of, but not under, the Act. The first report that will be produced under the Act is the *Marine Domain Report*, in October 2016. The Act creates a joint regulation making power for the Minister for the Environment and Minister of Statistics (the Ministers) to recommend topics for reporting to be set in regulation.
10. Topics identify the key areas of interest for each of the domains, create consistency across domains, and ensure continuity of information over time. They also communicate the scope of environmental reporting and let people know what to expect in reports. Topics also bridge the gap between an environmental domain (set in legislation) and a statistic (set by the Government Statistician).
11. Under section 19 of the Act, topics are required to relate to:
 - a. the *state* of New Zealand's environment
 - b. *pressures* on the state of the environment that may be causing, or have the potential to cause, changes to the state of the Environment
 - c. *impacts* that the state of the environment and changes to the state of the environment may be having on the following matters:
 - i. ecological integrity; and
 - ii. public health; and
 - iii. the economy; and
 - iv. te ao Māori; and
 - v. culture and recreation.
12. The environmental reporting framework set by the Act does not include topics for 'response', ie, the government, business or social response to environmental issues raised through environmental reporting. This was a deliberate policy decision aimed at ensuring that environmental reporting remains separate from other, often more value-based, decision-making processes, and is therefore trusted as independent.
13. The proposed regulations will comprise a list of topics that the Ministry for the Environment (MfE) and Statistics New Zealand can report on under the Act. A description of the topics will not be included in regulation, so not to restrict the autonomy of the Government Statistician whose role is to decide on the measures for topics. This is fundamental to his or her duty to act independently, required under section 14 of the Act. MfE and Statistics New Zealand will

produce non-statutory guidance to support the proposed regulations and describe each topic.

14. Under section 19(3) of the Act, Ministers are required to consult with the Government Statistician, Parliamentary Commissioner for the Environment, iwi authorities, local authorities and the public prior to recommending regulations. Officials developed a list of proposed topics for consultation in 2015. The topics were informed by expert scientific advice from both within and outside the Ministry for the Environment.
15. In November 2015, Cabinet agreed to the Ministers releasing the “Topics for Environmental Reporting: Consultation Document” (EGI-15-Min-0125 refers). MfE and Statistics New Zealand consulted between 11 November and 23 December 2015, and received submissions from a broad range of submitters. This paper reports back on the results of this public consultation on the proposed topics, and provides our proposal for a list of topics to be set in regulation.

Comment

Proposed topics

16. The proposed topics are listed in the table below. The coverage of topics has not changed significantly from those that were consulted on, but we have rationalised and clarified some of the topics. We are confident that the final topics:
 - a. meet the requirements of the Act
 - b. cover all domains comprehensively and at the right level of detail
 - c. respond adequately to feedback from public consultation.
17. A description of each topic, including examples of possible measures which could be reported on under that topic, is included in Appendix 1. The guidance that will be issued by MfE and Statistics New Zealand will be based on those descriptions.

Final topics for environmental reporting regulations	
Air Domain	
Pressures from:	State of:
Human activities	Air quality, and concentrations of air pollutants
Climate and natural processes	
Physical form of the land environment	
Atmosphere and Climate Domain	
Pressures from:	State of:
Human activities generating greenhouse gases	Atmospheric properties
Human activities generating particulate matter	Climate
Land cover and use affecting the climate	UV intensity
Human activities generating ozone depleting substances	

Natural pressures on climate and atmosphere

Freshwater Domain

Pressures from:

Pests, diseases and exotic species
Resource use and management, and other human activities
Discharges and waste
Climate and natural processes
Physical form of the land and freshwater environment

State of:

Freshwater ecosystems and habitats
Freshwater species, taonga species and genetic diversity
Freshwater quality, quantity and flows

Land Domain

Pressures from:

Pests, diseases and exotic species
Resource use and management, and other human activities
Waste, effluent, and contaminants
Climate and natural processes
Physical form of the land environment

State of:

