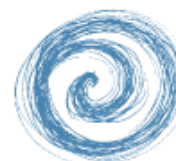


# OCEANS POLICY SECRETARIAT

WORKING PAPER ONE  
14 March 2003



**OCEANS POLICY**

## INFORMATION ISSUES

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## Introduction

1 The Government's Sustainable Development Programme of Action reflects a commitment to using the best information available to support decision-making, addressing risks and uncertainty when making choices, and taking a precautionary approach.

2 Good information, fit for purpose, is required to make sound decisions and underpin a sustainable development approach to our oceans. This paper examines the current management of our marine information and investigates some of the issues arising.

## Information outcomes for oceans

3 A fundamental part of the vision for our oceans is that New Zealanders understand marine life and processes. Without this understanding it will be difficult to achieve our goal of best value for the oceans – especially the aspects relating to wealth creation and protection and restoration of ecological integrity.

4 A key outcome for an Oceans Policy must therefore be a much better understanding of the highly dynamic, diverse and complex system we are trying to manage. This will involve collaboration by managers and users of marine information to promote better collection, management, sharing, access, use and interpretation of data, and more effective coordination of research.

## The current management of oceans information

### Data collection

5 Many different agencies and community groups collect data and information about various aspects of our marine environment, for a range of different purposes<sup>1</sup>.

6 Many data-sets already exist, at a number of different scales, to assist specific management questions. These data-sets quantify a wide range of social, economic, environmental and cultural factors relevant to marine management, such as:

- commercial fish stocks
- non-commercial species
- protected species
- pests and weeds
- land-based pollution, sedimentation, erosion

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<sup>1</sup> Information about the range of data collection agencies, and the types of data they collect, is summarised in a number of reports – see e.g. Victoria Froude, *Review of National Databases Relating to the New Zealand Marine Environment* prepared for the Ministry for the Environment Environmental Performance Indicators Programme, August 2000 (unpublished); Victoria Froude, *Review of Existing Coastal and Estuarine Monitoring (excluding regional council monitoring)*, prepared for the Ministry for the Environment Environmental Performance Indicators Programme, June 1998; and Philip Tortell, *Coastal Resources Database and GIS – a report to the NZ Maritime Safety Authority*, Wellington, July 2001.

- jurisdictional boundaries (e.g. between regions, Continental Shelf, exclusive economic zone)
- hydrographic and bathymetric surveys
- tidal records
- known gas and oil discoveries
- microbial marine water quality
- toxic algae outbreaks
- marine reserves and taiapure
- marine protected areas
- distribution of seafood industry employees
- recreational zones (swimming, boating)
- location of mataitai
- council monitoring sites
- indicator monitoring results
- estuaries.

7 The development of indicators under the Environmental Performance Indicators Programme led by the Ministry for the Environment is a useful tool for better coordination of marine data collection<sup>2</sup>. Indicators allow us to measure key parameters of change, using consistent monitoring and reporting methods, so that we can build a national picture of significant trends. A set of indicators for the marine environment has been agreed<sup>3</sup>, but most require development (e.g. establishment of monitoring regimes) before they can be implemented.

### **Data management**

8 Existing data is held by a wide range of public and private agencies.

9 The quality of existing data-sets varies widely, and is not always quantified, which makes it difficult to determine how ‘fit for purpose’ our existing data-sets are. The Ministry for the Environment has recently produced a draft Environmental Metadata<sup>4</sup> Framework to help address this issue. The approach taken with this Framework is being incorporated into an initiative led by Land Information New Zealand under the E-Government Programme, to develop government-wide standards for geo-spatial information.

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<sup>2</sup> The Ministry for the Environment has compiled reports on data available to implement proposed indicators for the marine environment. These provide a good proxy assessment of the coverage and extent of monitoring in relation to key issues and policy goals.

<sup>3</sup> The agreed set includes indicators for: fish stocks, fishing impacts, marine biodiversity, physical/chemical values, human health and values. The fish stocks indicators are already available online at [www.environment.govt.nz](http://www.environment.govt.nz).

