PIANC
The World Association for Waterborne Transport Infrastructure

PIANC EnviCom WG 218

Terms of Reference

The implications of invasive alien species for waterborne transport infrastructure

Background and need

This technical Working Group report is intended to provide port managers, harbour masters, engineers and environmental scientists with a practical guide on managing the business, liability, health and safety and other risks associated with invasive alien species.

According to IUCN[1] an alien species is a species introduced by humans – either intentionally or accidentally – into an area outside its natural past or present distribution. Whilst such introductions are mostly undesirable in biodiversity terms, not all alien species have negative impacts. Between 5% and 20% of alien species become problematic in their new environment. It is these species that are termed invasive alien species (IAS).

IAS, also referred to as invasive non-native species (INNS), can include animals, plants, fish, invertebrates or any other type of living organism. IAS can devastate natural ecosystems, outcompeting native species, destroying habitats, and in some cases causing extinctions. As such, IAS represent the second most important cause of biodiversity loss across the globe (https://www.iucn.org/theme/species/our-work/invasive-species).

However, the issues are not limited to biodiversity. Invasive alien species can also have very significant economic, operational, liability, social, and health and safety implications. There are many publications describing the problems and associated costs of IAS. To provide some examples at a global level:

- IAS are estimated to cost the European Union countries at least 12 billion and probably over 20 billion euros per year[2]
- economic damages associated with non-indigenous species invasions in the United States, the United Kingdom, Australia, India, Brazil and South Africa total more than $336 billion annually, of which control costs account for more than $30 billion[3]

At a national level, the costs are maybe clearer, viz:

- the New Zealand economy loses about 400 million NZD a year due to exotic (alien) species and spends a further 440 million NZD preventing an increase of these losses, in combination equating to 1% of New Zealand's GDP[3]
- the total cost to the British economy of invasive non-native species is estimated at approximately £1.7 billion annually[4]

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[1] International Union for Conservation of Nature. See https://www.iucn.org/theme/species/our-work/invasive-species

[2] https://ieep.eu/work-areas/biodiversity/invasive-alien-species

[3] http://www.helsinki.fi/metsatieteet/tiedotteet/pdf/ME408_Group5_report.pdf

[4] http://www.nonnativespecies.org/index.cfm?sectionid=59

- invasive species cost the United States more than $120 billion in damages every year[5].
- In the aquatic environment, common pathways for the introduction of alien species include the release of fish from aquaculture or other fisheries into the wild; transport and release via ships' ballast water or other discharges; and spread through man-made corridors such as canals[1]. Fouling of hulls, anchors and other hard surfaces or transfer via recreational boating activities provide additional pathways, as do introductions from ornamental ponds and gardens, escapes from farms and horticulture, discards from commercially imported live foodstuffs or fishing bait, and the distribution of tsunami or storm-related marine debris.

Whilst it is acknowledged that careful management of shipping is needed at an international as well as local level to prevent new releases or the spread of IAS[6], shipping is not the subject of this report. Rather **the proposed guidance will focus on addressing the potentially significant economic, liability, engineering, operational and health and safety implications of IAS for waterborne transport infrastructure**. Health and safety in this case refers both to potential consequences of invasions of burrowing or fouling species (e.g. Chinese mitten crab burrows can contribute to the failure of earth embankments with implications for flood risk; zebra mussels block intakes or outfalls with consequences for dependent infrastructure and operations); and to the difficulties inherent in operations to remove or manage these species.

Globalisation with its increasing movement of goods and people between countries, and climate change are two of the main factors that are expected to exacerbate the problems with IAS.

Objectives of the Working Group

The Working Group will review existing good practice, referring to both published and grey literature as well as to case studies that will be collected as part of the process.

