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INVASIVE SPECIES

Nearly one fifth of the Earth's surface is at risk of plant and animal invasions − including many biodiversity hotspots. Alien species have doubled in the last 50 years (IPBES, 2018). The 2019 UN IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) Assessment highlights the threat posed by invasive and alien species as one of five principal drivers impacting global biodiversity. It warns that cumulative records of alien species have increased by 40% since 1980, due to increased transport of goods and people and human population dynamics and trends (IPBES, 2019).

Marine invasive species can have a devastating impact on biodiversity, ecosystems, fisheries, human health, tourism and coastal development and are very difficult and expensive to tackle.

WHAT IS AN INVASIVE SPECIES?

An invasive species is one that has been introduced by human activity – deliberately or accidentally – to geographic areas outside its native range and caused ecological or economic impacts in that location.

The World Register of Introduced Marine Species estimates that globally there are 1,711 introduced marine species (WRiMS, 2019), but not all of these are – or will go on to become – invasive in their new locations. Many introduced species perish, but some thrive in the absence of the predators and parasites encountered in their native range. Such species can reproduce rapidly and take over their new environment, smothering native species. The IUCN Global Invasive Species Database lists 59 invasive species in the marine realm (GISD, 2019).

PRINCIPAL PATHWAYS FOR MARINE INVASIVE SPECIES

In the 20th and 21st centuries, trade and travel have been the most important factors in the widespread distribution of invasive species in both aquatic and terrestrial ecosystems.

Rapid globalisation and increasing trends of trade, travel, migration and pollution have accelerated marine biological invasions by increasing rates of new introductions through various pathways, including:

- shipping - through ballast water and biofouling of ship hulls
- navigational canals - transporting species via inland waterways
- aquaculture – escape/overspill of non-native species introduced for farming
- aquarium trade – deliberate and accidental release of exotic species
- plastic pollution – transport of invasive species attached to plastic waste.

Shipping is the most significant vector for the introduction of marine invasive species. As much as 10 billion tonnes of ballast water is carried around the world per year, carrying up to 7,000 species of aquatic plants, microbes and animals every hour of every day (GEF-UNDP-IMO, 2017). Large boats fill their tanks with seawater to counterbalance cargo weight at their loading port, and release it at their destination – along with whatever species it contains, from fish to crustaceans, to algae and

microscopic organisms. The other way that ships transport invasive species is via biofouling – species attached to ships hulls, anchors and other equipment. Pieces of plastic move species around the ocean in much the same way.

IMPACTS

Invasive species can alter marine ecosystems by:

- disrupting native habitats
- causing the extinction of flora and fauna (by consumption and out-competing for space and resources)
- overwhelming important vulnerable ecosystems such as coral reefs and mangroves
- decreasing water quality
- increasing competition and predation among species
- spreading disease.

Invasive fish, crabs, clams, mussels, algae and corals have also resulted in adverse economic impacts, such as collapse of fish stock, loss of tourism, damage to coastal areas and enormous costs. Invasive species can also impact human health via the introduction of pathogens, such as cholera bacteria. (OECD, 2017).

MOST "UNWANTED" SPECIES

Among the many invasive species blighting the marine environment, some cases stand out as destructive, difficult and expensive to control (IUCN, 2019; Smithsonian Institute, 2011; GEF-UNDP-IMO, 2017).

Green crab (Carcinus maenas)
This European crab has been carried widely in ballast water and is sold as fish bait around the world. It now has established populations on both US coasts, in southern South America, Australia, South Africa and Japan. It is a ferocious predator and in some areas has affected the commercial shellfish industry. Its introduction to the US in the 1950s has since cost the American fishing industry millions of dollars.

Killer algae (Caulerpa taxifolia)
A strain of this algae, native to the Indian and Pacific Oceans, escaped aquariums and has spread widely in the Mediterranean, replacing native plants and depriving marine life of food and habitat. In 1984, non-native "killer algae" was discovered along the coast of Monaco and has since spread over more than 13,000 hectares of seabed. Caulerpa taxifolia forms dense monocultures that prevent the establishment of native seaweeds and excludes almost all marine life, affecting the livelihoods of local fishermen and tourism. In California, it was eradicated at huge cost using toxic chemicals.

Sea walnut (Mnemiopsis leidyi)
This stingless jellyfish-like creature is native to the east coast of North and South America. In 1982, it was discovered in the Black Sea, where it had been transported in ballast water. From there it also invaded the Caspian Sea. In both seas, it formed immense populations, contributing to the collapse of local fisheries. The species has also been found in the Mediterranean, Baltic and North Seas.

Veined rapa whelk (Rapana venosa)

A large marine snail native to the northwest Pacific was discovered in the Black Sea in 1946 and later spread to the Mediterranean Sea. In 1998, it was found in the Chesapeake Bay in the US, probably transported in the ballast water of ships. It is also established in European coastal waters from Norway to Spain and has severely reduced shellfish in the Black Sea, where it is now fished and sold to Asian countries as food.

Zebra mussel (Dreissena polymorpha)

Native to the Caspian Sea, Black Sea and their inflowing rivers, the zebra mussel travelled through European canals in the 18th and 19th century, reaching the Baltic Sea and spreading to the Great Lakes and many rivers and lakes in North America. The estimated cost of dealing with the freshwater zebra mussel introduction in the US from 1989-2000 is US$750 million to US$1 billion.

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