EAS Congress/WP/2010/11

eas Congress 2009

Theme 2

Natural and Manmade Hazard Prevention and Management

WORKSHOP 4: DEVELOPMENT AND ADVANCES ON MARINE BIOSAFETY IN THE CONTEXT OF THE CONVENTION ON BIODIVERSITY

25 November 2009

International Maritime Organization (IMO)

Chair: **Dr. Jose Matheickal**
International Maritime Organization

The East Asian Seas Congress 2009

"Partnerships at Work: Local Implementation and Good Practices"

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INTRODUCTION

Invasive aquatic species (IAS) are one of the four greatest threats to the world's oceans, and can cause extremely severe environmental, economic and public health impacts. In recent years, the threat of climate change and the translocation and spread of invasive or pathogenic species are the focus of international efforts due to potential transboundary and long-term impacts on a planetary scale.

Translocation of marine invasive aquatic species by ships can occur through ballast water transfer and fouling of ship hulls as well as trading of exotic species (marine and estuarine). On ballast water transfer for example, it is estimated that about 10 billion tons of ballast water would be transferred around the world per year containing over 7,000 marine species, mostly microscopic planktons and organisms. Several regions, including the Great Lakes, Caspian Sea, Black Sea and the Pantanal, have been affected by invasive species — causing havoc to native aquatic species and its environs as well as economic losses to the local fishing industry and coastal tourism. It has been estimated that the economic impact of marine invasive species may well exceed US$ 100 billion per year. International instruments on ballast water management and antifouling systems have been ratified by several IMO-member States but there is a need to build capacity, enact compatible legislation and apply technology in order to implement the provisions of such instruments at national levels.

East Asia is one of the main sources of translocated species like the mitten crab, *Corbula* (Asian clam) and *Codium* (seaweed) and is also a centre of biological diversity (terrestrial and marine) that could de drastically reduced if bio-invasions take place. At present, marine biosafety is an emerging concern in the region, particularly with respect to ballast water management for international shipping.

Hence, the workshop on Development and Advances on Marine Biosafety in the Context of the Convention on Biodiversity reviewed current global and national actions to address the challenges associated with marine biosafety. Specifically, the workshop highlighted the adverse environmental impacts on marine biodiversity, public health and certain marine economic sectors, among others, as well as the potential transboundary and long-term impacts. International efforts to address the translocation of invasive species as well as to mitigate the environmental impacts through the promulgation of environmental instruments, adoption and application of standards, research, technology and the promotion of public awareness and capacity building were discussed.

Ballast Water Management

The IMO Ballast Water Management Convention (2004) regulates the introduction of invasive species via the ballast water and sediments from ships. The objective is to prevent, minimize, and eventually eliminate the risk to the environment, property, resources and human health. To date, the convention has been ratified by 23 countries representing around 23% of the world tonnage.

Relevant articles of the convention are shown in Box 1.

Box 1. Highlights of the BWM Convention.

- Article 5 – Sediment Reception Facilities where cleaning and repair of BW tanks occurs, provides for the safe disposal of sediments (should not damage the environment)
- Article 6 – Scientific and Technical Research Parties shall promote, facilitate and monitor research on BW Management (BWM)
- Article 7 – Survey and Certification – Each party shall survey and certify its ships
- Article 9 – Inspections of Ships – Includes inspection of BW record book, validity of Certificate and BW sampling; no undue delay; ships without valid certificate; detailed inspection and no BW discharge until proven harmless
- Article 13 – Technical Assistance, Co-operation and Regional Co-operation – Train personnel, availability of technology, equipment and facilities, joint research, implementation of BWMC
- Article 14 – Communication of Information – Each Party shall report to IMO on B to ensure vessels flying their flag are in general compliance with the Convention.

The Convention emphasized obligations of Flag States as follows:

- enact domestic laws including penalties and sanctions;
- ensure that all vessels under their jurisdiction have a Ballast Water Management Plan (BWMP) in place, and that they carry a Ballast Water Management Record BWM requirements and on availability of reception facilities;
- a designated officer on each vessel for ensuring compliance with the BWMP and for reporting to port authorities;
- crew members are adequately trained in implementing the BWMP; and
- establish appropriate procedures for the issuing of the International Ballast Water Management Certificate.