This information will be used:

- To prepare an overview of the issues associated with invasive alien species and to highlight some of the species concerned
- To explain the relevance of these issues to waterborne transport infrastructure, including species-specific or generic risks
- To provide examples of the economic (cost) implications in cases where invasive alien species become established, detrimentally affecting infrastructure either directly or indirectly
- To introduce the type of measures that ports and/or waterway operators can take to reduce the risks, including both preventative measures and measures to deal with new invasions or established species
- To explain the principles of biosecurity planning insofar as these are relevant to risk reduction in ports, inland waterways and marinas.

The following are amongst the measures that can be taken to reduce both business and liability risks, and that should therefore be reviewed by the WG:

- the role of inspection and maintenance in identifying and removing unwanted species, for example covering intakes and outfalls and similar, dry docks, dredging equipment, quay or dock walls and other hard surfaces, earth embankments or dams etc.

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[5] https://www.fws.gov/verobeach/PythonPDF/CostofInvasivesFactSheet.pdf

[6] For example through Convention on the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) and the IMO's Global Ballast Water Management Programme; or the recreational boating industry's 'check-clean-dry' campaigns

- the application of special materials such as a coatings, paint, surface treatments or other devices to control or prevent the attachment of unwanted organisms (biofouling)
- operational restrictions, for example lock closures
- measures that ports or others might take (or at least need to be aware of) so as to reduce the risk to navigation infrastructure, for example monitoring of vessels' implementation of the BWM Convention; provision of ballast water reception facilities
- technical and engineering solutions e.g. reducing salt water intrusion through locks
- the role of communication and training to raise awareness of port and waterway operators regarding IAS management.

Earlier PIANC and other reports to be reviewed

It is not immediately obvious that any existing PIANC reports deal directly with IAS, but reports on climate change (TG 3; WG 178) and those dealing with trends and globalisation (TG 181) may provide useful background information.

In addition to the references in the above footnotes, it is anticipated that the Working Group will make reference to a wide range of technical and scientific third-party publications.

Scope

This technical Working Group report will focus on the potential economic, operational, liability, engineering and health and safety implications of IAS for ports, marinas, and inland waterway infrastructure and operations. It will highlight some of the steps that can be taken to reduce these risks, and will introduce the principles of (marine) biosecurity plans insofar as these can be prepared to reduce the risks to ports and inland waterways.

Whilst the guidance will provide an overview of good practice for vessels in terms of managing the pathways by which IAS can be introduced, the emphasis of the guidance will be on measures that can be taken by the owners and operators of navigation infrastructure. Vessels will not be a main focus of the report.

The report will acknowledge the implications of IAS for wider biodiversity, but again this will not be a main focus of the report. The report will focus on species (or generic groups of species) that represent a potential threat to ports, marinas and inland waterway infrastructure.

Final product

The final product will have a dual purpose:
- to raise awareness of the navigation infrastructure-specific issues associated with invasive alien species, and
- to provide practical, guidance, based on state-of-the-art information and on good practice.

More specifically, the report will:
- describe the type of good practice measures available to reduce risks and/or to manage situations where IAS have been introduced or become established
- highlight lessons learned, including from poor practice or past mistakes
- recommend relevant monitoring regimes depending on the nature of the threat, and

- introduce the concept of (marine) biosecurity planning.

Working Group membership

This Working Group would benefit from having representatives from the PIANC Commissions (MarCom, InCom, RecCom and EnviCom) as well as from other international organisations including sector organisations (IAPH, IHMA), environmental NGOs, and experts from organisations with relevant policy responsibilities such as the Regional Seas Conventions or the European Commission. The overall composition of the WG should be a mix of infrastructure owners and operators, ecologists, and engineers and technicians bringing solutions.

Relevance for developing countries

The need for guidance on IAS is vitally important for developing countries: in particular the report should help to raise awareness of low cost / low technology measures that can be taken to reduce the risk of introduction and establishment of IAS.

Climate change implications

Observations and anecdotal evidence indicate that climate change is already exacerbating the problems associated with INNS. Warmer air and especially water temperatures make it much more likely that introduced species will establish and thrive in new environments. This emphasises the timeliness and importance of progressing this proposed WG.