

*Review Paper (SS-3)***BALLAST WATER MANAGEMENT PROGRAMME :  
SIGNIFICANCE OF SUSTAINABLE DEVELOPMENT AND  
ENVIRONMENTAL EDUCATION****K. M. Sanal and Rakesh Warriar\***

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*Received September 7, 2007      Accepted March 20, 2008***ABSTRACT**

Shipping industry, an economically flourishing industry in world scenario, is becoming a primary threat to biological existence of marine habitat and natural resources. Marine pollution, in particular, pollution caused by shipping, disturbs the various forms of marine life and upset marine ecology. The introduction of invasive marine species into new environments by ships' ballast water has been identified as one of the greatest threats to oceans in the world. Such introduction of non-native species via the discharge of ballast water can prove detrimental to the ecosystems in innumerable ways. Unlike other forms of marine pollution, the impacts of these are most often irreversible.

In response to the threats posed by discharge of ballast water, the IMO has come up with guidelines for the control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and bacteria. Efforts are underway to frame effective ballast water management programmes and treatment methods. Scientific techniques such as onboard treatment of ballast water, open ocean exchange of the ballast water etc, have been employed in the mitigation processes.

The measures adopted so far have failed to show 100% positive results. Technical solutions stressing more on the concepts of Ecologically Sustainable Development (ESD) and Environmental Education may prove much more effective. Ecological integrity should be a fundamental consideration in ballast water management programmes.

**Key Words :** Marine pollution, Marine ecology, Ballast water management programmes, Ecologically sustainable development (ESD), Environmental education.

**INTRODUCTION**

Pollution is one of the hurricane problems causing environmental degradation. The degradation in marine world is a great concern for the present and future as it covers the three fourth of the globe.<sup>1</sup> Shipping industry has turn out to be a primary threat to biological existence of marine habitat and natural

resources. Marine pollution, in particular, pollution caused by shipping, disrupts marine life and upsets marine ecology. The introduction of invasive marine species into new environments by ships' ballast water has been identified as one of the greatest threats to oceans in the world. The detriment that is brought about can be of huge proportions. Unlike other forms of marine pollution, the impacts of this are most often irreversible.

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Natural barriers to dispersal of species such as temperatures and land masses are being reduced rapidly and tropical zones are being pierced, due to deliberate actions of mankind. Solid ballasts like rock, sand and metals have given way to water for reasons like economic viability, efficiency, easiness etc. However, the cost paid for such a transition is alarmingly high.

### OBJECTIVES

The objective of this paper is to analyse the gravity of the issue of pollution caused due to discharge of ballast water as well as the various ballast water management programme implemented in the international scenario. Few suggestions that considerably address this concern are put forward as well.

### MATERIAL AND METHODS

#### **Ballast water: A cause for marine pollution**

The term 'Ballast' indicates any material used to maintain the balance and stability of the vessel. The process of using ballast is quite simple. When a ship is empty of cargo, water is filled in as ballast. When cargo is loaded, the ballast water is discharged. The problem arises when water collected as ballast from one region is discharged in a totally different environmental and ecological region. Introduction of foreign species through discharge of ballast water sets off competition between native and non-native species for space or nutrients. They have an adverse impact on the commercial shellfish beds as well. Some toxic chemicals are also known to be transported in ballast water. Toxins accumulated by shellfish can be harmful to the health of human and marine mammals.

Studies have shown that about three to ten million tones of ballast water are transferred every year, taking along with it, almost seven thousand different species of marine life. The survival and growth of the introduced species in the new atmosphere would gradually wipe out the native species. The natural patterns of biogeography are thus altered, causing ecological imbalance.

### International Conventions

The effects of discharge of ballast water in many areas have been devastating and studies show that the rate of bio-invasions will mount at an alarming rate. The adverse impacts not only fall upon the trading countries, but also on the neighbouring and transit countries. It has always been recognized that the best way of improving safety at sea is by developing international regulations that are followed by all shipping nations. The international community has been very responsive to this grave issue.

As early as in 1973, an important convention regulating and preventing marine<sup>2</sup> pollution by ships is the IMO International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78) was introduced. However, the convention considered other forms of marine pollution rather than ballast water. In 1991 the marine Environment Protection Committee (MEPC) adopted MEPC resolution 50(31), which brought forth the Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ships Ballast Water and Sediment Discharges. This was the primary initiative in this direction. It was in the Rio conference,<sup>3</sup> that the issue of ballast water was raised as a matter of global concern. The conference called for international bodies such as the IMO to address this issue.

The World Summit on Sustainable Development (WSSD) re-affirmed its commitment to Agenda 21 and in its Plan of Implementation the WSSD called for acceleration of the development of measures to address invasive species in ballast water. The Summit also urged the IMO to finalize the IMO Ballast Water Convention. In November 1993, the IMO Assembly adopted resolution A.774 (18), which brought forth the Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ships' Ballast

Water and Sediment Discharges, based on the Guidelines adopted in 1991. In 1997, the member countries of IMO have developed "Guidelines for the control and management of ships' ballast water, to minimise the transfer of harmful aquatic organisms and pathogens". These guidelines put forth various recommendations that aimed at mitigating pollution and damage caused through ballast water.

The International Convention for the Control and Management of Ships' Ballast Water and Sediments adopted in 2004 was a seminal change in the legal scenario. Moreover, the IMO is currently in the phase of implementing the GEF/UNDP/IMO Global Ballast Water Management Programme (GloBallast Programme).

