

## BALLAST WATER MANAGEMENT IN CROATIA

BELAMARIC, GORAN, GORANA, JELIC-MRCELIC, MERICA, SLISKOVIC and  
RANKA, PETRINOVIC<sup>1</sup>

<sup>1</sup> Faculty of Maritime Studies Split, Zrinskofrankopanska 38, 21000 Split, Croatia,  
gjelic@pfst.hr.

### SUMMARY

The World Health Organization, as well as Port Authorities, have expressed great concern regarding the growing menace of harmful aquatic organisms and pathogens released from the ballast tanks of freighters partaking in international voyages. Management and control measures include (1) minimizing the uptake of organisms during ballasting by avoiding areas where populations of harmful organisms are known to occur; (2) cleaning ballast tanks, such as removing mud and sediments that accumulate in tanks, which may harbour harmful organisms; and (3) avoiding unnecessary discharge of ballast. Ballast Water Exchange is the operational method currently used by all ships that are subjected to existing regulations, this exchange strives to remove exotic species from ballast tanks by replacing seawater taken on in port and near shore areas with seawater from the deep, open ocean. International regulations concerning the problem of ballast water were first introduced in the late 1980s. In 2004, The Ballast Water Convention was adopted, consisting of Articles and an Annex which includes technical standards and requirements for the control and management of ships' ballast water and sediments. By adoption of the Maritime Code in 2004, which is based about 80 percent on Maritime Code of the Republic of Croatia enacted in 1994, Croatia was obliged to create legislation on ballast waters control and management within the period of two years from the enforcement of the Code.

### 1 INTRODUCTION

International Maritime Organization estimates that ten billion tons of ballast water with 10,000 species of marine organisms is transferred each year worldwide. The introduction of invasive marine species into new environments has been identified as one of the four greatest threats to the world's oceans. The vast majority of marine species carried in ballast water do not survive the journey. Even those that do survive a voyage and discharging, the chances of surviving in the new environmental conditions, including predation by and/or competition from native species, are low. However, when all factors are favourable, an introduced species may become invasive, out-competing native species, and multiplying into pest proportions. There are hundreds of examples of catastrophic introductions around the world resulting in economic and/or ecological impacts in the native environment, and causing severe consequences to human health. Unlike other forms of marine pollution, such as oil spills, where ameliorative action can be

taken and from which the environment will eventually recover, the impacts of invasive marine species are most often irreversible. Further, municipal and industrial water users have spent large sums of money in recent decades cleaning infested waters. Also, commercial and recreational fisheries throughout the world have sustained economic losses due to the depletion of native species. Action to prevent and control future invasions is essential.

## **2 BALLAST WATER MANAGEMENT**

Ballast Water Exchange is the method currently used by all ships that are subject to existing regulations, which requires seawater taken on in port and near shore areas to be exchanged with seawater from the deep, open ocean. This exchange can be accomplished by the sequential (empty and refill) method or by the overflow/flow-through method. The sequential method requires completely emptying segregated ballast tanks and refilling them with open ocean water. The overflow method entails pumping open ocean water into a full, ballast tank for a length of time that will exchange the ballast water tank volume at least three times. The biological effectiveness of ballast water exchange has not yet been confirmed and exchange occasionally cannot be performed due to safety concerns. Ballast water exchange is not completely effective and may have safety and cost implications for the operation of the ship. Other options include (1) mechanical treatment methods such as filtration and separation; (2) physical treatment methods such as sterilisation by ozone, ultra-violet light, electric currents and heat treatment; and (3) chemical treatment methods such adding biocides to ballast water to kill organisms and various combinations of the above. Due to the limitations of Ballast Water Exchange, it is clear that practical and economical onboard treatment methods must be developed and their efficacy confirmed.

## **3 BALLAST MANAGEMENT TIPS**

The following measures are recommended to minimize the uptake and release of harmful aquatic organisms. These measures are of the utmost importance to improve environmental compliance and enforcement within ballast water management.

### **3.1 Minimize Ballasting in Ports and Coast Areas**

Although most merchant ships require ballast water for stability, minimizing the amount of ballast water taken in from ports and coastal areas will reduce the number of potential invaders transported to the next port.

### **3.2 Perform Open Ocean Ballast Exchange Within Safety Permits**

Most open ocean species cannot survive in the near shore environment. With open ocean exchange, ballast water containing organisms from near shore sites is replaced within open ocean water containing species not well adapted to the near

shore environment. Croatia must adopt a law requiring exchange of ballast water at open sea or following other specified management requirements.

### **3.3 Avoid Ballast Uptake Over Night**

Some organisms rise in the water column to feed or reproduce during the day, making them more available for uptake. The chance for bottom dwelling organisms and sediments being entrained with ballast water increases when ballasting in shallow ports where sediments are disturbed by propeller wash.