On the other hand, obligations of Port and Coastal State include the following:

- enact domestic laws;
- establish a compliance monitoring and enforcement (CME) system, including procedures for the inspection of vessels; and
- Ports and terminals where ballast tanks are cleaned or repaired must have adequate facilities for sediment reception.

The member countries of IMO have also developed several technical Guidelines to assist with the implementation of the Convention.

The Convention provides the critically needed set of management tools through which the maritime industry can be regulated in a manner that is predictable, transparent and responsive with regard to environmental benefits, technological achievability and international consistency. The Convention includes three sets of management measures and these include: (1) mid-ocean ballast water exchange; (2) ballast water treatment using onboard treatment technologies; and (3) any alternative management options that will provide the same level of protection as given by option 1 and 2.

It is widely recognized that Option 1 – ballast water exchange, is only a temporary management option due to the safety issues involved and the constraints related to biological effectiveness of such a process. The Convention therefore requires that the ships will eventually have to meet the performance standards, which are basically ballast water discharge quality standards. This also means that ships would need to be equipped with ballast water treatment technologies to meet these discharge standards. As per the Convention, all international-going vessels would need to be fitted with a treatment technology by the year 2016, when the ballast water exchange option will be phased out.

The technology developers and shipping industry have been rising to this challenge and some steady progress has been achieved over the last few years. There are currently over 100 R&D projects around the world focusing on development of treatment technologies for shipboard applications. Several of these treatment systems have received IMO approvals and also type approvals by national administrations and are therefore available in the market. Several ship owners are currently fitting these treatment systems on board ships.

The GloBallast Partnerships Programme

The overall goal of the GloBallast Partnerships Programme (GBP) is to assist the developing countries to reduce the risks and impacts of marine bio-invasions caused by international shipping.

GloBallast Partnerships focus on: The Legal, Policy and Institutional Reform Process at National Level.

The implementation strategy for GBP uses a multi-component, multi-tired approach:

- A global component, managed through IMO London, providing international coordination and information dissemination, including the development of toolkits and guidelines, and establishing a strong cooperation with industry and NGOs.

- A regional component, providing regional coordination and harmonization, information sharing, training, and capacity building in the application of ballast water management tools and guidelines. The regional component and activities will be coordinated with the support of Regional Coordinating Organizations (RCOs).

- A significant country component, that establishes a fast track (Lead Partner Country-LPC) and partner track (Partner Country-PC) process for GEF-eligible countries in the priority regions. LPCs are the countries who have committed to

develop and implement a National Ballast Water Management Strategy (NBWMS), and to adopt legal, policy and institutional Reforms (LPIR).

Tools developed under the GloBallast Programme:

1. GloBallast Introductory Training Course on Ballast Water Management which is developed using the Train-X methodology.

2. NIWA – GloBallast Training Course on Port Biological Baseline Survey – developed by the National Institute of Water & Atmospheric Research (NIWA), New Zealand, in cooperation with GloBallast.

3. Risk Assessment Tool for Ports.

   The GloBallast Risk Assessment methodology is supported by a GIS interface. The Database consists of Port environmental data from approximately 400 ports. Figure 1 below shows the ballast water RA methodology.

