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Promoting a Plan for a Marine Environment Monitoring Network in the North Pacific

Tomohiro SHISHIME
Assistant Director
Water Quality Bureau
Environment Agency of Japan

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Introduction

This paper is based on a report entitled *On the Plan for a Marine Environmental Monitoring Network*("Kaiyou Kankyou Monitaringu Nettowaku Kousou nitsuite") released in 1997 by the Environment Agency of Japan's Marine Environment Study Group.

Numerous events have recently drawn attention to the necessity of protecting the marine environment in the North Pacific and the need for establishment of a monitoring network in the region.

One event was the oil spill caused by the Russian tanker *Nakhotoka* in January 1997 off the coast of Shimane Prefecture in the Sea of Japan. Japan is still coping with the environmental impact of this oil spill. Another event was the enacting of the United Nations Convention on the Law of the Sea in July 1996. The Law of the Sea calls on the world community to preserve and protect the world's marine environment and resources. Monitoring will be an essential element of policy initiatives taken toward such goals. Still another event was the signing in 1994 of the Northwest Pacific Action

Plan (NOWPAP) by Japan, Russia, South Korea, and China. The area covered by NOWPAP includes the Sea of Japan and Yellow Sea. An yet another event is the protocol to the London Dumping Convention in 1996 which obligates Japan, and other signatories, to conduct environmental impact assessments of marine dumping of waste materials.

Recent developments inside and outside Japan have shown that there is a growing need for more comprehensive monitoring programs. Domestic monitoring in Japan and international monitoring in the Northwest Pacific are insufficient with regards to marine environment protection in the region. It will be imperative to implement monitoring activities in a systematic fashion and utilize the data to formulate better marine environment management policies.

In Section 2 of the paper the need for increased monitoring of the marine environment in Japan and Northeast Asia are discussed. The specific weaknesses of Japan's domestic monitoring programs are highlighted, and the increased momentum in the region for establishing an international marine environment monitoring network is demonstrated. Section 3 lays out some of the requirements for instituting comprehensive domestic and international marine environment monitoring programs. Discussed are the types of pollutants and media that must be monitored, the spatial and temporal scales of monitoring programs, the ocean areas where monitoring sites must be situated, and the types of issues that will fall under various monitoring programs and the types of parameters that must be measured in each issue area. Finally, the paper concludes with a description of the Environment Agency's efforts to promote a marine environment monitoring network in the North Pacific.

The Need for Increased Monitoring of the Marine Environment

1. 2.1 Domestic Monitoring

To date, Japan's monitoring efforts have focused primarily on water pollution, not marine ecosystem protection. Japan's coastal prefectures have implemented marine monitoring programs in keeping with Article 15 of Japan's Water Pollution Control Law ("Suisitsu Odaku Boushi Hou"). Also, as mandated by Article 46 of the Law Relating to the Prevention of Marine Pollution and Maritime Disaster ("Kaiyou Osen oyobi Kaijou Saigai no Boushi nikansuru Houritsu"), the Marine Safety Agency and the Meteorology Agency have conducted various scientific surveys. The Marine Safety Agency has, for instance, carried out a Marine Pollution Survey to investigate levels of pollution in waste dumping areas and shipping lanes. The Meteorological Agency has carried out a National Survey on the Natural Environment.

In addition to the above monitoring, the Environment Agency is involved in a number of surveys which have monitoring programs. These include the Water Quality Monitoring Surveys of Public Waters, the Area-Wide Comprehensive Water Quality Survey, the Investigation of Pollution in the Adjacent Seas of Japan, and the Chemicals in the Environment.

However, more comprehensive monitoring strategies than these are needed. Monitoring strategies that are aimed at protecting the marine environment are required. In fact, such monitoring is more in line with the intent of the Basic Environment Law (Kanyou Kihon Hou), which was passed in November 1993.

