

**U O W**

Ballast Water Case Studies

China-ASEAN Academy on Ocean Law and Governance  
1<sup>st</sup> Special Program of Maritime Law Enforcement

National Institute for South China Sea Studies (NISSCS)  
China-Southeast Asia Research Center on the South China Seas (CSARC)  
Australian National Centre for Ocean Resources and Security (ANCORS)  
20-26 October 2019, Haikou, China

Anthony Morrison, PhD (amorriso@uow.edu.au)  
Research Fellow, Australian National Centre for Ocean Resources and Security (ANCORS)




---

---

---

---

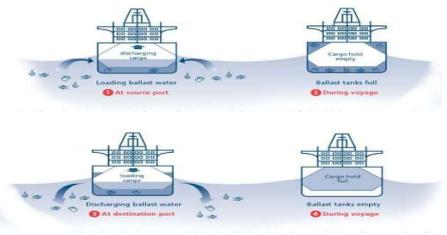
---

---

---

---

What is Ballast Water ?



ANCORS UOW

---

---

---

---

---

---

---

---

The Problem of Ballast Water

- four main categories – ship-borne water, fouling, ship-borne sediments and bio-films. Ships' ballast water (and sediments) is by far the main vector
- ballast water contains the alien species which have been transported from their native environments to new environments. These organisms survive until a ship reaches its destination and are discharged through the ship's ballast water.
- resulted in serious damage to the environments into which the organisms are introduced
- The IMO has sought to control and manage the problem through voluntary Guidelines and a multilateral convention.

ANCORS UOW

---

---

---

---

---

---

---

---

### The Problem of Ballast Water

- Ballast water as a mode of introduction of invasive alien species
- Intentional or unintentional (“hitchhiking”)
- Some ships have ballast water amounting to 25%-50 % dwt.
- Vessels have from several 100 litres to over 100,000 tons of ballast water
- 3,000 alien species transferred in ballast water each day
- The spread of invasive species has been recognized by the IMO as one of the greatest threats to the world’s oceans and a major problem for the planet.

ANCORS UOW 

---

---

---

---

---

---

---

---

### Ten of the Most Unwanted

Invasive plants, animals and microbes are being carried around the world attached to the hulls of ships and in ship ballast water. When discharged into new environments, they can become dangerous and expensive to control, and even threaten biodiversity, agriculture and human health.



ANCORS UOW 

---

---

---

---

---

---

---

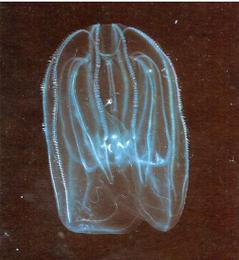
---

### North American Comb Jellyfish

Native to Eastern Seaboard of the Americas

*Introduced to Black, Azov and Caspian Seas*

Reproduces rapidly (self-fertilising hermaphrodite) under favourable conditions. Feeds excessively on zooplankton. Depletes zooplankton stocks; altering food web and ecosystem function. Contributed significantly to collapse of Black and Azov Sea fisheries in 1990s, with massive economic and social impact. Now threatens similar impact in Caspian Sea.



ANCORS UOW 

---

---

---

---

---

---

---

---

### Asian Kelp

Native to Northern Asia

*Introduced to*  
Southern Australia, New Zealand, West Coast of the United States, Europe and Argentina

Grows and spreads rapidly, both vegetatively and through dispersal of spores. Displaces native algae and marine life. Alters habitat, ecosystem and food web. May affect commercial shellfish stocks through space competition and alteration of habitat.



