

Biological impacts of invasive species on aquatic and terrestrial systems

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Abstract

The invasive species become the major stress creator for the terrestrial and aquatic ecosystems. The world is facing a global consequence of the invasion of biological species due to the exponential growth of human population. With synergies of the other changes in the environment that exacerbates the ongoing invasions of the non-native species which facilitates the new ones, thereby escalates the extension and creates impacts of the new invaders.

Introduction:

The increasing international trade among the countries, lead to the introduction of the invasive species in the terrestrial and aquatic ecosystems (Hulme, 2021). These invasive species are capable of dominating the native species in all aspects (Campoy *et al.*, 2018). The impacts caused by the foreign species may be either directly or indirectly at organisms, community and the ecosystem levels. By understanding the crucial impacts and by the appropriate management, it is necessary to take steps for protecting and restoring our ecosystems for maintain the

sustainable environment. Improved cooperation among international countries is necessary to reduce the impacts of non-native species on biodiversity for its ecosystem services.



U.S. Geological survey

Colonization of species accelerated by the humans:

The invasive species has been already spread around the world level, the colonization of the species is accelerated by the humans to a greater extent (Alexander *et al.*, 2018). After the establishment of the invasive species in the new environment it become a dominant pest and it seems to be very difficult to control (Pyskep *et al.*, 2020). The colonization of the new species should possess the tolerance capacity for the new environment in all aspects such as food, habitat, predation and reproduction with the new habitat.

Special traits for increasing ability:

There have been many reasons for the successful establishment and stable nature of the invasive species to the new environment (Havel *et al.*, 2020). The most important is the asexual reproduction which is most common in the aquatic ecosystems and the vegetative reproduction in most of the

species, beyond all that invasive species has the ability of higher growth rate and shoot allocation where the non- invasive species lack this ability (Smith *et al.*, 2020). For entering into the novel environmental conditions, the non- native species lack in the biotic resistance together with the abiotic environmental factors. The species diversity of the recipient community is the most determinant for the invasion success.

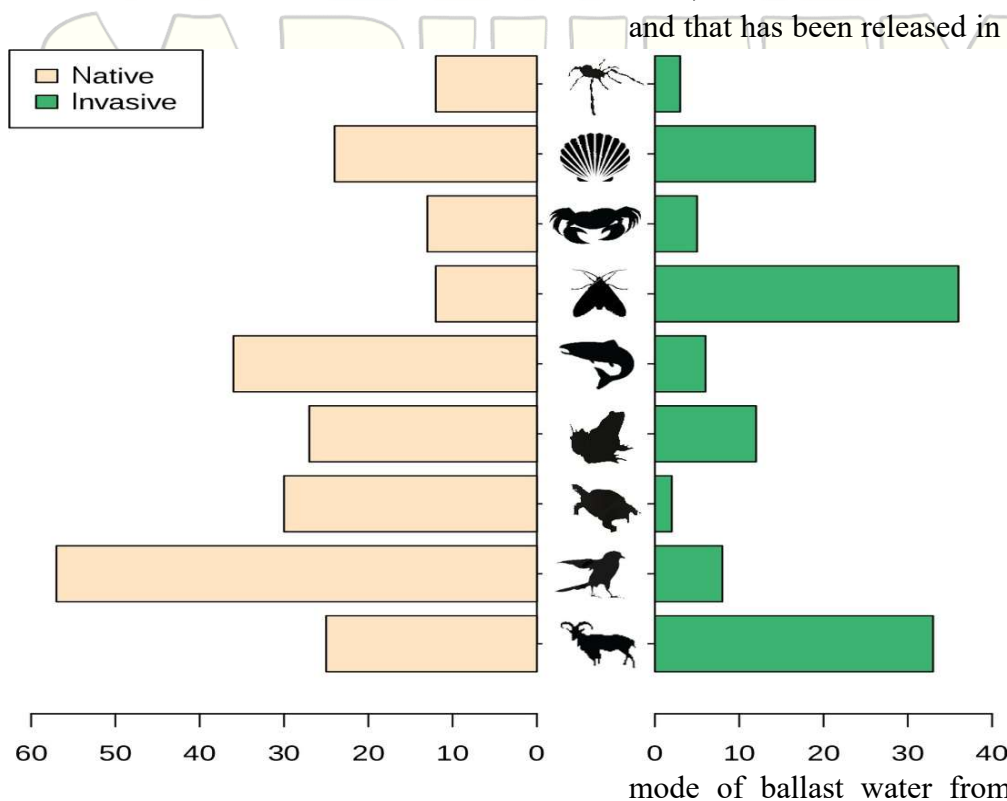
Biological impacts of invasive species:

