

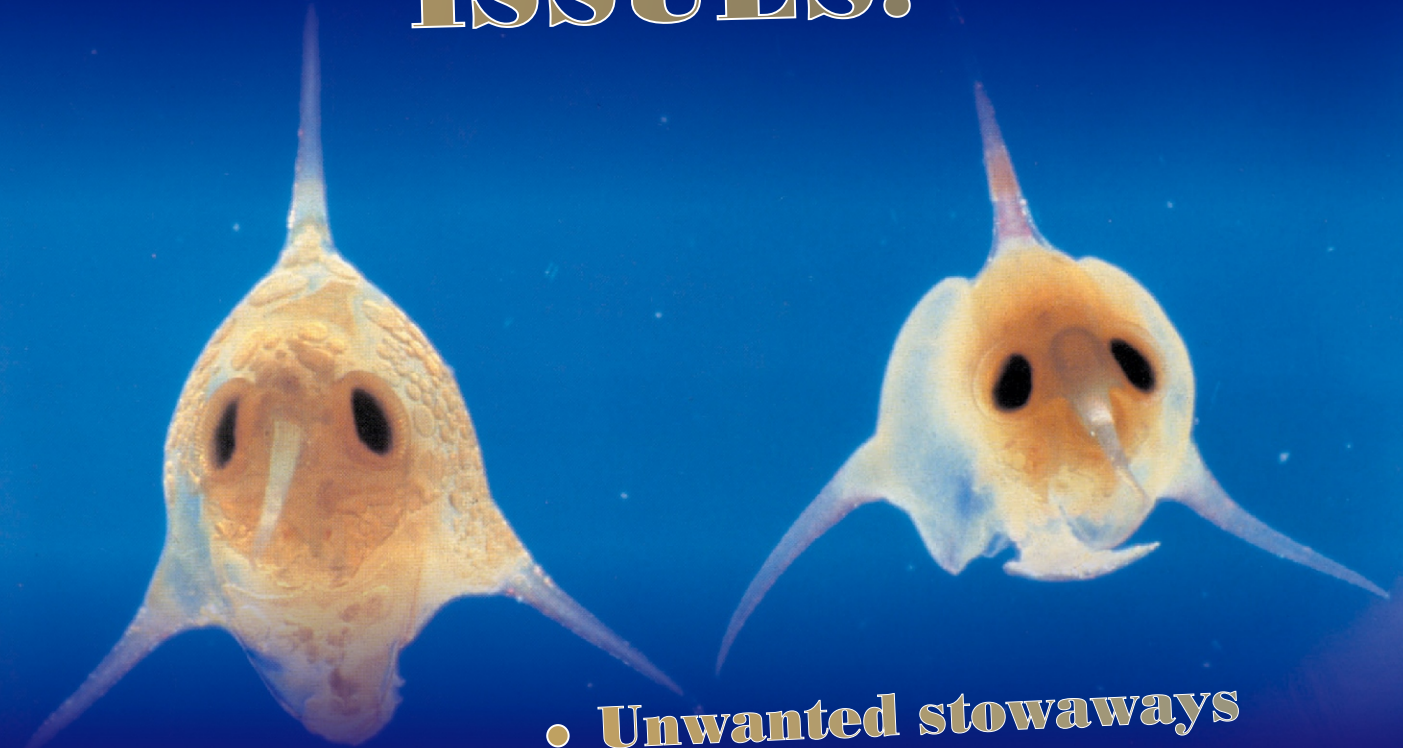
Tropical Coasts

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July 2001

TRANSBOUNDARY ENVIRONMENTAL ISSUES:



- Unwanted stowaways
- Ultrahazardous cargo
- Oil spills
- Navigational mishaps

Shared Threats, Shared Opportunities

Maria Socorro Z. Manguiat
Issue Editor



This age of connectivity, made possible in large part by advances in communication and information technology, has strengthened the ties that bind us in both positive and negative ways. Information can now be transmitted more quickly than ever and goods and persons transported at heretofore-unimaginable speeds. Buzzwords include globalization and the breaking of barriers. However, the same connectivity has also meant that environmental problems previously confined within smaller areas have now become shared problems. These problems threaten the sustainability of resources, including our very health and welfare.

Like the technological revolution, the winds of economic realignment that are sweeping the region can be seen both as a challenge and an opportunity. These movements, aimed at bringing growth and economic prosperity to the region, will also aggravate environmental problems. While national capacity to handle purely domestic environmental problems varies, the region-wide capacity to handle problems that span beyond national jurisdiction is just beginning to emerge. These new economic directions will, however, also create new ties and structures that can be the foundation not only for economic cooperation, but for environmental management which, as the countries are learning from their own experiences, cannot be divorced from any development plan, if the development sought to be achieved is to be sustainable.

This issue of *Tropical Coasts* focuses on environmental issues that are shared by countries in the East Asian Seas region as well as some

of the possible responses to these issues. The challenges include those relating to the sea transport of ultrahazardous radioactive materials, navigational safety, ballast water control and management, and oil spills.

Among the responses offered are the adoption of a regional protocol to address the issue of ultrahazardous radioactive material, cost-sharing in the management of international straits, more mature applications of information technology through the marine electronic highway, and the formulation of oil pollution contingency plans that address the aspects of prevention, mitigation and compensation. These responses reflect how technology will play a pivotal role in offering solutions to the environmental problems facing the region in the coming years, as explained in Messrs. Sekimizu, Sainlos and Paw's article on the marine electronic highway. Science will also lead us to a better understanding of the magnitude and trends relating to the threats to the coastal and marine environment in the region, as Mr. Dandu Pughuic's article on ballast water demonstrates. Capt. Mark Heah Eng Siang's article on the *Natuna Sea* case indicates how costly the application of these solutions can be. Figures from Mr. Pughuic's article show, however, how much more costly doing nothing can be.

To face these and other transboundary environmental issues in the region, and to apply the solutions provided in this article and the many others yet to be explored, there is a need to work together in a more structured fashion. Stakeholders in the region must be guided by a vision that will define the directions to be taken in addressing these issues and indicate which of these problems must receive their priority attention. Strategies must then be formulated to address these priority issues. The institutional mechanism that will provide continuity and sustainability to carry out the vision must also be formulated, for while the goal is to provide a comprehensive regime for addressing these problems, the development of such a regime will take years and sustained effort that can be accomplished most efficiently only through the avenue of a regional mechanism.

The question, however, is how far such a regional mechanism should go. Prof. Jon Van Dyke, in his article on *The Legal Regime Governing Sea Transport of Ultrahazardous Radioactive Material*, argues for the development of a regional protocol because of the failure of the international community to provide adequate responses to the concerns of coastal states relating to the risks attendant to the sea transport of ultrahazardous radioactive material. The debate on international versus regional regimes in the management of environmental issues also emerges in Prof. Robert Beckman's piece on Article 43 of the United Nations Convention on the Law of the Sea. In certain cases, such as in dealing with ballast water, the best solution may be for a uniform set of guidelines that applies worldwide, with the regional mechanism making adaptations with respect to appropriate technologies and arrangements for cooperation among neighboring states. Regardless of the actual form that the regional mechanism takes, or the breadth of its reach, it is clear that the time has come for thinking seriously about a regional mechanism. The age of connectivity and the forces of economic realignment provide the opportunity to move this thinking forward. ■

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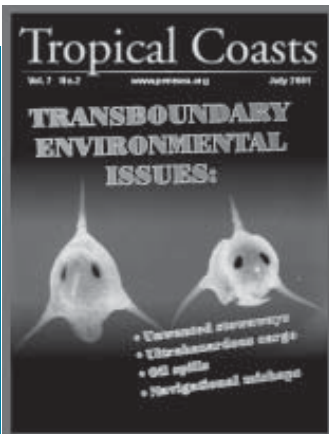
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on the cover

Looks can be deceiving.

These crab larvae, like many seemingly harmless marine species, can be transported through a ship's ballast tanks and cause devastating impacts on the whole ecosystem.

Photo of crab larvae
courtesy of Roger Steene



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special feature

32 Shihwa Lake: From a Disaster to a Showcase

With the signing of the Shihwa Declaration, the Korean government and various stakeholders vowed to rebuild Shihwa Lake by providing guidelines that will ensure the protection and sustainable use of its resources. (See related story on page 61)

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The Safety Concerns

In November 1992, Japan shipped 2,200 pounds (one metric ton) of plutonium in a refitted freighter called the *Akatsuki Maru* from France to Japan, going around the Cape of Good Hope in Africa and then south of Australia before turning north to traverse the Pacific to Japan. In February 1995, the British vessel *Pacific Pintail* carried 28 canisters of high-level vitrified nuclear waste (HLW) in glass blocks, each weighing 1,000 pounds, going around Cape Horn at the tip of South America and then across the Pacific. In early 1997, the British vessel *Pacific Teal* carried 40 of such canisters, going around Africa and then up through the Tasman Sea. In January 1998, the British vessel *Pacific Swan* carried 60 HLW canisters, going through the Caribbean and then through the Panama Canal. The *Pacific Swan* made a similar voyage in March 1999, carrying 40 cylinders of HLW through the Mona Passage (between Puerto Rico and the Dominican Republic) and then through the Panama Canal.

The Legal Regime Governing Sea Transport of Ultrahazardous Radioactive Materials



The *Pacific Pintail*, a specially designed double-hulled vessel used only for the transport of nuclear material.

Source: Uranium Information Centre, Ltd. (UIC).

1

From July 21 to September 27, 1999, the *Pacific Pintail* and the *Pacific Teal* traveled from France to Japan carrying 446 kilograms of weapons-usable plutonium contained in 40 mixed plutonium/uranium oxide (MOX) fuel elements. This transport was routed around the Cape of Good Hope in South Africa, across the southern Indian Ocean, and then up

through the Tasman Sea and the western Pacific Islands to Japan. The ships “adhered to a request by the [South African] government to stay out of South Africa’s territorial waters and its larger marine [exclusive economic zone] EEZ.”^[2]

The *Pacific Swan* left Cherbourg, France on December 29, 1999, carrying 104

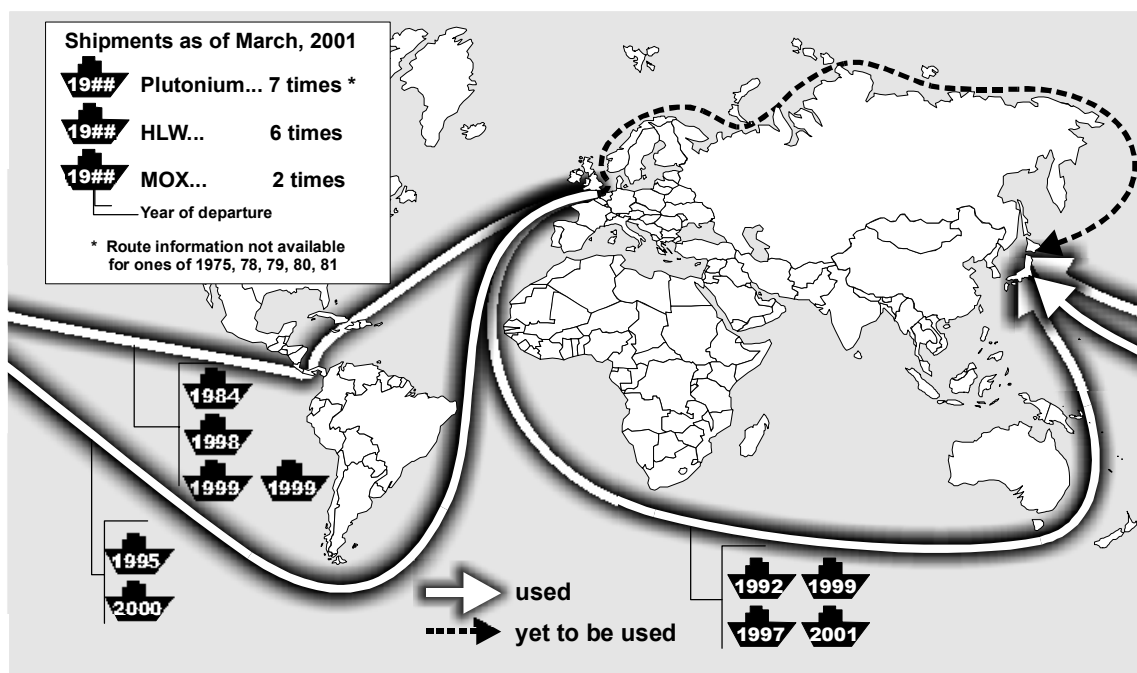
containers of vitrified high-level waste and traveled through the Caribbean Sea and Panama Canal, on its way to Japan. A year later, the *Pacific Swan* again made the journey, this time with the largest cargo of nuclear waste ever carried — 192 canisters of high-level wastes and this time traveling around Cape Horn at the tip of South America, arriving in Japan in February 2001. Almost simultaneously, the *Pacific Pintail* and the *Pacific Teal* went around the world the other way, around the Cape of Good Hope at the tip of Africa, carrying 230 kilograms of plutonium and four tons of uranium contained in 28 MOX fuel assemblies. During this shipment, transport officials suggested that one or two such shipments of plutonium fuel would be made each year for the next 15 years.

These shipments present risks of a magnitude totally different from any previous ocean cargoes. Each of the nuclear waste canisters contains 17,000 terabecquerels in beta-gamma activity. The *Pacific Swan*, for instance, carried a

“ These shipments present risks of a magnitude totally different from any previous ocean cargoes.”

staggering 96,000,000 curies of radioactivity when it traveled around Cape Horn in January 2001. The MOX fuel on the 1999 and 2001 shipments of the *Pacific Teal* and *Pacific Pintail* could be easily converted to provide the materials needed to build dozens of nuclear weapons. These long-lasting, highly radioactive and radiotoxic nuclear materials could endanger large coastal populations or produce widespread, long-term radioactive contamination of the marine environment. They are extremely difficult to handle, and the equipment necessary to salvage them in the event of an accident have not yet been

Figure 1. Shipments of high-level radioactive waste (HLW) and mixed uranium-plutonium oxide (MOX) fuel from Europe to Japan.



Source: Citizen's Nuclear Information Center. (Used with permission)

These long-lasting, highly radioactive and radiotoxic nuclear materials could endanger large coastal populations or produce widespread, long-term radioactive contamination of the marine environment. They are extremely difficult to handle, and the equipment necessary to salvage them in the event of an accident have not yet been developed.”

developed. British representatives acknowledge that in the event of a vessel sinking “it was quite apparent that recovery from some places would not be possible.”^[3] But a sinking may not be the most dangerous foreseeable event. If a vessel carrying such a cargo collided with another vessel causing an intensely hot and extended shipboard fire, then radioactive particles could become airborne, putting all nearby life forms in grave danger.

These cargoes are not, therefore, just another group of “dangerous goods.” They are truly “ultrahazardous,” requiring a focused and comprehensive legal regime designed to internalize the real costs of the shipments. There is also a need to ensure that the risks they create are *not* transferred from those that benefit from these shipments to those who gain nothing from them. Because of their concerns, several South

American countries have objected to the nuclear transports passing their territorial waters and EEZs, as Chile did in 1995. In August 1998, Argentina and Chile conducted joint naval exercises to prepare for a hypothetical accident, a ship carrying ultrahazardous radioactive materials collided with an iceberg.

Affected nations have protested vigorously against recent shipments. In 1992, the Heads of Government of the Caribbean Community (Caricom) issued a strong statement that “shipment of plutonium and other radioactive or hazardous materials should not traverse the Caribbean Sea.”^[4] In the Pacific, New Zealand has taken the lead in protesting these shipments, arguing that they should not be permitted through their EEZ because of the “‘precautionary principle’ enshrined in the Rio Declaration. There should be recognition in international law of the

right of potentially affected coastal states to prior notification, and, ideally, prior informed consent for shipments of nuclear material.”^[5]

South Africa has similarly registered regular protests to these shipments. In August 1999, the Regional Environment Minister for the Western Cape Province, Glen Adams, called for the shipments to end, saying: “Because the shipments are expected to continue for the foreseeable future, the risk incurred at no benefit to us will be a recurring risk. This is a risk that our province does not want to carry.”^[6] The Indian Ocean country of Mauritius announced that the ships would not be allowed into their EEZ. Because of opposition in Korea, a 1999 shipment used the Tsuruga Strait instead of the Korean Strait.

The Current State of Affairs at the International Level

In March 1996, the International Maritime Organization (IMO) held a Special Consultative Meeting where governmental and nongovernmental organizations presented their views on the risks created by these transports and the legal regime that applies to them. Meeting assignments were then given to various international bodies to address these issues. A few issues have been satisfactorily resolved, but many require further examination and discussion.

Making the INF Code Mandatory

The members of the IMO decided in 1999 that the IMO Code for the Safe Carriage of Irradiated Nuclear Fuel (INF), Plutonium (Pu) and High-Level Radioactive Waste should be incorporated into the International Convention for the Safety of Life at Sea (SOLAS). This Code regulates the packaging of the radioactive materials and the construction, design, and staffing of ships that transport them, but “reliance on design and packaging safeguards alone has become neither prudent nor palatable” to many coastal countries.^[7]

Shipboard Emergency Planning

The Marine Environment Protection Committee (MEPC) of the IMO has developed Guidelines for Developing Shipboard Emergency Plans, which are designed to be added to the INF Code. The Committee recognized the need for consultation with coastal states in the development of these shipboard emergency plans. It is unclear, however, whether coastal nations will be fully informed of these plans, so that they can develop coordinated shore-based emergency plans.

Planning for Shore Emergencies and Creating Salvage Plans

These steps are obviously desirable endeavors to reduce the risk of accidents, but no systematic effort has yet taken place, and the shipping and nuclear nations appear reluctant to undertake these important assignments.

“ These cargoes are not, therefore, just another group of ‘dangerous goods.’ They are truly ‘ultrahazardous,’ requiring a focused and comprehensive legal regime designed to internalize the real costs of the shipments. There is also a need to ensure that the risks they create are *not* transferred from those that benefit from these shipments to those who gain nothing from them.”

Type B transport flask (right) used for high level waste.

Source: Uranium Information Centre, Ltd. (UIC).



Unloading vessel for transport flasks.

Source: Uranium Information Centre, Ltd. (UIC).

“International discussions have stalled. It is unlikely that any new comprehensive instrument will emerge from these international discussions in the near future. It is crucial, therefore, that regional bodies act to protect their environments from the possible degradation and destruction resulting if any vessel carrying ultra-hazardous cargoes meets an accident.”

Avoiding Particularly Sensitive Sea Areas

Little work has been done thus far to identify sensitive sea areas ships carrying ultrahazardous cargoes must avoid.

Creation of a Liability Regime

Many gaps exist in the current treaty framework. Among the problems are: the definition of damage does not clearly include environment and consequential losses, a liability regime needs to be applied, an international claims tribunal needs to be considered, liability for other parties such as suppliers, financiers and operators needs to be addressed, liability limitations need to be removed or modified and additional supplementary funding protocols need to be created. Under the current regime, victims have to bring claims in the courts of the countries responsible

for the damage rather than their own courts. Japan is also not at present a party to any of these conventions. For the moment, the IMO has left the question of developing a liability regime for INF material at sea to the International Atomic Energy Agency (IAEA).

International discussions have stalled. It is unlikely that any new comprehensive instrument will emerge from these international discussions in the near future. It is crucial, therefore, that regional bodies act to protect their environments from the possible degradation and destruction resulting if any vessel carrying ultrahazardous cargoes meets an accident.