<sup>4</sup> ‘Metadata’ is data about data. It provides information such as what the data is about, who collected it, where it was collected, what method was used to collect it, how and where it is held, and who looks after it. Metadata is an invaluable tool for finding existing data-sets and determining their ‘fitness for purpose’ in relation to any management issue.

10 Several other standards and policies have been, and are being, developed within government, including the State Services Commission's E-Government Unit. Among these is the New Zealand Government Interoperability Framework or e-GIF,<sup>5</sup> which will be an important driver for the adoption of spatial data standards.<sup>6</sup> Maritime data quality and metadata standards are also being addressed as a key aspect of the Maritime Special Interest Group's work programme.<sup>7</sup>

### **Sharing and accessibility of data**

11 Although a great deal of information is known to exist, it is often inaccessible to those who need it.<sup>8</sup> This may be because it is in an unusable form, it cannot be located, or it is in private hands (including information held by the publicly-owned Crown Research Institutes).

12 However, a number of initiatives are under way to integrate the marine information that we already have, and to make it more accessible, such as:

- the considerable investment by Crown Research Institutes (CRIs) and the Foundation for Research, Science and Technology (FRST) in database accessibility and integration, and the CRIs having publicly-stated policies on access arrangements
- the development of a Coastal Resources Atlas by the Maritime Safety Authority. This is to be a GIS<sup>9</sup>based tool that will provide comprehensive coastal and marine resource information for the purpose of oil spill response, oil spill contingency planning and oil spill risk assessment
- the development of a National Aquatic Biodiversity Information System (NABIS) under the umbrella of the New Zealand Biodiversity Strategy (NZBS), being led by the Ministry of Fisheries (MFish). This is a centralised decision-making tool that will contain several layers of aquatic biodiversity information. It is designed mainly to enable decision makers and planners to make informed decisions on the issues that affect aquatic biodiversity
- the development of a system to make available information on core marine indicators through the web, to support decision-making about the marine environment. This is led by the Ministry for the Environment as part of its Environmental Performance Indicators Programme, and includes the development of an environment classification as a key component

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<sup>5</sup> See [www.e-government.govt.nz/interoperability/index.asp](http://www.e-government.govt.nz/interoperability/index.asp).

<sup>6</sup> In time, it will be mandatory for all public service organisations to adopt the e-GIF. Organisations of the wider state sector (crown entities, state-owned enterprises etc.) are encouraged to adopt it, and local government agencies are also invited to use it.

<sup>7</sup> M-SIG is a subsidiary of the Officials Committee on Geo-Spatial Information, which aims to "advise LINZ in a coordinated way about local and central government needs for Maritime Geospatial Data provided by LINZ under its mandate".

<sup>8</sup> As an example, the Maritime Safety Authority (MSA) is working to develop a Coastal Resources Atlas to allow better protection of important ecological and economic resources during marine oil spill responses. It has identified the information it needs for the Atlas, and is aware that a lot of this information already exists. However, much of this either cannot be located or is spread across many agencies that have little ability (or will) to share it. The costs and effort needed to duplicate the information would be great.

<sup>9</sup> Geographic Information System.

- the E-Government metadata initiatives, which will contribute to improved access to information.

13 There are also initiatives to improve institutional coordination between management agencies. A key example is the Environmental Information Officials Group that has been established within central government to discuss better coordination of environmental information generally.<sup>10</sup> Other groups within government include the Marine Biodiversity Coordination Group (led by MFish), the National Maritime Coordination Centre (led by Customs) and the Maritime Special Interest Group (led by Land Information New Zealand).

14 Regional information forums are being established throughout the country so that Ministry for the Environment (MfE), regional councils and territorial local authorities can discuss options to improve sharing of information. MfE is working closely with these forums to support work under the Environmental Performance Indicators Programme, including the negotiation of information sharing protocols for monitoring and supply of indicators data for use at the national level. In turn, these agencies are benefiting from standards being developed by central government, such as MfE's draft Environmental Metadata Framework.