### **3.4 Avoid Ballast Uptake in “Hot Spots”**

“Hot spots” are water bodies that are particularly infested with non-native species, have toxic algal blooms or are contaminated by sewage outfalls. Scientists are trying to identify global hot spots.

### **3.5 Reduce Invasions Via Hull and Anchor Fouling**

Non-native species can attach to hull, pipes and tanks. They should be removed and disposed off on a regular basis. Anchors and anchor chains should be rinsed during all retrievals to prevent transport of nuisance species from their point of origin.

### **3.6 Keep Records of Ballasting Operations**

Masters of all vessels carrying ballast water into Croatian waters after operating beyond the Exclusive Economic Zone, unless specifically exempted, are required to keep records and provide written information to the Authorities (Harbour Master).

## **4 CROATIAN MARINE AND COASTAL AREAS**

The exceptional natural beauty of Croatia’s coastal and marine areas and the irrational use of natural resources gives rise to the fear that these areas will be contaminated by invasive species due to ballast water exchange. Consequently, the imposition of an efficient marine and coastal management system appears to be an extremely important objective. A comprehensive assessment on the country’s marine and coastal areas would go beyond the scope of this paper but some of the most significant problems should be mentioned:

- Seriously insufficient level of scientific knowledge about marine ecosystems and species;
- The lack of coastal management plans;
- The absence of specially designated and managed marine areas;

- Inefficient control due to physical features of marine areas (well-indented coast and numerous islands makes control both difficult and expensive);
- Intensive and often illegal building activities along the coastline and related problems;
- The development of nautical tourism, which results in rapidly increasing number of recreational crafts and related problems; and
- The disrespect of sustainable capacity of marine environment in general.

## 5 ENVIRONMENTAL LEGISLATION ENFORCEMENT

At the national level, responsibility for the environment belongs to the recently established Ministry of Environmental Protection and Physical Planning, which has significantly strengthened the competence and capacity of environmental protection in Croatia. Inadequate working conditions (the lack of human resources, financial sources, equipment, on-the-job training opportunities, etc) and enforcement agencies (inspection, administrative offices), particularly their local branches, are the major institutional problems. The Ministry of Environmental Protection and Physical Planning has authorized environmental inspectors, but their number is far from sufficient. Such understaffing is mostly apparent in major towns such as Zagreb, Rijeka, Split, and Osijek. In addition, insufficient coordination with other governmental bodies (such as the Navy, Maritime Police, Ministry of Maritime Affairs, Business and Commerce) results in a lack of awareness of their responsibilities. Further, at the local level, the uneven and often scarce capabilities of local administration are responsible for failures in enforcements of environmental laws and regulations.

Regarding Croatia's environmental legislation practice, the following facts should be emphasized:

- Environmental legislation still needs to be harmonized with ratified international treaties and EU legislation;
- The lack of utilization of the Croatian judiciary system in environmental matters makes both courts and attorneys inexperienced in regard to relevant cases;
- The inefficiency of the judiciary system in general; and
- The insufficient rate of public participation in environmental decision-making procedures due to the lack of proper information and awareness.

The lack of environmental protection programs adopted at the regional level illustrates inefficient law enforcement in Croatia. The failure to implement local

environmental programs results from the incompetence of regional environmental authorities and the lack of experts to carry out these tasks. However, the Croatian government is motivated to impede environmental degradation in their country. For example, in 1997, Croatia invested about 0.2-0.3 percent of their GDP directly to environmental protection (the equivalent of \$30-35 million U.S. dollars). Regardless, it is the opinion of the authors that corruption significantly contributes to environmental problems, particularly in certain regions and fields of interests. Such cases include the issuance of building permits for the coastal zone without respecting physical planning documents, or allowing the exploitation of certain natural resources, such as gravel and rocks.

## 6 BALLAST WATER REGULATIONS

International regulations concerning the problem of ballast water were first introduced in the late 1980s. Canada and Australia brought their concerns to the attention of the International Maritime Organization's Marine Environment Protection Committee after experiencing particular problems with marine flora and fauna devastations caused by unwanted species. In 1991, Marine Environment Protection Committee Resolution 50 (31) - Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ships' Ballast Water and Sediment - was adopted by Marine Environment Protection Committee. Two years later, International Maritime Organization Assembly adopted resolution A774 (18) with same title. The resolution required updating of the original guidelines according to development of international applicable legally-binding provisions by Marine Environment Protection Committee and MSC.

