IUCN
The World Conservation Union

Center for MEDITERRANEAN Cooperation

IUCN has over 160 members in the Mediterranean region, including 15 governments. IUCN is recognized as an official observer at the United Nations. The UICN mission is to influence, encourage and assist Mediterranean societies to conserve and use sustainably the natural resources of the region; and to work with IUCN members and cooperate with all other agencies that share the objectives of IUCN.

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Marine Bio-Invasions: A Challenge for the Med

Forging Cooperation to address a borderless issue

Introduction of non-indigenous species is one of the most pervasive and irreversible impacts of human activities on natural ecosystems. In the marine environment, invasive species has been rated as one of the 4 greatest threats to the world's oceans- the other 3 being Land-based pollution, over-exploitation of marine resources, and destruction of coastal and marine habitats.

Marine and aquatic ecosystems are particularly vulnerable to alien species invasions. Organisms can spread rapidly in aquatic environments and they are hard to detect. In addition control and eradication options, used in the terrestrial ecosystems, can not be used in aquatic ones. For this reason, instruments that deal with aquatic invasive species should focus on the **prevention** of introduction and the **early detection** of introduced species.

A Global Problem: Biological boundaries and ecosystems do not recognize political borders. Therefore, governing species introductions, especially in the marine environment, should be addressed at the international and regional level as well as at the level of national and local concern. **Cooperation and Information sharing** between nations and organizations is critical to efficiently address the problem of alien invasive species, especially in marine and aquatic environments.

Mechanisms for arrival, introduction and translocation of non-indigenous marine species into a new environment:

Natural dispersal Natural dispersal is a mechanism for the range expansion of a species through the movement of larvae or adults to a new location, and the successful settlement of recruits in this new location.

Canals Artificially constructed waterways have provided a new pathway for aquatic species dispersal, either through natural dispersal (larvae in the plankton, active migration by adults) or through association with shipping or fisheries activities.

Ballast water and sediments The release of species in ballast water discharged from vessels. Various types and life stages of species can be transported in ballast water, including plankton, crustaceans, fish, larvae, eggs or cysts. Ballast water as a vector also includes sediments that accumulate in the bottom of ballast tanks and that contain species that have a resistant stage or resting cyst as well as adult stages of benthic organisms.

Fouling communities on ships hulls are typically composed of encrusting or sessile species, however they can include mobile species. This vector can introduce species through a variety of means: spawning of a fouling species on a vessel in port and its successful settlement and establishment of a reproductive population; dislodgement of fouling species from a vessel in port through abrasion with wharf structures, ropes, etc., or through in-water vessel hull cleaning or through high vessel speeds, etc.; sinking of fouled vessels either deliberately or accidentally.

Fisheries/ Aquaculture: intentional The deliberate translocation of fish, crustaceans or molluscs to establish or support a new fishery. For example many aquaculture operations use species that are not native, which involves introducing species from elsewhere in the world.

Fisheries/ Aquaculture: accidental The accidental translocation of species through aquaculture and fisheries activities. This vector includes the accidental release of live fish, crustaceans and molluscs imported for human consumption, introduction of organisms associated with target imported species, the accidental translocation of species attached to aquaculture, or fishing gear (floats, cages, etc), the dumping of organisms from vessels or release from shore of unused, unsuccessful or excess bait species (and associated organisms).

Pet and aquarium-organism release The accidental and deliberate release of pets and aquarium organisms by individuals, or aquaria. This often involves releasing non-indigenous species directly into natural waterways or indirectly via drainage and sewer systems.

Scientific escape The accidental introduction of species during research activities conducted by education, scientific and private institutions.

Lessepsian migration: a new class of threat?

The terms "Lessepsian" or "Erythrean" refer to species that crossed the Suez Canal from the Red Sea into the Mediterranean Sea.

At the global level, shipping is the first vector for species introduction into new areas. This figure doesn't seem to be true for the Mediterranean Sea. A first look at some groups of exotic species show that more than 70% of the non-indigenous decapods and about 63% of the exotic fishes occurring in the Mediterranean are of Indo Pacific origin (much likely to have made their way into the Mediterranean through the Suez Canal). This makes the Canal as the first pathway of arrival of alien species into the Mediterranean. The impacts of some lessepsian species have proven to be considerable mainly in the Levantine basin of the Mediterranean, where they are replacing native species and becoming a "familiar sight".

According to the IUCN definition (see page 2), as well as CBD and RAMSAR terminologies, they are alien species, as they are non native (non-indigenous) to the Mediterranean Sea, and they are outside their normal area of distribution which is the Indo-Pacific region. When these species succeed in establishing populations in the Mediterranean sea, compete with and begin to replace native species they are "Alien Invasive Species", as they are an agent of change and a threat to the native biodiversity. Depending on their impact, Lessepsian migrants are either alien or alien invasive species. In the context of CBD, "introduction" refers to the movement by human agency, indirect or direct, of an alien species outside of its natural range (past or present). The Suez Canal, being a human made canal, is a human agency. Lessepsian migrants are therefore "introduced" species (indirect, and unintentional). Whatever wording is chosen, they represent a threat to the native Mediterranean biodiversity, because they are non-indigenous to this sea.

