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## An Impact of Invasive Alien Species in Aquatic Ecosystem

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### Abstract

Invasive alien species” or “exotic species” are increasing worldwide and most are due to the actions of humans. While most species fail to thrive or have minor impacts on their new ecosystems, the large number of introductions has led to numerous problems. Aquatic invasive species are particularly pervasive and may cause food web disruption, biodiversity loss, and economic harm. It cause damage to ecosystems include freshwater ponds, lakes and reservoirs, small streams and large rivers, and coastal marine systems. Study explains the some essential invasive species origin and their characteristics such as Water Hyacinth, Gaint Salvinia, and water cabbage/ lettuce, Nile/ red tilapia, African catfish, Thai pangus and Sucker mouth armoured catfish. Study discussed about the threats in fisheries due to alien species invasion.

### Introduction

An alien species is a species introduced outside its natural past or present distribution; if this species becomes problematic, it is termed an invasive alien species (IAS). Invasive species are among the leading threats to native wildlife. Approximately 42 percent of threatened or endangered species are at risk due to invasive species. IAS are the most common threat to amphibians, reptiles and mammals on the IUCN Red List. They may lead to changes in the structure and composition of ecosystems detrimentally affecting ecosystem services, human economy and wellbeing. An invasive species can be any kind of living organism - an amphibian (like the cane toad), plant, insect, fish, fungus, bacteria, or even an organism’s seeds or eggs - that is not native to an ecosystem and causes harm. They can harm the environment, the economy, or even human health. Species that grow and reproduce quickly, and spread aggressively, with potential to cause harm, are given the label invasive (NWF, 2016). Havel *et al.* (2015) explained humans have enormous impacts on Earth and its biodiversity and many of these effects are global. Lakes and streams are particularly prone to species loss with the greatest threats coming from land use changes and exotic invasive species. Humans have been particularly effective in breaking down biogeographic barriers through long-distance trade, intentionally introducing some species and carrying others as hitchhikers. Although most introduced species fail to establish and spread. Many freshwater species have become invasive.

### Invasive Alien Species on Aquatic Ecosystem

Several species of alien flora and fauna has been reported especially, plants like Water Hyacinth (*Eichhornia crassipes*), Gaint Salvinia (*Salvinia molesta*), and water

cabbage/ lettuce (*Pistia stratioides*) caused severe damage to our wetland ecosystem. In recent times, Indian wetlands and its fish diversity faces a new risk due to the invasion of ornamental fishes. From time immemorial, number of alien plants and animals get introduced into Indian wetlands both accidentally and intentionally. Among the introduced, few species Nile/ red tilapia (*Oreochromis niloticus*), African catfish (*Clarias gariepinus*), Thai pangus (*Pangasiandon hypophthalmus*) and Sucker mouth armoured catfish (*Pteryoplichthys* sp.) have emerged as a great threat to Indian aquatic diversity and pose a serious threat to regional and local economy. Especially, the Indian fish diversity is highly affected due to this invasion.

**1. Water Hyacinth - Killer of Aquatic Biodiversity**

**W**ater hyacinth (*Eichhornia crassipes*), a species that originated in South America, has been widely distributed in the world. It is a free-floating aquatic macrophyte that typically grows about 0.5 m height and up to 1m in tropical areas (Figure 1). Recently, it is considered as an invasive species in many places due to its destruction on water and aquatic biodiversity. It will affect more countries with its expansion into higher latitudes due to climate change (Villamagna and Murphy, 2010).

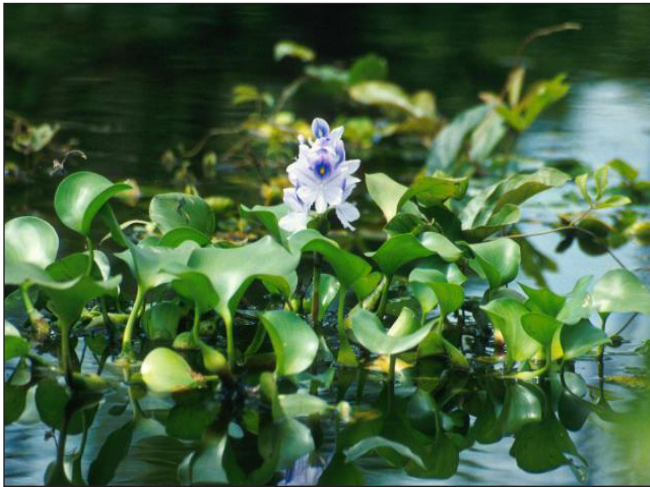


Figure 1: Water hyacinth

**2. Giant Salvinia**

**G**iant salvinia (*Salvinia molesta*) is one of the most noxious invasive species in the world. Giant salvinia, is an exotic fern from South America that invades ponds, lakes, and other waterways in the United States. It damages aquatic ecosystems by outgrowing and replacing native plants that provide food and habitat for native animals and waterfowl (Figure 2).