ANCORSUOW 

---

---

---

---

---

---

---

---

### Zebra Mussel

Native to Eastern Europe (Black Sea)

*Introduced to:* Western and northern Europe, including Ireland and Baltic Sea; eastern half of North America

Fouls all available hard surfaces in mass numbers. Displaces native aquatic life. Alters habitat, ecosystem and food web. Causes severe fouling problems on infrastructure and vessels. Blocks water intake pipes, sluices and irrigation ditches. Economic costs to USA alone of around US\$750 million to \$1 billion between 1989 and 2000



ANCORSUOW 

---

---

---

---

---

---

---

---

### Toxic Algae (Red/Brown/ Green Tides)

Several species have been transferred to new areas

May form Harmful Algae Blooms. Depending on the species, can cause massive kills of marine life through oxygen depletion, release of toxins and/or mucus. Can foul beaches and impact on tourism and recreation. Some species may contaminate filter-feeding shellfish and cause fisheries to be closed. Consumption of contaminated shellfish by humans may cause severe illness and death.



ANCORSUOW 

---

---

---

---

---

---

---

---

### Cholera

Various strains with broad ranges

*Introduced to* South America, Gulf of Mexico and other areas

Some cholera epidemics appear to be directly associated with ballast water. One example is an epidemic that began simultaneously at three separate ports in Peru in 1991, sweeping across South America, affecting more than a million people and killing more than ten thousand by 1994. This strain had been reported only in Bangladesh.



ANCORS UOW

---

---

---

---

---

---

---

---

### Chinese Mitten Crab

Native to: Northern Asia

*Introduced to:* Western Europe, Baltic Sea and West Coast North America

Undergoes mass migrations for reproductive purposes. Burrows into riverbanks and dykes causing erosion and siltation. Preys on native fish and invertebrate species, causing local extinctions during population outbreaks. Interferes with fishing activities.



ANCORS UOW

---

---

---

---

---

---

---

---

### Round Goby

Native to: Black, Asov and Caspian Seas

*Introduced to:* Baltic Sea and North America

Highly adaptable and invasive. Increases in numbers and spreads quickly. Competes for food and habitat with native fish including commercially important species, and preys on their eggs and young. Spawns multiple times per season and survives in poor water quality.



ANCORS UOW

---

---

---

---

---

---

---

---

### European Green Crab

Native to: European Atlantic Coast

*Introduced to:* Southern Australia, South Africa, USA and Japan

Highly adaptable and invasive. Resistant to predation due to hard shell. Competes with and displaces native crabs and becomes a dominant species in invaded areas. Consumes and depletes wide range of prey species. Alters inter-tidal rocky shore ecosystem.



ANCORS UOW

---

---

---

---

---

---

---

---

### North Pacific Seastar

Native to: Northern Pacific

*Introduced to:* Southern Australia

Reproduces in large numbers, reaching 'plague' proportions rapidly in invaded environments. Feeds on shellfish, including commercially valuable scallop, oyster and clam species.



ANCORS UOW

---

---

---

---

---

---

---

---

### Cladoceran Water Flea

Native to: Black and Caspian Seas

*Introduced to:* Baltic Sea

Reproduces to form very large populations that dominate the zooplankton community and clog fishing nets and trawls, with associated economic impacts.



ANCORS UOW

---

---

---

---

---

---

---

---

**IMO Technical Guidelines**

- Currently there are 14 Guidelines that have been issued. The subjects of the Guidelines are varied and include:
  - Guidelines for ballast water exchange,
  - water sampling,
  - water and sediment reception facilities,
  - designation of ballast water exchange areas and
  - risk assessment under Regulation A-4.

ANCORS UOW 

---

---

---

---

---

---

---

---

**Globallast Programme/Partnerships**

- Global Ballast Water Management Programme (GloBallast). The aims of the programme are to assist developing countries to reduce the transfer of harmful aquatic organisms in ships' ballast water and to implement the *1997 Guidelines* and the *Ballast Water Convention*.
- GloBallast Partnerships (GBP), was introduced with the aims of continuing the progress made in the original project. The main aim of the GBP is on national policy, legal and institutional reforms in specific developing countries.

ANCORS UOW 

---

---

---

---

---

---

---

---

**Conclusion**

- Inaction is not an option, unilateral enforcement is a start, but international cooperation is, and will be, the means of realization of effective progress toward the eventual eradication of alien invasive species.

ANCORS UOW 

---

---

---

---

---

---

---

---