The Relevant Principles of International Law

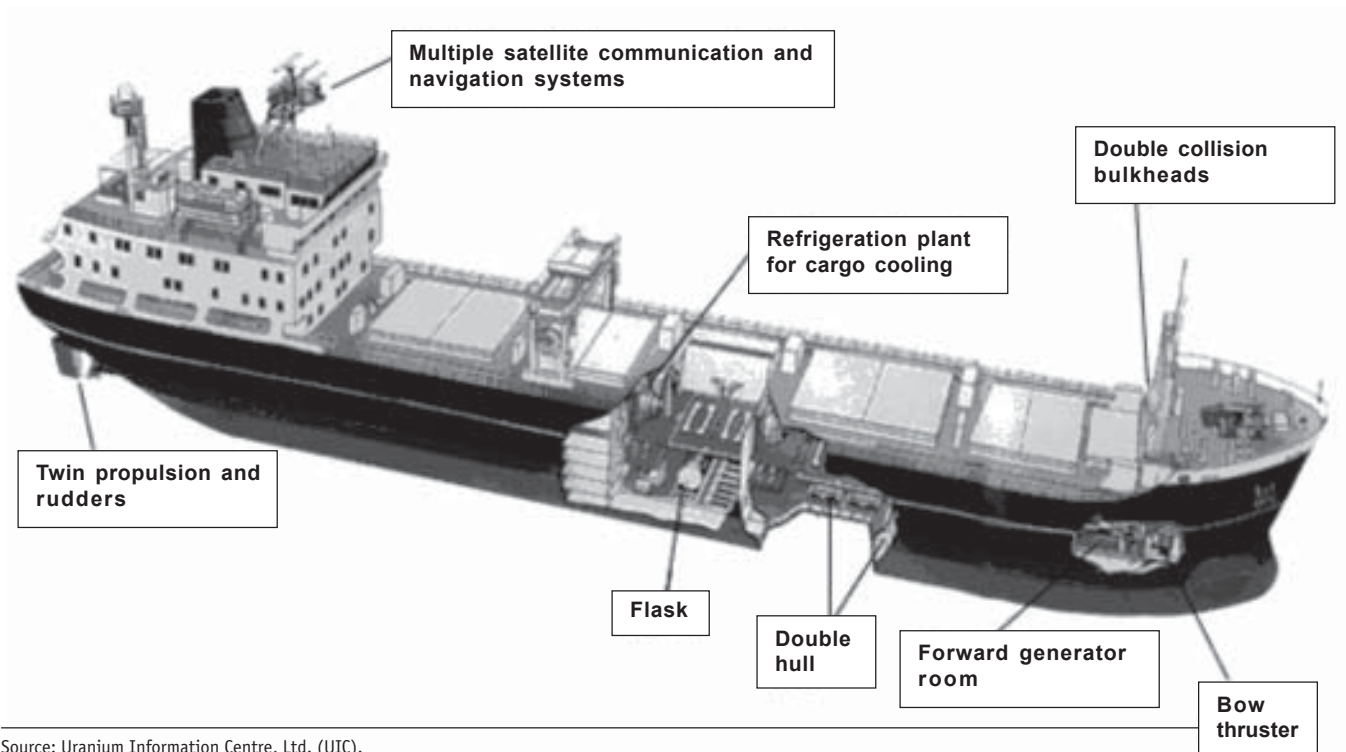
The Governing Framework

The 1982 United Nations Convention on the Law of the Sea (LOS), and its accompanying network of treaties

and customary international law principles, recognize a number of obligations all sea users must adhere to. Vessel-source pollution regulation falls largely under the treaty framework of the SOLAS and the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 relating thereto (MARPOL 73/78). The Basel Convention and regional conventions such as the Waigani Convention deal with the transboundary movement of hazardous wastes, but do not specifically address nuclear material. The IAEA Code and INF Code address the movement of nuclear material. A number of specific treaties relate to nuclear energy and liability while some regional conventions lay down specific principles relevant to shipments of radioactive waste. The primary international bodies dealing with this issue are the IMO and the IAEA. The issue is also discussed in regional bodies such as Caricom and the South Pacific Forum.

The LOSC contains a number of articles on both the freedom of navigation and the protection of the marine environment. These navigational freedoms are often cited to counter calls to regulate ultrahazardous nuclear shipments, particularly the demand to provide advance notification of shipments. But states also have “the obligation to protect and preserve the marine environment” and this duty is accompanied by specific liability: “States are responsible for the fulfillment of their international obligations concern-

Figure 2. Purpose built vessel for transport of spent nuclear waste.



Source: Uranium Information Centre, Ltd. (UIC).

ing the protection and preservation of the marine environment and shall be liable in accordance with international law.”^[8]

The Duty to Avoid Causing Harm to Other States

Principle 21 of the Stockholm Declaration on the Human Environment affirmed the responsibility of states “to ensure that activities within their jurisdiction and control do not cause damage to the environment of other states or areas beyond the limits of national jurisdiction.” South Africa has cited the principle that no nation has the right to expose another to danger as one of the principles underlying its opposition to the 1997 journey of the *Pacific Teal*.

The Duty to Protect the Marine Environment

Marine environmental protection is now a major concern because of over fishing, oil and chemical spillages, toxic waste transport, and the transport of radioactive materials. States must take necessary measures to ensure that activities under their jurisdiction or control do not cause damage to other states. Pollution arising from incidents or activities under their jurisdiction or control should not spread beyond the areas where they exercise sovereign rights in accordance with the LOSC. The measures taken must include those designed to minimize to the fullest possible extent pollution from vessels. These obligations

have emerged as a countervailing force against the freedom of navigation, which has throughout its development been set against other rights and uses of the ocean. Freedom of the high seas is exercised under the conditions laid down by the LOSC and by other rules of international law. Coastal states have jurisdiction in the EEZ for the purpose of the protection and preservation of the marine environment.

Prior Consultation

International law requires prior and timely consultation at an early stage and in good faith. It requires the provision of relevant information to potentially affected states. Similarly, international law requires prior

““ These obligations have emerged as a countervailing force against the freedom of navigation, which has throughout its development been set against other rights and uses of the ocean. ””

consultation whenever the activity of one nation creates a significant risk to another. Inherent in the duty to consult is the duty to inform or notify, which is a precondition of meaningful and effective consultation. Article 198 of the LOSC requires that when a state becomes aware that its activities are causing or are likely to cause pollution to the marine environment, it shall immediately notify other states likely to be affected. Similarly, the Convention on Early Notification of Nuclear Accidents requires notification.

Although the duty to consult is one of the most venerable and well-established principles of international law, the shipping and nuclear nations are reluctant to acknowledge that they must consult with affected coastal nations regarding these ultrahazardous shipments. They argue that such consultation would interfere with their freedom of navigation and may assist terrorists who wish to attack the shipments. These arguments are spurious. Consultation regarding route-selection and emergency planning is in everyone's best interest. They can only serve to make these shipments safer for all concerned.

Proper international consultation has several elements. The *first step* is to disclose the nature of the project with its attendant risks and safety measures to potentially affected states. Preparing an *environmental impact assessment* is a logical way to fulfill this obligation, and is required by Articles 204–206 of the LOSC. Numerous other treaties also impose an environmental assessment requirement.

The *second step* is to listen to the concerns of the affected nations. Suggestions, if helpful and constructive,

should be accepted and acted upon. If the shipping states reject a suggestion, they should explain why.

This procedure entails no risks and can only lead to safer voyages. The coastal states may have ideas regarding shipping lanes and weather patterns that can reduce the risks. The Western Pacific and the Caribbean are, for instance, subject to intense storms during certain times of the year. The island and coastal states' understanding of the shipments and their cargoes can enable them to make better use of their rescue equipment. Preparing for coastal emergencies can only be done after understanding the risks involved.

Prior Notification

The shipping and nuclear nations argue that prior notification is inconsistent with the freedom of navigation guaranteed under LOSC. But the shipping and nuclear nations currently *do*, in fact, provide notification, at least to their close allies and the nations that they trust. The smaller Caribbean nations have been, however, left in the dark regarding these shipments, creating a two-tiered situation whereby some affected nations are treated as second-class citizens without the right to learn what is going on. Obviously such a situation is unfair and unacceptable.

Prior notification is useful in reducing the alarm resulting from unsubstantiated rumors as well as ensuring proactive contingency plans dealing with coastal emergencies. Prior notification for transboundary movement of hazardous materials is standard in a number of conventions, including the Basel Convention, the Bamako Convention, the IAEA Code of Practice on the International Transboundary Movement of Radioactive Waste, and the IAEA Regulations for the Safe Transport of Radioactive Material.

Prior notification requirements are not unprecedented. A recent survey of national actions listed Canada, Djibouti, Libya, Malta, Pakistan, Portugal and the United Arab Emirates as requiring prior notification before

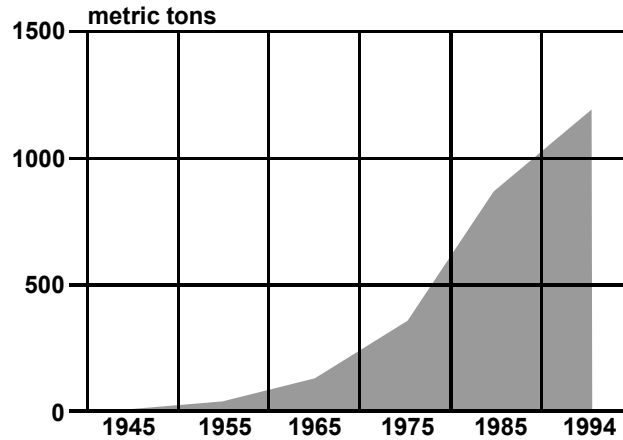
hazardous cargoes can pass through their waters. It identified Egypt, Guinea, Iran, Malaysia, Oman, Saudi Arabia, Turkey, and Yemen as requiring prior authorization for such passage. It mentioned Argentina, Haiti, Ivory Coast, Nigeria, the Philippines, and Venezuela as completely prohibiting passage by ships carrying nuclear or other inherently dangerous or noxious substances.^[9]

Moreover, Malaysia explicitly insisted on prior authorization before any such shipment passes through its waters, and that “such a passage no longer constitutes ‘innocent passage’ under international law and such vessels should not access the Straits of Malacca and Singapore. The straits states must be able to say no to such ships and if necessary, stop them from transit.”^[10] Malaysia has specifically linked its claim to stop these shipments to “the gaps in the legal regimes governing these activities.”^[11] Two European scholars, after surveying recent treaties and national actions, have said that these developments suggest a “trend towards recognition of a right of prior notification.”^[12]

Preparation for Foreseeable Emergencies

The consequences of an accident involving a ship transporting radioactive material could be very serious. Hence, emergency procedures must include access to appropriate ports, the availability of

Figure 3. Total Worldwide Plutonium Production 1945-1994.



Source: Nuclear Control Institute. (Used with permission)

tugboats and firefighting equipment, and retrieval in the event of a sinking. Since rules on access to ports by vessels in distress are “somewhat patchy,”^[13] coastal nations are inevitably going to be unenthusiastic about allowing such vessels into their ports for emergency repairs. Such entry would affect the vital interests of the country, for example through the risk of exposure to radioactive contamination. It thus “would seem essential that emergency arrangements should include prior consultation and agreement with coastal states on ports where repairs could be undertaken without posing risks to the safety of the adjacent population.”^[14]

Liability

It is clear that a country creating risks is liable to compensate the injured country, but the practical mechanisms for compensation are not always in place. Because the nuclear and shipping nations are putting coastal populations and small

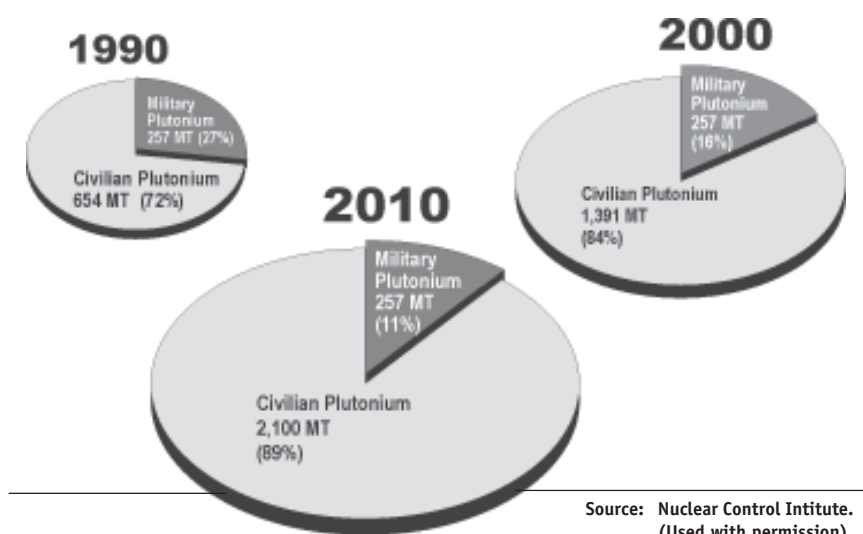
island communities at risk, in a situation where they obtain no benefit from the activity, a detailed liability regime should be developed to ensure timely compensation in case of injury. In many legal systems, including international law, when an actor engages in ultrahazardous activity and harm results, the actor is held to be strictly liable. A specific regime covering all foreseeable damage and ensuring adequate funding is urgently needed.

Are These International Law Requirements Consistent with Navigational Freedoms?

Innocent Passage Through Territorial Seas

Although innocent passage is permitted through territorial seas, the passage must in fact be innocent. Passage is innocent so long as it is not prejudicial to the peace, good order, or security of a coastal state. Coastal

Figure 4. Total Military and Civilian Plutonium (in metric tons).



states have been arguing that shipments of ultrahazardous radioactive cargoes are prejudicial to their security, thus rendering the passage non-innocent. Passage must take place in compliance with coastal laws mandated by international law, and other rules of international law.

Protection of Marine Resources in Exclusive Economic Zones

Navigational freedoms are protected in the EEZ, but a coastal state has a responsibility to protect its marine environment. When combined with sovereign rights over the management of natural resources, this authority provides significant jurisdiction to prevent pollution and allows coastal states to place considerable limitations upon navigational rights to protect the marine environment.

The Precautionary Principle

In exercising their jurisdiction to protect and preserve the marine environment under the LOSC, states may and should apply the precautionary principle. A Chilean naval vessel challenging the 1994/95 shipment, representing a coastal State responsible for its marine environment in the Cape Horn region, cited the precautionary principle as a primary reason for banning the *Pacific Pintail* from its EEZ.^[15]

When Is Unilateral Action Permissible?

International law anticipates nations taking countermeasures to respond to violations. Because no centralized international policing mechanism exists, those nations aggrieved by violations of international law by others can take unilateral

actions to protect their interests. These responses are sometimes characterized as “reprisals” and sometimes as “countermeasures.”

A country seeking to block passage of ultrahazardous nuclear cargoes through its EEZ would thus argue that such passage violates the standards found in the LOSC. Countries are required to prepare environmental impact statements and contingency plans for accidents, consult with affected states, and establish appropriate liability regimes for such hazards. Because these requirements are found directly in the LOSC itself, they are certainly “international standards” that must be complied with. The widespread “state practice” of coastal nations protesting such shipments, as described above, certainly reinforces the conclusion that these precautionary measures must precede such shipments.

The number of serious protests against these ultrahazardous cargoes — from threatened coastal and island nations — have led commentators to recognize the “emerging state practice with regard to regulating the threat of vessel-source pollution in the law of the sea.”^[16]

The nations shipping ultrahazardous radioactive cargoes argue that they are entitled to passage rights because their shipments comply with

the standards established in SOLAS. But surely this treaty does not override the fundamental principles in the LOSC—which has been characterized as the “Constitution for the Oceans.”

Malaysia, on the other hand, has also urged the international community to take action toward “the establishment of a regime of prior notification, consultation with coastal states, environmental impact assessment, an emergency response plan and a strict liability regime that would govern damages from accidents as well as flag state responsibility and accountability.” One commentator who supports the right to take military action to prevent threats to environmental resources characterizes the governing rule as follows: “When the environmental threat is immediate and threatens destruction similar in kind to an armed attack, producing property damage, loss of life, and refugee flows, a state may legally use force to address that environmental disaster internationally.”^[17]

When the principles of international law are unresolved or in dispute, it is commonplace for countries to take appropriate unilateral actions to convey and protect their views. The strong protests and military actions taken, in particular, by Brazil, Argentina, and Chile provide examples of such initiatives. They are likely to continue because of the frustrations over the lack of action by the responsible international organizations. The IMO’s Legal Committee, for instance, did not act on Argentina’s 1996 proposal that would have required vessels transporting INF to avoid territorial seas and EEZs of other nations unless permission for transit has been secured.^[18] At about the same time, the Mediter-

“The number of serious protests against these ultra-hazardous cargoes – from threatened coastal and island nations – have led commentators to recognize the ‘emerging state practice with regard to regulating the threat of vessel-source pollution in the law of the sea.’”

ranean nations adopted a “Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and Their Disposal,” which explicitly prohibits the transport of hazardous wastes through territorial seas without prior notification to and consultation with the affected coastal state (Article 6(4)). This development is significant because France is a Mediterranean nation, and its acceptance of this provision by its Mediterranean neighbors sharply undercuts the position of the maritime nations that such notification and consultation requirements are inconsistent with passage rights under the freedom-of-the-seas doctrine.

Concerned coastal and island nations may thus conclude that they have the right to block any passage through their territorial seas and that they have the right to prior notification and consultation before any vessel can pass through their 200-mile EEZs.

If the shipping nations refuse to comply or cooperate, then the coastal nations will have proper grounds to use force to prevent these ships from passing through their maritime zones. In fact, the coastal nations may feel obliged to use force, because their failure to block the passage of these ships may later be interpreted as acquiescence and acceptance of the vessels' rights of passage.

Conclusion

"[F]urther measures are necessary" to protect coastal nations from the risks created by shipments of ultrahazardous radioactive cargoes. If the measures are not adopted "through co-operation at the international level," they will be "defined unilaterally" by coastal state initiatives.^[19] International law now requires nations to protect the marine environment, and coastal nations are entitled to protect their coastal marine resources. Unless the shippers of ultrahazardous cargoes engage in meaningful consultations, discuss routing alternatives, prepare environmental impact assessments, establish emergency contingency planning, and agree to a liability regime, coastal nations will have no alternative except to protect their interests.

Recommendation Number 1: Comprehensive Regional Protocols Are Needed to Ensure the Safety of the Sea Transport of Ultrahazardous Radioactive Cargoes.

Although concerned coastal nations have raised alarm over these shipments since 1992, international response has been halting and incomplete. This process should not be seen as an adversarial situation between the shipping and nuclear nations on the one hand and the concerned coastal states on the other. It is in everyone's interest to protect the marine environment and coastal populations. Shippers do consult with and notify many nations, but leave out other affected coastal and island countries.

Regional protocols could fill the gap and ensure that these shipments conform to the standards of safety needed to protect coastal populations and the marine environment.

A regional regime should include the following:

- a. The obligation to notify and consult prior to any shipment of high-level radioactive materials through the territorial sea or EEZ of any nation. Consultations must be in good

faith and must include discussions regarding alternative routing and emergency contingency planning.

- b. The requirement to prepare an environmental impact assessment prior to such shipments. The process of preparing the assessment must be interdisciplinary and must include public input.
- c. The exclusion of certain specific hazardous routes.
- d. Detailed provisions on accident and emergency procedures. These procedures must include access to appropriate ports, availability of tugboats and firefighting equipment, and plans for retrieval in the event of a sinking.
- e. A binding liability and compensation regime applicable to these shipments. Such a regime must not only clearly include environmental and consequential damage on a strict liability basis to a realistic level but must also spell out the conditions of liability in these circumstances. It should also include the creation or identification of a compensation fund to pay victims, and provide an international tribunal to hear claims.

**Recommendation Number 2:
Concerned Nations Should
Bring a Claim Against
France, Japan, and the
United Kingdom Utilizing the
Dispute-Resolution
Procedures in the Law of the
Sea Convention**

Part XV of the LOSC establishes mandatory dispute resolution procedures. This innovative mechanism is just now beginning to be utilized by the contracting parties. Article 297(1)(b) authorizes coastal and island states to bring claims against shipping nations whenever “it is alleged that a State in exercising [its navigational] freedoms, rights, or uses has acted in contravention of this Convention or of laws or regulations adopted by the coastal State in conformity with this Convention and other rules of international law not incompatible with this Convention.”