Land cover, ecosystems and habitats
Land species, taonga species and genetic diversity
Land and soil condition and suitability for use

Marine Domain

Pressures from:

Pests, diseases and exotic species
Resource use and management, and other human activities
Discharges, soil loss and waste
Climate and natural processes
Physical form of the marine environment

State of:

Marine ecosystems and habitats
Marine species, taonga species and genetic diversity
Marine water and sediment quality and ocean acidity
Sea level, temperature, and circulation

All domains

Impacts on:

Biodiversity and ecosystem processes
Public health
Economy
Mātauranga Māori, tikanga practice and kaitiakitanga
Customary use and mahinga kai
Sites of significance, including wāhi taonga and wāhi tapu
Culture and recreation

Topics meet legislative criteria

18. Section 19(2) of the Act sets out legal requirements for the topics to ensure that they are relevant, robust and focussed on what New Zealanders need to know about their environment. These requirements are that –
 - a. *pressure* or *impact* topics affect significant areas, resources, or numbers of people
 - b. topics are able to be measured with robust statistical methods

- c. *pressure* and *impact* topics are closely related to any *state* topic that it is asserted to affect or to give rise to that impact.

19. We are confident that the proposed final topics meet these criteria.

Topics cover all domains comprehensively and at the right level of detail

- 20. To ensure complete coverage of each domain, the topics we have recommended are quite broad. Setting topics too narrowly increases the risk of inadvertently creating gaps, which may mean relevant content cannot be included in the reports. The broad focus of the topics will also help ensure they are adaptable and durable, without requiring frequent revision.
- 21. We consider the topics will be practical and provide adequate direction to the Government Statistician, who has a statutory role to decide on measures for the topics, supporting the independence of reporting.
- 22. The coverage of the topics is comparable to that of national environmental reporting of other countries we have looked at, except that the New Zealand framework excludes 'response', which is included by many other jurisdictions.

Topics respond adequately to feedback from public consultation

- 23. A total of 47 submissions were received during the public consultation process. The majority of submitters who commented on the topics, including local government, iwi organisations, and industry and professional associations, gave general support for the proposed topics.
- 24. Many submissions suggested amendments to the proposed topics. These suggestions have been considered and amendments made where appropriate. The most common concern raised was a perceived lack of reporting on the interrelationships between domains. We intended that the reports themselves, and in particular the synthesis reports, will make clear links between domains to adequately capture the interrelationships.

Consultation

- 25. The following agencies were consulted on this paper: Ministry for the Environment, Statistics New Zealand: Te Puni Kokiri, Treasury, Department of Internal Affairs, Land Information New Zealand, Department of Conservation, Ministry of Transport, Ministry for Primary Industries, Ministry of Business, Innovation and Employment, and Ministry of Culture and Heritage. Departments did not have any comments that required changes to the topics.
- 26. The Department of the Prime Minister and Cabinet has been informed.

Financial implications

- 27. There are no financial implications resulting from the proposed topics for regulations under the Act.

Human rights

- 28. There are no human rights implications from this paper. We consider that the proposals are consistent with the New Zealand Bill of Rights Act 1990.

Legislative implications

29. This paper proposes regulations to be made under the Environmental Reporting Act 2015.
30. The commencement of the proposed regulations will also affect the timing of the commencement of the Environmental Reporting Act 2015. According to section 2, the Act will commence nine months after the date of Royal Assent (ie, 28 June 2016) or will be brought into force via Order in Council when the regulations are recommended, whichever is earlier. We recommend that the Act is brought into force via Order in Council along with the proposed regulations to ensure that both come into effect at the same time.

Regulatory impact analysis

31. A Regulatory Impact Statement has not been prepared for these proposals because the proposals will have no or only minor impacts on businesses, individual or not-for-profit entities. Under the Act there is no mechanism to require the collection of data (and therefore impose costs on data providers) to inform the topics. The Act focuses on using existing data collected by local government and other agencies, and therefore the compliance costs for implementing the Act will be minimal.