On February 13, 2004 the International Convention for the Control and Management of Ships Ballast Water and Sediments (Ballast Water Convention) was adopted at International Maritime Organization Diplomatic Conference in London. The Ballast Water Convention consists of Articles and an Annex which includes technical standards and requirements for the control and management of ships' ballast water and sediments. In accordance with the Ballast Water Convention, coastal countries have a right to take, individually or jointly with other Parties, more stringent measures with respect to the prevention, reduction, or elimination of harmful aquatic organisms transfer in consistency with international law. Ships have to be surveyed, certified, and remain open to inspection by Port State control. The Ballast Water Convention will come into force twelve months after the Convention is ratified by 30 States representing 35 percent of world ships tonnage. Between 2009 and 2016, the introduction of mandatory ballast water management is necessary in order to eliminate the common practice of vessels discharging untreated ballast water. During the transition period, ships are allowed to exchange ballast water, but it must be at least 200 nautical miles from nearest land and at least of 200 meters depth. If it is not possible, the ship should stay at least 50 nautical miles from the nearest land and at 200 meters depth. When these requirements cannot be met, special areas may be designated jointly by neighboring states where ships can exchange ballast water. For example, the North

Adriatic Sea is less than 100 meters deep sea and the ballast waters should be exchanged only at the Strait of Ontranto.

In recent years, the public in Croatia has gained awareness of the need to manage ballast water. The problem of ballast water in the Adriatic Sea is extremely serious because eight million tons of ballast water is discharged every year. The Adriatic Sea is a shallow, semi-closed sea with a slow shift of currents. Although the maximum depth is 1300 meters, it does not exceed 100 meters in the North and 20 meters in the Trieste gulf. The Adriatic Sea's ecosystem is highly sensitive and the preservation of balance is of vital importance. By adoption of the Maritime Code in 2004, which is based about 80 percent on Maritime Code of the Republic of Croatia enacted in 1994, the Minister in charge of maritime affairs, with consent of Minister of Environment, was obliged to bring legislation on ballast waters control and management within the period of two years from the enforcement of the Code. In 2007, Croatian Code for the management and control of Ship Ballast Water was set out. The recent Croatian initiative is to identify the Adriatic Sea as Particularly Sensitive Sea Area.

## 7 CONCLUSION

In summarizing the issues covered by this ballast water management analysis, it is apparent that many problems are connected to *improper pollution control by ships, industries and waste management* in general. Ballast water, pollution, and waste are in various ways the principal contributors to the degradation of Croatia's marine and coastal areas. The existing ballast water management system, characterized by numerous vessels operating without proper preventive measures fails in both technical and educational aspects. Croatia has created a comprehensive legal framework for sound environmental management, mostly based on the "command and control" principle, but it has not been fully adopted yet. However, there is still a need for further adjustment of *legislation* by following contemporary environmental legal standards, especially those of the EU. These adjustments have to be done with respect to Croatian conditions and circumstances. Furthermore, a balancing of domestic environmental laws and regulations with some traditional laws covering related issues (coastal/marine management, water management) is necessary to make their application more efficient.

## 8 REFERENCES

- <sup>1</sup> Economic Commission for Europe, United Nations. 1999. Report on providing environmental protection in the Republic of Croatia.
- <sup>2</sup> Kandzija, V., Kumar, A., Palankai, T., Karaman, A. N., Grabovec, M. O. 1997. Economic system of European Union and adjustment of the Republic of Croatia. Faculty of Economics University of Rijeka. Università degli studi di Trieste.
- <sup>3</sup> Kerovec, N. 1995. Stimulative employment measures in the Republic of Croatia. *Journal of Social Policy*, 1, 27-36.
- <sup>4</sup> Ministry for building, housing, communal affairs and environmental protection Republic of Croatia. 1987. Report of quality of environment in Croatia.

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- <sup>5</sup> REC Country Office Croatia. 2001. Strategic Environmental Analysis of Croatia.
- <sup>6</sup> State Directorate for the Protection of Nature and Environment of the Republic of Croatia. 1998 Coastal Area Management in Croatia.
- <sup>7</sup> The GEF/UNDP/IMO Global Ballast Water Management Programme (GloBallast): <http://globallast.imo.org> (25/04/2007).
- <sup>8</sup> The International Maritime Organization. 2001. Workshop Report of the 1st International Ballast Water Treatment Standards Workshop, 28-30 March, Raaymakers, London, UK.
- <sup>9</sup> The International Maritime Organization. 2003. Workshop Report of 1st International Workshop on Guidelines and Standards for Ballast Water Sampling, 7-11 April, Raaymakers, Rio de Janeiro, Brazil.
- <sup>10</sup> Fairmont Shipping Limited (Canada). 2005. Ballast Water Management Manual.

*Excerpt from the Proceedings of the International Network for Environmental Compliance and Enforcement's (INECE) Eighth International Conference, Linking Concepts to Actions: Successful Strategies for Environmental Compliance and Enforcement, held 5-11 April 2008, in Cape Town, South Africa.*

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INECE Secretariat  
2300 Wisconsin Ave, NW Suite 300B  
Washington, DC 20007  
[inece@inece.org](mailto:inece@inece.org)  
<http://www.inece.org>