**3. Water Cabbage/ Lettuce**

**W**ater lettuce was first discovered in New Zealand waterways in 1973. The plant forms thick mats that block sunlight and slow or prevent the growth of native aquatic plants. As the plant dies and decomposes, it

removes oxygen from the water, which can disrupt and even kill fish communities. Dense mats of water lettuce can hinder swimmers and boaters, prevent other recreational uses of waterways, and restrict water flow in irrigation and flood control canals (Figure 3).



Figure 2: Giant salvinia

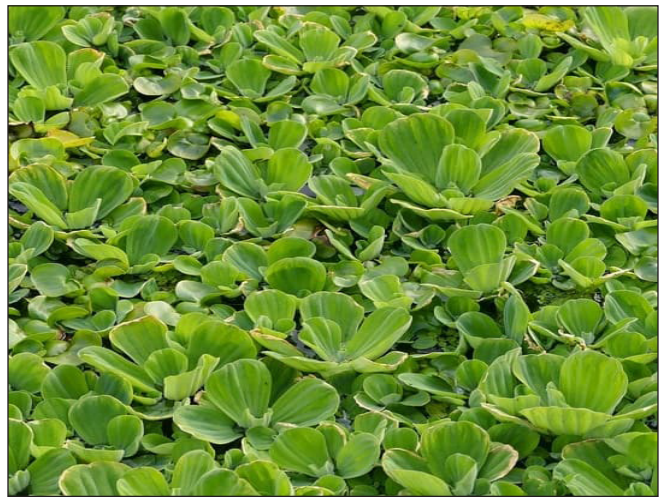


Figure 3: Water lettuce

**4. Nile/ Red Tilapia**

**I**n India, tilapia (*Oreochromis mossambicus*) was introduced in 1952, with a view to filling up unoccupied niches, such as ponds and reservoirs. The species spread all across the country within a few years due to its prolific breeding and adaptability to wide range of environmental condition. The Nile tilapia is considered an omnivorous species come from Africa and it ingests zooplankton, phytoplankton, or debris present in rivers (Figure 4). As a consequence, the release of Nile tilapia into non-native aquatic ecosystems may result in competition for food and space, thereby damaging native species. The wide environmental tolerance and high reproductive rate of Nile tilapia facilitate its use for aquaculture, but also render the species highly invasive.





Figure 4: Nile tilapia

### 5. African Catfish

**N**orth African catfish (African catfish) have almost pan-African distribution. It highly tolerates adverse water quality conditions and can be raised in high densities resulting in high yields in a short period of time compared to Indian Catfish and other indigenous species. It is the most dangerous freshwater fish, introduced in the country in the 1990's (Figure 5).



Figure 6: Sucker Mouth Armoured Catfish

### 6. Sucker Mouth Armoured Catfish

**S**ucker mouth catfish has been identified as a great threat to global freshwater diversity and originated from South America. Recent studies in India disclosed the invasion of this species in several inland waters. For instance, a constant decline of native species biomass due to high invasion of Sucker mouth fishes was reported in Thiruvananthapuram, Kerala. Interestingly another species of sucker mouth catfish *P. pardalis* was reported to cause huge damage to the native species diversity of Vandiyur Lake, Madurai. The biomass of *P. pardalis* was statistically significant compared to the indigenous varieties. They are causing damage to fishing gear, competing and harming against native species and disrupting environments by its burrowing activities (Figure 6).



Figure 5: African Catfish

## Threats in Wetlands

**W**etlands and its biodiversity are getting depleted alarmingly due to habitat destruction, pollution, overexploitation of aquatic resources, tourism and the introduction of invasive exotic species along with alien pathogens and parasites. In particular the freshwater ecosystem which supports 40% of the globally recorded fish species is highly vulnerable to afore said anthropogenic pressures. In recent decades invasive alien species are considered as one of the major factors for the devastation of the freshwater ecosystem and have emerged as a great threat for the existing indigenous aquatic diversity, in particular fish species.

## Threats on Aquatic Environment

**I**nvasive alien species have devastating impacts on native biota, causing decline or even extinctions of native species, and negatively affecting ecosystems. Invasive alien species are animals, plants, fungi and microorganisms entered and established in the environment from outside of their natural habitat. They reproduce rapidly, out-compete native species for food, water and space, and are one of the main causes of global biodiversity loss. Species are often introduced deliberately, through for example, fish farming, pet trade, horticulture, biocontrol; or unintentionally.

## Conclusion

**O**ver all study explains and propose the facts about Invasive species and their origin. It can alter Aquatic ecosystems by disrupting native habitats. Invasive species are 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. It should need to restrict the introduction of invasive alien species on aquatic ecosystem.

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