Publicity

32. To inform interested parties about the commencement of the proposed regulations and the publication of guidance, MfE and Statistics New Zealand will email those who submitted on the topics and other interested stakeholders.
33. To support transparent decision making, we will also make this paper publicly available from MfE's and Statistics New Zealand's websites, following the gazetting of the regulations.

Recommendations

34. The Minister for the Environment and the Minister of Statistics recommend that the Cabinet Economic Growth and Infrastructure Committee:
 - 1 note that the Minister for the Environment and Minister for Statistics consider that the statutory requirements for consultation as set out in section 19(3) and that the statutory criteria for topics as set out in section 19(2) of the Environmental Reporting Act 2015 are met for the proposed topics for environmental reporting
 - 2 agree that the final topics, as set out in the table in this paper, be set in regulations under the Environmental Reporting Act 2015
 - 3 authorise the Minister for the Environment and Minister of Statistics to issue drafting instructions to the Parliamentary Counsel Office to draft the regulations
 - 4 invite the Minister for the Environment and Minister of Statistics to report back to the Cabinet Legislation Committee in June 2016 with draft regulations

- 5 note that the Ministry for the Environment and Statistics New Zealand will produce non-statutory guidance to support the topics
- 6 note that the Minister for the Environment and Minister of Statistics will publish this paper on the Ministry for the Environment's website (and provide a link from the Statistics New Zealand's website) following Cabinet's decision on the proposed topics.

Authorised for lodgement

Hon Dr Nick Smith

Minister for the Environment

Hon Craig Foss

Minister of Statistics

Appendix 1. Final topics and descriptions.

Air pressure and state topics and topic descriptions

Pressure topics		
Topic		Examples of what could be covered by this topics
Pressures from:	Human activities	Emissions of air pollutants from human activities, including residential emissions (for example, burning wood or coal for home heating), transport, industrial activities, including forestry and agriculture.
	Climate and natural processes	Contribution of natural substances and meteorological conditions to New Zealand's air quality.
	Physical form of the land environment	Contribution of the shape of the land to the concentrations of air pollutants. This topic provides important context, but is unlikely to change significantly over time. Note that under the Act, 'pressure' means 'a natural or human-induced circumstance, factor, element, activity, or process'.
State topics		
Topic		Examples of what could be covered by the topic
State of:	Air quality, and concentrations of air pollutants	Concentrations of air pollutants in New Zealand that affect air quality, many of which can affect human health. This includes particulate matter in New Zealand's air: gases such as carbon monoxide, sulphur dioxide, nitrogen dioxide and ground-level ozone; metals, such as arsenic and lead; and organic compounds such as benzo(a)pyrene and benzene.

Atmosphere and climate pressure and state topics and topic descriptions

Pressure topics		
Topic		Examples of what could be covered by the topic
Pressures from:	Human activities generating greenhouse gases	Emissions of gases that absorb infrared radiation and contribute to the warming of the planet, including from energy use, agriculture, waste and industrial activities. Greenhouse gases include carbon dioxide, methane, and nitrous oxide.
	Human activities generating particulate matter	Emissions of particulate matter (can include both solid and liquid particulates) that can absorb light or heat and therefore affect climate. Examples are black carbon, trace elements such as heavy metals, salts (nitrates, sulphates, etc) and organic carbon compounds. These particles can be produced by activities such as ploughing, construction, quarrying and fuel combustion.
	Land cover and use	Land cover and use, for example through land-use change and forestry activities, can affect the exchange of greenhouse gases such as carbon dioxide between the land and the atmosphere.
	Human activities generating ozone depleting substances	Emissions of substances, such as CFCs, that can damage the ozone layer, which protects the Earth from UV rays, particularly over New Zealand.
	Natural pressures	The effect that natural pressures have on the state of New Zealand's atmosphere and climate. For example this may include: Land form Variations in atmospheric circulations, eg, El Niño Southern Oscillation, which are a major influence on our climate. Substances that absorb or scatter UV light, and therefore change the amount of