A claim could be brought by concerned coastal states contending that the shipping nations (France, Japan, and the United Kingdom) have violated:

- a. their duties under Articles 204–206 to prepare and disseminate an environmental impact statement (because “planned activities under their jurisdiction or control may cause substantial pollution of or significant and

“ Unless the shippers of ultrahazardous cargoes engage in meaningful consultations, discuss routing alternatives, prepare environmental impact assessments, establish emergency contingency planning, and agree to a liability regime, coastal nations will have no alternative except to protect their interests. ”

- harmful changes to the marine environment”),
- b. their duty to consult affected states, including specifically their duty under Article 199 to “jointly develop and promote contingency plans for responding to pollution incidents in the marine environment,”
- c. their general duty under Articles 192 and 235 to “protect and preserve the marine environment,” including the more specific duty under Article 194(5) “to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life,” and
- d. their more specific duty under Article 235(3) to create an appropriate liability regime,

including the “development of criteria and procedures for payment of adequate compensation, such as compulsory insurance or compensation funds.”

Under Article 287, each contracting party is instructed to choose one or more of four possible “means for the settlement of disputes,” (a) the International Tribunal for the Law of the Sea (ITLOS), (b) the International Court of Justice (ICJ), (c) a five-member arbitral tribunal established pursuant to Annex VII of the Convention, or (d) a “special arbitral tribunal” established pursuant to Annex VIII (designed for specialized disputes requiring scientific expertise, including “protection and preservation of the marine environment” and “navigation, including pollution

“Regional protocols could fill the gap and ensure that these shipments conform to the standards of safety needed to protect coastal populations and the marine environment.”

from vessels and by dumping”). If a contracting party does indicate its preference, it shall be deemed, under Article 287(3), to have accepted the Annex VII arbitral tribunal. The United Kingdom has indicated its choice for the ICJ. Japan and France have not yet indicated any preference. Under Article 296, decisions rendered by a court or tribunal under these procedures are final and must be complied with by all the parties to the dispute.

One awkward aspect of this proposed course of action resulted from the United Kingdom’s selection of the ICJ as well as France and Japan not making any selection, thus triggering the Article VII arbitral tribunal as the default choice. Because of these differences, it may be necessary to proceed separately against the United Kingdom in the ICJ and against France and Japan in an arbitral tribunal. It appears from the language of Article 290 that the ICJ could issue preliminary measures against the United Kingdom, and the ITLOS could issue preliminary measures against France and Japan if an arbitral tribunal is not established within two weeks from the filing of the complaint. It would be preferable, of course, if the countries agree upon a single tribunal for this adjudication, but, if not, it may be necessary to proceed in two separate venues.

This new dispute-resolution procedure is now open for business. The dispute, regarding the obligations of the nations transporting ultrahazardous radioactive materials by sea, appears to be an appropriate one for mandatory dispute resolution. ■



The BNFL ship *Pacific Teal* enters Fukushima harbor with its cargo of MOX fuel, September 1999. A Japanese security forces boat is seen on the left, and the towers of the Fukushima power plant are in the background.

Source: Jorge Punzi ©Greenpeace/MacColl. (Used with permission)

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- [2] South African Press Agency, *British Nuclear Ships Pass SA Coastline*, Aug. 14, 1999.
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- [8] United Nations Convention on the Law of the Sea, Dec. 10, 1982, entered into force Nov. 16, 1994, UN Doc. A/CONF.62/122 (1982), 21 I.L.M. 1261; 1982. Most countries and commentators recognize that most of the provisions in the Law of the Sea Convention codify obligatory customary international law principles, and hence are binding even on countries that have not yet ratified the Convention.
- [9], [12] Kari Hakapaa and Erik Jaap Molenaar, *Innocent Passage – Past and Present*, 23 Marine Policy 131, 142; 1999.
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- [13], [14] Wonham *et al.*, 296 p., 299 p.
- [15] Transcript of Radiotelephone conversation of March 22, 1994. Coastal States have the specific right “to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone, where particularly severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance.” Law of the Sea Convention, Article 234. This provision could strengthen Chile and Argentina’s claim to ban highly radioactive nuclear carriers from their EEZs.
- [16] Nadelson, at 222 (citing in particular the Joint Declaration of Brazil, Argentina, Chile and Uruguay about Radioactive Waste Transport issued by the Brazilian Foreign Ministry to the IAEA, Jan. 17, 1997, Communication of Feb. 28, 1997, INF Circ/533, which indicated that international law justified unilateral action).
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- [18] Statement of Argentina presented to the Special Consultative Meeting of Entities Involved in the Maritime Transport of Materials Covered by the INF Code, International Maritime Organization, March 4-6, 1996, YSCM 5, Presentation 6 (stating that ships carrying ultrahazardous radioactive cargoes should avoid territorial seas and exclusive economic zones of third states unless there is no “high-sea route of similar convenience with respect to navigational and hydrographical characteristics,” and stating further that if passage through a territorial sea or EEZ of a third state is required the shippers must “comply with the routing systems set up by such States”).

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Using Article 43 of UNCLOS to Improve Navigational Safety and Prevent Pollution in International Straits

Background

At the third United Nations Conference on the Law of the Sea from 1973 to 1982, States faced the difficult task of devising a legal regime to govern straits used for international navigation that balanced the interests of the straits States and the larger international maritime community. Straits States have an interest in preventing vessels from polluting their waters and coasts. The international maritime community, on the other hand, has an interest in ensuring unimpeded passage for vessels from all States on routes used for international navigation. The goal of the negotiations was to strike an appropriate balance between the interests of the two groups.

The issue of passage through international straits was linked to the issue of the breadth of territorial sea. Straits States demanded the right to claim a territorial sea adjacent to their coasts of 12 nautical miles. The consequence of this was that international straits that were less than 24 nautical miles wide fell within the territorial sovereignty of straits States. Naval and maritime powers feared that this would threaten the interests of the international community in giving the vessels of all States free and unimpeded passage on major international shipping routes.

After difficult negotiations, a consensus was reached. A new legal regime governing straits used for international navigation was established. This was embodied in the 1982 United Nations Convention on the Law of the Sea, which is commonly referred to as the 1982 UNCLOS.



The term “Straits of Malacca” refers to the Strait of Malacca and the Strait of Singapore. The Strait of Malacca is situated between the East Coast of Sumatra Island and the West Coast of Peninsular Malaysia. It is contiguous to the Strait of Singapore at its southeast end, forming one international shipping route linking the Indian Ocean (via the Andaman Sea) with the South China Sea to the Pacific Ocean. The length of the Straits is around 600 nautical miles (nm) with the widest section (220 nm) near the northwest entrance, narrowing gradually to around 8 nm at the southeast entrance near the Riau Archipelago.

Source: PEMSEA

“Straits States have an interest in preventing vessels from polluting their waters and coasts. The international maritime community, on the other hand, has an interest in ensuring unimpeded passage for vessels from all States on routes used for international navigation. The goal of the negotiations was to strike an appropriate balance between the interests of the two groups.”

The 1982 UNCLOS prescribes a special regime that gives ships and aircraft of all States the right of unimpeded passage through and over straits used for international navigation. This right, referred to as “transit passage,” cannot be impeded or suspended by the States bordering the straits. However, vessels exercising the right of transit passage through straits used for international navigation are required to comply with generally accepted international rules and standards for navigational safety and for the prevention of pollution from ships. These international rules and standards are established by the international community under the auspices of the International Maritime Organization (IMO). Although the States bordering the straits have sovereignty over the waters, the IMO has jurisdiction to establish rules governing

ships exercising passage through the straits.

In recent years, a debate has ensued in Southeast Asia regarding the rules governing the Straits of Malacca and Singapore. Malaysia and Indonesia argue that the legal regime in the 1982 UNCLOS does not adequately protect the rights and interests of the straits States. They have pointed out that straits States carry a heavy burden with respect to straits used for international navigation. The obligations of straits States are not commensurate vis-à-vis the risks passing vessels pose to their waters and coastline. Under the 1982 UNCLOS, straits States must respect the right of all States to exercise transit passage through such straits, even though such passage often provides no benefit to the straits States and creates a potential risk to their waters and coastline.

Presentors at the Workshop for Subregional Cooperation in Oil Spill Modelling in the Malacca Straits discuss how to prevent, reduce and control pollution in the Straits of Malacca.

Source: PEMSEA



“ Article 43 expressly provides that user States and straits States ‘shall by agreement co-operate’ for the purposes specified. The language of Article 43 is general and vague, exhortatory in character, and not self-implementing. However, it in effect establishes a legal obligation on user States and straits States to negotiate in good faith to achieve a consensus on how to cooperate to enhance navigational safety and prevent, reduce and control pollution from ships.”

This light beacon provides safety to vessels passing between Singapore and Batam Island in the Straits of Malacca.

Source: Malacca Strait Council



Straits States must also bear heavy financial burdens with respect to international straits by maintaining lighthouses and navigational aids and undertaking hydrological surveys and radar-based vessel traffic systems (VTS). They must also update/maintain equipment and be constantly ready to combat pollution from passing vessels.

The regime established in the 1982 UNCLOS, however, does not provide that these burdens shall be borne solely by the straits States. In fact, the 1982 UNCLOS contains a specific provision, Article 43, that is intended to establish a burden-sharing arrangement. Article 43 of the 1982 UNCLOS, reads:

User States and States bordering a strait should by agreement co-operate:

- in the establishment and maintenance in a strait of necessary navigational and safety aids or other improvements in aid of international navigation; and
- for the prevention, reduction and control of pollution from ships.

Article 43 expressly provides that user States and straits States “shall by agreement co-operate” for the purposes specified. The language of Article 43 is general and vague, exhortatory in character, and not self-implementing. However, it in effect establishes a legal obligation on user States and straits States to negotiate in good faith to achieve a consensus on how to cooperate to enhance navigational safety and prevent, reduce and control pollution from ships.

The issues relating to the Straits of Malacca and Singapore, especially Article 43, have been the subject of much study and discussion over the last five years. For example, two international conferences on the Straits of Malacca and Singapore were held in

Singapore. These were organized by the Institute of Policy Studies, Singapore and the IMO. The first, held in 1996, brought together for the first time the three straits States, the IMO, the user States and other stakeholders. At the 1996 Conference, there was a consensus among participants that it would be equitable if there were burden-sharing between the strait States, user States and other stakeholders in ensuring navigational safety and in combating pollution from ships in the Straits.

A follow-up Conference on the Straits of Malacca and Singapore was held in 1999. The purpose of the Conference was two-fold. First, it sought to advance the dialogue on how the various stakeholders can cooperate more effectively to ensure navigational safety and prevent, reduce and control pollution in the Straits of Malacca and Singapore. Second, it aimed to achieve a consensus on how to implement Article 43.

The 1999 Conference failed to achieve a consensus on how to implement Article 43 in the Straits of Malacca and Singapore. However, the Conference did make significant contributions on several matters relating to cooperative arrangements under Article 43 for the Straits of Malacca and Singapore. Among the points of consensus were:

First, there was a general consensus that it is inequitable for the straits States alone to be responsible for shouldering the responsibility for providing maritime infrastructure for navigational safety and for protecting the marine environment.

Second, there was a consensus that Article 43 implies a measure of obligation on user States to enter into a dialogue in good faith with the straits States with a view to achieving an agreement as envisaged by the Convention.

Third, there was a consensus that the three straits States concerned must decide among themselves the nature and extent of assistance they seek and the modalities they wish to establish for such cooperation, and that the initiative for such cooperation must come from the straits States.

Fourth, there was an emerging consensus that certain principles should govern any funding mechanism under Article 43, and that some form of funding mechanism to implement Article 43 with respect to the Straits of Malacca and Singapore is inevitable.

There are several unresolved issues relating to how a mechanism might be established to implement Article 43 in the Straits of Malacca and Singapore. With respect to a

“One of the challenges will be how the IMO can be given a role without it appearing in principle to be a diminution of the sovereignty of the straits States or an internationalization of the Straits.”

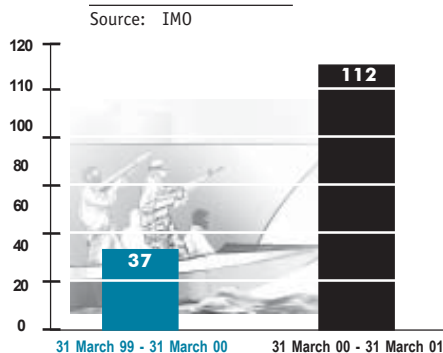


One of the 51 lighthouses and light beacons the Malacca Strait Council installed in the Straits of Malacca to ensure navigational safety.

Source: Malacca Strait Council

“ Article 43 provides for a mechanism for burden-sharing, a mechanism which would be fairer to all States. This could be used to fund VTS [vessel traffic systems] or electronic chart data information systems that would enhance navigational safety. This could also be utilized to fund initiatives combating the growing menace of piracy and armed robbery against ships in the Straits of Malacca and Singapore. This could likewise be tapped to prevent, reduce and control pollution from ships by helping the straits States implement and enforce the International Convention for the Prevention of Pollution from Ships (MARPOL) regulations. ”

Figure 1. Reported Piracy and Armed Robbery Incidents in the Malacca Straits.



funding mechanism, there are at least four important issues that must be resolved:

First, there must be a consensus on the definition of “user States” under Article 43. Some legal scholars at the 1999 Singapore Conference argued that the term “user States” makes it clear that all flag States of ships engaged in commercial services and ships entitled to sovereign immunity are included. They stated that the formulation leaves the door open for an inclusive interpretation of international cooperation, where not only governmental agencies representing the States concerned, but also entities or natural or juridical persons which possess the nationality of the States concerned, or are effectively controlled by them or their nationals, can also be involved. Others argued that a more restrictive definition should be adopted.

Second, it must be determined whether the cooperative arrangement should be informal and voluntary or whether it should be formal and mandatory, and whether the arrangement should be specifically for the Straits of Malacca and Singapore or part of a broader arrangement that governs all major straits used for international navigation. Conference participants from Indonesia and Malaysia favored an informal voluntary arrangement between the straits States and user States that are major beneficiaries, which would apply only to the Straits of Malacca and Singapore. Some legal experts argued that the IMO should develop principles for charging users the cost of maritime infrastructure that would provide a framework for agreements between user States and straits States under Article 43. The development of such a set of legal principles by the IMO might make it easier to get user

States, especially national and juridical persons, to contribute to a funding mechanism. Once such principles are developed, the straits States would be required to propose the use of such a scheme for a particular strait. The straits States would be the initiators, so there would be no question of a diminution of their sovereignty. With respect to the cooperative arrangement for particular straits, some experts suggested that an “umbrella” arrangement among straits States and user States should first be negotiated, and that specific arrangements of varying forms and participation could then be established within the framework of the umbrella arrangement.

Third, a system for managing the funding mechanism for the Straits of Malacca and Singapore, that meets the interests of both strait and user States, must be devised. On the one hand, the political sensitivity of the straits States must be taken into account, and the arrangement must be framed so that it does not appear to be a diminution of the sovereignty of the straits States in their territorial waters. On the other hand, if the management system can be devised to give contributing stakeholders a voice in how the funds are utilized, they are more likely to support it.

Fourth, a consensus must be reached on what role the IMO should play in the abovementioned process. In view of the importance placed on

competent international organizations in the 1982 UNCLOS and the contribution and responsibilities of the IMO regarding navigational safety and the prevention of pollution from ships, it might reasonably be expected that the organization should have a role in the process to establish cooperative arrangements under Article 43. One of the challenges will be how the IMO can be given a role without it appearing in principle to be a diminution of the sovereignty of the straits States or an internationalization of the Straits.

Article 43 provides for a mechanism for burden-sharing, a mechanism which would be fairer to all States. This could be used to fund VTS or electronic chart data information systems that would enhance navigational safety. This could also be utilized to fund initiatives combating the growing menace of piracy and armed robbery against ships in the Straits of Malacca and Singapore. This could likewise be tapped to prevent, reduce and control pollution from ships by helping the straits States implement and enforce the International Convention for the Prevention of Pollution from Ships (MARPOL) regulations.

However, if Article 43 is to be implemented, action must be initiated. At the 1999 Singapore Conference, the consensus was that the responsibility to initiate action to address these issues rests with the three concerned straits States. However, no action seems to have been taken by the three straits States since the 1999 Singapore

Conference to establish a burden-sharing arrangement under Article 43. Therefore, it may be appropriate for the IMO to initiate action either through its Legal Committee or through the Global Environment Facility/United Nations Development Programme/IMO Regional Programme on Building Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), a regional programme that seeks to build partnerships among stakeholders in the East Asian region to reduce/remove barriers to effective environmental management. ■

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Malacca Strait Council. *Principal Aids to Navigation in the Straits*.

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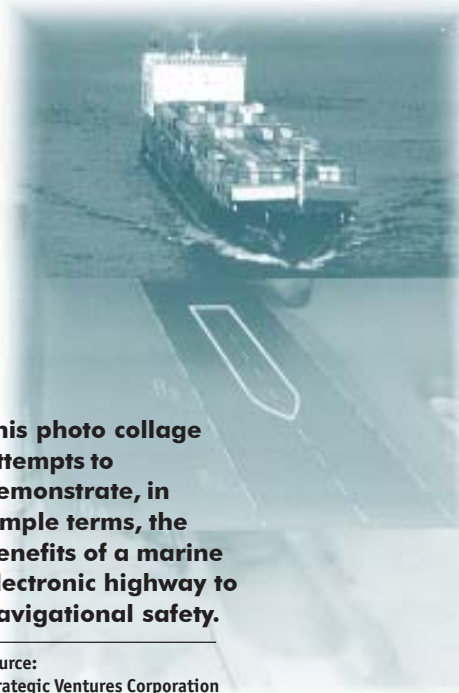
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Introduction

The bulk of world trade, in tonnage terms, is transported by ships and will remain so for many years. Economic development in many parts of the world such as in the Asia-Pacific region will exert tremendous pressures on the maritime industry, especially on future energy demands. Such pressures will have a bearing on the aging fleet of the maritime industry and the ban on single hulled tankers, burgeoning coastal populations, and the need to address marine pollution from land- and ship-based sources. Hence, a shift in policy and strategy will be required to improve shipping operations including the adoption of new technologies and management systems to enhance navigational safety and minimize pollution risk but ensure better commercial performance. It will also require a coherent monitoring and response programme within a multi-sectoral setting as marine pollution has transboundary implications in addition to social, legal and economic dimensions. This is particularly important in highly congested and confined sea lanes with high biodiversity such as the Straits of Malacca and Singapore. Thus, the sustainability of the maritime industry and the need to ensure clean seas will require coordinated and collaborative efforts among key stakeholders at the local, national and international levels. Key determinants that ensure the effectiveness of such efforts are the availability and management of up-to-date and reliable marine information.^[1]

The Marine Electronic Highway in the Straits of Malacca and Singapore - An Innovative Project for the Management of Highly Congested and Confined Waters



This photo collage attempts to demonstrate, in simple terms, the benefits of a marine electronic highway to navigational safety.

Source:
Strategic Ventures Corporation

Advancements in information technology have significant impacts on the shipping industry. Many of the newer commercial vessels are equipped with electronic navigational charts (ENCs) – electronic chart display and information systems (ECDIS) including an integrated bridge system.^[2] However, the majority of the present world fleet still uses paper charts for navigation. The slow adoption of new technologies by the shipping industry is due to several factors such as capital

outlay requirement, training of mariners and limited sea area coverage of current ENC's. The developments of maritime safety technologies are generally industry-driven and in adherence to standards and performance criteria (e.g., International Organization for Standardization [ISO], International Electrotechnical Commission [IEC], IMO and International Hydrographic Organization [IHO]). Demonstrating the benefits of electronic navigation will most likely be initially based on efforts of individual maritime companies and pilot projects in certain ports or sea areas. The realization of such benefits could hasten the adoption of electronic navigation, in particular wider coverage of ENC's and adoption of ECDIS and automatic identification systems (AIS) by all vessel types.^[3]

Information technologies on environmental management and protection, especially for coastal and marine areas applications are numerous and cater to various sectors and levels. Unlike maritime safety technologies, adherence to standards and performance criteria by environmental information systems is less rigorous.

Although maritime safety and marine environmental management technologies are distinct in terms of application, systems integration is possible. This is the underpinning of the marine electronic highway.

“A shift in policy and strategy will be required to improve shipping operations including the adoption of new technologies and management systems to enhance navigational safety and minimize pollution risk but ensure better commercial performance.”