Japan's Basic Environment Law incorporates an array of environmental protection mechanisms designed to foster healthy lifestyles, maintain sustainable economic development, and minimize environmental impact. Article 14 of the law stipulates that environmental protection shall assure the

following: (i) the health of citizens, the preservation of a sound living environment, and the appropriate protection of the natural environment; (ii) biological diversity; and (iii) opportunities for citizens to enjoy closer contact with the natural world. These goals govern marine environment protection issues in Japan, as they do other environmental issues.

The Japanese Cabinet approved in December 1994 a Basic Environment Plan aimed at translating the principles behind the Basic Environment Law into a tangible action program. Protecting the marine environment is one priority of the Core Environmental Program. Related to marine issues, several areas for action have been spelled out: (i) promotion of effective countermeasures against land-based effluent discharges, (ii) enforcement of appropriate restrictions on discharges of oil, toxic chemicals, and other harmful waste materials by marine vessels, (iii) preventive measures against tanker oil spills, and an adequate level of preparedness for cleanup in case of spills, (iv) consideration of methods for curbing ship exhaust-gas emissions, (v) consideration of methods for preventing pollution from undersea commercial activities, and (vi) research and development of new technologies to deal with massive oil spills and pollutants in water suspension. In addition, the Program calls on government agencies to collaborate in creating new water quality measurement programs and frameworks, to develop and implement comprehensive marine environment assessment methods that employ biotic indicators, and to strengthen marine environment surveys and monitoring activities.

The Central Environment Council submitted a report—"The Second Investigation into Progress Made thus far Under the Basic Environment Plan (Kankyou Kihon Keikaku no Shincyoku Joukyou no Dai Nikai Tenken Kekka Nitsuite)"—to the Japanese Cabinet concerning its second investigation into progress made on the Basic Environment Plan, which is part of the Basic Environment Law, on 13 June 1997. In the report, the Council called for efforts to improve the scientific basis for action through establishment of systematic, broad-based monitoring programs. The report also noted that international cooperation would be essential to this end, and urged cooperation through NOWPAP and similar frameworks.

The Cabinet, in addition to accepting the Central Council on the Environment’s report, approved establishment of ocean and coastal biological surveys and monitoring aimed at gathering information on the marine environment in May 1997 as part of a new structural adjustment program for the Japanese economy.

Monitoring the effects of the *Nakhotoka* tanker oil spill continues. Long-term monitoring is a crucial part of the cleanup task.

1. 2.2 International Monitoring

There are several international conventions to which Japan is a signatory that relate to marine environment monitoring. The most important of these are discussed below.

(1) UN Convention on the Law of the Sea

The UN Convention on the Law of the Sea provides the overarching framework for international efforts to protect the marine environment. The Law of the Sea obligates countries to take steps to protect and preserve the marine environment (Article 192). It urges monitoring of the risks and impacts of pollution (Article 204). In addition, all parties are encouraged to pursue specific actions as dictated by provisions in other conventions and agreements (Article 237). One of the key features of the Law of the Sea is that it established Exclusive Economic Zones (EEZs). EEZs extend the scope of national jurisdiction over marine resources and responsibility for marine environment protection to 200 nautical miles from the country's coastline. In keeping with the spirit of the Law of the Sea,

Japan has begun strengthening its policies and initiatives for the protection of the marine environment.

(2) London Convention1

The London Convention was signed in 1975. Its objective is to prevent marine pollution attributable to ocean dumping of waste from land-based sources. Various protocols to the London Convention have been adopted, the most recent of which was revised in November 1996 and calls on countries to step up their monitoring and assessment of the impact of ocean dumping on the marine environment.

(3) MARPOL 73/78 Convention 2

Another convention to which Japan belongs is the International Convention for the Prevention of Pollution from Ships, commonly referred to as the MARPOL (MARine POLlution) Treaty. MARPOL is the legal cornerstone of all pollution cleanup efforts related to ships. The MARPOL Convention came into force in Japan in 1983. MARPOL requires signatories to stem marine pollution attributable to ship discharges of oil, toxic effluent, and other waste materials. Similar to the London Dumping Convention, recent MARPOL protocols call for expanded monitoring and assessments programs.