15 Other initiatives are under way outside government. The New Zealand branch of the World Wildlife Fund for Nature is carrying out a biodiversity assessment of New Zealand's marine environment. This is part of a global programme and is due to be completed by mid-2003. It will provide a qualitative assessment of the state of key habitats and species within our oceans, based on information from scientific experts. A further initiative is *Species 2000 New Zealand*. This is part of a global initiative to describe species, and will result in a publication that lists all New Zealand's described taxa, both living and extinct, and that estimates the number of species that still await discovery and description.<sup>11</sup> Work is being led by the National Institute of Water and Atmospheric Research (NIWA), who expect to publish their report in 2004.

## Data interpretation

16 Models and tools for interpreting marine information are being developed by a range of agencies, for a variety of management purposes. The marine classification system being developed by NIWA for MfE's Environmental Performance Indicators Programme is one example. The Department of Conservation's (DoC's) Species Classification System is another. Many other models and tools have been developed at smaller scales – for example, to assess the likely effects of new roads on sensitive estuarine environments.

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<sup>10</sup> The EIO's stated objective is "To coordinate activities related to the development of information management and delivery systems under the Environmental Reporting (ER), and the National Aquatic Biodiversity Information System (NABIS), Terrestrial and Freshwater Biodiversity Information System (TFBIS) and Coastal Resource Atlas (CRA) programmes, and associated environmental information initiatives".

<sup>11</sup> See [www.niwa.cri.nz/rc/biodiv/](http://www.niwa.cri.nz/rc/biodiv/) and [www.aut.ac.nz/eos/documents/species2000.pdf](http://www.aut.ac.nz/eos/documents/species2000.pdf). NIWA's work to date lists a total of 16,405 known marine species within New Zealand's EEZ. NIWA estimates that between 5,680 and 7,700 more marine species remain to be discovered, which means that New Zealand's total marine species count is likely to be in the range of 21,810 – 23,830.

## **Strategic planning for research and information collection**

17 The Ministry of Research, Science and Technology (MoRST) is currently undertaking a stocktake of marine-related research. This will provide a broader overview of relevant research initiatives already completed or under way.

18 The Foundation for Research, Science and Technology allocates public funding to research providers. Decisions on research applications are guided by criteria and research priorities determined through mechanisms such as investment strategy development, Strategic Portfolio Reviews, or individual portfolio reviews. These strategies are developed with input from government officials, external advisors, experts and representatives of end user groups. Many are being renewed now, but revised versions will not influence investment decisions until at least 2005.

19 Limited sharing and coordination of data that is collected make it difficult to estimate the gaps and overlaps between the various research activities. In particular, there appears to be insufficient emphasis on research into the impacts of activities of specific industry sectors.

## **Information issues**

20 This section examines issues arising under the following headings:

- identification of information requirements
- gaps in existing information
- generation of information
- data management
- data sharing and access
- use and interpretation of information
- coordination and prioritisation of research
- capacity.

### **Identification of information requirements**

21 Perhaps the most pressing issue in relation to marine information is the lack of a shared understanding and approach to what data is collected, based on an analysis of the range of management functions and purposes that the data must inform. We need to identify the management requirements for marine information, assess how effectively our current information is delivering on these needs (including what data we can stop collecting), and then identify the research and information gaps that need to be filled (and how we can best get the remaining data that we need).