Table 1. Some examples of existing facilities and information technologies that are in place along the Straits of Malacca and Singapore for maritime safety and environment protection and management.

Facility and Information Technology	Coverage in the Straits			
	Indonesia	Singapore	Malaysia	Straits-Wide
VTS	✓	✓	✓	✓
Radar System		✓	✓	✓
ENCs	✓	✓	✓	
DGPS Broadcast Systems		✓		✓
STRAITREP	✓	✓	✓	✓
Ship Routeing System	✓	✓	✓	✓
GMDSS	✓	✓	✓	✓
GIS-based Environmental Database	✓	✓	✓	✓
Pollution Dispersion Model				✓
Oil Spill Trajectory Model	✓	✓	✓	✓

Source: PEMSEA

The Concept of a Marine Electronic Highway

Advancements in information technology and Internet connectivity are changing the way information is used by the maritime sector although a large part is still focused on local and autonomous applications. The use of information systems in more mature and expansive applications such as in a marine electronic highway that integrates maritime safety

technologies and environmental management systems will result in improved performance (e.g., improve situational awareness of mariners and achieve optimal underkeel clearance, enhance emergency response), new capabilities (e.g., online and real time communication, enhanced monitoring system) and innovative applications (e.g., integrated modelling/forecast, risk-based management).

“ Advancements in information technology and Internet connectivity are changing the way information is used by the maritime sector although a large part is still focused on local and autonomous applications. ”

The Marine Electronic Highway (MEH) is envisioned to be a regional network of marine information technologies linked through the ENC–ECDIS. The availability of differential global positioning system (DGPS)^[4] with accuracy of 1 to 5 meters enhances the navigational accuracy of ENC–ECDIS, especially in congested and confined waters.

Although the MEH is still being defined, some of the basic components can be outlined. From a technical standpoint, the MEH has two components, namely maritime safety, and environmental protection and management. Within maritime safety, three categories are recognized, namely, navigational

safety, precision navigation and emergency response. Precision navigation shall be the backbone of the MEH upon which all the technological platforms would be integrated commencing with the ENC–ECDIS (Figure 1). Precision navigation consists of onshore, sea-based and ship-based facilities from which information and data flow into the network. Such facilities include transponders^[5] such as an AIS and onboard access to the Internet.

With AIS, real time information can be automatically provided to and/or received from appropriately equipped shore facilities or other ships. With enhanced AIS, hydrographical and oceanographic data including weather conditions can

be transmitted and/or received, thereby facilitating ship movement, particularly in restricted or congested waterways as well as during inclement conditions. Currently, AIS is mainly for basic ship information exchange. However, future developments may include other relevant information such as weather data. With AIS or similar facility, information flow could be real time, forecast, archived data, and monitoring/time lag data. The presence of a network of meteorological centers such as the South East Asian Centre for Atmospheric and Marine Prediction (SEACAMP) could provide higher resolution local weather conditions or forecasts that could be transmitted through the AIS allowing mariners to evaluate the weather conditions along their route.

For environmental protection and management, four categories are identified that have a bearing on the marine and coastal environments: environmental monitoring, protection and management, emergency response and risk/damage

Figure 1. The Marine Electronic Highway is the integration of maritime safety technologies and marine environment management and protection with precision navigation as its backbone.

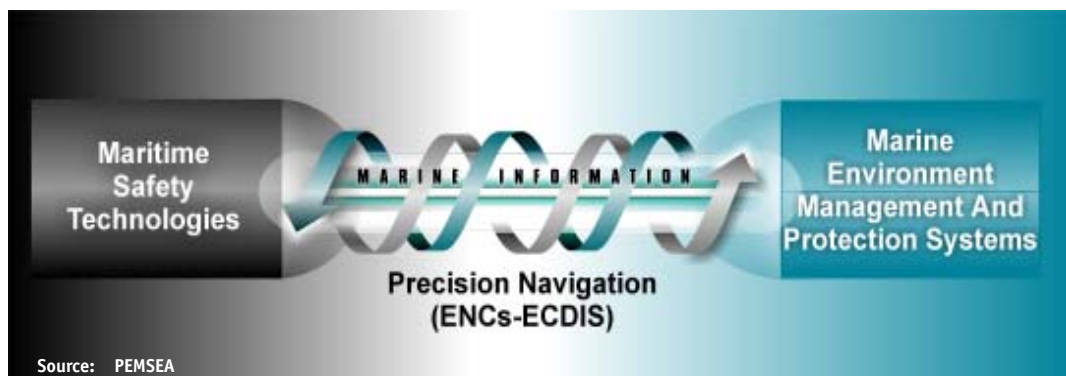
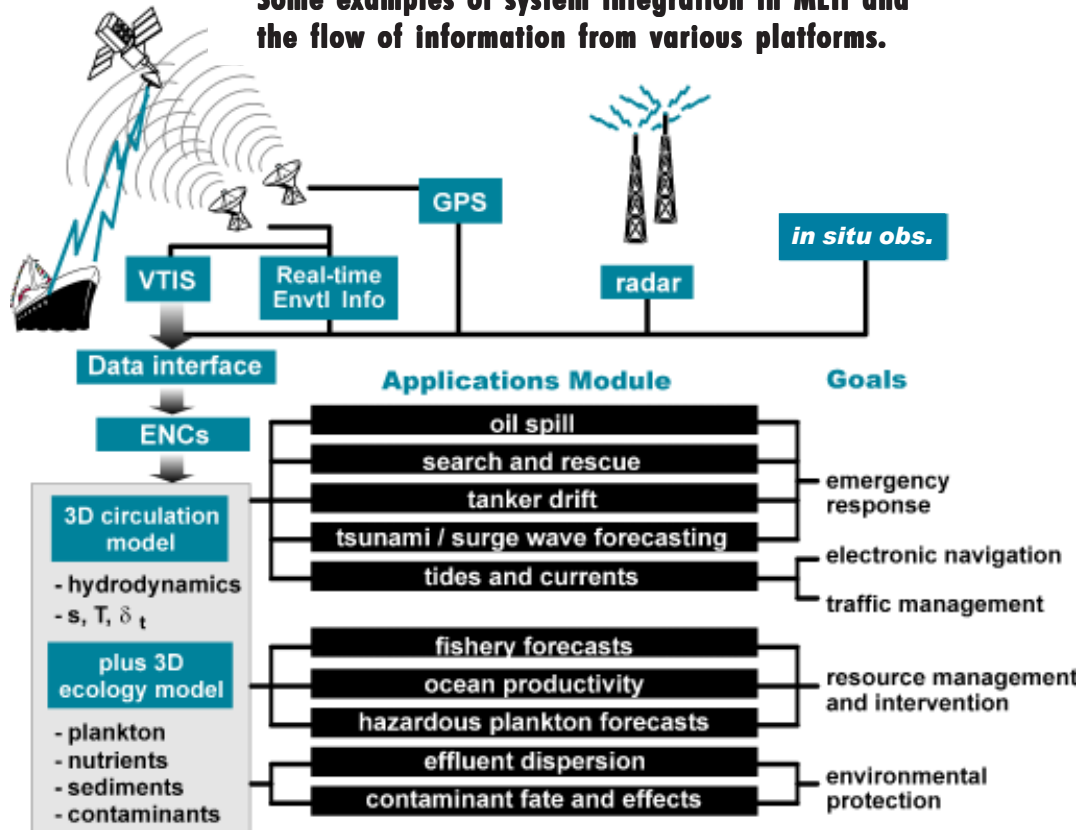


Figure 2. Marine Electronic Highway Functional Diagram. Some examples of system integration in MEH and the flow of information from various platforms.



Source: PEMSEA

assessment. Currently, the technologies being utilized for environmental protection and management are numerous with varying data formats. However, integrated systems are already in the market, such as GIS linked to other systems, providing a wide range of applications.

The integration of the maritime safety component with the environmental protection and management technologies will be the foundation of the marine electronic highway. This technical integration will be built from the perspective of end-users and their requirements and is one aspect of the MEH system. It

will include new technologies, applications and management approaches. For the MEH to work effectively, system integration between maritime safety technologies and environmental information systems must never interfere with precision navigation. Other issues include security of online transactions, communication traffic, access costs, and protection against cyber crimes. Some of the possible systems within the MEH are illustrated in Figure 2.

Sustainable financing mechanisms, obligations associated with accession or ratification of international conventions, protocols,

agreements and treaties, legal, institutional and administrative arrangements and political considerations are the non-technical aspects of the MEH that will have to be identified, assessed and integrated into the system.

The Marine Electronic Highway Project

The Global Environment Facility (GEF)/United Nations Development Programme (UNDP)/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas (MPP-EAS) initiated

“The use of information systems in more mature and expansive applications such as in a marine electronic highway that integrates maritime safety technologies and environmental management systems will result in improved performance..., new capabilities... and innovative applications...”

discussions on the need for an enhanced information technology system in the Straits of Malacca and Singapore to address navigational safety and transboundary marine pollution issues in 1996.

In 1997, the Strategic Ventures Corporation (SVC), a private company based in Canada, completed a pre-feasibility study for the World Bank on the Southeast Asia MEH focusing primarily on the public sector. The following year, the International Finance Corporation (IFC) commissioned a feasibility analysis of the MEH, this time giving emphasis on the private sector. Using the inputs of both studies, the MPP-EAS prepared the Project Preparation and Development Facility (PDF) Block B Application (for grants up to US \$350,000), which was reviewed and endorsed by the Governments of Malaysia and Indonesia, and submitted to the GEF.

While the general outline of the MEH had been discussed in various fora and by the major users (e.g., shipping companies, oil spill responders, environmental agencies), there are other aspects that need to be considered:

- Who will the other users of the highway be and what are their needs?
- What technologies and services currently available among the three littoral States will meet the needs of identified users?
- What new technologies and services will be required and how will they be packaged as part of the MEH?
- Who will provide these new technologies and services?
- What mechanisms will allow these technologies and services to operate efficiently and profitably within the MEH network?
- What are the financial implications of such technologies and services?

Essentially, the Malacca Straits MEH will consist of physical infrastructure, hardware and software, processes and resources focusing on both navigational safety and transboundary marine pollution prevention. The system will also include economic, legal and institutional mechanisms that will allow it to be fully functional, efficient and sustainable, without compromising public welfare.

Project Objectives

The Regional MEH Project will have three phases:

- Phase 1** – Setting up a prototype system in the Straits of Malacca and Singapore;
- Phase 2** – Network construction in priority waters from the Straits to Sea of Japan/East Sea; and
- Phase 3** – Completion of the entire network with emphasis on oil and gas transportation routes.

The immediate objective is to reach consensus among interested stakeholders on the development and implementation of a regional MEH. This period will also be used to collect additional information necessary to effectively plan the second phase, and conduct an early analysis of a potential third phase. It will be followed by the refinement of the Project Brief and the development of a project document

that will be the basis for the implementation of the first phase.

The developmental objective of Phase 2 is to implement, through an “appropriate institution” a regional MEH, commencing in the Straits of Malacca and Singapore. GEF has allocated a Project Development Facility (PDF) Block B grant to develop a Project Brief on Phase 1. The World Bank is the implementing agency with the IMO as the executing agency of the PDF Block B Grant.

Strategies and Approach

The MEH Project consists of three components, namely, maritime safety, environmental protection and management, and sustainable financing. Four key issues are fundamental to advance MEH technology in the Straits of Malacca and Singapore, namely:

1. **Information technology**, specifically integrating existing technologies and capacities with new and innovative ones while focusing on the specific needs of users within the three countries as well as other users;
2. **Socio-economic benefit** to the governments, industry/private sectors, and civil society as a consequence of the proposed MEH technology;
3. **Financing mechanisms/ investment potential**, including the establishment of interagency, intergovernmental and inter-sectoral

partnerships as vehicles for successfully developing, financing, constructing and operating the MEH as a self-sustaining, revenue-generating enterprise; and

4. **Institutional arrangements**, with agreements among participating parties on the administrative, legal, financial and operational aspects of a “managing tool,” which will be responsible for implementing the first phase MEH project.

To achieve the objective of the PDF Block B and pave the way for the implementation of the first phase MEH in the Straits of Malacca and Singapore, several strategies and approaches are envisaged.

Stakeholder Participation and Partnership

The MEH Project entails building consensus among relevant and interested stakeholders at the local, national and regional levels. One of the mechanisms to involve stakeholders is the establishment of national and regional steering committees.

Each country shall define the MEH technology and the existing/available systems and capacities. In doing so, they shall contribute to MEH development including potential uses/users, benefits and obligations. The establishment of an inter-sectoral and inter-ministerial body

“The integration of the maritime safety component with the environmental protection and management technologies will be the foundation of the marine electronic highway.”

to be called a National Steering Committee shall galvanize and coordinate such efforts. Additional institutional arrangements shall be undertaken such as assigning a lead agency and a National Focal Point.

At the regional level, the Project Steering Committee shall be composed of the National Focal Points, the GEF/World Bank and IMO. Potential members are from the private sector (*i.e.*, technology providers and users), shipping industry and special bodies like the Tripartite Technical Experts Group and user States. Observers from interested institutions and organizations are invited to participate in technical sessions. Over time, certain private sector groups will be members of the Project Steering Committee where a “managing tool” shall emerge.

“...the sustainability of the maritime industry and the need to ensure clean seas will require coordinated and collaborative efforts among key stakeholders at the local, national and international levels.”

Aside from providing a technical description, the Action Plan for a regional MEH shall also include an estimate of investments and operating costs, assessment of the economic impact potential and market sector analysis (*i.e.*, users, their needs and willingness to pay), among others. Apart from the design of the “managing tool,” proposals shall be prepared to include an implementation plan, an operational plan, evaluation of incremental cost and identification of co-financing. The participation of user States in the development of the MEH, particularly as regards sustainable financing, shall take into account the provisions of Article 43 of the United Nations Convention on the Law of the Sea (UNCLOS) since part of the Straits of Malacca and Singapore is an international sea lane.^[6]

Refinement of the MEH Concept

The PDF Block B Grant will define the technical specifications of a regional MEH for the Straits of Malacca and Singapore including other components.

Action Plans, GEF Project Brief and Workshops

The development of the technical description of the MEH and its financial components as well as the legal and institutional arrangements will be dealt with at several levels. At the national level, each littoral State shall identify and describe all mechanisms already in place in the Straits of Malacca and Singapore that are within their territorial jurisdiction. This shall include technologies / infrastructure, regulating instruments, capacity, budgetary allocation, management systems, operation and maintenance modalities, *etc.* relating to maritime safety and environmental protection/management.

In addition, gaps, constraints and benefits derived from these mechanisms will also be quantified. The level of interagency coordination and cooperation as well as system integration shall be critically assessed to determine the technical, legal, institutional, financial and management barriers and how to overcome them.

Potential technologies and mechanisms to enhance maritime safety and environmental protection/

management shall also be identified and assessed including gaps and constraints to system integration, operation, management, maintenance and sustainability.

For the regional MEH, a similar approach shall be adopted. However, additional considerations include the existing/available regional infrastructure and mechanisms, contributions of user States and international bodies including obligations, constraints and gaps arising from Article 43 of the UNCLOS and other international instruments.

Multisectoral Team of Experts

Three national action plans (Indonesia, Malaysia and Singapore) and a regional action plan shall be developed based on the abovementioned processes. A multisectoral team of experts recruited for the Project together with a Project Manager shall develop the action plans in close consultation with the governments and the Project Steering Committee. The regional Action Plan shall also include an implementation and operational plan for the first phase and an initial implementation plan for the second phase.

Review, validation and refinement will be carried out for each action plan at the national and regional levels through workshops. Two national workshops will be undertaken by the Project while a third one will be organized by Singapore.

The regional workshop aims to develop consensus on the first phase of the regional MEH and formulate an implementation plan that will assist the

stakeholders in addressing and overcoming any gaps and barriers associated with the construction and operation of a full-scale MEH system.

Status of the MEH Project

On 7 November 2000, the World Bank approved, in principle, the PDF Block B Grant. IMO initiated start up activities such as the holding of consultative meetings with relevant government agencies in the three littoral States, establishing country organizational framework, preparing for the first Project Steering Committee Meeting and recruiting project personnel. A Letter of Agreement was signed on 12 March 2001 between the World Bank and IMO to implement the PDF Block B Grant.

In 19 to 20 March 2001, the first Project Steering Committee Meeting was held in Putrajaya, Malaysia. The meeting achieved the following:

- Establishment of the Project Steering Committee;
- Assurance of firm commitments from the governments of Indonesia, Malaysia and Singapore to the MEH Project;
- Approval of Terms of Reference of the Project Manager and three Technical Consultants ;
- Initial review of the curriculum vitae of candidates for the Project Manager and the three Technical Consultants ; and
- Agreement on the work plan.

The recruitment of the Project Manager and Technical Consultants has been accomplished.^[7] The implementation of the remaining five project activities, meanwhile, is underway.

Conclusion

MEH provides a host of potential opportunities and benefits not only for the shipping industry, but also to a variety of users. Its application may be extended to environmental management programs, search-and-rescue operations, anti-piracy programme, environmental impact assessment, and fisheries/aquaculture management, among others. The implementation of the MEH Project and the lessons to be learned will thus be much anticipated. ■

“Sustainable financing mechanisms, obligations associated with accession or ratification of international conventions, protocols, agreements and treaties, legal, institutional and administrative arrangements and political considerations are the non-technical aspects of the MEH that will have to be identified, assessed and integrated into the system.”

End notes :

- [1] In the context of this article, marine information is a broad collection of diverse types of information associated with activities in the coastal and marine environments such as shipping, fishing, coastal and marine management, marine conservation, maritime crime prevention, marine pollution response and prevention, *etc.*
- [2] Such a system involves the automated collection, processing and display of the ship's navigation and other sensor data in order to maximize watch bridge efficiency and navigational safety. Electrotech Australia. 2001. Avail from: <http://www.electrotech.net.au/navigation/>.
- [3] Regulation 19 of Chapter V of the International Convention for the Safety of Life at Sea (SOLAS) requires AIS to be fitted aboard all ships of 300 gross tonnage and upwards engaged on international voyages, cargo ships of 500 gross tonnage and upwards not engaged in international voyages and passenger ships irrespective of size built on or after 1 July 2002. Similar ships constructed before 1 July 2002 will also be required but at varying dates (beginning 1 July 2003 but not later than 1 July 2008).
- [4] DGPS is a radio navigation system that receives satellite generated positioning information. This system calculates real-time corrections to that information based on its known positioning and then transmits those corrections over select marine radio beacon transmitters to users located in the transmitter's coverage area. U.S. Coast Guard. Understanding DGPS. Avail from: <http://www.uscg.mil/reserve/magazine/mag1996/>.
- [5] These are electronic circuits that are attached to an item whose position or presence was to be determined. Transponders News. Avail from: <http://rapidftp.com/transponder/>.
- [6] Please see Prof. Robert C. Beckman's related article entitled "Using Article 43 of UNCLOS to Improve Navigational Safety and Prevent Pollution in International Straits," which is found on pages 18 to 23 of this issue. *Ed.*
- [7] For more details, refer to the news brief on the personnel hired for the MEH project found on page 61 of this issue. *Ed.*

Reference for Photo on Page 24 :

Strategic Ventures Corporation. The South East Asia Marine Electronic Highway. A report to the World Bank (June 1997).

Shihwa Lake: From a D

THE MISTAKES

Irrational coastal development policies spelled disaster for the Shihwa coastal area. In 1994, a 12.7-kilometer sea dike was completed in the hope of building an artificial freshwater lake and converting adjacent wetlands into farmlands and urban areas. However, after spending half trillion won (US\$ 400 million) to create the artificial lake from tidal flats and another half trillion won (US\$ 400 million) to pump in freshwater, the reservoir's water quality became so degraded that it could not meet the standard for agricultural use. Pollution from industrial complexes and populated cities flowed into the lake causing algal blooms and eutrophication, thus lowering the lake's water quality. Insufficient circulation of the contaminated water worsened the problem. This situation likewise led to the destruction of traditional fishing activities and disintegration of coastal communities.