(4) Northwest Pacific Action Plan (NOWPAP)

NOWPAP is one of 13 regional seas programs under the aegis of the United Nations Environment Programme (UNEP). It was adopted by Japan, Russia, South Korea, and China in 1994 as a body for coordinating monitoring in the Sea of Japan and Yellow Sea, two semi-enclosed bodies of water. Japan has been assigned a leading role in the monitoring activities of this program.

(5) Global Action Plan for the Protection of Marine Environments from Land-Based Activities

Another marine environment-related governance regimes to which Japan belongs is the Global Action Plan for the Protection of Marine Environments from Land-Based Activities which was adopted in 1995 at an international conference sponsored by UNEP in Washington, DC. This action plan acknowledges that most of the pollution affecting the world's oceans today can be traced to conventional land-based sources. The Global Action Plan has spurred work on various specific action plans at the national and regional levels, some of which Japan is participating in.

In addition to activity pursued within the above international conventions and programs, protecting the marine environment was a priority issue at several recent international forums.

- Japan-U.S. Common Agenda (May 1997)The Japan-U.S. Common Agenda is a bilateral undertaking aimed at addressing global scale environmental problems. Japan and the U.S. held a preliminary conference in May 1997 under their Common Agenda framework to discuss actions against oil spills. The U.S. proposed stronger bilateral cooperation on scientific research and technological development related to oil spills, including cooperation on monitoring activities.

- APEC Environment Ministers Conference (June 1997)Sustainable marine environments were one of the themes addressed by the Asia-Pacific Economic Cooperation Forum (APEC) environment ministers conference that convened in June 1997. The conference culminated with a joint declaration calling for increased efforts in four areas—sustainable cities, sustainability of the marine environment, cleaner production, and environmentally sustainable growth. In particular, those sections of the declaration devoted to the issue of sustainable marine environments underscored the importance of not only environmental protection itself, but also coordinating

measures in three specific fields: coastal zone management, marine pollution, and sustainable management of marine resources.

- Denver Summit (June 1997)At the Denver Group of Seven Summit Prime Minister Hashimoto noted the importance of working through UNEP and the International Maritime Organization (IMO) to strengthened safety standards and regional cooperation on the marine environment. Russia proposed Environment Monitoring Program in the North Pacific. Russia voiced concern for monitoring of water quality, evaluating the impact of human activities on the natural environment, adopting of uniform measuring techniques, and agreeing on rules for sharing of data. The joint declaration issued by the Denver Summit incorporated a pledge to enhance cooperation in monitoring the ecology in the North Pacific.

- UN General Assembly Special Session on the Environment and Development (June 1997)A special session on the environment and development took place at the UN General Assembly in New York in June 1997. At the session, Prime Minister Hashimoto mentioned the Russian tanker oil spill off the Japanese coast, and announced that the Japanese government would do its best to strengthen international measures for the protection of the marine environment. The document adopted by the Special Session cited a need for qualitative and quantitative enhancements in scientific data used as a basis for decisions concerning the protection of the oceans and their biological resources.

- The Environmental Summit of Local Governments in the Northwest Pacific Region (July 1997)The Japanese city of Toyama hosted an "Environmental Summit of Local Governments in the Northwest Pacific Region" conference which was sponsored by Toyama Prefecture in cooperation with the Environment Agency and the Ministry of Transportation. It was attended by delegates from municipalities in Japan, China, South Korea, and Russia. The forum was devoted chiefly to exchange of information and discussion of collaboration at the local government level to protect the environment of the Northwest Pacific. It resulted in adoption of the Toyama Appeal, which, among other concerns, urges national governments of the region to monitor marine water quality and ecosystems on a comprehensive, systematic basis so as to provide a foundation for policy action.

Issues Related to Establishment of Monitoring Programs and Networks

As indicated by the foregoing section, the need for monitoring marine environments has become a major focus of attention in Japan and the rest of the world. Effective monitoring by Japan, however, will have to take into account the following:

- Monitoring must extend beyond the traditional emphasis on protecting the health and living environment of human populations. It must also extend to examining the health and diversity of marine ecosystems.
- Monitoring must be brought into line with the conventions to which Japan belongs. Monitoring must seek to identify the environmental impact of land-based, marine-based, and undersea activities.
- A monitoring network in the Sea of Japan and Yellow Sea region is essential.
- Monitoring of EEZs, not just selected coastal areas, must be established. EEZ monitoring must go beyond conventional water quality monitoring. Targets for protection of the marine EEZs must be set and implemented, and monitoring programs related to these goals established.

