

Impacts of Invasive Alien Species

Predicting the progress and consequences of a biological invasion is a difficult endeavour packed with complex variables and uncertainties.

IUCN describes the impacts of alien invasive species as **"immense, insidious and usually irreversible"**.

American botanist Warren Wagner of Michigan University explains the difficulty of predicting the effects of invasive alien species before it's arrival and invasion **"Nothing is more difficult than to predict what will happen to an exotic"**

Impacts: Ecological and Environmental

Alien Invasive Species can impact the environment at all levels of organization including gene, species, habitat and ecosystem.

Gene Pool

Same as humans, it is important to recognize that each organism is genetically unique with respect to the habitat and nature of the ecosystem.

"If introduced or spread into habitats with closely related species, alien invasive species could interbreed with native species resulting in changes to the genetic makeup of either species (Secretariat of the Convention on Biological Diversity, 2003)."

Possible negative consequences of alterations in gene pool:

Reduction in the survival of either species

Creation of a more successful invader

Creation of hybrids that could be more susceptible to certain pests and pathogens

Loss of gene pools

Ecosystems

The impacts of alien invasive species at the ecosystem level include changes to trophic structures, changes in the availability of resources such as water and nutrients, and changes in the disturbance regimes (McNeely et al., 2001; Secretariat of the Convention on Biological Diversity, 2003a).

Species

Invasive alien species can influence species diversity, richness, composition and abundance. At the species level, direct effects of alien invasive species occur through processes such as the predation of, competition with, and pathogen and parasite transmission to individual organisms, eventually leading to population declines and species extinctions (Loehle, 2003; Secretariat of the Convention on Biological Diversity).

Habitats

Through their impacts on species and ecosystem processes, alien invasive species can result in the fragmentation, destruction, alteration or complete replacement of habitats which in turn, has cascading effects on even more species and ecosystem processes (McNeely et al., 2001; Secretariat of the Convention on Biological Diversity, 2003a).

Ecosystems

Changes subjected to the ecosystem can include changes to trophic structures, changes in the availability of resources, etc.

Economy

Economic impacts can be either direct or indirect. Direct costs are of those related to mechanisms adopted in controlling the spread of invasive species, while the degradation of ecosystem services can be accounted as the indirect.

Social & Health

These species often triggers skin complications, while they act as vectors for dangerous pathogens and diseases. Loss of food sources and decrease of land value are often associated with the introduction of invasive species.



Asian Tiger Mosquito, (*Aedes albopictus*) native to South East known to carry over 20 highly dangerous human pathogens such as dengue, yellow fever and chikungunya was introduced to Europe in the form of eggs on used tyres or heavy duty equipment. Regular mosquito outbreaks have been reported across western and southern Europe, where it poses a major health risk.

Since the 17th Century invasive alien species is accountable to nearly 40% of all animal extinctions for which the cause is known

-UNEP-

Through direct impacts on species or through alterations of habitats, invasive alien species are responsible for placing 762 forest species at risk (IUCN, 2005). The loss of such species is leading to a more homogenous world which is perhaps the biggest threat to global biological diversity, behind habitat loss

(Perrings, Williamson and Dalmazzone, 2000; McNeely et al., 2001; Richardson and Rejmánek, 2004).



Miconia
Miconia calvescens

-Shades out native plants and completely takes over forests

-Shallow root systems encourage erosion
-Decreases the amount of rainwater into the watershed

-The seeds spread easily through animals and even through dirt/mud stuck in vehicles, shoes, clothing, etc.

Has overtaken two-thirds of Tahiti's Forests, since its introduction in 1937 and is directly responsible for threatening 25% of their native forest species with extinction.

Invasive alien species are often associated with many emerging infectious diseases such as **Lyme disease, Ebola, Marburg hemorrhagic fevers, malaria, yellow fever, leishmaniasis, trypanosomiasis and Kyasanur forest disease**

(Morse, 1995; Sanchez et al., 1995; Wilson, 1995; Daszak, Cunningham and Hyatt, 2000; Chivian, 2001; Chivian, 2002; Cinco et al., 2004).

Giant Hogweed Plant
Heracleum mantegazzianum



Wisknotweed

Has been introduced to countries as an ornament. The plant has the potential to readily disperse and can grow along roadsides, ditches and streams. It contains high toxins which can cause severe dermatitis and burns when exposed to sunlight. If in contact with the eyes it can cause blindness to the eyes. Each year in Germany alone, 6 to 21 million Euros are spent for eradication and medical treatment. With its dense impenetrable strands, it can also reduce the biological diversity of the native plant species.

80% of the threatened species in the Fynbos biome of South Africa are endangered due to invasions by alien species

North American Red Swamp Crayfish,
Procambarus clarkii



Simon Davey

The North American red swamp crayfish, (*Procambarus clarkii*), was originally introduced into Europe for use in aquaculture. Having escaped into freshwater streams, this aggressive species has since spread across several EU countries, actively colonizing new territories at the expense of rarer native crayfish, such as *Austropotamobius pallipes* which is listed in the Habitats Directive. Apart from causing local extinctions, the red swamp crayfish is also a carrier of a fungus-like organism that is wiping out entire populations of European crayfish. The disease alone is estimated to have an economic cost of over €53 million/year.

Annual environmental losses caused by introduced pests in the US, UK, Australia, South Africa, India, Brazil have been calculated at over **US\$100 billion**

-CBD-

It is estimated that US spends around 80 Billion to combat biological invaders.