Aqua et Terra
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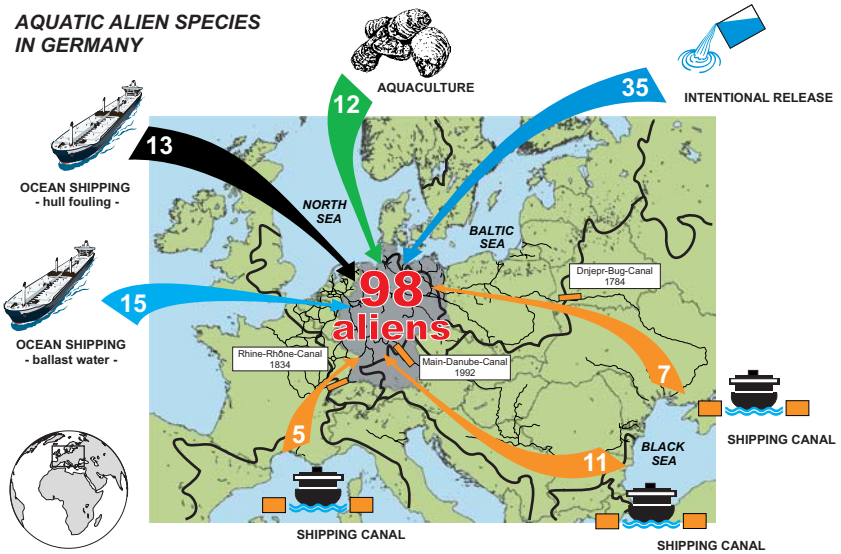
Convention on Biological Diversity



Known or probable introduction vectors, number of established alien species in inland and coastal waters, main watersheds, important canals and their opening date.

International shipping

a risk for aquatic biodiversity

Biological invasions associated with human activities are a significant form of global change and a major threat to biodiversity.

For all German aquatic ecosystems (Inland waters, the North and the Baltic Sea coast) a brief summary of the current state of knowledge about established alien species is given and the overall importance of different human-mediated vectors for their introduction into German waters is evaluated.

Following these findings, the need for action and possible measures for a successful implementation of the Convention on Biological Diversity is elaborated.

- 98 alien species have established permanent populations in German inland and coastal waters (State 2004).
- International shipping (Ocean shipping, and canals which connect previously geographically isolated river and sea basins) represents the most important introduction vector.
- The majority of aliens are macrozoobenthic species (60), primarily crustaceans, molluscs and polychaetes.
- Every second species has spread successfully across a larger area.
- About every fifth species can be defined as invasive because of significant effects on ecosystems, habitats or species.
- There is no indication that these alien species will ever leave Germany again. Every action should be based on an individual case decision. Eradication is only at early detection of a new alien a potential measure.
- The trend of global unification of flora and fauna associated with an irretrievable loss in biodiversity goes on continuously.

	Inland waters	North Sea	Baltic Sea	total
Phytoplankton	-	7	3	7
Macrophytes	6	7	1	14
Zooplankton	-	1	3	3
Macrozoobenthos	42	27	15	60
Fishes	8	-	-	8
Amphibians	1	-	-	1
Parasites	5	1	1	5
total	62	43	23	98

Number of established alien species in German waters (State 2004).

Crustacea - *Eriocheir sinensis*

Origin: south-east Asia
Vector: ships' ballast water
First sighting: 1912

The Chinese mitten crab became abundant in German waters within few years. Following the late 1940s their abundance decreased because of increased water pollution. Since several years increasing populations in Europe are reported and first crabs are re-imported to Asia for human consumption.

Polychaeta - *Ficopomatus enigmaticus*

Origin: Indian Ocean (?)
Vector: ships' hull
First sighting: 1975

The tubed worm has been recorded from a number of brackish water sites, mostly confined to southern coasts. In northern Europe its occurence is favoured by the discharge of heated effluent water from power plants. The worm builds massive calcareous reef-like aggregates, which can affect the form and structural stability of e.g. harbour structures.

Crustacea - *Dikerogammarus villosus*

Origin: Ponto-Caspian
Vector: shipping canal
First sighting: 1995

The spreading of this invasive species in north-western Europe can be attributed to the opening of the Main-Danube-Canal in 1992. Within few years the amphipod became abundant in German waters, eliminating both native and another alien amphipod species.

Conclusion:

Alien species are still a challenge to act.

Prevention of further arrivals is the decisive step to take and thus a cruical issue for an international biosecurity strategy.

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