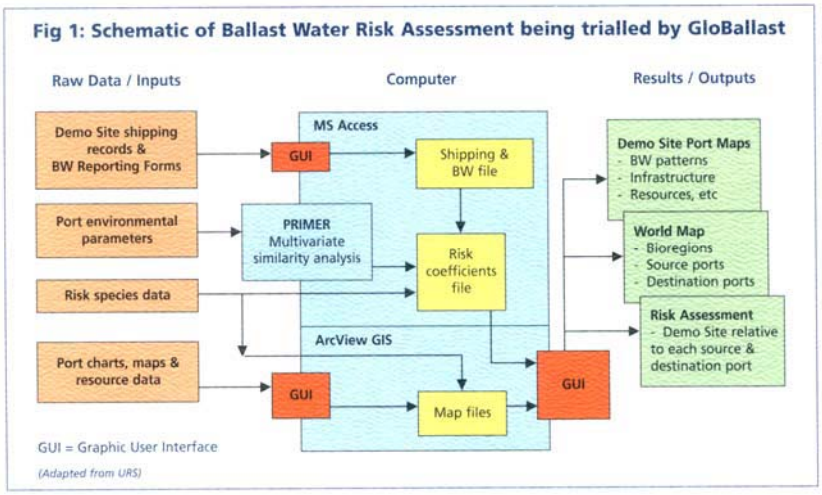

Fig 1: Schematic of Ballast Water Risk Assessment being trialled by GloBallast

4. Communication and Awareness Raising Tools – include posters, technical reports and the GBP website.

A series of tools/guidelines are also being developed in collaboration with partners and these include the GloBallast Guidelines for National Ballast Water Status Assessments (with IOI-SA), Guidelines for Ballast water Economic Assessments (with IUCN), Guidelines for development of a National BWM Strategy (with IUCN) and a GloBallast Toolkit for Legal Reform (Global Task Team).

The National Status Assessments is prepared jointly with the International Ocean Institute (IO) South Africa. It provides a structured approach and templates for rapid status assessments and serves as a tool in the development of a national ballast water management strategy.

The Guidelines for Economic analysis for addressing marine IAS in ballast water is prepared jointly with IUCN (International Union for Conservation of Nature). It illustrates the

economic benefits of implementing the BWM Convention and provides an approach (with templates) to estimate the costs associated with ratifying and implementing the BWM Convention, as well as the potential cost of dealing with a marine invasion. It will also serve as a useful tool in the development of policies, strategies and implementation/ratification of the BWM Convention

The Guidelines for legal reform in the context of the Ballast Water Management Convention is prepared by a Global Legal Task Team with experts from all GBP regions. It consists of: (a) the Guideline document and road map with an expanded legal review as background document; (b) Model Ballast Water Management Act; and (c) A two-day training course for maritime lawyers.

GloBallast Partnerships has established a pioneering public-private sector partnership titled “Global Industry Alliance for Marine Biosecurity (GIA).” The current GIA members include shipping giants such as BP Shipping, Vela Marine International, Daewoo Ship Building and Marine Engineering Services, and APL. A GIA Fund established through annual membership contribution by the GIA industry partners will provide the necessary financial resources for the GIA to implement selected projects. This innovative public-private sector partnership model is expected to assist in creating solutions for addressing the ballast water issues, including new technologies, along-with training and capacity-building activities.

Examples of projects implemented within the GIA framework include:

- Global expert workshop on harmonization of methodologies for Test Facilities of BWM systems;
- Global R&D Forum on Emerging BWM Systems;
- Comparison of existing and emerging alternative BWM systems and establishment of a scientific basis for proving equivalency;
- Outreach and awareness building; and
- Training package for the shipping industry.

Marine Biofouling

Biofouling is the undesirable growth of organisms on man-made structures. Marine biofouling occurs on ships, port infrastructure, navigational instruments, seawater intake pipes (heat exchangers, cooling systems, desalination plants), oil platforms, etc. On vessels, they reside on unprotected surfaces, crevices and low-flow areas such as sea chests.

Anti-fouling paints are used to coat the bottoms of ships to prevent sea life, such as algae and molluscs attaching themselves to the hull – thereby slowing down the ship and increasing fuel consumption.

These compounds slowly "leach" into the sea water, killing barnacles and other marine life that have attached to the ship. But the studies have shown that these compounds persist in the water, killing sea life, harming the environment and possibly entering the food chain. One of the most effective anti-fouling paints, developed in the 1960s, contains the organotin tributylin (TBT), which has been proven to cause deformations in oysters and sex changes in whelks.

In response to this issue, the International Convention on the Control of Harmful Anti-fouling Systems on Ships was adopted in October 2001, to prohibit the use of harmful organotins in anti-fouling paints used on ships and will establish a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.

Under the terms of the new Convention, Parties to the Convention are required to prohibit and/or restrict the use of harmful anti-fouling systems on ships flying their flag, as well as ships not entitled to fly their flag but which operate under their authority and all ships that enter a port, shipyard or offshore terminal of a Party.

In PR China, the AFS issue is addressed through technical, scientific, legal and institutional means. Technical interventions include promotion of alternatives such as the use of copper-based anti-fouling paints, tin-free anti-fouling paints, non-stick coatings, developing national standards and the identification of 30 manufacturers with 100 productions.