Aside from these, the government created industrial complexes in the cities, Ansan and Siheung, surrounding the lake. As a result, these areas became famous for their environmental and industrial problems. Within these industrial complexes, workers and residents suffered from frequent colds, respiratory difficulties, headaches and allergies. Around 1,200 factory incinerators contributed to air pollution. Given these appalling conditions, ocean plants, lugworms and shellfish declined in number and wildlife shied away from the area.

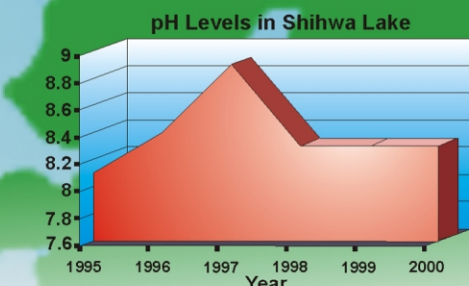
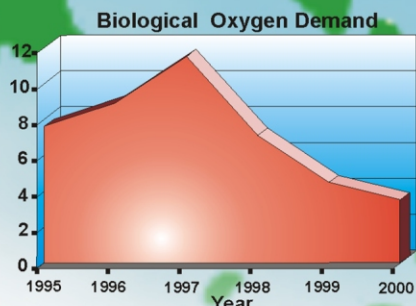
To make matters worse, in 1994 the government proposed to build a specified-waste disposal facility on reclaimed land. Specified-waste contains heavy metals that may pollute the soil and underground water.

FAST FACTS	
Shihwa Lake	
Width of Sea Dike:	12.7 kilometers
Area of Shihwa Lake:	Approx. 50 km ²
Water Volume:	180 million tons
Average Depth:	4-5 meters
Reclaimed Area:	Approx. 110 km ²
Surrounding Population (as of 2000)	
Hwasung County:	180,000
Siheung City:	300,000
Ansan City:	570,000
Number of Companies in Industrial Complexes (as of 1999)	
● Banwol National Industrial Complex:	2,093
● Shihwa National Industrial Complex:	2,721
● Banwol Regional Plating Industrial Complex:	53
Sources:	
Je J.-G. editor. 2000 Let's save the natural ecosystem and attract tourists. Hwasung-Siheung-Ansan Citizen's Coalition for Shihwa, a Lake of Hope. 24 p.	
Woo J.C. 2001 Simulation of water quality using ecosystem model in Shihwa Lake. MOMAF-PEMSEA Regional Workshop on Shihwa Management Strategy and Regional Initiative for Coastal Environmental Management: 237-247 pp.	



The first recorded nesting of Saunder's Gull outside of China transpired in 1998 in Shihwa Lake. In the past, sea gulls used the area as a resting point during migration and for purposes of mating.

The inflow of inland sewage and insufficient circulation of contaminated water caused the deterioration of Shihwa Lake's water quality. Deterioration levels worsened after the completion of the dike in 1994 and rose steadily until the government abandoned the plan to change Shihwa into a freshwater lake. Seawater was then regularly discharged into the lake, resulting to an improvement in water quality.



Disaster to a Showcase

City

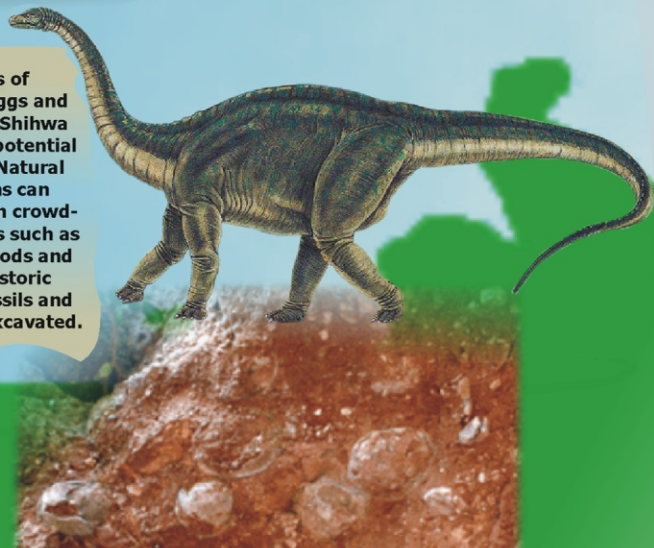


Ansan
City

ROE DEER
Capreolus pygargus

Many animal species, a number of them rare, are returning to Shihwa Lake. Wildlife species such as boars, wild rabbits, raccoons and roe deer have settled in the brush of the adjacent reclamation area.

Recent discoveries of dinosaur bones, eggs and footprints around Shihwa Lake offer a high potential for local tourism. Natural historical museums can feature exhibits on crowd-pleasing dinosaurs such as sauropods, theropods and many other pre-historic animals whose fossils and eggs have been excavated.



nty

Sources:

Dr. Yuong-Nam Lee
Geology Division/Geological Museum,
Korea Institute of Geosciences and Mineral Resources (KIGAM).
Avail from: <http://www.inpaku-fukui.com/english/kaseki/sekai/korea/korea.html>
<http://www.cyberspacemuseum.com/apato.html>

The state-run Banwol and Shihwa Industrial Complexes are located around Shihwa Lake. These complexes consist of numerous dyeing, leather, chemical and plating industries, which cause heavy pollution.



Source: PEMSEA



THE INITIATIVES

The environmental impacts of the Shihwa Reclamation Project became a lesson to the government, non-government organizations and the public on the danger of irrational coastal development.

Residents living around the lake have expressed their opposition to government policies vis-à-vis Shihwa Lake. The Hwasung-Siheung-Ansan Citizen's Coalition for Shihwa even developed a "Citizen's Proposal to Establish the Shihwa Eco-Park," which aims to develop the region as an area of abundant resources in marine products, environment and culture where industrial complexes exist in harmony with nature. Studies have been conducted on how to improve the environment and develop a sustainable plan for the area.

Government, meanwhile, has abandoned its plan to pump freshwater in the lake. Instead, representatives of the Ministry of Maritime Affairs and Fisheries (MOMAF), the governments of Kyonggi Province, Ansan City, Siheung City and Hwasung County and local stakeholders signed the "Shihwa Declaration on Sustainable Coastal Use and Environmental Protection" on 15 March 2001 in Seoul, Republic of Korea.

The Shihwa Declaration recognizes that coastal resources play an essential role in the economic development and social well-being of Korea. Among the pledges under the Declaration are: endorsing policies that promote and enhance sustainable development of Shihwa coastal area; developing a coordinating mechanism for managing Shihwa Lake involving governments, the private sector, civil society groups and other concerned stakeholders; strengthening management capacity of relevant agencies, particularly at the local level; and sharing/adopting experiences from international agencies and other countries for improved management of the coastal environment and its resources. (see pages 34 to 35 for the full text of Shihwa Declaration).

A Memorandum of Arrangement (MOA) for the Shihwa Integrated Coastal Management Development was signed between the International Maritime Organization, MOMAF and representatives of the four local governments in the Shihwa Lake Special Management Area on 15 March 2001 in Seoul, Republic of Korea.

Under the MOA, IMO, MOMAF, and the Governments of Kyonggi Province, Ansan City, Siheung City and Hwasung County have agreed to support, promote and collaborate in the development of the Lake Shihwa Integrated Coastal Management site. The project aims to protect and restore the integrity of the coastal ecosystem and its resources through intergovernmental, interagency and intersectoral partnerships.

The Shihwa Declaration on Sustainable Coastal Use and Environmental Protection

RECOGNIZING, that coastal resources have played an essential role in the economic development and social well-being of Korea; and that the sustainable use of coastal resources is directly linked to the health of the coastal ecosystem;

WHEREAS, the coastal area of Korea has often been the site of multi-agency and multi-sector conflict resulting in overexploitation of coastal resources and the degradation of their resource base;

WHEREAS, the creation of Shihwa Lake is a result of a land-oriented coastal development policy and inadequate integrated planning and management of resource use and the degradation of environmental quality of Shihwa Lake has raised the awareness of the general public and governments on the significance of long-term integrated planning and the value of balancing economic development and environmental conservation;

WHEREAS, the general public has begun to understand that the coastal wetland is not a wasteland but a precious natural resource serving society by absorbing pollutants, providing nursery and feeding grounds for fish and birds, buffering against coastal hazards and protecting life and property;

RECOGNIZING, the sustainable use and wise management of coastal resources in Shihwa Lake are essential to vitalize the local economy and to enhance the quality of life of both the local residents and the residents of Seoul Capital Metropolitan area;

RECOGNIZING, that the unique natural and cultural features of Shihwa coastal area need to be preserved as a national heritage;

RECOGNIZING, that the cooperation and commitment of relevant stakeholders, including national and sub-national governments, the private sector, civil society groups and local residents, are essential for the successful restoration of Shihwa coastal environment and the revitalization of the local economy;

THEREFORE, on the occasion of the MOMAF-PEMSEA Regional Workshop on Shihwa Management Strategy and Regional Initiatives for Coastal Environmental Management held in Seoul, March 15-16, 2001, we, the Ministry of Maritime Affairs and Fisheries, the Provincial Government of Kyonggi, the City Government of Ansan, the City Government of Siheung, and the County Government of Hwasung, hereby pledge to ensure the sustainable use of coastal resources and environmental protection of Shihwa Lake for the primary benefit of Shihwa coastal communities by:


- Endorsing policies that promote and enhance sustainable development of the Shihwa coastal area;
- Restoring Shihwa Lake water quality by effectively controlling land-based pollution in the watershed of the Shihwa area, by optimizing seawater circulation, and by cleaning-up polluted sediments, under the principles of precautionary approach and integrated management;

- Developing the spatial use plan of Shihwa Lake and adjacent areas in accordance with the carrying capacity of the environment;
- Protecting coastal wetland and habitats and preserving the cultural and archeological assets as a national heritage;
- Developing and implementing a comprehensive integrated and inter-sectoral management plan of Shihwa coastal resources and environment based on partnerships with and commitments of relevant stakeholders at both national and local levels;
- Developing a coordinating mechanism for managing Shihwa Lake involving governments, the private sector, civil society groups, and other concerned stakeholders;
- Strengthening management capacity of relevant agencies, particularly at the local level, for effective management of the coastal environment and resources;
- Promoting the involvement of all the stakeholders in the development and implementation of a Shihwa integrated management plan, particularly local communities;
- Promoting a multidisciplinary research approach involving ecological, economic and other social sciences to holistically address management problems in the Shihwa coastal areas;
- Developing and implementing a long-term integrated monitoring plan for effective control of environmental and resource degradation;
- Sharing and adopting wise experiences from international agencies and other countries for improved management of the coastal environment and its resources; and
- Providing an appropriate institutional framework to effectively engage concerned stakeholders for the protection and sustainable use of the Shihwa coastal area.

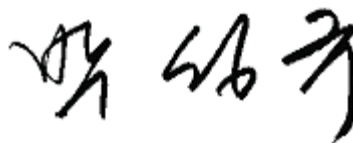
SIGNED March 15, 2001, on behalf of:



Mr. Lee Young Woo
 Director General
 Bureau of Marine Policy
 The Ministry of Maritime Affairs and Fisheries



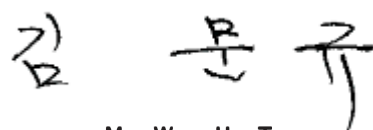
Mr. Lyu Do Hyeong
 Director
 General Agriculture Fisheries
 The Provincial Government of Kyonggi



Mr. Park Sung Kyu
 Mayor
 The City Government of Ansan



Mr. Back Chung Su
 Mayor
 The City Government of Siheung



Mr. Woo Ho Tae
 Magistrate
 The County Government of Hwasung

By
Captain Mark Heah Eng Siang
Deputy Director
Port Division and Shipping Division
Maritime and Port Authority of Singapore

Natuna Sea Incident - Singapore's Experience

Introduction

Singapore, an island nation and home to the world's busiest port, is situated at the crossroads of major shipping lanes linking the east and west. It is next to the Strait of Singapore, which serves as an important route for Very Large Crude Carriers (VLCCs) travelling to and from East Asia. The Port of Singapore received more than 145,000 vessel calls totalling some 910 million gross tons in 2000. Being an important oil-refining centre and the world's top bunkering port, it receives more than 15,000 tankers each year. It also sold some 18.7 million tonnes of bunker fuel in 2000. Thus, its exposure to oil pollution risk is much higher than most ports in the world.

Conscious of the port's vulnerability, the Maritime and Port Authority of Singapore (MPA) has proactively sought to prevent oil spill incidents and prepare itself for oil pollution clean up action. To achieve this, MPA strictly enforces international conventions for oil pollution prevention, implements and enhances various navigational safety measures, and maintains the highest state of readiness to respond to any emergency at all times. This proactive approach had put the port in good stead when the oil tanker *Evoikos* spilled some 28,500 tonnes of heavy marine fuel oil into Singapore waters on 15 October 1997. The spill was Singapore's largest oil spill. Because of the country's preparedness, the oil slick was cleaned up within a record time of three weeks. The port continued with its activities without any disruption.



The site of the incident.

Source: Maritime and Port Authority of Singapore.

Nearly three years after the *Evoikos* spill, on the morning of 3 October 2000, the 51,096 gross ton tanker *Natuna Sea*, carrying some 70,000 tonnes of Nile Blend

crude, ran aground off the Indonesian island of Batam. As a result, some 7,000 tonnes of her cargo spilled into the Strait of Singapore.

Singapore had ratified the following international conventions relating to oil pollution prevention:

- **International Convention for the Prevention of Pollution from Ships (MARPOL 73/78):**
 - Annex I - Prevention of Pollution by Oil
 - Annex II - Control of Pollution from Noxious Liquid Substances
 - Annex III - Prevention of Pollution by Harmful Substances in Packaged Form
 - Annex V - Prevention of Pollution by Garbage from Ships
 - Annex VI - Prevention of Air Pollution from Ships
- **International Convention on Oil Pollution Preparedness, Response and Co-operation**

Responses

Upon receiving the information, the MPA responded immediately. The Singapore Vessel Traffic Information Service (VTIS) started warning ships and promulgated safety warning broadcasts. MPA activated its Marine Emergency Action Procedure (MEAP) Oil Spill Contingency Plan. The Emergency Operations Committee (EOC), chaired by MPA's Director-General, was convened to clean up the massive oil spill. Indonesian and Malaysian authorities were promptly notified as part of the Standard Operating Procedures for Joint Oil Spill Combat in the Straits of Malacca and Singapore.

The Marine Emergency Action Procedure (MEAP) details the response procedures for all marine incidents such as oil pollution, shipboard fire, grounding, collision and sinking. Government agencies and private organisations are parties to the MEAP. Their roles and responsibilities are listed in the MEAP. MPA is the custodian of the MEAP and co-ordinates all responses rendered by each party.

The Standard Operating Procedures for Joint Oil Spill Combat in the Straits of Malacca and Singapore (SOP) is a document containing the operating procedures in response to an oil pollution incident in the Straits. It was developed by the littoral States of Indonesia, Malaysia and Singapore. The SOP facilitates oil spill response and information dissemination.

Before the oil slick moved into the port, preventive measures were set in place at sensitive areas such as the fish farms, beaches, underwater sea-world and sea water intake points for cooling purposes. Aware that Nile Blend crude oil would become too thick if not acted upon quickly, the MPA immediately planned for an aerial dispersant spraying operation to be conducted in the afternoon of the same day of the grounding. Time is of the essence and quick response to the large extent of the spill was very crucial. Therefore, aerial spraying was a key strategy for combating the oil spill as it could

“The round-the-clock clean up operations involved some 60 craft and 400 personnel from 17 organisations including ministries, governmental agencies, major oil companies, oil spill response companies, salvage companies and contractors.”



The Natuna Sea.

Source: Maritime and Port Authority of Singapore.



The *Evoikos*.

Source: Maritime and Port Authority of Singapore.

effectively cover a very large sea area in a very short time. Aerial spraying was carried out by fixed wing aircraft in the sea area south of the Traffic Separation Scheme of the Singapore Strait. It was the first time such aerial spraying of dispersants was conducted in the Singapore Strait. This boosted surface spraying of dispersants. Unfortunately, another aerial dispersant spraying operation planned for the following morning was delayed and subsequently aborted because of difficulties with experts from the International Tanker Owners Pollution Federation Limited (ITOPF).^[1] The planned second aerial spraying was a missed opportunity.

As expected, the insufficiently dispersed oil slick in the Strait thickened. “Tar-balls” (hardened lumps of the untreated spilled oil) hit popular beaches of Sentosa and a

few other islands in the south, the East Coast Park beaches, western and eastern anchorages. The round-the-clock clean up operations involved some 60 craft and 400 personnel from 17 organisations including ministries, governmental agencies, major oil companies, oil spill response companies, salvage companies and contractors.

With dispersants having no further effect, the strategy shifted to corralling thickened oil and tar-balls using oil booms for recovery by grab cranes. Some 72,000 litres of dispersants and more than 1,300 metres of oil booms were used. The entire clean up generated some 920 metric tons of oily wastes that were disposed of at approved reception facilities.

While cleaning progressed, lightning the *Natuna Sea* took place.

Ship-to-ship transfer of the remaining oil from the *Natuna Sea* was conducted, cargo removed, and oil booms placed around the vessel to contain any new leaks from damaged tanks. Anti-pollution craft were also kept on standby around the *Natuna Sea*.^[2] The tanker was re-floated successfully on 12 October 2000 and towed to a safe anchorage in Indonesian waters. Six tugs, nine other vessels and as many as 100 technicians, were involved in the re-floating and towing operation co-ordinated by the EOC and MPA’s Port Operations Control Centre. Marine traffic in the Singapore Strait was not impeded and no further spillage was reported.

The Strait and port waters were cleaned on 19 October 2000, after two weeks of intensive operations. Beach and shore cleaning operations, however, continued until 22 November 2000.

Success Factors

MPA’s ability to swiftly put its well-exercised contingency plan into action contributed positively to the success of the clean up operations. Quick and round-the-clock effective responses had

minimised marine environmental damages and economic losses. Other success factors were:

(a) Multi-pronged action

This included, exploiting information technology, e.g. using the MPA's OilMap (Computerised Oil Spill Model) to predict the oil slick movement and plan future responses, MPA's network of closed-circuit television for pictures and locations of the oil, twice-a-day aerial reconnaissance, close consultation and co-ordinated execution of the following clean up strategies:

- (1) isolating the spill source by pumping out the remaining oil in the breached tanks while lightening the grounded tanker;
- (2) protecting sensitive areas by booming;
- (3) dispersing the oil using dispersants;
- (4) conducting aerial dispersant spraying to complement spraying from surface craft; and
- (5) containing and recovering the oil by booming, trawling with nets and snare booms and using flotsam retrieving craft, retrofitted low-freeboard (the difference between the level of

water and the upper edge of the side of a boat) bumboats with workers on board to manually scoop up the oily waste.

(b) Communication

There were effective and efficient communication links among all units. Regular consultation and meetings were held to update every party involved and plan for future actions. For instance, warnings and periodic updates were given to owners and operators of places sensitive to oil spills, such as fish farms, water intake points of oil refineries and power plants, water treatment plants, and recreational areas.^[3] Indonesian and Malaysian counterparts were kept updated of the situation.

“Six tugs, nine other vessels and as many as 100 technicians, were involved in the re-floating and towing operation co-ordinated by the EOC and MPA's Port Operations Control Centre.”

(c) Media Management

Responses and updates to local and foreign media were transparent, prompt and regular. This had helped to minimise media speculation and reassure the public that the situation was under control.

Lessons Learned

The *Natuna Sea* incident tested MPA's responses and measured its progress in oil spill management. Lessons from the *Evoikos* incident were well learned. For example, as a result of the *Evoikos* incident, shipowners' response in the *Natuna Sea* incident had improved after numerous MPA meetings with the shipping community and oil industry.