The shipping industry has also been very active in helping to address this concern. The International Chamber of Shipping (ICS) and the International Association of Independent Tanker Owners (INTERTANKO) and Classification Societies have published Model Ballast Water Management Plans. They give practical guidance for the implementation of the IMO Guidelines on-board ships.

## RESULTS AND DISCUSSION

The present law speaks of implementation of ballast water management programmes at various levels to ensure mitigation of marine pollution. Ships are required to have on board and implement a Ballast Water Management Plan approved by the administration as well as mandated to undergo surveys, inspections, certification assessments etc. Additional measures may also be imposed to prevent, reduce, or eliminate the transfer of harmful aquatic organisms and pathogens through ballast water and sediments. There is a ballast water exchange standard and a ballast water performance standard as well. The other specific requirements are provided in the guidelines.

The most recommended and currently implemented treatment technology at present is reballasting at sea, a method by which ballast water is exchanged out at sea, though it is highly subject to serious ship- safety limits. Newer methods have been adopted in the recent past, such as on- board treatment of ballast water. However, they all have failed to give 100% positive results. Therefore, the need for formulating alternative and effective ballast water management plans have arisen drastically. Significant research and development efforts are being undertaken by different bodies to come up with better solutions to this form of pollution.

Research efforts regarding Ballast water management end up in many solutions. These solutions are tested with some conditions like safety, environmental acceptance, cost effectiveness, working feasibility. Besides and in addition to these technical solutions there are some basic concepts that can help in the development of new solutions for ballast water management.

### Environment and Sustainable Development (ESD)

The term sustainable development refers to achieving economic and social development in ways that do not exhaust or adversely affect a country's natural resources. In the modern era, society aims at a high rate of social and economical development. The priority is gradually shifting from conservation of natural habitat to societal progress and economical advancement. A balance between the two is the only sensible solution in the present scenario. Growth of shipping industry is an unavoidable aspect of social progress. Pollution due to ballast water is a direct hazardous consequence of this. To establish a balance between the two is the challenge of the day. Sustainable development, in this context, would mean maintaining a delicate balance between the human need to improve lifestyles on one hand, and preserving natural resources and

ecosystems, on which we and future generations depend.

#### **Environmental information and Environmental education (EE)**

Information is recognized as a prerequisite to effective national and international environmental management, protection, and cooperation. The availability, and access to, information allows preventive and mitigation measures to be taken, ensures the participation of citizens in national decision-making processes, and can influence consumer behavior. The world population needs to be informed and educated about the intensity of the issue. Educational policies in nations should be framed in such a manner so as to infuse awareness about environmental protection and prevention of environmental pollution. Public participation has great significance in protection of natural ecosystem and framing of environmental policies. Public participation in environmental decision making process can bring in enhanced and efficient alternative solutions into the picture.

#### **Environment Impact Assessment (EIA)**

Decision making in Environmental issues needs persistent scrutinizes in the light of Environment impact assessment. When, a new technical solution for minimizing the effect of ballast water comes forth, it should be proved that there is no adverse impact on the environment caused by solution.

#### **Co-operation between countries**

As marine pollution caused by ballast water is a global environmental issue, every country is a victim and a crime doer. The responsibility lies on the world community in totality. Though conventions specify certain guidelines for the implementation of management of ballast water, state governments are the immediate bodies to look after its effectiveness. The co-operation of countries for solving environmental issues and avoidance of danger in emergency situation thus is necessity of time.

#### **Improving compliance with international environmental law**

Compliance is an actor's behavior that conforms to a treaty's explicit rules<sup>4</sup>. Compliance of existing treaties and conventions regarding environmental law seems to be very weak. Non-compliance may be due to as preference, incapacity, and inadvertence of parties. As environment is the victim, compliance should be strict. compliances of the existing rules may be done by positive inducements and Negative sanctions. Positive Inducement includes financial incentives, policy advising and educational efforts to study the implementation whereas negative sanction means the traditional method of penal sanction. The compliance system<sup>5</sup> designed by studying the necessity of treaties and convention can be an appropriate solution for this.

#### **Polluter pays principle**

To address the biological pollution caused by the ballast invaders, polluter pays policy is a good way out. For example, the U.S. government imposes a levy on all oil shipments. This money pays to clean-up after oil spills. The levy is a fair tax because it pays for problems created by those who are taxed. The same kind of levy should be imposed on cargo ships to pay for the costs of ballast invaders<sup>6,7</sup>.

As described by lawyer Peter Jenkins, one who advocates taxes to recover the costs of biological invasions:

In essence, taxpayers are subsidizing economic globalization by paying to clean up the biological messes it leaves behind. And when government agencies cannot afford to clean them up, our forests, waters, and other resources suffer long-term damage. Thus it is recommendable that levy could be incorporated into the "Draft International Convention for the Control and Management of Ships' Ballast Water and Sediments" before it is ratified in February next year<sup>8,9</sup>.

### CONCLUSION

Modern technology owes ecology an apology." Shipping is seemingly the main contributor to marine pollution. Nevertheless, this industry has flourished to such great heights that it is considered to be an environmentally acceptable mode of transport and development. International conventions and national legislations help to control and regulate the impact of shipping on the marine environment. It is apparent that operational as well as technical mitigation measures are important. Also a flexible approach is required allowing the use of different measures in different circumstances. Education and training in environmental issues will lead to a better-educated workforce with a deeper understanding of the environmental and socio-economic impacts of shipping. This better awareness should help in the further development of legally compliant and ultimately a sustainable industry. The challenge remains to reduce environmental damage by maritime operations to a level that is acceptable and sustainable.

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