Arrival of New Tropical Atlantic Species: A New Trend?

In recent decades, the arrival of exotic species from the tropical Atlantic has become a noticeable feature. Whether this reflects an expansion of the natural area of these species that now enter the Mediterranean through the Gibraltar straight, because of a warming trend of the water; or an extension of the maritime traffic; or is simply the result of a more intense scientific investigation, is still an open question. While not as intense as the "lessepsian" movement, the process deserves to be studied and monitored.

Photo Credit: Globallast Programme, IMO

Invasiveness Cannot Be Reliably Predicted

We generally cannot predict very well which species will become invasive. So far, the best predictor of which species will become problematic is whether or not a species has proven to be invasive elsewhere, especially under similar (climatic and geographic) conditions and in related ecosystems. Prevention of introductions is the first and most cost-effective option. This lesson has been learned the hard way from several cases of highly destructive and costly invasive organisms such as the zebra mussel in the Great Lakes (economic costs for the USA are over 1 Billion Dollars). Had such species been intercepted at the outset, an enormous loss of native species and/or money could have been prevented.

The introduction of *invasive marine species* to new environments is a major threat to the world's oceans

- Whole ecosystems are changing
- Economic impacts exceed billions of dollars
- People are falling ill and even dying from introduced marine pathogens
- Once established, it is virtually impossible to control invasive marine species
- Marine introductions must be prevented

(IMO, GloBallast Programme)

A series of key international conventions and agreements recognize the importance of the threat posed by alien invasive species, and are playing an important role in the development of instruments to prevent, reduce and control the introduction and transfer of alien species. Most of these instruments are based on the **application of the Precautionary approach.**

Extracts from

The IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species

of relevance to the Mediterranean Action Plan

The goal of these guidelines is to prevent further losses of biological diversity due to the deleterious effects of alien invasive species. The intention is to assist governments and management agencies to **give effect to Article 8 (h) of the Convention on Biological Diversity**, which states that: "Each Contracting Party shall, as far as possible and as appropriate: ...(h) Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species."

Terminology:

IUCN focused on using terminology consistent with that **already in use by practitioners and policy makers** in the field of biological diversity loss caused by alien invasive species.

"**Alien species**" (non-native, non-indigenous, foreign, exotic) means a species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce

"Alien invasive species" means an alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity.

UNDERSTANDING AND AWARENESS

* Understanding and awareness, based on information and knowledge, are essential for establishing alien invasive species as a priority issue which can and must be addressed.

* Better information and education, and improved public awareness of alien invasive issues by all sectors of society, is fundamental to preventing or reducing the risk of unintentional or unauthorised introductions, and to establishing evaluation and authorisation procedures for proposed intentional introductions.

* Control and eradication of alien invasive species is more likely to be successful if supported by informed and cooperating local communities, appropriate sectors and groups.

* Information and research findings which are well communicated are vital prerequisites to education, understanding and awareness.

PREVENTION AND INTRODUCTIONS

* Preventing the introduction of alien invasive species is the cheapest, most effective and most preferred option and warrants the highest priority.

* Rapid action to prevent the introduction of potential alien invasives is appropriate, even if there is scientific uncertainty about the long-term outcomes of the potential alien invasion.

* Vulnerable ecosystems should be accorded the highest priority for action, especially for prevention initiatives, and particularly when significant biodiversity values are at risk.

* Since the impacts on biological diversity of many alien species are unpredictable, any intentional introductions and efforts to identify and prevent unintentional introductions should be based on the precautionary principle.

* In the context of alien species, unless there is a reasonable likelihood that an introduction will be harmless, it should be treated as likely to be harmful.

ROLE OF IUCN

* IUCN will actively participate in the processes and meetings of the Convention on Biological Diversity (CBD) to implement article 8(h) by providing scientific, technical and policy advice.

* IUCN regional networks will play a significant role in raising public awareness at all levels on the issues of alien invasive species, the various threats to native biological diversity and the economic implications, as well as options for control.

* The ongoing work of the Invasive Species Specialist Group (ISSG) will be supported, including the following actions: the development and maintenance of a list of expert advisors on control and eradication of alien invasive species; expansion of the alien invasive species network; production and distribution of newsletters and other publications.

* The ISSG will develop regional databases and early warning systems on alien invasive species and work with other cooperating organisations to ensure efficient and timely dissemination of relevant information to requesting parties.

IUCN Invasive Species Specialist Group (ISSG)

The Invasive Species Specialist Group (ISSG) is a voluntary specialist group of the Species Survival Commission (SSC) of IUCN. The network is now comprised of over 150 experts on invasive species from over 42 countries. The goals of the ISSG are to reduce threats to natural ecosystems and the native species they contain - by increasing awareness of alien invasions and of ways to prevent, control or eradicate them. The group's activities, while firmly focused on biodiversity, traverse a range of biosecurity issues.

Species Survival Commission

Photo Credit: Globallast Programme, IMO