“ MPA’s pollution risk management approach of prevention, preparedness and response has worked well in the *Evoikos* and *Natuna Sea* incidents. However, the shipmaster and his officers should play the most important role to safeguard the marine environment from oil pollution. Human error has been a key culprit for many such disasters. ”

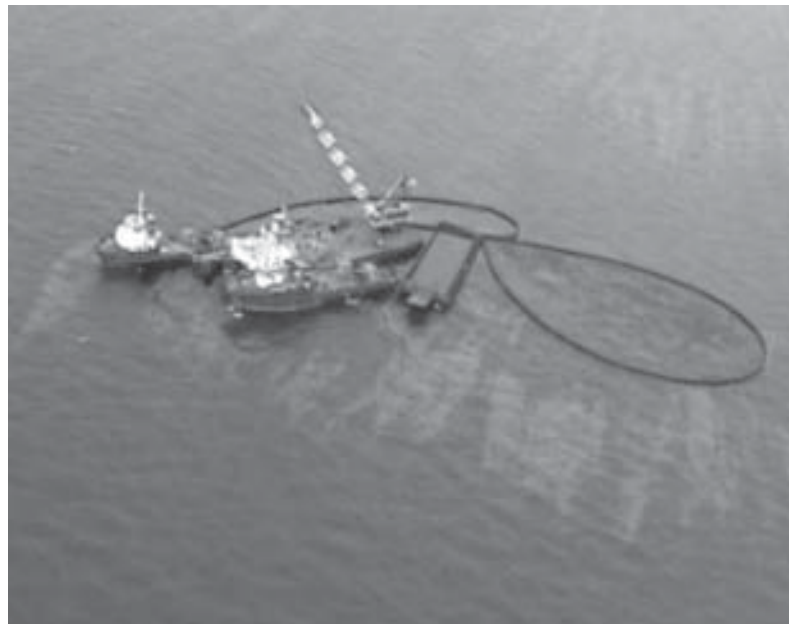
As the oil slick in the Strait was not sufficiently dispersed, it hardened into lumps, *i.e.*, “tar balls” and wastes glued to oil. These flowed into Singapore waters on every turn of the tide. A large specialised oil recovery vessel was put out of action with pumps choked with tar balls and thick oily wastes. Although there was an aerial dispersant spraying operation, there would have been more oil dispersed had the second aerial dispersant spraying been conducted as planned.

Flotsam and garbage retrieval craft were found to be most effective in recovering lumpy oil and wastes. The prompt retrofitting and deployment of such craft helped in the speedy clean up operations and minimised damage. More such craft will be retrofitted for combating oil spills in the future.

Swimming lagoons and other oil spill sensitive areas should, wherever possible, have fixed securing points for holding oil booms so that response craft need not be deployed to hold booms but for other useful clean up work.

Corralling oil and recovery using grab cranes.

Source: Maritime and Port Authority of Singapore.



The *Natuna Sea*'s managers had quickly engaged oil spill response companies and consultants to support the clean up operations. Not all tanker owners and managers are committed and act responsibly to this extent. As time is of the essence when conducting a clean up operation, the services of an oil spill response company should be immediately engaged. Tanker owners and charterers which operate tankers navigating in the Strait and Port of Singapore are therefore strongly advised to have prior arrangements with oil spill response organisations based in Singapore to enable swift remedial actions in an oil spill.

Conclusion

MPA's pollution risk management approach of prevention, preparedness and response has worked well in the *Evoikos* and *Natuna Sea* incidents. However, the shipmaster and his officers should play the most important role to safeguard the marine environment from oil pollution. Human error has been a key culprit for many such disasters.

Two weeks were spent on cleaning up the oil pollution caused by the *Natuna Sea*. The beach cleaning took a longer time. It was costly. Yet the parties who have contributed to the successful operations still have to wait to be compensated. Thankfully, for this incident, the *Natuna Sea* owners and the Protection and Indemnity Club (that insures the third party liability of shipowners) have expressed assurance of quick compensation.

No matter how effective the clean up action, prevention is still better than cure. There is a need to continually work together to enhance navigational safety and keep the marine environment clean. ■

“No matter how effective the clean up action, prevention is still better than cure. There is a need to continually work together to enhance navigational safety and keep the marine environment clean.”



Dispersant spraying by surface craft.

Source: Maritime and Port Authority of Singapore.

Endnotes:

- [1] International Tanker Owners Pollution Federation Limited, a non-profit organization of owners and bareboat charterers of tankers, combination carriers and barges, provides advice on the most appropriate clean up response during an oil pollution incident, upon the request of a Protection and Indemnity (P & I) Club or the International Oil Pollution Compensation Fund. White, Ian C. 2000. Facilitating the Speedy Payment of Oil Spill Compensation Claims Under the CLC and FUND Convention. 7 *Tropical Coasts* 1:4-11, 51.
- [2], [3] Maritime and Port Authority of Singapore. Avail from: www.mpa.gov.sg/homepage/pressreleases/001007-b.html. File: Oil Tanker Runs Aground Off Batu Berhanti Beacon (9th Update) [7 October 2000].

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History and Background

Since the introduction of steel hulled vessels around 120 years ago, water has been used as ballast to stabilize vessels at sea. The amount of ballast carried on board ranges from several hundred liters to more than 100,000 tons, depending on the size and purpose of the vessel. Global shipping transports over 80 percent (IMO, 1997) of the world's commodities and in the process, transfers around 10 billion tons of ballast water across regions each year (IMO, 1997).

Ballast water is pumped-in to maintain safe operating conditions throughout a voyage. This practice reduces stress on the hull, provides transverse stability, improves propulsion and maneuverability, and compensates for weight lost due to fuel and water consumption. Since all ships are designed for a certain weight range, ballast is used to compensate for unloaded cargo.

Tankers and bulk-carriers are the largest vessels existing in the industry. They normally transport goods on the outward voyage and use ballast when they return. They then pump-out ballast water when they load cargo for the next voyage. Modern ships have several small ballast tanks, which allows flexibility in handling liquids onboard and ensures better stability and structural strength. In the case of bulk-carriers and older tankers (which have a few large tanks), a significant portion of their ballast water is carried in empty cargo holds.

Ballast water may contain suspended matter, such as sediment particles and organic debris. These may form layers in ballast tanks and cargo holds. The internal structure of a ballast tank is extremely complex and allows many locations for sediments to become trapped, accumulating during the voyage. In some cases, depending on the quality of water in the port of origin, sediment accumulation in ballast tanks may become severe.

Ballast Water Management and Control: An Overview



Ship discharging ballast water.

Source: Steve Raaymakers.

The Problem

While ballast water is essential for safe and efficient modern shipping operations, it may pose serious ecological, economic and health threats. There are literally thousands of marine species carried in ships' ballast water. These include bacteria and other microbes, small invertebrates, eggs, cysts and larvae of various species. In some cases, healthy, living fish have been found in ballast tanks.

“Global shipping transports over 80 percent of the world’s commodities and in the process, transfers around 10 billion tons of ballast water across regions each year.”

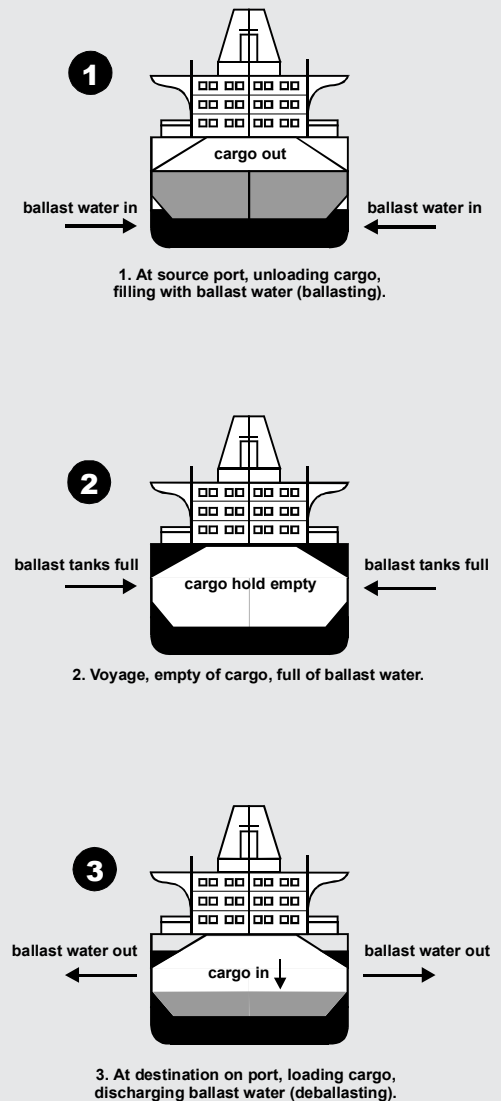
The introduction of invasive marine species into new environments by ships’ ballast water, attached to ships’ hulls and via other vectors has been identified as one of the four greatest threats to the world’s oceans. The other three are land-based sources of marine pollution, overexploitation of living marine resources and physical alteration/destruction of marine habitat.

It is estimated that 4,500 different species are carried around the world at any one time in ballast tanks. The development of larger and faster ships, combined with rapidly increasing world trade, reduced natural barriers to the dispersal of species. Greater quantities are carried more quickly and frequently to a greater number of destinations. It is believed that a marine species invades a new environment somewhere in the world every nine weeks. Many species can be transferred in ballast water because virtually all marine species have a planktonic stage in their lifecycle. This means that while it is

highly unlikely that an adult prawn, clam or shellfish will pass through in-take filters, their planktonic eggs or larvae could easily get through.

During the last three decades, a significant number of introduced, non-indigenous species have been transported through ships’ ballast tanks. As a result, whole ecosystems are being changed. In some cases, the economic impacts have been devastating. It is even feared that killer diseases such as cholera could be transported in ballast water. During the 1991 South American cholera epidemic, the bacterium that causes the disease was discovered in oysters and fish as far away as Mobile, Alabama. The US Food and Drug Administration then sampled the ballast water of 19 ships arriving in the Gulf of Mexico from Latin America. It found the South American epidemic strain of cholera in five of them. Some medical researchers believe that the strain that caused the epidemic was originally transported from Asia to South America through ballast tanks. The South American

Figure 1.
Cross-section of ships showing ballast tanks and ballast water cycle.



Source: GloBallast Project Coordinating Unit.



Don't let looks deceive you. The North Pacific Seastar may cause extensive destruction along Australia's coastal areas.

Source: Commonwealth Scientific and Industrial Research Organisation (CSIRO).
(Used with permission)

epidemic resulted in over a million reported cases of cholera and over 10,000 deaths (Cohen, 1999).

There have been hundreds or perhaps thousands of introductions through ballast water. The following cases are only a few examples, and have been selected due to their severe environmental, economic and human health impacts.

North Pacific Seastar (*Asterias amurensis*)

This starfish was introduced to Australia in ballast water coming from Japan in the 1980s. It has no natural predators or competitors in Australia, which allows the population to multiply and spread rapidly, altering the native ecology. The Seastar is a voracious predator and consumes large quantities of native shellfish

“ It is believed that a marine species invades a new environment somewhere in the world every nine weeks. ”

including oysters, mussels and scallops. It poses a potential threat to the commercial shellfish industry.

European Zebra Mussel (*Dreissena polymorpha*)

The Zebra Mussel is a small bivalve shellfish, which was introduced into the North American Great Lakes through ballast water from Europe in the 1980s. As an encrusting species, it grows in large colonies attached to hard surfaces such as rocks, wharves, pylons and within industrial cooling water intake pipes along the shores of the Great Lakes. The lack of predators facilitated rapid multiplication and dispersal. It currently infests over 40 percent of US inland waterways. It is estimated that since 1989, more than US\$ 5 billion has been

spent cleaning fouled waterways and structures.

Comb Jellyfish (*Mnemiopsis leidyi*)

The ctenophore was introduced to the Black Sea in the late 1970s through ballast water coming from North America. At times, it has reached densities of one kilogram of biomass per square kilometer throughout the entire infested area. The Comb Jelly consumes plankton through filter feeding. Their vast numbers in the Black Sea caused massive reductions of plankton in the 1980s and 1990s, which led to the collapse of the anchovy and sprat fisheries in the region. It is estimated that commercial losses amount to US \$500 million per year, excluding the social problems suffered by traditional fisherfolk. The invasion of *Mnemiopsis leidyi* has changed the ecology of the Black Sea, compounding other impacts such as pollution.

The ctenophore has also been spotted recently in the neighboring Caspian Sea, where economic effects could be even more devastating due to the sensitivity of the local environment.

South East Asian dinoflagellates (*Gymnodinium* and *Alexandrium*)

This is probably one of the most notorious examples of harmful aquatic organisms introduced through ballast water in the Asia-Pacific region. The dinoflagellates are microscopic algae which spend a large part of their lives cocooned as extremely tough cysts in seabed sediments. When environmental conditions are favorable, the cysts may produce a motile planktonic organism which is released into the water column. The organism then reproduces in great numbers and may form into so-called "red tide." These planktonic algae contain paralytic toxins, which may be absorbed by filter feeding shellfish such as oysters, mussels, scallops and clams. When humans eat these contaminated shellfish, paralysis or even death may result. Toxic dinoflagellates may be transferred when ballast water is taken during a "red tide" bloom. The cysts may also be taken and transferred from sediments.

A number of countries have suffered from this introduction. In Australia, the commercial oyster industry had to be closed down. Expensive testing and monitoring activities are now being carried out on a permanent basis.

“ During the last 10 years, the transfer of alien invasive species in ships’ ballast water has received increasing attention.... It is hoped that the proposed convention will be agreed upon during a diplomatic conference in 2003. ”

The Global Response

During the last 10 years, the transfer of alien invasive species in ships’ ballast water has received increasing attention. In 1991, the Marine Environment Protection Committee (MEPC) of the IMO adopted the Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ships’ Ballast Waters and Sediments Discharges. In 1992, the United Nations Conference on Environment and Development (UNCED) requested IMO to consider the adoption of appropriate, legally binding rules on ballast water discharges to prevent the spread of non-indigenous organisms.

The IMO member countries have developed voluntary guidelines

for the control and management of ships’ ballast water to minimize the transfer of harmful aquatic organisms and pathogens. These guidelines were adopted by the IMO Assembly in 1997, by resolution A.868(20). They replace earlier less comprehensive voluntary guidelines adopted in 1993. Management and control measures recommended by the guidelines include:

- Minimizing the uptake of organisms during ballasting, by avoiding areas in ports where outbreaks or populations of harmful organisms are known to occur, e.g., in shallow waters and in the dark.



Enthusiastic volunteers standing on a skiff full of North Pacific starfish at Sullivan's Cove, Hobart, Australia during a clean-up drive.

Source: Center for Research on Introduced Marine Pests. (Used with permission)

- Cleaning ballast tanks and removing mud and sediments that accumulate on a regular basis.
- Exchanging ballast water at sea before arrival in port, replacing it with “clean” open ocean water. Any marine species taken on at the source port are unlikely to survive in the open ocean, where environmental conditions are different.

Significant research and development efforts are underway in a number of scientific and

engineering research establishments around the world. These efforts aim to develop a more complete solution to the problem. Options considered include filtration and sterilization using ozone, ultra-violet light, heat treatment and chemicals.

Any control measure developed must meet a number of criteria, including:

- safety for the ship and its crew;
- environmental acceptability (not causing more

environmental impacts than it can solve);

- practicability (compatible with ship design and operations);
- cost-effectiveness (economical); and
- biological effectiveness.

Recognizing the limitations of current IMO voluntary guidelines and the serious threats posed by invasive marine species, the IMO member countries are developing a mandatory international legal regime to regulate and control ballast water. The IMO's MEPC and its Ballast Water Working Group are well advanced in developing this regime.

The draft text of the proposed international convention for the control and management of the ships' ballast water and sediment recognizes the importance of regional cooperation in achieving the objectives of the convention. Its accompanying draft regulations provide, *inter alia*, criteria for establishing regional ballast water management areas.

During the last session of MEPC, the Working Group reviewed the

consolidated text of the draft legal instrument and generally agreed with the principles contained therein. To facilitate the work needed to further develop the anticipated convention, the Committee has established a “Ballast Water Standards Correspondence Group,” which will submit a report of its work and findings to the next MEPC in April 2002. All IMO member states were invited to contribute to the work of this correspondence group. It is hoped that the proposed convention will be agreed upon during a diplomatic conference in 2003.

GloBallast Programme

In addition to the aforementioned initiatives, the IMO has joined forces with the Global Environment Facility (GEF), the United Nations Development Programme (UNDP), member governments and the shipping industry to assist less-industrialized countries to tackle the ballast water problem. The full title of this new programme is “Removal of Barriers to the Effective Implementation of Ballast Water Control and Management Measures in Developing Countries,” or simply the “Global Ballast Water Management Programme” (GloBallast).

The programme assists developing countries in implementing effective measures to control the

introduction of foreign marine species. Its six demonstration sites were chosen to represent the main developing regions of the world. A brief profile of the sites is provided below:

Dalian, China – East Asia

The Port of Dalian is located on the southern tip of Liaodong Peninsula in the Northeast coast of China. It faces the Bohai Sea in the west, the Yellow Sea in the east, and the Shandong Peninsula in the south.

About 5.5 million tons of ballast water was discharged in Dalian Port and its coastal waters in 1997. This ballast water came from ships visiting from Korea, Japan, Southeast Asia and to a lesser extent, from North America and Europe.

In 1993 and 1994, the prawn farming industry suffered severe losses due to an unknown bacterium or pathogen, and prawns died in great numbers causing a total loss of three billion yuan (around US\$ 362,430,000 using the current exchange rate). While no direct correlation has been established between ship ballast water and losses to the fishing and prawn industry, the port is near the farming areas. The proximity of Dalian to valuable prawn farming areas is one of the reasons for its inclusion in the project.

During the second meeting of the Country Project Task Force held in January 2001 in Beijing, significant progress was noted in terms of institutional arrangements and planning. With the finalization of the National Workplan, implementation is ready to commence. A number of activities, including port baseline surveys and compliance monitoring, have been initiated and the IMO reporting form has been successfully adopted in four major ports.

The Chinese government is currently planning a 15-year project for the protection of the marine environment known as “Blue Bohai Sea.” GloBallast shall provide information on its activities regarding risk assessment, port surveys and compliance, monitoring and enforcement.

Mumbai (Bombay), India - South Asia

The Port of Mumbai lies midway along the west coast of India. It possesses a deep harbor covering 400 square kilometers.

Many Indian vessels departing from Mumbai have been cleaning ballast water tanks in the high seas on a tank-by-tank basis for years. The reason for such

Figure 2.
GloBallast Water Management Programme

D E M O N S T R A T I O N S I T E S

1	Sepetiba	Brazil	South America
2	Dalian	China	East Asia
3	Mumbai	India	South Asia
4	Kharg Island	Iran	Middle East
5	Saldanha	South Africa	Africa
6	Odessa	Ukraine	Eastern Europe



Source: Globallast Project Coordinating Unit.

practice is that captains fear that mud and sediment mixed with ballast water would quickly settle and accumulate at the bottom of the tank. Such practice may, however, help reduce the possibility of introducing harmful organisms or pathogens, which live in shallow water or sediment. The Government encourages the practice of ballast water tank cleaning in the high seas and the Indian experience with this practice makes it an attractive participant for the GloBallast Programme.

Kharg Island, Iran – Middle East

Kharg Island is located on the Persian Gulf and is Iran's and the Gulf's largest port facility. The selection of Kharg Island as a demonstration site, aside from its location and importance, is due to the Gulf's sensitive environmental nature. Gulf waters are shallow, have substantial marine biodiversity, high water temperature, and experience little exchange of water with surrounding marine areas through the Ormuz Strait.

Port of Saldanha, South Africa – Africa

The Port of Saldanha is the largest port in the southern part of South Africa and covers 7,430 hectares of water area. It is the country's deepest port. Located in the southwest of the country facing the Atlantic Ocean, Saldanha Bay is considered to be a highly sensitive environmental area due to intensive aquaculture activities near the port. The surrounding area, meanwhile, has been declared officially as a "natural reservation."

Port of Odessa, Ukraine – Eastern Europe

Odessa is one of the largest ports in the Black Sea. Its location on historically founded merchant ways between West and East, closeness to Bosphorus and Dardanelles, convenient exit to Mediterranean Sea and Indian Ocean, year round navigation, and proximity to the big industrial and agricultural areas make it a particularly attractive, heavily used port.

The areas near the port are important nursery and feeding areas for Black Sea fisheries.