A national legislation adopting the AFS Convention is being developed and aimed at:

1. protecting human health from anti-fouling related activities as well as harmful effect of TBT by food chain;
2. protecting the marine environment from harmful effects of AFS on ships; and
3. adopting and uniform application of the AFS Convention to facilitate ships operation and related governing activities.

Other initiatives include the conduct of scientific researches, establishment of national task force and prohibit sale of TBT in the market.

Prospects for Research and Technology Development in Marine Biofouling Prevention

The impacts of marine biofouling have direct economic cost for shipping and biodiversity and ecological impacts. Direct economic costs include cost of AF application (new VLCC, US$ 150,000 – 400,000); cleaning and maintenance costs (Hull cleaning, approximately US$ 35,000) – average about 10% total cost of vessel, and fuel costs which account for 50% of operational cost of a ship, and slime alone will cause a 4% drop in speed1.

In terms of biodiversity and ecological impacts, the real cost is a large annual budget for pest management. For example, cost of eradication of *Mytilopsis sallei* from Darwin Harbor – US$ 1.6 million, excluding manpower costs, and the management of zebra mussels in the Great Lakes – US$100 million/yr.

Therefore, it was recommended that focus of marine biofouling prevention should be focused on: (a) Antifouling Coatings and Treatment Systems; (b) Environmental impacts from the use of toxic antifouling substances; (c) Management Practices to reduce fouling on ships.

Research and development initiatives in the future may focus on a combination of methods with synergistic properties that will deliver good performance at a lower environmental cost.

Existing coatings R&D is conservative as development costs are very high.

Lack of international coating performance standards make it difficult for new technologies to enter a marketplace dominated by a few large players.

New R&D is needed to tackle ship fouling, particularly on:

- Better ship design to reduce fouling in niche areas;
- Better designs to facilitate maintenance activities; and
- Better coatings and tools that allow regular maintenance.

CONCLUSIONS AND RECOMMENDATIONS

The workshop brought forward the following conclusions and recommendations to address marine biosafety issues in the region:

1. There is an urgent need to recognize and address the economic and societal costs of marine bio-invasions in the EAS region, due to the potential impact on biodiversity and the intensity of shipping activities.

2. Countries are encouraged to ratify the International BWM Convention on an urgent basis. Implementation of the Convention should be supported through regional cooperation efforts and regional agreements.

3. To remove barriers for early and effective implementation of existing instruments, capacity building will be of outmost importance. This should also include Compliance Monitoring and Enforcement related capacity-building aspects.

4. Countries and key stakeholders are encouraged to make use of existing tools and guidelines developed by programmes such as GEF-UNDP-IMO GloBallast.

5. Regional financial institutions (e.g., ADB) and NGOs are encouraged to participate in and support capacity-building efforts, to ensure long-term sustainability of the management efforts.

6. Existing regional networks (e.g., PEMSEA, COBSEA, ASEAN) are encouraged to actively address the biosafety issues.

7. There is an urgent need for governments to ratify the AFS Convention, in order to drive technology development to address fouling in non-hull areas of vessels. New R&D is needed to prevent fouling under low flow/static conditions (e.g., when vessels are moored, at berth or at anchor).

8. There is a need for coating standards (e.g., ISO standards), which would be useful to enhance development and business competition on antifouling technology and products, including market entry into an otherwise very conservative market.

9. The regional efforts to address biosafety issues should be assisted by the development of a (regional) database on invasive species, distribution and prior invasion history, environmental and ecological requirements.

10. Regional and port-specific risk assessment (qualitative) should be carried out, using existing information on shipping patterns and port environmental conditions.

11. Biofouling should be addressed from a perspective of biosafety, and countries should be encouraged to contribute to the ongoing discussion on the development of a global framework for biofouling.

12. There is an urgent need to raise the public awareness on the biosafety issues in the region.

13. Regional and national efforts should be supported with the establishment of a regional network (correspondence group) of biosafety experts, from the various organizations active in the biosafety field.

14. It is strongly recommended to re-establish the Regional Task Force which was initiated during the first phase of GloBallast.