The introduction of the alien or invasive species for the new environment leads to the overpopulation and harms the new environment. Their occurrence adversely affects the ecological and environmental balance (Geburzi and McCarthy, 2018). Invasion of the alien species rather than the natural ecosystems, reaches its peak because of the anthropogenic activities. The most significant biological impacts of the invasive species are the loss of the native species which reminds as notable evidence in this modern era (Grooks *et al.*, 2002).

Behavioral changes of native and non-native species in their taxonomic groups

Biological impact of invasive species on aquatic ecosystems:

The development of the maritime trade led to the development of the invasive species and adversely affected the species in the aquatic ecosystems. In fact, Martin *et al.*, (2020) has highlighted the hundreds of the invasive species and reported that shipping was the foremost cause of the transfer of the invasive species. Many marine organisms had the high ability to attaching with marine hulls. So, this is the major reason for the easy transportation of invasive species from one water body to the another and it possess the significant risk for the soul biological invasion event (Martinez *et al.*, 2020; Sofoer *et al.*, 2018). For the controlling of the vessel hull fouling there is no current regulations to manage. The foremost reason for the significant reason for the widespread of the invasive species is the ballast water (Kucuk, 2019). The ballast water was taken by the sea



and that has been released in the sea ports by the form of transoceanic vessels, plays as a largest vector for the invasion of the new species. For example, the fresh water mussels which has a native of Caspian sea reached out to the Great lakes by the mode of ballast water from the source of



transoceanic vessel (Kvistad *et al.*, 2019; Eissa *et al.*, 2011). The zebra mussels have been dominated the traditional species for the purpose of oxygen and food and compete their life over it. Therefore, it is necessary for the development of the comprehensive fouling and ballast water management plans to prevent the future invasions that causes devastating changes in the aquatic ecosystem to had a change around the world.

Biological impacts of invasive species in the terrestrial ecosystems:

Biotic inversion is the major threats posed to the environment for the global biodiversity which is due to the increasing globalization and tourism (Uniyal *et al.*, 2020). The invasive species drives the native species by the niche displacement or by process of the hybridization with related species that present in the native ecosystems (Viard, 2020). Beyond the economic ramifications, the alien invasions result in the extensive changes in the structure, composition and the global distribution of the biotic species at the site of introduction, that leads ultimately to the homogenization of the global fauna and flora (Bell, 2021). This leads to the major loss of the biodiversity. Land clearance and human habitats has led a significant pressure on the local species that present around those ecosystems. The habitats that have been prone to the invasions has an adverse effect on the local ecosystem (Lima, 2018). Multiple successive introductions of the various non- native species might have the interactive effects and the introduction of a second non-active species may flourish the first invasive species. For example, gem clam was introduced from East coast of the united species into California Bodega which has displaced the native clam species. The invasive species alter the fire regime, nutrient cycling and hydrology in the native

environment (Pysek, 2020; Ricciardi and MacIssac, 2022).

Impact on human health:

Not only the invasive species causes the ecological damage and economical losses, they also lead to major impact on the human health. They have aided a negative impact on the human life such as reduction in the resource availability, widespread of diseases, recreation works, tourism and educational activities (Smith, 2019). They have also led to allergic symptoms and skin problems in humans (Bousquet, 2020). The invasive species causes small problems to life threatening problems. The control effects and managing efforts also lead to the negative implications on the health of the human well-being. Even a pesticide application for the eradication of the pest leads to the negative environmental impacts (Deguine, 2021; Oliveira and Grahag, 2020).

Conclusion:

The current research has been going on for the purpose of prediction of the future invasion of the non-native species as a topic of priority. The trend has been emerged out for the future research because of the extreme adverse effects. The invaders imposed a serious threat and it is impossible to eradicate at a stretch when it has been introduced. The Future consensus should have the ability to manage by prediction of species that have a likelihood of causing impacts and preventing the introduction of the invasive species.

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