- Evaluation of progress toward the targets is essential. Differing targets are appropriate for different ocean bodies, limited ocean areas, mediums, etc.3

Some of the issue areas which new monitoring systems must address are outlined below.

(1) Contamination by toxic chemicals

Organochlorine compounds, heavy metals, organic tin compounds, organophosphates, polycyclic aromatic hydrocarbons, synthetic detergents, and surfactants count among the most common toxic substances causing contamination of the marine environment. Many persist for long periods. Thus, they can have global reach. The sources of these chemical pollutants are for the most part land-based. They tend to reach the oceans either directly (because the pollutants originate in coastal area), or indirectly through river systems or the atmosphere. In some cases they are released as a result of ocean dumping.

(2) Organic pollution and eutrophication.

Another problem is pollution attributable to excessive input of organic water and/or nutrients, or to a deterioration in the natural cleansing power (or diluting power) of ocean areas. These problems tend to be more pronounced in bays and other enclosed or semi-enclosed waters.

(3) Contamination from the disposal of plastic materials.

The ecological impact from discarded plastic materials is already well-substantiated. Plastic materials are often mistakenly ingested by animals that occupy relatively higher levels of the marine food chain, and can inflict external injuries on animals that become entangled with them.

(4) Oil pollution

Oil pollution derives from a variety of human activities, including the flushing of ocean vessel bilges, leakage from undersea oil wells, and runoff or discharges from land-based facilities. In some areas, the damage from tanker oil spills and similar accidents has been widespread and long-term.

(5) Thermal pollution

Thermal pollution is caused by heat energy discharged by power plants or factory cooling water, or by urban wastewater effluent (warm wastewater). Though it depends largely on the volume of water discharged, in general this kind of pollution can be described as a localized problem.

(6) Radioactive contamination

Radioactive materials are similar to toxic chemicals in that they can persist in the environment for long periods of time. Above-ground nuclear tests conducted in years past constitute the principal source of such pollutants. Nuclear-powered ships, discharges by land-based nuclear facilities, and ocean dumping (including illegal dumping) are major sources of marine radioactive contamination.

(7) Nutrient depletion and declining fertility

In some ocean area, it will be necessary to maintain nutrition by an afforestation in a river basin to control oligotrophy and declining fertility.

(8) Depletion of resources vital to preservation of marine environments

Land reclamation operations, embankment reinforcement projects, and other physical alterations to shallow-water environments have directly as well as indirectly contributed to the loss of seaweed beds, tidal marshes, coral reefs, mangrove forests, and other important biotic communities. These developments can contribute to marine nutrient imbalances as well as degeneration of the natural resilience or cleansing ability of marine ecosystems. Such shallow-water environments are, incidentally, also valuable from the standpoint of assuring human populations opportunities for closer contact with the natural world.

(9) Biotic disruptions

Many non-native wildlife species have penetrated marine ecosystems simply because they were attached to ship hulls or concealed in ship ballast water. Some have become naturalized in Japan because they were capable of adapting to local environmental conditions. In some cases the biotic balance has been upset by the uncontrolled release of certain plant species into the environment, sparking concerns about the threat to genotypic diversity.4

(10) Declining fishery resources

Although marine environmental change and the fishery industry have itself been one of the causes of environmental disruption, other phenomena as well have contributed to declines in fishery resources, per se. For example, large numbers of eggs or fry of certain fish species have been drawn into factory water intake ducts and killed as a result. Such factors have spurred concern about the potential damage to the health of marine ecosystems, the heightened risk to the health of human populations, and a decline in the social or economic value of marine resources. Sweeping alterations in biotic composition, together with declines in fishery resources, are among the major symptoms of the deteriorating health of marine ecosystems.