While exact information on the amount of ballast discharge in the port is not available, calculations from the oil products sector indicate large volumes. More than 14,400,000 tons of oil and oil products were trans-

ported through Odessa. It is calculated that a total quantity of 5,489,000 tons of ballast water were discharged into and around the port area.

A significant part of Ukrainian port traffic is oriented towards Europe (14 percent), China (6 percent) and the largest part represents the exchanges and transit with members of the Commonwealth of Independent States (42 percent). It may be, therefore, assumed that the largest amounts of ballast water discharged may originate from Europe and the Far East.

Sepetiba, Brazil - South America

The Port of Sepetiba is adjacent to Rio de Janeiro. Within 500 kilometers from the port, a concentration of industrial and commercial areas (producing 70 percent of Brazil's Gross Domestic Product) may be found. Sepetiba's coal and ore terminals have the capacity to handle 7,000,000 and 15,000,000 tons per year, respectively. The port was constructed in 1982 to meet the need of the Companhia Siderurgica Nacional and Valesul to move bulk cargo from their plants and thus, unburden the Port of Rio de Janeiro.

According to an evaluation of ports conducted by the Companhia Docas do Rio de Janeiro, which acts as the Port Authority for Rio de Janeiro, Sepetiba, Angra dos Reis, Niteori and Fornu, Sepetiba will become Latin

America's largest and the first Southern Atlantic Harbor to be a major cargo hub capable of handling over 20 million tons per year. Additionally, it is equipped with modern equipment and will accommodate the latest generation vessels up to 8,000 twenty-foot equivalent units (TEUs). Sepetiba is intended to be a model port highlighting concern for environmental management. The development of an Environmental Management Plan is a priority.

The efforts in these demonstration sites shall be replicated throughout each region. It is hoped that the project shall further catalyze the development of an international regulatory regime for ballast water through galvanizing action by IMO member states. More information on the GloBallast programme is provided in the website <http://globallast.imo.org>.

Conclusion

Unlike an oil spill, which can be cleaned up, the effects of marine species introduction are usually irreversible. The question "Which is the bigger threat?" however, has yet to be resolved. At the moment, opinions differ regarding this matter. But one thing remains certain: the transfer of unwanted organisms in ballast water may be the biggest challenge facing the global shipping industry this century. ■

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Introduction

Countries bordering the Seas of East Asia, including Brunei Darussalam, Cambodia, China, DPR Korea, Malaysia, Indonesia, Japan, Philippines, RO Korea, Singapore, Thailand and Vietnam, have always relied on the vast resources of the ocean for food supply, livelihood, medicine, energy, minerals, transport and recreation.

Geographically, these coastal countries semi-enclose five large marine ecosystems, viz: Yellow Sea, East China Sea, South China Sea, Sulu-Celebes Sea and Indonesian Seas. The rich ecosystems therein include one-third of the world's mangroves and coral reefs and generate more than 40 percent of the world fisheries production (Food and Agriculture Organization, 1999). These ecosystems protect life and properties in the coastal lowlands against flooding and natural hazards. They also support a global center of marine biodiversity as well as sustain a continuous supply of raw materials, mineral and oil deposits that contribute substantially to the maritime economy of the East Asian Seas region. The estimated value of goods and services sourced from coastal, ocean and terrestrial ecosystems averages \$33 trillion a year (Costanza *et al.*, 1997). Coral reefs in Southeast Asian Seas generate an estimated value of \$112.5 billion a year (Ruitenbeek, 1999 citing Costanza *et al.*, 1997, 1998).

Partnerships in Environmental Management for the Seas of East Asia (PEMSEA): A Framework for Regional Cooperation



Figure 1. The Seas of East Asia

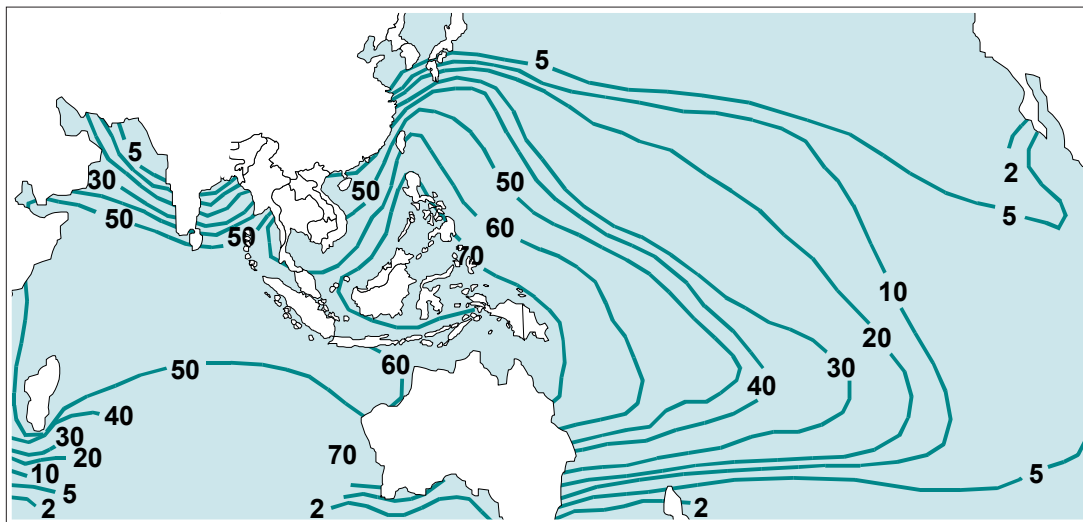
Source: PEMSEA

The Seas of East Asia play a significant role in the economy of the region. Maritime trade increased from 15 percent of the regional Gross Domestic Product (GDP) in 1970 to over 50 percent in 1995, as exports grew by 10 percent per annum (World Bank, 1998). Half of the world's merchant fleet sails through the Straits of Malacca and the Lombok Straits. Thirteen of the 20 largest maritime ports in the world are located in the shipping corridor stretching from Singapore to Japan (American Association of Port Authorities, 1999).

Despite immense land and sea areas, national economies are concentrated in a rather narrow strip of coastal lowland and marine areas. In the East Asian region, about 77 percent of the total population of 1.9 billion currently live within 100 kilometers from the coast (Burke *et al.*, 2001). This figure is expected to increase substantially in the 21st century. Unfortunately, a significant number of these people still live in poverty.

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Figure 2. Scleractinian Coral Distribution. The global center of hard coral diversity emanates from the region, particularly around eastern Indonesia and the Philippines, where 70 genera are recorded.



Source: Veron, J.E.N.

“Coastal and marine environmental conditions in most parts of the region are in a severe state of degradation. Environmental stresses have begun to impact on human health, reduce the productive capacity of the resource systems, and impede economic growth.”

Coastal and marine environmental conditions in most parts of the region are in a severe state of degradation. Environmental stresses have begun to impact on human health, reduce the productive capacity of the resource systems, and impede economic growth. Already, an increase in the number of cases of gastroenteritis and upper respiratory tract infections due to contact with contaminated seawater has been reported. Most of these cases are in areas where just over 10 percent of the organic contaminants are removed by sewage treatment (Chia and Kirkman, 2000). Red tide outbreaks are widespread, resulting in the loss of human lives and millions of dollars in fishery and aquaculture products. Many valuable natural habitats have also been destroyed over a span of 50 years. The Philippines and Thailand, for example, have lost more than half of their mangrove forests. Much of their seagrass beds have been completely wiped off due to bottom trawling operations and pollution (Sudara *et al.*, 1994). While the actual cost of environmental recovery is not yet fully understood, the World Bank (1998) reported that remedial measures require slightly less than 1 percent of the national GDP. This amount is expected to increase to 1 to 1.5 percent by 2020.

With the expected increase in energy demand in the region, rapid growth of coastal population and changing consumption and use patterns (as a result of economic globalization and improved standards of living), efforts in environmental protection are unlikely to keep pace with the escalating economic and population pressures. This will be further aggravated by the growth of intra-regional markets, which will lead to an intensification of competing uses of limited resources and result in negative effects on the region's social, cultural and environmental characteristics.

The situation is particularly worrisome with respect to environmental and natural resource use issues across national or administrative boundaries. While specific and localized environmental issues have been addressed in some countries, transboundary issues are often nobody's business. Unfortunately, the impacts of transboundary environmental degradation have taken their toll not only on



A glimpse of the coastal area in Danang, Vietnam.

Source: PEMSEA

the functional integrity of shared resource systems, but also on the resource systems within national boundaries. Human activities and economic development often result in unsustainable use of natural resources and further aggravate the productive capacity of the resource systems due to failure in understanding the connectivity between ecosystems. Overexploitation of natural resources, increasing numbers of pollution hotspots, poverty proliferation, and the steady deterioration of livelihoods, food supply and human health are consequences of globalization in the region.

In the November 2000 Singapore Summit, the Association of South East Asian Nations (ASEAN) and North Asian leaders favorably considered an economic realignment in light of increasing impacts of globalization, especially in terms of trade and economic interdependency between nations of the region. The proposed East Asian Economy takes advantage of the vast combined markets of the region which are comparable to that of Europe and North America. The economic realignment shall certainly strengthen the concept of regionalism and forge greater collaboration. The emergence of subregional cooperation in trade, as exemplified by the proliferation of economic growth centers, further enhances and reinforces the desire for the expansion of the ASEAN framework to cover their northeast Asian neighbors (see figure on back cover).

It is, therefore, clear that economic development in the context of the new East Asian Economy cannot be divorced from the need for collective efforts to protect the environment. Environmental protection is an indispensable part of social and sustainable economic development. Environmental management should, therefore, form an inseparable part of a regional programme of action for the new East Asian Economy.

A number of international environmental conventions and agreements have been enacted over the past years. Of specific relevance to the protection and management of the coastal and marine areas are the UN Convention on the Law of the Sea, Chapter 17 of Agenda 21, the UN Framework Convention on Climate Change (UNFCCC), the Convention on Biodiversity (CBD), and other specific international conventions and protocols. The implementation of these conventions, however, is an even greater challenge than their ratification. In many countries, the enforcement of these global instruments has been ineffective.

Eleven participating governments of East Asia, in collaboration with the Global Environment Facility (GEF), the United Nations Development Programme (UNDP) and the International Maritime Organization (IMO), are collectively addressing the marine environmental problems of the Seas of East Asia by focusing on areas of common concern and building

“ With the expected increase in energy demand in the region, rapid growth of coastal population and changing consumption and use patterns (as a result of economic globalization and improved standards of living), efforts in environmental protection are unlikely to keep pace with the escalating economic and population pressures.”

“ It is, therefore, clear that economic development in the context of the new East Asian Economy cannot be divorced from the need for collective efforts to protect the environment. Environmental protection is an indispensable part of social and sustainable economic development. Environmental management should, therefore, form an inseparable part of a regional programme of action for the new East Asian Economy. ”

capacities to tackle regional environmental issues. The formation of the GEF/UNDP/IMO Regional Programme on Building Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) evolved from the increasing realization of the magnitude and complexity of environmental problems and the need to mobilize collective efforts, resources and skills of all sectors and interest groups through genuine partnerships.

PEMSEA has confirmed its niche among the countries of the new East Asian Economy, ASEAN+3. It aims to establish a multi-country, multi-sectoral shared vision for the Seas of East Asia, along with supporting strategies and environmental action programs for attaining that vision. A functional regional framework is the ultimate target of PEMSEA, which among other operating mechanisms will incorporate integrated implementation of international environmental instruments such as the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA), the UNFCCC and the CBD.

PEMSEA activities focus on (a) enabling local governments to effectively manage coastal and marine resources and their environment through strengthening local capacity in integrated planning and management of their coastal areas in collaboration with civil society and other stakeholders; (b) promoting multi-country and multi-agency cooperation in managing subregional sea areas and marine pollution hotspots through shared visions, strategies and common action programs; (c) developing management-related methodologies, techniques, working models, and standards to strengthen practical efforts in the field; (d) providing policy support and scientific advice to decision-makers; (e) identifying and demonstrating the synergies and linkages between related international



Fisherfolk in Sihanoukville, Cambodia

Source: PEMSEA

environmental instruments and facilitating their integrated implementation, and (f) creating environmental investment opportunities, sustainable financing mechanisms and institutional arrangements for implementing marine environment-related international conventions and action programs.

In implementing its long-term development objectives and activities, PEMSEA shall install appropriate consultative mechanisms to ensure accessibility of expert advice for the region. It shall establish a Regional Ocean Think-Tank for the Seas of East Asia to brainstorm specific policy issues of common concern. It shall create a Multidisciplinary Expert Group (MEG) composed of senior regional and international experts to provide sound scientific advice to the region, and invite regional experts to serve as senior advisors to the Regional Programme. To build a critical mass of regional experts, PEMSEA will also institute a Regional Task Force to provide inter-disciplinary technical and scientific services to the region.

In an era of progressive economic realignment and accelerated growth in maritime trade, the obligation to protect the remaining ocean heritage particularly in the Seas of East Asia is no longer confined to the realm of the academe. Rather, it is the responsibility of all citizens of the region and the world at large. ■

“ In an era of progressive economic realignment and accelerated growth in maritime trade, the obligation to protect the remaining ocean heritage particularly in the Seas of East Asia is no longer confined to the realm of the academe. Rather, it is the responsibility of all citizens of the region and the world at large. ”

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T R A I N I N G

2001

PEMSEA's training initiatives provide unique learning experiences through:

Direct involvement of local stakeholders that simulates interactions of key players in coastal and marine environmental protection and management

Field studies integrated in training courses, which complement theory with actual practice

Site-specific application of new skills learned that ensures enhanced capability at the end of the training

A concrete plan of action developed during the training which encourages participants to engage in follow-on activities related to the training

Effective environmental management requires trained and skilled people...

Be one of them!



For further information please contact:

The Regional Programme Director
GEF/UNDP/IMO Regional Programme on Building Partnerships
in Environmental Management for the Seas of East Asia
(PEMSEA)

Mailing Address: R.O. Box 2502, Quezon City 1165, Philippines
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e-mail: info@pemsea.org

Training at ICM Demonstration Sites

- 18 - 22 June 2001 Public Awareness and Participation (Bali)
- 23 - 27 July 2001 Environmental Risk Assessment (Chonburi)
- 23 - 27 July 2001 Environmental Risk Assessment (Klang)

Regional Training Courses

- 05 - 06 September 2001 Regional Consultative Workshop on Strengthening Recovery of Ship Pollution Clean-up Costs and Damage Claims (Singapore)
- 08 - 17 October 2001 Project Development and Management for Coastal and Marine Environmental Projects (Manila)
- 12 - 30 November 2001 Integrated Coastal Management (Manila and Xiamen)

** The above schedule is subject to change.*

ALUMNI NETWORK

Get involved... stay involved.

The Alumni Network offers:

- ☐ New and up-to-date information on PEMSEA activities
- ☐ Information on opportunities for professional upgrading and degree programs available on fields relevant to coastal and marine environmental management
- ☐ A chance to be a member of the PEMSEA roster of trainers
- ☐ Information on PEMSEA related training activities within the region

To join, visit the PEMSEA website and complete the registration form.

KNOW MORE
www.pemsea.org



Integrated Coastal Management (ICM)

ICM provides a framework and practical tools to assist policy makers, planners, and resource managers to meet the challenges of sustainable development in the coastal areas.

Topics Covered

- ICM concepts, principles and applications
- ICM program initiation and data gathering
- ICM strategic management plans - development and implementation
- ICM action plans - formulation, approval and implementation
- Stakeholders and community participation
- Environmental impact assessment
- Environmental accounting and resource valuation
- Sustainable financing
- Institutional and legislative requirements
- Research and information management
- Environmental monitoring and evaluation techniques
- Developing integrated waste management practice
- International conventions on marine pollution
- Integrated land and water use zonation scheme

Who Should Attend?

- Government planning officers, administration and technical staff at local, provincial and national levels
- Resource managers
- ICM project staff
- Trainers and researchers involved in coastal and marine environmental activities

Entry Requirements

- Must be directly involved in coastal-marine environment programs and/or projects
- English language proficiency

The collage displays several course descriptions from the PEMSEA website:

- Integrated Coastal Management (ICM):** A three-week, comprehensive course focusing on the principles and guidelines toward integrated coastal management. It focuses on participatory training to resource planners, managers and decision-makers. Participants will have the opportunity to do "hands-on training" in the field.
- Risk Assessment / Risk Management (RA/RM):** The risk assessment process provides a management by determining specific risks to ecosystems and human health. On management involves selecting the appropriate options to minimize the identified risks.
- Damage Claims and Compensation for Oil Pollution:** The course strengthens countries' capacities in recovery of oil spill cleanup costs and pollution damage claims.
- Strategies, Tools and Techniques for Implementing International Conventions:** The training programme presents experience and practices regarding international conventions on marine training workshop will become familiar and techniques for implementing to marine pollution prevention at MARPOL, CLC and FUND, conventions.
- Oil Pollution Preparedness and Response:** The IMO Oil Pollution Preparedness and Response Cooperation Convention (OPRC) model training courses are designed to address the training needs of personnel involved in response at various levels. The training course for operator, commander, senior manager, trainer course. The duration is 5 days.
- Port State Control:** This nine-day training course makes use of the IMO model course on Port State Control. It provides training for officers authorized by their governments to exercise port state control under the Convention for the International Convention for the Control of Pollution of Ships and Air (MARPOL 73/78) and the International Convention for the Control of Pollution of the Sea by Oil (OILPOL 54).
- Natural Resource Damage Assessment (NRDA):** Natural resource damage assessment involves valuation of the damages associated with an action, event or activity on the environment and human health. A good understanding and strengthened capacity in NRDA would enable governments to develop sound policies and reasonable compensation measures.

Featured Training Course for This Issue

capacity building

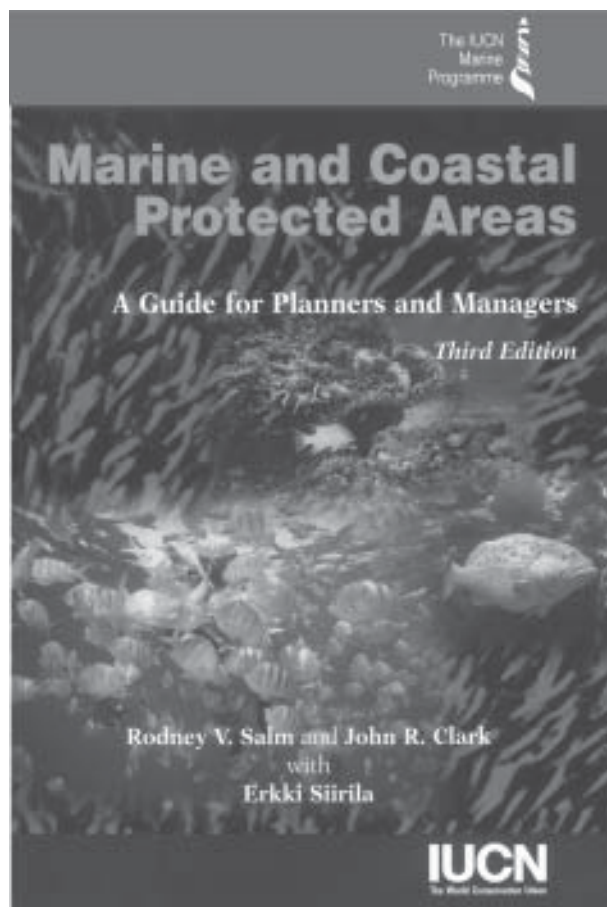
Beyond the Orange Book: Managing Marine and Coastal Protected Areas in the New Millennium

Nancy Bermas

Marine and Coastal Protected Areas A Guide for Planners and Managers. 2000. Third Edition. Rodney Salm and John Clark with Erkki Siirila. Published by The World Conservation Union, Washington, DC. 371 p.

Marine protected areas (MPAs) are known to have been in existence for hundreds of years. Majority of statutorily established MPAs, however, are very recent. The World Conservation Union (IUCN), the publisher of this book, defines a protected area (PA) as “an area of land and/or sea especially dedicated to the protection of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.” A compatible definition for marine protected areas was also developed by IUCN, *i.e.*, “any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical or cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment.”

