

Ballast Water

The problem

- The introduction of exotic species into new environments can pose a major threat to the integrity of natural communities, the existence of rare and endangered species, the viability of living resource-based industries and pose risks to human health. Marine pests can be as damaging as oil spills but their effects are much more persistent.
- In the marine environment, any mechanism that can rapidly transport organisms from shallow coastal waters across natural oceanic barriers has the potential to help exotic marine organisms invade new environments. International shipping, by transporting marine organisms in ballast water, provides such a mechanism.

The context

- Ballast water is used by shipping world-wide to enhance the safety and operational efficiency of modern vessels. When cargo is unloaded from a vessel, ballast is taken up to maintain the trim and draft of the vessel.
- When a vessel loads ballast water, it also takes up all minute the organisms contained in that water which may include planktonic species, the larvae of bottom dwelling invertebrates and fish, and pathogens. These organisms are released with the ballast water at another port when the vessel loads more cargo. It has been estimated that world-wide, over 3,000 species are transported in ballast water every day.
- Australia is particularly vulnerable to exotic introductions by ballast water as a result of its reliance on international shipping for trade, the high volume of dry bulk exports and the wide geographic spread of its receiving ports. Collectively, Australian ports receive around 150 million tonnes of ballast water each year; most of this comes from Southeast Asia. Transit time for vessels between Australian and Japanese ports, for example, is usually less than 20 days which is shorter than the larval life for a wide range of fish and invertebrate species.
- A key factor in the successful establishment of exotic species is likely to be the number of import opportunities (i.e. port visits by international ships) rather than the volume of ballast water discharged. More frequent port visits increases the chances that the conditions in the receiving port will be suitable for the introduced species to survive and become establish. Australian ports receive over 6000 ship visits per year where ballast water is discharged.
- One study in Australian ports found 67 different species in the ballast tanks of 23 bulk carriers. A similar study in the US reported 367 different species from 159 vessels. Overseas experience suggests that most introduced species do not survive or have very little impact once established in their host environment. Only a small number of species cause widespread environmental and economic damage and become pests in their new environment.
- Examples of ballast water introductions of particularly damaging marine pests world-wide include the zebra mussel (*Dreissena polymorpha*) and the Asian clam (*Potamocorbula amurensis*) in the US; the comb jelly (*Mnemiopsis leidyi*) in the Black and Asov Seas; the toxic dinoflagellate (*Gymnodinium catenatum*) and the northern Pacific seastar (*Asterias amurensis*) in Australia.

Managing the problem

- The development of methods designed to control the unintentional introduction of exotic species in ballast water are limited by requirements of vessel safety, environmental acceptability, technical feasibility, practicality and cost effectiveness. A number of techniques have been developed and are used to varying degrees.
- Reballasting at sea is required by a number of Governments including Australia. This involves the flushing of ballast tanks with clean oceanic water during transit between ports. However, exchange at sea may not always be possible because of weather conditions and vessel safety considerations.
- Other methods currently being developed and tested include filtration of ballast water (either during uptake or discharge), chemical, heat, UV and ozone treatment. Ultimately it is likely that a number of ballast water treatment options will be available with no single method being suitable for all situations.
- In July 2001, Australia will initiate new ballast water arrangements that will screen incoming vessels and identify those that are carrying ballast that is likely to contain one or more of a group of target pest species. Vessels identified as carrying high risk ballast will be required to undertake some level of ballast water management if they are intending to discharge this ballast in Australian ports. This ballast management could include approved onboard treatment, ballast exchange at sea, or tank to tank transfer to contain high risk ballast water on the vessel. Vessels that have not or cannot implement any of these management options may be denied permission to discharge ballast in Australian waters.

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