1. 3.1. Spatial and Temporal Scale of Monitoring

In the process of selecting marine environments for monitoring, it will be necessary to bear in mind the objectives of each monitoring program and set specific geographic and time scales for the programs.

As far as spatial scale is concerned, some problems demand monitoring on a global scale, and some on a regional or local scale. One of the difficulties encountered in monitoring programs of differing scales is that data are not compatible or comparable. It will be important, for instance, to collect data on those regions near Japan which are commensurate with global-scale monitoring programs run by the UN or other multilateral institutions.

As far as temporal scale is concerned, regardless of the issue in question, it will be necessary to monitor over a period of at least several decades if changes in the marine environment are to be accurately assessed. Even longer periods of time will be required to shed light on global-scale problems. In the interest of identifying mid-range environmental trends in the waters near its shores, Japan must conduct surveys on a continuing basis over at least several decades.

1. 3.2. Selection of Ocean Areas for Monitoring

An understanding of the characteristics of the waters surrounding Japanese archipelago is essential to the process of selecting areas for monitoring. The Pacific Ocean, Sea of Japan, and East China Sea constitute the principal bodies of water nearest Japan.

The East China Sea is the source of the Kuroshio Current (Kuroshio Kairyu). The Kuroshio Current

flows northwards and splits off southern Japan. A small portion of the Kuroshio Current becomes the Tsushima Current and enters the Sea of Japan. The main portion continues up the Pacific coast of Japan.

The Tsushima and East Korean Warm Current from the Yellow Sea constitute the main currents flowing in the Sea of Japan from the south. The EEZs along the coastline and offshore areas fronting the Sea of Japan are important areas for commercial fishery operations. The Sea of Japan requires monitoring aimed at determining the environmental pollutant loads from the South Korean Peninsula, the Russian Far East, and Japan itself. The threat of airborne pollution from the Chinese mainland is another factor that underscores the need for international monitoring.

Japan's heavily industrialized and urbanized Pacific coastline is a major source of marine pollution. Monitoring on the Pacific side will also be vital in view of the fact that Japan has been engaged in heavy ocean dumping along the outer perimeter of the Kuroshio Current.

In conclusion, it is essential that the Environment Agency monitor selected areas of the Pacific Ocean, Sea of Japan, and East China Sea.

1. 3.3. Selection of Pollutants, Sites and Media for Monitoring

Bearing in mind the need for solutions to the marine monitoring-related issues discussed earlier in Section 3.1, monitoring sites and media need to be selected with attention to such factors as ocean currents, pollution sources, local fishery operations, and so forth. The selection process for new marine monitoring sites and media must adequately take account of those activities already under way.

The Environment Agency’s Water Quality Monitoring Surveys of Public Waters, Area-Wide Comprehensive Water-Quality Survey, the Investigation of Pollution in the Adjacent seas of Japan**,** and the Chemicals in the Environment, the Marine Safety Agency’s Marine Pollution Survey, and the Meteorology Agency’s Observation for Monitoring Background Marine Pollution discussed previously are all limited in scope. Figure 1 illustrates the scope of each of each undertaking. As can be seen in the figure, in its offshore areas (within the 200-mile limit) Japan still has few surveys devoted specifically to measuring the concentrations of various chemical pollutants that have triggered serious environmental ills in recent years, e.g., organochlorines, organic tin compounds, and polycyclic aromatic hydrocarbons. Though measuring the accumulation of toxic chemical substances in aquatic organisms is primarily a task of the Environment Agency's Chemical Pollution Survey, this survey has been limited to shallow waters and inland sea areas. Comparable surveys of chemical accumulations in offshore areas have yet to be performed.

Figure 2 graphically illustrates in graphical form the vertical depth range of the above-cited surveys.

Other than the Japan Offshore Marine Pollution Survey, all are essentially limited to the surface stratum, a specific depth, or an area near a given ocean dumping site. They were not designed to monitor vertical gradients in any given parameter.