Pressure topics		
		<p>UV light that reaches New Zealand. Natural sources of these aerosols include wind erosion, forest fires and volcanic eruptions.</p> <p>Natural aerosols, particularly marine aerosols, can affect cloud formation, which affects climate.</p> <p>The intensity of the radiation from the sun that enters the stratosphere. This is dependent on the distance, location and orientation of the Earth relative to the sun.</p> <p>Sea temperature, which can influence how much moisture is taken up by the air, as well as atmospheric circulations.</p>
State topics		
Topic	Examples of what could be covered by the topic	
State of:	Atmospheric properties	This topic covers: concentrations of greenhouse gases in the atmosphere, such as carbon dioxide, methane, nitrous oxide and carbon monoxide; concentration of atmospheric ozone relevant to New Zealand; concentrations of particulate matter that absorb or scatter light and heat, or affect cloud formation, affecting our climate. Includes atmospheric clarity.
	Climate	Climate variables such as national average temperature, annual number of frosts days and warm days; precipitation (rainfall, snowfall, sleet and hail); sunshine hours; wind gusts; occurrence of extreme weather (eg, extreme wind, rainfall, and thunderstorms).
	UV intensity	Intensity of the UV radiation emitted from the sun.

Freshwater pressure and state topics and topic descriptions

Pressure topics		
Topic	Examples of what could be covered by the topic	
Pressures from:	Pests, diseases and exotic species	The occurrence and distribution of diseases and introduced and exotic species in the freshwater environment, including wetlands. This topic will cover introduced species, such as trout, that are not pests but have the potential to affect indigenous ecosystems and species, and indigenous species that have the potential to become pests.
	Resource use and management, and other human activities	<p>The pressures that resource use and management, and other human activities have on the state of the freshwater environment. For example:</p> <ul style="list-style-type: none"> • how catchment land use and management influences the condition of freshwater bodies in that catchment. For example, land use, irrigation and the extent of riparian protection influences pressures such as soil loss, run-off from land, including nutrients and contaminants. • abstractions and diversions of fresh water, which can reduce flows and change hydrology, affecting freshwater ecosystems • taking of freshwater species for recreational, commercial and customary uses. • physical modifications such as river straightening, diversions, hydro dams, underground piping/culverts, weirs and other barriers to fish passage.
	Discharges and waste	Discharges from industry, sewage treatment plants, stormwater and other sources, and run-off from agricultural land. Waste and litter from land that makes its way into the freshwater environment.
	Physical form of the land and	The landscape and form of freshwater catchments. This includes the shape of the

Pressure topics		
	freshwater environment	land (topography), geology and river morphology. This topic provides important context, but is unlikely to change significantly over time
	Climate and natural processes	Pressures on the freshwater environment from climatic and natural events such as rainfall, temperature, volcanic and seismic activity, natural erosion, and natural nutrient discharges from substrate.
State topics		
Topic		Examples of what could be covered by the topic
State of:	Freshwater ecosystems and habitats	Freshwater ecosystems and habitats (for example, condition of river beds and extent of wetlands)
	Freshwater species, taonga species and genetic diversity	Occurrence, abundance and genetic diversity of freshwater species (includes threatened species). Taonga species includes those valued for mahinga kai, eg, tuna.
	Freshwater quality, quantity and flows	Measures of freshwater quality, quantity (the volume of water), and flows (how quickly the water is flowing). Freshwater quality measures include the chemical condition of the water, for example concentrations of nutrients, such as nitrogen and phosphorus; salinity; the physical condition of the water, such as the amount and quality of sediment it carries and how clear it is; and the concentration of harmful organisms that contaminate water and can affect human and ecosystem health (for example, <i>Escherichia coli</i> (<i>E.coli</i>)). This topic covers extent of glacial ice, snow cover, and geothermal water quality and quantity.