22 Without such a 'needs analysis', it is difficult to determine the adequacy of our existing data-sets.

### **Gaps in existing information**

23 Despite the caveat in the paragraph above, it is possible to identify some significant gaps in our existing information and knowledge. These include:

- gaps in quantitative data on ecological processes, marine taxonomy, impacts of fishing on target species (as well as non-target species and the wider marine environment), water quality issues such as contaminant concentrations in marine and estuarine sediments, Maori environmental concerns, and climate change impacts
- insufficient understanding of the scale of land use impacts, such as sedimentation and pollution on marine biodiversity
- insufficient information on coastal hazards, which makes it hard to justify with certainty where ‘hazard lines’ and ‘buffer zones’ should be drawn
- poor information to assess the socio-economic impacts of marine management decisions (e.g. a reduction in the total allowable catch for fishing or the introduction of a marine area closure)
- a poor level of information for decisions relating to sustainability for some fish stocks managed under the quota management system
- taking insufficient account of informal observations about our marine environment by individuals and groups in the community. Traditional Maori knowledge (matauranga Maori) about New Zealand’s marine processes and biodiversity is a valuable, but under-used, source of knowledge. There is only partial recognition of information needs in relation to issues of special importance for Maori.

### **Generation of information**

24 We can begin to address data gaps by focusing data collection on the points set out above. However, more generic problems remain.

25 As noted above, we lack a shared understanding and approach to what data is collected and for what purposes.<sup>12</sup> We also need to be clear about who is responsible for collecting what data, and who is liable to pay for its collection.

26 The size and nature of the marine environment – and the fact that data needs to be collected from platforms such as boats – means that marine data is expensive to collect and often results in a long lead time from identification of the need to delivery of data. We have a relatively small population base to fund data collection and research at both national and local levels. This limits our ability to respond to key information needs.

27 Data collection is also made difficult by the physical characteristics of the marine environment. Compared to land, the ocean environment is highly variable. This means that marine processes, species distribution, ranges of ‘natural equilibrium’, and lengths of natural processes are difficult to estimate and describe. Timescales in relation to oceans’ processes and functions also vary greatly, and we understand little about these so far.

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<sup>12</sup> As an example, the Maritime Safety Authority approached the Department of Conservation to identify key information needs to safeguard marine reserves from the impacts of potential oil spills. Information about the specific values needing priority protection was not easily available.

28 A further issue is the supply of ‘disinformation’ by some sectors of the fishing industry when observers are not present. This results, for example, in under-reporting of seabird and marine mammal by-catch. The collection of information on environmental impacts of fishing undertaken from small vessels unsuited to carrying observers remains an unresolved problem.<sup>13</sup>

### **Data management**

29 The large and increasing costs of data collection and management limit our ability to maintain data-sets on an ongoing basis. In addition, some responsibilities for managing marine information are not clearly understood, resulting in a lack of accountability for actions and outcomes.

30 There is a need for better information about who holds what data-sets, and the standards used to manage that data. An agreed metadata approach would help promote the effective management and use of data at different levels and scales. Data quality standards are also required for the delivery of consistent data. The current variability (and even absence) of data standards makes it difficult to determine the quality of existing data and information. Data quality of existing data-sets needs to be assessed according to criteria such as: right data relevance; accuracy; completeness; timeliness; format; and context.

31 Clear data standards can help make data more useful across a wider range of management purposes. As noted above, a number of standards are being developed and used, and there may be a need to review the effectiveness of these for marine management purposes.

32 A common regulatory framework or policy on spatial information is also needed to manage the identification, definition, allocation and recording of the various rights, interests, restrictions and activities in the marine environment. The Cadastral Survey Act 2002 currently provides for the establishment of a spatial reference system and cadastral system for defining and recording tenures, for both land and the seabed. The Act also specifies a regulatory authority and processes for standards, auditing and operation of a cadastral system. The regulatory environment covers the marine area, but usage of the cadastral system is currently concentrated on dry land.

### **Data sharing and access**

33 We have only a limited picture of the marine information that already exists, both in the public and private domains. A priority, therefore, must be to document and standardise data-sets that are currently available.

34 Information is not always constructively shared. To compound the difficulty of finding out what data is already held, access to data is hampered by limits of data compatibility (caused by varying data quality standards) and use restrictions (e.g. for commercial or political reasons). Data may be subject to high costs and other use constraints when it has high commercial value (e.g. geological information about potential minerals or petroleum deposits and fishing, or data used as the basis for rights allocation). Such costs and constraints are usually valid, but may not be

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<sup>13</sup> See the Parliamentary Commissioner for the Environment’s report ‘Setting Course for a Sustainable Future’, section 3.8.9.

justified in some cases. Consistent policies or standards on use restrictions may be needed in some areas.