It is imperative that surveys be conducted on the basis of appropriately selected media and ocean areas. Marine environments typically comprise several media amenable to measurement—water quality, sediments, and biomass, for instance. However, most of the surveys cited have been relatively limited in the media covered. The Water Quality Monitoring Surveys of Public Waters was designed to measure water quality in only a narrow band near the Japanese coastline. The Area-Wide Comprehensive Water-Quality Survey only examines water quality, sediments, and plankton density in coastal and inland bay waters undergoing eutrophication. The Chemicals in the

Environment Survey focuses on water quality, sediments, and selected organisms in coastal and inland bay waters. In effect, outside the measurements concerned with eutrophication, these surveys have basically been designed to examine water quality alone.

In sum, from the vantage point of monitoring the health of marine ecosystems, it will be necessary to design comprehensive surveys that cover broader geographical ranges, more vertical depths, and a greater number of media. In addition, the scope of study of living organisms needs to be enlarged. There are at least two types of protocols for scientific observations concerning living organisms: those designed to gauge the concentrations of contaminants that have accumulated inside selected organisms, and those that measure population sizes and species diversity to gain an understanding into the conditions characterizing a given biological community. At present, such studies are under way on a very limited basis, and thus will need to be expanded in the years ahead.

1. 3.4. Selection of Issues for Monitoring

Of the issues discussed in Section 3, Environment Agency-led undertakings in the arena of marine monitoring will in principle be aimed at the following:5 (i) situations in which there are an unspecified number of different pollution sources and the potential for a combined impact exists despite compliance with emission standards; (ii) situations in which the sources or causes of certain forms or manifestations of pollution are unclear; and (iii) situation where issues are not being monitored exclusively by other government offices. Also, in view of the polluter-pays-principle, the Environment Agency plans to put more emphasis on the monitoring of polluting industries or point sources in areas where commercial activities can be expected to have a direct environmental impact.

Given these perspectives, the issues listed below fall outside the scope of future monitoring-based studies because they are already subjects of investigation by other programs:

- thermal pollution—an issue relatively localized, and its sources clearly defined;
- radioactive contamination—an issue currently addressed within the Atomic Energy Basic Law;
- biotic disruptions—an issue dealt with on a case-by-case basis; and
- damage to fishery resources—an issue currently addressed within the context of ordinances pertaining to the marine products industry.

Furthermore, it should be noted that certain accumulations of toxic chemicals in marine organisms are being examined within the context of other investigative frameworks concerned chiefly with the protection of human health.

Therefore, of the issues discussed in Section 3.1, the following seem appropriate as themes for future marine environment monitoring: (i) contamination by toxic chemicals, (ii) organic pollution and eutrophication, (iii) pollution damage from plastic waste materials, (iv) oil pollution, (v) oligotrophy (nutrient deficits) and declining fertility, and (vi) the loss of natural biotic communities vital to the preservation of marine environments. Both individual and combined impacts of these phenomena on marine ecosystems may be monitored.

Organic pollution and eutrophication, oligotrophy and declining fertility, and the loss of important biotic communities are issues chiefly limited to coastal and inland bay areas. The Water Quality Monitoring Surveys of Public Water and the Area-Wide Comprehensive Water-Quality Survey are already addressing the organic pollution and eutrophication issues. Furthermore, monitoring under the Environment Agency's National Survey on the Natural Environment (Shizen Kankyou Hozen Kiso Chousa) emphasizes the issues of oligotrophy, declining fertility, and the loss of important biotic

communities.

Toxic chemicals, discarded plastic materials, and oil spills can cause pollution-related ills on a much broader scale than coastal areas and inland bays. Their effects can be felt far offshore. In the interest of measuring levels of compliance with environmental standards that have been set up to protect human health, some toxic chemical pollutants are now subject to coastal and inland bay surveillance activities under the Water Quality Monitoring Surveys of Public Water. The Chemicals in the Environment Survey has also served as a basis for monitoring toxic chemical concentrations with an eye to ensuring that they do not become threats to human health. However, the levels of many toxic chemical pollutants have not been measured in areas farther offshore. Though surveys by the Marine Safety Agency and Meteorology Agency have been looking into some of the pollution effects attributable to discarded plastics and oil spills, more refined surveys concerned with such factors as the types of waste material involved and oil chemical composition need to be conducted. New monitoring schemes which look into issues and areas ignored by existing surveys must be developed.