Land pressure and state topics and topic descriptions

Pressure topics		
Topic		Examples of what could be covered by the topic
Pressures from	Resource use and management, and other human activities	The pressure placed on land by rural and urban land use and management, and the extraction and use of minerals and other resources.
	Waste, effluent, and contaminants	The pressure placed on land by solid and liquid wastes (both point source and diffuse), including hazardous waste and litter. The topic also covers the presence of heavy metals, such as cadmium, in soils, which in high concentrations can be toxic to humans.
	Pests, diseases and exotic species	The occurrence and distribution of exotic species, pests and diseases in the land environment. This topic may include exotic species that are not considered pests, but affect indigenous ecosystems and species, eg, deer, chamois and tahr.
	Climate and natural processes	Climatic conditions and natural events such as volcanic and seismic activity, which affect the condition, habitats and physical terrain of the land.
	Physical form of the land environment	The landform that underlies and shapes the land domain. Landform is a major factor in the extent and severity of erosion, ecosystem distribution and type, and vegetation cover. This topic provides important context, but is unlikely to change significantly over time
State topics		
Topic		Examples of what could be covered by the topic
State of	Land species, taonga species and genetic diversity	Occurrence, abundance and genetic diversity of terrestrial species (includes threatened species). Taonga species includes those valued for mahinga kai.

	Land cover, ecosystems and habitats	The extent and distribution of vegetation and other land cover in New Zealand, including indigenous forests, wetlands, peatlands, production forest, pasture, urban and infrastructure, and how this has changed over time. This topic will cover protection/conservation status, rare ecosystems (naturally uncommon ecosystems) and threatened ecosystems.
	Land and soil condition	Measures of soil erosion (both the extent of actual erosion and the susceptibility to erosion), soil health (the physical, biological and chemical condition of soils), and the uses different land types are suitable for.

Marine pressure and state topics and topic descriptions

Pressure topics		
Topic		Examples of what could be covered by the topic
Pressure from	Resource use and management, and other human activities	The pressure exerted on the marine environment through commercial, recreational and customary fishing; the extraction of resources such as oil, gas and minerals; non-extractive use such as shipping and recreation; modification of oceanic and coastal benthic habitats, eg, as a result of bottom trawling or coastal structures, such as a marina or seawalls.
	Discharges, soil loss and waste	Includes discharges into waterways and the sea (both point-source and diffuse), including nutrients and contaminants such as heavy metals; soil loss from land; and waste, litter and marine debris.
	Pests, diseases and exotic species	The occurrence and distribution of diseases and introduced and exotic species in the marine environment, including estuaries.
	Climate and natural processes	How climate and natural processes affect the marine environment, for example temperature and climate oscillations such as the El Niño Southern Oscillation, and extreme wave and storm events.
	Physical form of the marine environment	The physical form of the ocean floor, such as seamounts or trenches, and the type of benthic substrate. This topic provides important context, but is unlikely to change significantly over time
State topics		
Topic		Examples of what could be covered by the topic
State of	Marine species, taonga species, and genetic diversity	The numbers, distribution, range and conservation status and genetic diversity of marine species such as seabirds, fish, marine mammals, (including threatened species), invertebrates, plankton and algae. Taonga species includes those valued for mahinga kai.
	Marine ecosystems and habitats	The condition, distribution and range of marine ecosystems and habitats. Includes protection/conservation status of coastal and marine areas.
	Marine water and sediment quality and ocean acidity	The physical and chemical quality of water in oceanic, coastal and estuarine areas, including for example concentrations of contaminants such as heavy metals, water clarity, and ocean acidity.
	Sea level, temperature, and circulation	The physical and chemical properties of oceanic waters related to sea temperature, sea level (including frequency of sea level extremes), currents and waves.

