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# Ballast water



IMARES  
WAGENINGEN UR

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## Winning the war against undesirable organisms

Cargo vessels move billions of tons of ballast water around the world every year, allowing organisms such as plankton, mussels, crabs and jellyfish to travel as stowaways. When released at the port of arrival, exotic plants and animals can cause severe damage to both the local ecosystem and the economy, with coastal areas being especially vulnerable. Applied research by IMARES, part of Wageningen UR (University & Research centre) provides a major contribution to tackling this problem.

The problem of invasive species travelling on ships has been with us for centuries. While originally related primarily to organisms attached to the hulls of vessels, ballast water later created a new vector for their dissemination. The intensification of shipping means that this issue is becoming ever-more problematic. There are numerous examples of non-native species causing enormous damage to coastal areas. Since 1991, for instance, South America has been struggling with the Asian golden mussel, which has changed the biodiversity and crippled fishing in parts of the continent. In the Caspian Sea, fishermen contend with similar problems due to an invasion by an Asian jellyfish species that eats both the food of fish and their spawn. This jellyfish has recently also been spotted in Dutch waters.

## Ballast Water Management Convention

To prevent unwelcome visitors, the International Maritime Organisation (IMO) set up the Ballast Water Management Convention in 2004. Already been signed by many countries, the core of the convention is that all ships must eventually install a treatment system that would prevent various organisms from being transported in ballast water. These are mostly so-called two-stage methods, such as systems that first filter out most of the organisms in ballast water mechanically, then kill the remainder with UV light or chemicals. In the latter case, there must be guarantees that the ballast water will be safe for the ecosystem after discharge. Unstable chemicals must therefore be used, or the active ingredients neutralised before discharge.

## Projects

IMARES is studying the effectiveness of ballast water treatment plants. Comprehensive ecotoxicological knowledge is deployed to map the potential negative effects of the treatment system on the environment. This involves the use of various *toxicity tests*, the so-called *WET tests*, on algae, crustaceans and fish.

Research can also be conducted in more natural conditions at IMARES. This takes place in '*mesocosms*' – experimental ecosystems in ponds with a capacity of 4-5 m<sup>3</sup>. These ponds can also be used at an early stage of the

development of a treatment system, for instance by serving as a pilot-scale ballast water tank and thereby allowing multiple treatment processes to be quickly and easily carried out in parallel.

The worldwide research into the effectiveness of treatment systems focuses on their effects in saltwater. Many major ports, however, are partially or completely freshwater, including Rotterdam, Hamburg, Antwerp and the cities in the Great Lakes region of the US. To test the effects of ballast water in such areas, IMARES will open a *freshwater test facility* in Den Helder next year. The unique location of this facility on the grounds of the De Helsdeur pumping station (owned by the District Water Control Board) means that testing will also be possible in brackish water.

## Major economic and ecological importance

Partly thanks to our research, many ships will be fitted with highly sophisticated and secure systems for ballast water treatment in the coming years. We are thereby making an important contribution to the reduction of unwanted organisms in vulnerable coastal areas. Moreover, IMARES is involved in the development of rapid screening methods for determining the ecological risk of individual batches of ballast water, in a way that creates no additional downtime for shipowners. This means that the research has high ecological as well as economic value.

## Partners

In combating the ballast water problem, IMARES works with various governments and companies worldwide, as well as with fellow research institutes and universities.

*'IMARES makes a major contribution to the reduction of unwanted organisms in coastal areas.'*

## Contact

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