1. 3.5. Measurement Parameters

In terms of the basic viewpoints outlined in the preceding sections, future efforts in marine monitoring will be driven by the objectives of (i) preserving ecosystems, (ii) preventing marine pollution, and (iii) protecting or cultivating biological communities vital to the preservation of natural marine environments. Parameters to be measured related to each objective are outlined below.

(1) Ecosystem preservation

In order to develop a broad-based understanding of the impact on marine ecosystems, measurements of concentrations of toxic chemical substances that have accumulated in organisms at each trophic level of the food chain, and studies of the composition of specific biological communities need to be undertaken.

(2) Prevention of marine pollution

Some water and sediment quality parameters which need to be measured to assess the environmental impact from land-based activities (via water runoff or atmospheric pollution), marine shipping activities, and ocean dumping include toxic chemical substances, organic pollutants, nutrient salts, suspended micro-particulates, and oil.

(3) Protection of biological communities

Surveys for this purpose would focus on conditions affecting seaweed beds, coral reefs, and other biological communities vital to the preservation of marine ecosystems.

Though findings from the Environment Agency's National Survey on the Natural Environment will be utilized to assess some of the parameters cited above, new surveys must be initiated to offset lack of data on other parameters.

A Marine Environment Monitoring Network in the North Pacific?

1. Pursuing Plans for a Marine Environment Monitoring Network

Protecting Japan's marine environment through effective monitoring will demand domestic collection and analysis of environmental data on broad stretches of ocean, and international cooperation with neighboring countries. Japan itself needs to assume a more active role in protecting the region's marine environment. Work will need to be pursued within the NOWPAP framework. To this end, it will be important for countries of the region to share data on the marine environment and devise joint initiatives.

Under the NOWPAP/3 (NOWPAP program No. 3 is a venture involving the formulation of regionally coordinated monitoring programs) project to formulate regionally coordinated monitoring programs, Japan will be expected to assume a leading role in marine monitoring activities. Given this role, Japan must first take domestic action to work out monitoring guidelines and programs that allow for a systematic approach, and then implement them. These monitoring efforts will be crucial to devising joint marine monitoring programs.

It will also be important to make monitoring programs flexible to changes in scientific understanding as well as changes in international conventions. Furthermore, in keeping with the polluter-pay--principle, it will be necessary to regulate commercial interests which exploit marine resources or engage in ocean dumping of waste materials.

There is currently a shortage of useful marine-related data. For this reason, "fast-track" monitoring needs to be pursued to aid the task of defining effective standards or targets.

Centralized collection and storage of data will also be crucial. To this end, the idea of establishing an international marine monitoring network center should be explored. However, this will demand adequate study of role-sharing arrangements with the marine environmental data center already set up by the Intergovernmental Oceanographic Commission (IOC).

The idea of a regional marine monitoring network center needs to be considered in tandem with initiatives aimed at translating NOWPAP objectives into tangible programs. Creation of new environmental management policy frameworks, such as new regional conventions, need to also be considered.

In addition to devising plans for the monitoring network, it is essential that new and innovative technologies and approaches be explored if marine monitoring is to be conducted on a more effective and efficient basis. Examples would include the measurement of water quality by unmanned measuring stations, continuous measurements of water quality with equipment installed on ferries or other commercial vessels, and surveys that harness orbiting satellites to investigate coral reef distribution. In the process, though, adequate attention should also be given to the need for coordination or harmonization with the marine monitoring activities currently performed by the IOC and other multilateral organizations. It will also be necessary to swiftly analyze monitoring-derived data, and develop new water quality simulation technologies that allow for prompt projections or evaluations of the environmental fallout stemming from oil spills or other accidents.

Finally, it will be vital to consider implementing broad based monitoring programs that examine the impact on marine ecosystems due to the destruction of the ozone layer, global warming, and other global scale environmental problems.