Impact topics across all domains and topic descriptions

Impact topics	
Topic	Examples of what could be covered by the topic
Impacts on biodiversity and	The impact the state of the environment has on New Zealand's biodiversity and ecosystem

Impact topics	
Topic	Examples of what could be covered by the topic
ecosystem processes	<p>processes. For example:</p> <ul style="list-style-type: none"> air pollutants can settle and accumulate in habitats, such as heavy metals in waterways and alter ecosystem processes (air domain) rainfall influences how ecosystems are able to function because it affects the ability of plants to grow and support the wider ecosystem (atmosphere and climate domain) change in the conservation status of plant and animal species ecosystem functioning, such as food chains.
Impacts on public health	<p>The occurrence of health effects that are related to the state of the environment. For example:</p> <ul style="list-style-type: none"> the health effects (eg, respiratory irritation to some types of cancers) of New Zealand's air quality (air domain) the occurrence of skin cancers (which is related to UV exposure), the occurrence of salmonella and cryptosporidium and influenza (related to temperature) (atmosphere and climate domain) toxic algae and water-borne diseases such as <i>Campylobacter</i> and <i>Giardia</i> can have significant human health effects (freshwater domain) how the condition and management of land affects food safety, eg, through the presence of heavy metals and other contaminants in food (land domain) illness from faecal contamination of coastal areas or consuming shellfish affected by contamination or toxic algae (marine domain).
Economic impacts	<p>The impact the state of the environment has on natural resource value, availability and use, and industry and households in economic terms. For example:</p> <ul style="list-style-type: none"> measurement of the economic production of New Zealand, focusing on the aspects of New Zealand's primary industry that are strongly dependent on the atmosphere and climate, including agricultural production (atmosphere and climate domain) impacts on tourism and recreation, eg ski-field open days (atmosphere and climate domain) the effect of the freshwater environment on hydroelectricity generation, tourism and urban water use, including drinking water and industrial use (freshwater domain) the extent of highly productive soils available for food production (land domain) extent and availability of minerals, energy and other resources in all domains impacts on economic value of Maori-owned land (land domain) lost work days due to the health impacts of air quality (air domain) impacts on agricultural production and forestry in the primary industry sector, which are dependent on fresh water (freshwater domain) the monetary value of food produced on the land and the added value to the economy (land domain) the economic impacts caused by coastal erosion and storms that affect housing and infrastructure around the coastline (marine domain) impacts of pests and diseases on the economy
Mātauranga Māori, tikanga practice and kaitiakitanga	<p>How the state of the environment affects the ability to maintain, develop and transmit traditional Māori knowledge about the environment and maintain tikanga practice. The ability to pass on knowledge about the environment to the next generation through hands-on experiential learning and interactions with the environment is especially important.</p> <p>Tikanga practice involves traditional protocols and practices relating to the environment, such as the size of customary take of mahinga kai (traditional food) or the use of rāhui (closures). The retention and development of tikanga practice is important to Māori identity and well-being.</p> <p>Kaitiakitanga governs use (customary and otherwise) of resources and access to sites</p>

Impact topics	
<i>Topic</i>	<i>Examples of what could be covered by the topic</i>
	ensuring, among other things, the sustainability and integrity of the resources and sites.
Customary use and mahinga kai	How the state of the environment (and especially biodiversity and ecosystems) affects the ability of Maori to exercise customary use and access mahinga kai in land, coastal, marine and freshwater environments. This topic will measure access to these sites and their condition, and abundance of mahinga kai resources.
Sites of significance, including wāhi taonga and wāhi tapu	Extent, distribution and condition of sites that are significant from a cultural, historical, archaeological, recreational or ecological perspective, including sacred sites. Covers how the state of the environment affects the condition, integrity and access to these sites.
Impacts on culture and recreation	<p>The impact the state of the environment has on the cultural and recreational use of our environment, for example:</p> <ul style="list-style-type: none"> • through air clarity and visibility (air domain) • damage caused to heritage sites from extreme weather events (atmosphere and climate domain) • health risks for recreation, for example swimming, freshwater swimming closures or alerts, and popularity of freshwater activities such as freshwater fishing (freshwater domain) • fishing and boating (marine domain). • aesthetic and amenity value.