35 In relation to the Crown's funding of research through the Public Good Science Fund, there have been tensions between the public interest and private concerns. Some science providers are unwilling to release information that they have gathered because of intellectual property considerations. For example, the Ministry of Fisheries only learnt of the discovery of an exotic crab in the Hauraki Gulf when it was reported in a museum article in an industry magazine.

36 Limited sharing of existing information perpetuates the need for similar data-sets to be built to support every new purpose and management question that arises. The costs of this are significant.

### **Use and interpretation of information**

37 Because New Zealand's oceans are vast, complex and dynamic, we will probably never have all the information we need to fully understand the effects of our actions on the marine environment. The key management challenge, therefore, is making good decisions in the face of uncertainty.

38 At the moment, we have limited capability for modelling and interpreting data and information. A marine classification system, such as the one being developed by the Ministry for the Environment under its Environmental Performance Indicators Programme, is an important management tool and can be used to help predict the effects of proposed new activities. There is a need for other interpretive tools to be developed and shared.

39 Better coordination is required to develop shared standards and protocols between those agencies which collect data, and those which are working on shared systems for pooling, analysing and interpreting data. These are particularly important for use in aggregated monitoring and reporting programmes,<sup>14</sup> where coordinating agencies do not collect data directly, but instead rely on others to supply it.

40 The absence of protocols for the use and protection of mātāuranga Māori means that Māori are not confident about sharing their knowledge. This is compounded by limited capacity to interpret such information, and by variable (or absent) processes to incorporate mātāuranga Māori into decision-making.

41 Environmental education does not have a strong profile in many New Zealand schools, nor is there any purposeful focus on marine and coastal concerns.

### **Coordination and prioritisation of research**

42 As noted above, the Foundation for Research, Science and Technology seeks advice from a range of individuals and agencies on priorities for marine research. However, it has no mechanism for weighing competing (or conflicting) priorities identified by these groups. A clear statement of marine issues of priority to New Zealanders and New Zealand ecosystems is needed for use in setting future research

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<sup>14</sup> e.g. the Environmental Performance Indicators run by the Ministry for the Environment, or the National Aquatic Biodiversity Information System being developed by the Ministry of Fisheries.

priorities. Developing an overarching government policy to guide the allocation of research funds relating to oceans information, across different portfolios, would also be a useful tool.

43 There is a need for research to be better coordinated in relation to priority information gaps, and in the context of a long-term view of information needs. We also need to ensure that ‘blue skies’ research is protected and promoted so that we can safeguard potential uses and applications, and promote innovation and wealth creation.

44 ‘Goldrushes’ for marine space and resources (e.g. high seas, marine-protected areas, aquaculture) create new demands for information. We need to be more strategic about trying to anticipate these demands, and in determining how the costs of resulting research efforts will be met.

### **Lack of capacity**

45 In many cases and contexts, we lack capacity to collect, access and use data and information. In particular, there are gaps in relation to our capability to carry out strategic thinking about marine information needs, and in relation to particular skill sets (e.g. data analysis, taxonomy).

### **Conclusion**

46 Accurate information is a cornerstone of good decision-making. There are many gaps in our knowledge of the marine environment, either where research has not been carried out, or existing information has not been made available to those who need it.

47 Collecting and managing marine information effectively is a huge task: New Zealand’s oceans are vast, complex and dynamic. We may never have all the information we need – or indeed the tools and capacity required – to fully understand the effects of our actions on the marine environment.

48 However, we can use the information and the tools we do have more effectively, and we can focus our future research efforts more strategically. An Oceans Policy can help by providing the framework for us to:

- plan, prioritise and resource the generation of information that is needed for the range of marine management functions
- focus research in areas where it is most needed
- encourage better sharing of existing information
- develop good practice and tools for making decisions in the face of uncertainty.