1. 4.2. Environment Agency Budget for Marine Environment Monitoring

In the 1998 fiscal year (April to March), the Environment Agency's Water Quality Bureau is seeking

a budget appropriation of 180 million yen for a new marine monitoring survey aimed at gathering comprehensive and systematic data on water quality, sediments, and aquatic organisms. These data will be utilized to identify the impact of land- and marine-based pollutants on the marine environment of the Northwest Pacific, the marine environment load attributable to airborne pollutants, and conditions of background marine pollution. The survey will comprise the following activities:

(1) Ocean Areas

The survey will focus on ocean areas that (i) need to be assessed in terms of their general ecological health, (ii) contain fisheries, marine parks, or other environmental resources in need of protection, (iii) need to be monitored in order to determine the environmental impact from land-based pollution sources, and (iv) are sites for ocean dumping.

(2) Parameters

The survey will measure parameters such as organochlorines, heavy metals, and other indicators of water quality and sediment contamination; zooplankton, phytoplankton, and other ecosystem-related parameters; and plastics and microscopic waste particles in suspension.

(3) Survey Plan

The survey will be pursued on a continuing basis. Monitoring will be conducted at differing monitoring sites every year. However, every few years the same sites will be revisited.

In addition, the Environment Agency's Nature Conservation Bureau recently submitted a budget request of 263 million yen for establishing an international coral reef research and monitoring center. In view of the fact that coral reefs are the "rain forests of the sea" and serve as habitats for numerous marine life forms, their protection is a top priority of the Japan-U.S. Common Agenda. These developments helped set the stage for the International Coral Reef Initiative (ICRI), a comprehensive multilateral venture launched with assistance from Australia and other countries. Under current plans, the new coral reef monitoring center will be built on Okinawa, which is positioned near the geographical center of the coral reef network spanning the Japanese archipelago. Once up and running, the center will assist in the management, research, and monitoring of coral reef resources in East Asian waters, and play a central role in preserving and managing Japan's own coral reef resources.

Conclusion

It is essential that monitoring strategies incorporating innovative or new technologies and approaches be explored if marine monitoring is to be conducted on a more effective and efficient basis. Examples would include the measurement of water quality by unmanned measuring stations, continuous measurements of water quality with equipment installed on ferries or other commercial vessels, and surveys that harness orbiting satellites to investigate coral reef distribution. In the process, though, adequate attention should also be given to the need for coordination or harmonization with the marine monitoring activities currently performed by the IOC and other multilateral organizations. It will also be necessary to swiftly analyze monitoring-derived data, and develop new water-quality simulation technologies that allow for prompt projections or evaluations of the environmental fallout stemming from oil spills or other accidents. Finally, it will be vital to devote consideration to the idea of implementing broader-based monitoring programs that examine

the impact on marine ecosystems due to the destruction of the ozone layer, global warming, or other environmental problems of global scale.

Endnotes

1.The London Convention was originally called the "London Dumping Convention." The name was changed to "London Convention" in 1992.

2. MARPOL was originally adopted in 1973 and was modified in a protocol in 1978, hence the designation "MARPOL 73/78."

3. The terms "ocean" or "bodies of water" refer to relatively large bodies of water, such as the Sea of Japan or the Pacific Ocean. The term "ocean areas" refers to smaller regions of water defined in terms of ocean current flows or marine resource utilization.

4. One example of the introduction of exotic species is given in the IMO document "Harmful Aqutic Organisms in Ballast Water" (MEPC 41/9 31 December 1997), as follows: "Argentina reported on research carried out on macrobenthos of the River Plate estuary, demonstrating that unintentional introductions and subsequent invasions of bivalves have recently increased considerably due to increased transoceanic traffic. New species have been introduced with ships' ballast water from all regions of the world, but particularly from South East Asia."

5. These goals have been selected by the Environment Agency's Marine Environment Study Group.

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Nautilus Institute
608 San Miguel Ave., Berkeley, CA 94707-1535 | Phone: (510) 423-0372 | Email: nautilus@nautilus.org