AGRIALLIS
Science for Agriculture and Allied Sector: A Monthly e Newsletter
Volume 3 – Issue 3
Online ISSN: 2582-368X
www.agriallis.com

ENVIRONMENTAL IMPACTS ON EXOTIC FISHES INTRODUCTION IN INDIA

Article Id: AL202142

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Introduction of exotic species has the extinction of native species in aquatic ecosystems. Major concerns over the introduction of exotic fish are prolific breeding, predation or competition of introduced species affecting indigenous biodiversity. While much of the recent attention has been mainly focused on the adverse impact of exotic species introduction.

Why are they Introduced?

1) Improving local fishery potential,
2) Sport fishing,
3) For aquarium keeping,
4) Improving aquaculture productivity,
5) Controlling unwanted(mosquitoes) organisms.

* These all are only focused on short-time benefits of fisherman and fisheries sectors. But did not consider long term adverse effect on the biodiversity of the aquatic ecosystem.

Exotic Fishes Transplanted in India

1) Game fishes

* Brown trout- Salmo trutta fario(1863-1900)
* Rainbow trout -Salmo gairdner (1907)
* Atlantic salmon- Salmo salar (1968)

2) Food fishes

* Tilapia- Oreochromis mossambicus (1952)
* Common carp- Cyprinus carpio (1957)
* Grass carp - Ctenopahryngodon idella (1957)

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* Silver carp - Hypophthalmichthys molitrix (1959)

3) Larvicidal fishes

* Guppy - Pocilia reticulata (1908)
* Top monnow (mosquito fish)- Gumbusia affinis (1928)

4) Ornamental fishes

* Live bearers (27 species)
* Egg layers (261 species)

Impact on biodiversity

1) Genetic impacts

The genetic impact can be classified into two categories.
A) Reduction of effective population size by the ecological, biological & genetic of introduction.
B) Alteration/extinction of gene pools of the species/crossbreeding or hybridization & backcrossing.

Extinction due to hybridization

Hybridization between exotics & Native species has not only brought in genetic contamination but even resulted in species extinction in some cases.

Loss of traits

It's leading to economic value decline takes place in uncontrolled hybridization between exotic and native species.

Hybridization between bighead carp (Aristichthys mobiles) and silver carp (Hypophthalmichthys molitrix) should beneficial properties in terms of growth, food conversion and disease resistances.

But in further uncontrolled hybridization of these fishes in later generation, the offspring lost the acquired beneficial traits.

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Genetic Bottleneck

A genetic bottleneck is a sudden and drastic decline in numbers. It effectively samples a few individuals from a larger gene pool. Resulting in a remnants population with a less overall variation. Loss of variation has two components like reduction in the variance of qualitative traits and loss of specific and usually rare alles.

Inbreeding Depression

It is probably the most serious and nebulous problem in small population of endangered fishes. It is the mating of individuals related by common ancestry that share common genes due to descent than individual randomly selected from the population. Fitness characters with low heritability are generally effected in consanguineous mating.

2) Ecological impacts

Competition of exotic fishes with the native species for living space with same niche preference for food with fishes of similar types of feeding habits, predation on native fishes, spreading parasites and pathogens, thereby are some common ecological concerns.

Predation-Prey Interaction

Top carnivorous are often viewed as the most important significant threat as introduced fishes. Predation directly reduces the size of the prey species in the ecosystem.

Competition

Competition can occur between exotic and native species for food, habitat, mates and other essential resources. In recent days reported for inland water bodies, Tilapia Mozambique is considered to be a threat to native diversity.

3) Disease impact

The spread of pathogen along with species transported or traded in aquaculture is a serious concern with several international agencies such as, FAO, WHO, WTO and OIE.

4) Habitat impact

Many species of freshwater animals greatly modify aquatic habitat when placed into new areas. For eg. Crayfish, common carp, grass carp etc..

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5) Socio-economic impact

Since the exotic fishes never fetch a higher price than native varieties and also the decline of the native fish population is observed in the presence of exotic species in natural waters, the total economic returns declined for the stakeholders of the capture fisheries.

In aquaculture, however, it provided immediate gain, in most cases without consideration of the long term ecological consequences.

Conclusion

The global experience and present status of introduction of exotic species in India their ecological, biological and genetic impact analysis in this contribution indicate their generally deleterious effect on autochthonous species. In addition to eco-biological impacts, it has been seen that some fish are even extinct owing to loss of genetic variability and heterozygosity.

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