IUCN contributed significantly to the development of programs for establishing MPAs in the 1970s. The first edition of this book, also known as the *Orange Book* by virtue of the dominant color of its cover, was the product of the Third World Congress on National Parks held in 1982 in Bali, Indonesia. The *Orange Book* was considered a practical and useful guide to practitioners in MPA planning and management as well as to individuals who found the approaches and tools contained in the book useful. The evolution on the approaches to planning and managing MPAs for the past 15 years, however, have required a major update of the two previous editions of this book. The present version, therefore, incorporates new developments in MPA management. It specifically includes supplementary materials and updated concepts, case histories and approaches that are helpful to tropical coastal countries in organizing national systems of marine and coastal protected areas and in the planning and managing selected MPA sites. It is worth mentioning that the present version was developed based on the framework of the original contributions in the *Orange Book*.



The book is organized into three parts. Part I introduces MPAs as an important approach to managing coastal and marine resources. It discusses the following topics: roles of MPAs, site planning, community involvement, systematic selection of MPAs, strategies and tools for planning and managing MPAs, and the legal basis for MPAs. Part II considers principles and mechanisms for planning and managing PAs in four different environments: coral reefs, estuaries and lagoons, small islands and beaches. Emphasis is on technical knowledge about particular habitats and how this knowledge is used to meet management objectives. Part III presents case histories covering a wide variety of MPA experience around the world to help protected area planners and managers carry out their tasks. These “real world” examples are very effective in addressing specific aspects of PA management.

Numerous authors have contributed to the compilation of case histories, hence providing varied viewpoints on a wide range of practical issues and lessons learned pertaining to MPA establishment and management. An interesting feature of this section is that readers are encouraged to learn the details of a particular case history by contacting the authors, whose e-mail addresses are provided at the end of each contribution.

Unlike in previous versions, a particular concept is given emphasis throughout the book by providing explanatory and supporting facts in boxes. In some cases, readers can have a glimpse of the focus of an entire section by consulting the boxes. Practical examples are likewise provided in boxes to promote a better understanding of a particular issue on PA management.

The authors developed this book primarily to respond to the needs of managers and practitioners on MPA management. Those interested in marine and coastal protected areas in general, whether for practical, scientific or recreational purposes, may also find this book useful and informative. Authored by the notable duo with extensive experience in marine conservation, Rodney Salm and John Clark, the present version has been enriched with inputs from numerous contributors and the photographs of Erkki Siirila. The authors, contributors and sponsors of this book are to be commended for producing a useful and practical guide, which may enhance and accelerate actions towards successful MPA management.

Interested readers may contact Dr. John Waugh at the IUCN Marine Programme, 1630 Connecticut Ave NW, Washington, DC 20009-1053 USA. Phone: (202) 5182057; E-mail: jwaugh@iucn.org for more information. Readers are also directed to the IUCN Online Bookstore at www.iucn.org/bookstore/index.html for copies or they may contact the IUCN Publication Services Unit, 219c Huntingdon Road, Cambridge CB3 0DL, UK. Phone: 44 1223 277894; Fax: 44 1223 277175; Email: info@books.iucn.org. ■

If you wish to have your coastal or marine-related publication featured under this section, please send a copy of the same to:

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Visit the PEMSEA Website

www.pemsea.org



The PEMSEA website contains information on news and events relating to marine and coastal environmental management in the East Asian Seas Region: Brunei Darussalam, Cambodia, China, DPR Korea, Indonesia, Japan, Malaysia, Philippines, RO Korea, Singapore, Thailand and Vietnam.

It also boasts of a wide variety of online references and databases regarding the practice of two environmental management approaches - Integrated Coastal Management (ICM) and Risk Assessment/Management.

For information about PEMSEA, visit the website at www.pemsea.org or e-mail info@pemsea.org.

NEWS



Decline in Fisheries, Mangroves, Coral Reefs in Manila Bay Evident, Says PEMSEA Study

Declining. This word aptly describes the state of coastal and marine resources (including fish, shellfish, mangroves, and coral reefs) in Manila Bay based on an Initial Risk Assessment PEMSEA conducted recently. Based on preliminary reports, stocks of fish and shellfish have been decreasing due to overfishing and the use of destructive fishing methods. Pollution, reclamation projects, and fishpond conversion have affected mangroves while destructive fishing methods and sedimentation have damaged coral reefs.

In addition, initial findings show that human health risks in the area have risen due to bathing and consuming food contaminated with fecal coliform. Pollutants in Manila Bay also include phosphate, ammonia, oil, copper, cadmium, mercury, chromium, lead and certain pesticides.

The Initial Risk Assessment provides a glimpse of environmental conditions in the bay using available secondary data. It serves as a screening mechanism to identify priority environmental concerns, identify data gaps/uncertainties, and recommend areas for immediate management intervention. It also identifies resources and habitats that are at risk and recognizes significant causes of risks. At present, the Manila Bay Initial Risk Assessment is being reviewed by scientists, academicians, government officials, and non-government organization representatives prior to its finalization.

Manila Bay is a semi-enclosed estuary, which is connected to the South China Sea via a 16.7 kilometer-wide entrance. It is bounded by the National Capital Region, and the provinces of Bataan, Pampanga, Bulacan, and Cavite. Its coastline is approximately 190 kilometers long while its surface area measures about 1,800 square kilometers.



Regional Networks for Local Governments on ICM Formed

The Regional Network of Local Governments (RNLG) implementing integrated coastal management (ICM) was formally launched on 15 March 2001 during the MOMAF-PEMSEA Regional Workshop in Seoul, Republic of Korea. During the meeting, representatives from PEMSEA ICM sites – Sihanoukville, Cambodia; Batangas, Philippines; Bali, Indonesia; Chonburi, Thailand; Danang, Vietnam; Klang, Malaysia; and Shihwa, Republic of Korea – agreed to focus the network's efforts on holding annual meetings to share ICM wise practices, approaches, methodologies and other management interventions.

In addition, participants resolved to keep the network small and requested PEMSEA to act as secretariat of the network.

The RNLG aims to reinforce intergovernmental regional cooperation in managing the marine environment and promote implementation of ICM best practices. The services RNLG shall provide include: dissemination of information on ICM, linkage to other regional networks, trainings, sharing of database and provision of opportunities to be an advisor/resource person to regions establishing ICM projects. Aside from these, participating governments may benefit from the network through: the discussion of common issues relating to coastal and environmental management, advice in establishing parallel sites, leverage in obtaining funds from donors and access to facilities.



Mr. Lee Young Woo, Director General of the Bureau of Marine Policy of the Ministry of Maritime Affairs and Fisheries, and Dr. Chua Thia-Eng, Regional Programme Director of PEMSEA, congratulate each other after the signing of the Memorandum of Arrangement for the ICM Parallel Site in Shihwa Lake, Republic of Korea.

MOMAF - PEMSEA Workshop Fosters Regional Collaboration in Coastal Management



Over 100 participants from nine countries attended the MOMAF-PEMSEA Regional Workshop on Shihwa Management Strategy and Regional Initiatives for Coastal Environmental Management held on 15-16 March 2001 in Seoul, Republic of Korea to share experiences and lessons on coastal management.

During the activity, Mr. Moo Hyun Roh, Minister of the Ministry of Maritime Affairs and Fisheries (MOMAF), expressed his concerns about the continuing deterioration of the environmental quality of Shihwa Lake and called upon experts to recommend solutions to this problem. He explained that "coastal areas have long been subjects of development and exploitation because they are suitable places for production and habitation with proximity to the sea and abundant organic and inorganic resources."

To facilitate recommendations on the management strategies for the Shihwa Lake coastal area, a one-day field excursion was organized to expose participants to the area. Workshop participants reached a consensus that existing scientific and management efforts in the locality may be greatly enhanced and refined by applying an integrated framework and by encouraging stakeholders to formulate a common vision. In addition, they discussed the Shihwa management strategy with national and regional experts.

Delegates to the workshop represented PEMSEA ICM demonstration sites, national and local government units, national and local non-government organizations, and other stakeholder groups from the Shihwa area.



Marine Electronic Highway Steams Ahead

The GEF/World Bank/ IMO Marine Electronic Highway (MEH) Project moves ahead with the appointments of Mr. Guoy Tong Kiat as Project Manager, Mr. Henry M. Lumentah as Project Consultant for General Maritime Administration and Mr. Rozlan Mohd Ramli as Project Consultant for Marine Environment Protection.

Mr. Jean-Claude Sainlos, Senior Deputy Director of Marine Environment Division, International Maritime Organization chaired the kick-off meeting with the new Project Manager and Consultants on 11 May 2001 in Kuala Lumpur, Malaysia. The new appointees are expected to be on board on 1 June 2001.

The project has drawn considerable interest from the shipping sector. The MEH is considered to be the most significant advancement in navigational safety since the introduction of radar. It is envisioned to stretch along major shipping routes from the Persian Gulf to the Sea of Japan/East Sea.

NEWS

National Co-financing for PEMSEA Exceeds Target

Government input to PEMSEA (as of March 2001) has reached US\$ 8.3 million, 150 percent more than the target of US\$ 3.3 million indicated in the UNDP/GEF/IMO Regional Programme Project Document. These inputs represent the counterpart support of participating countries in the implementation of six Integrated Coastal Management (ICM) Demonstration Sites, two ICM Parallel Sites, two environmental management projects, and a workshop for the Regional Network for Local Governments.

Aside from government inputs, the private sector and other international agencies have collaborated on and co-sponsored activities with PEMSEA. Among these are the Sida Marine Science Programme, International Maritime Organization, Wastes Systems New Zealand, Hatfield Consultants and the Bataan Coastal Care Foundation.

E-Forum on Ecological Carrying Capacity Launched

PEMSEA is using the Internet in bringing together experts throughout the world to share experiences and expertise on the issue of carrying capacity, a known "bottleneck" affecting policy and management decisions in the East Asian region. The E-Forum on Ecological Carrying Capacity was launched on 3 May 2001 under Yahoo! Groups, a free forum-developing website.

The E-forum is part of a PEMSEA case study aimed at gathering existing knowledge on the concepts, approaches and methodologies used in measuring the carrying capacity of bays, lagoons and semi-enclosed seas as they relate to sectoral developments such as tourism, industries, fisheries and aquaculture.

Twenty-five experts initially made up the group and more are being invited to join. PEMSEA Regional Programme Director Dr. Chua Thia-Eng, National University of Singapore Professor Dr. Chou Loke Ming and PEMSEA Technical Officer Ms. Nancy Bermas act as moderators of the E-forum. The forum is expected to run from June to October 2001, the results of which shall be a review document on ecological carrying capacity.

BULLETIN BOARD

Asia-Pacific Conference on Marine Sciences and Technology Slated

The Asia-Pacific Conference on Marine Sciences and Technology will be conducted on 12-16 May 2002 at Port Dickson, Malaysia. Organized by the Malaysian Society of Marine Sciences (MSMS), the National Oceanographic Directorate of the Ministry of Science, Technology and the Environment (MOSTE), Malaysia and the Institute of Biological Sciences of the University of Malaya, the conference aims to provide a venue for interaction among scientists, policy makers, industry and marine enthusiasts. It also seeks to facilitate the sharing of experiences and the formulation of research, development and management strategies for the marine environment in the Asia-Pacific Region.

Interested parties may contact the conference secretariat at h1phangs@umcsd.um.edu.my or affendi@zoology.um.edu.my for more details.

The Sixth Asian Fisheries Forum

The Sixth Asian Fisheries Forum will be held on 25-30 November 2001 in the National Sun Yat-Sen University, Kaohsiung, Taiwan. The forum highlights the significance of fisheries in the region in the 21st century and offers a unique opportunity to update knowledge on recent trends and advances in Asian fisheries.

For more information visit the forum website at <http://www.afs.tfrin.gov.tw> or e-mail the Conference Manager at meetingmanager@aol.com

First International Conference on Ballast Water Management

The First International Conference on Ballast Water Management will be held in Singapore on 1-2 November 2001. Organized by the Environmental Technology Institute (ETI) in Singapore in conjunction with the Maritime and Ports Authority of Singapore and the Universities of Newcastle and Strathclyde, UK, the conference aims to provide a forum for the local, regional and global practitioners in the port and maritime industries to share new developments, concepts and practices in ballast water management and to exchange views and experiences.

For more information e-mail the conference coordinator Dr. Jose Matheickal at JTMATH@eti.org.sh.

O u r S h a r e d V i s i o n .



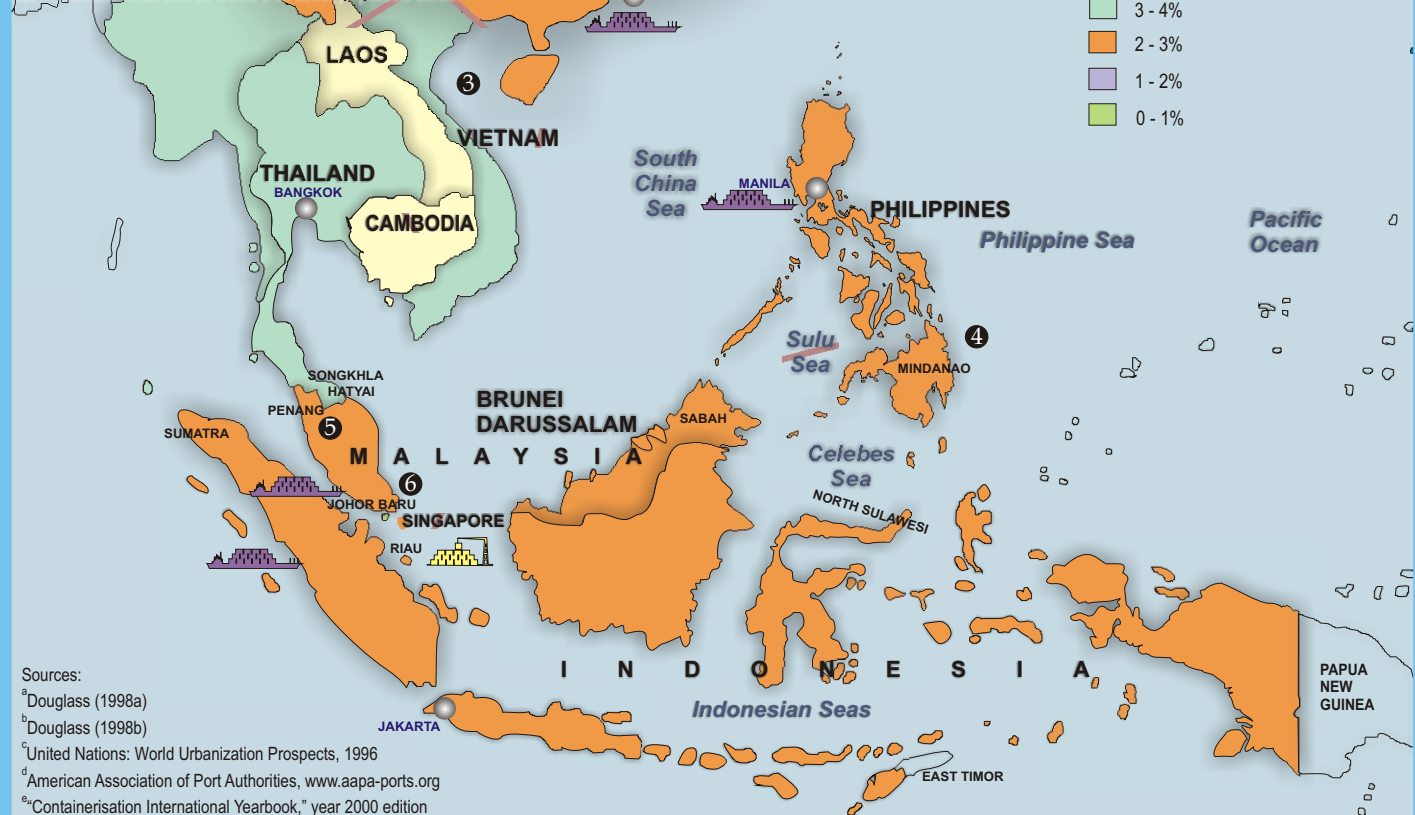
The resource systems of the Seas of East Asia are a natural heritage, safeguarding sustainable and healthy food supplies, livelihood, properties and investments and social, cultural and ecological values for the people of the region, while contributing to economic prosperity and global markets through safe and harmonious coexistence for present and future generations.

EAST ASIAN SEAS GROWTH AREAS

● Megacities in East Asia ^c

City	Population (millions)			Rank		
	1975	2000	2015	1975	2000	2015
Tokyo	16.5	28.0	28.9	1	1	1
Shanghai	11.2	14.2	18.0	3	6	8
Osaka	9.4	10.6	10.6	4	18	23
Beijing	8.1	12.0	15.6	10	12	12
Seoul	5.3	12.2	13.0	10	11	19
Tianjin	5.2	10.2	13.5	21	20	18
Jakarta	3.9	9.8	13.9	24	21	16
Manila	3.5	10.8	14.7	27	16	13
Shenyang	3.5	n/r	n/r	29	n/r	n/r
Hong Kong	3.5	n/r	n/r	30	n/r	n/r
Bangkok	n/r	7.2	9.8	n/r	28	27
Hangzhou	n/r	n/r	11.4	n/r	n/r	22

n/r = not ranked as one of world's 30 most populous cities



Sources:

^aDouglass (1998a)

^bDouglass (1998b)

^cUnited Nations: World Urbanization Prospects, 1996

^dAmerican Association of Port Authorities, www.aapa-ports.org

^eContainerisation International Yearbook, year 2000 edition

WORLD PORT RANKING - 1999				WORLD PORT RANKING - 1999			
TOTAL CARGO VOLUME, METRIC TONS (000s) ^f				CONTAINER TRAFFIC (TEUs) ^g			
RANK	PORT	COUNTRY	TONS	RANK	PORT	COUNTRY	TEUs
1	Singapore	Singapore	325,902	1	Hong Kong	China	16,100,000
2	Rotterdam	Netherlands	303,520	2	Singapore	Singapore	15,900,000
3	South Louisiana	United States	194,448	3	Kaohsiung	Taiwan	6,985,361
4	Shanghai	China	187,000	4	Busan	South Korea	6,439,589
5	Hong Kong	China	168,838	5	Rotterdam	Netherlands	6,400,000
6	Chiba	Japan	164,741	6	Long Beach (CA)	U.S.	4,408,480
7	Ulsan	South Korea	148,332	7	Shanghai	China	4,210,000
8	Houston	United States	144,184	8	Los Angeles (CA)	U.S.	3,828,218
9	Nagoya	Japan	133,038	9	Hamburg	Germany	3,750,000
10	Kwangyang	South Korea	131,059	10	Antwerp	Belgium	3,614,246
11	New York/New Jersey	United States	121,387	11	New York	U.S.	2,863,342
12	Antwerp	Belgium	115,654	12	Dubai	U.A.E.	2,844,634
13	Yokohama	Japan	114,538	13	Tokyo	Japan	2,700,000
14	Kaohsiung	Taiwan	110,722	14	Port Klang	Malaysia	2,550,419
15	Incheon	South Korea	108,227	15	Tanjung Priok	Indonesia	2,273,303
16	Busan	South Korea	107,757	16	Gioia Tauro	Italy	2,253,401
17	Kobe	Japan	102,527	17	Kobe	Japan	2,200,000
18	Marseilles	France	90,258	18	Yokohama	Japan	2,200,000
19	Kitayushu	Japan	87,346	19	Bremenhaven	Germany	2,180,955

Emerging/Proposed Transborder Regions^b

- 1** Northeast Asia TBR: Tumen River Basin, Russia, China, Republic of Korea, Japan, Democratic People's Republic Korea
- 2** Taiwan-Fujian TBR
- 3** Mekong TBR: Vietnam, Laos, Cambodia, Thailand
- 4** Eastern Growth Triangle: Mindanao, North Sulawesi, Brunei, Sabah
- 5** Northern Growth Triangle: Sumatra (Medan), Malaysia (Penang), southern Thailand (Songkhla, Hatyai)
- 6** Sijori Growth Triangle: Singapore, Johor Baru, Riau