An Introduction to Invasive Alien Species

One of SDG 15's targets, 15.8., reads as follows: "By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species" (SDGs Knowledge Platform). In this paper, we will list the negative effects of invasive alien species, that makes this target necessary, along with an example. We will also list suggestions to solve the problem and explain how this target relates to other SDGs.

Invasive alien species are non-native animals, microbes, diseases, or plants, that are pests (Hoddle). They are often native to another country or area, but are considered "invasive" when they "invade and establish populations in new areas and the resulting uncontrolled population growth and spread causes economic or environmental problems" (Hoddle). "On average, California acquires around nine new species of macroinvertebrate per year, of which around three will become pests. This is a rate of one new species every 40 days" (Hoddle).

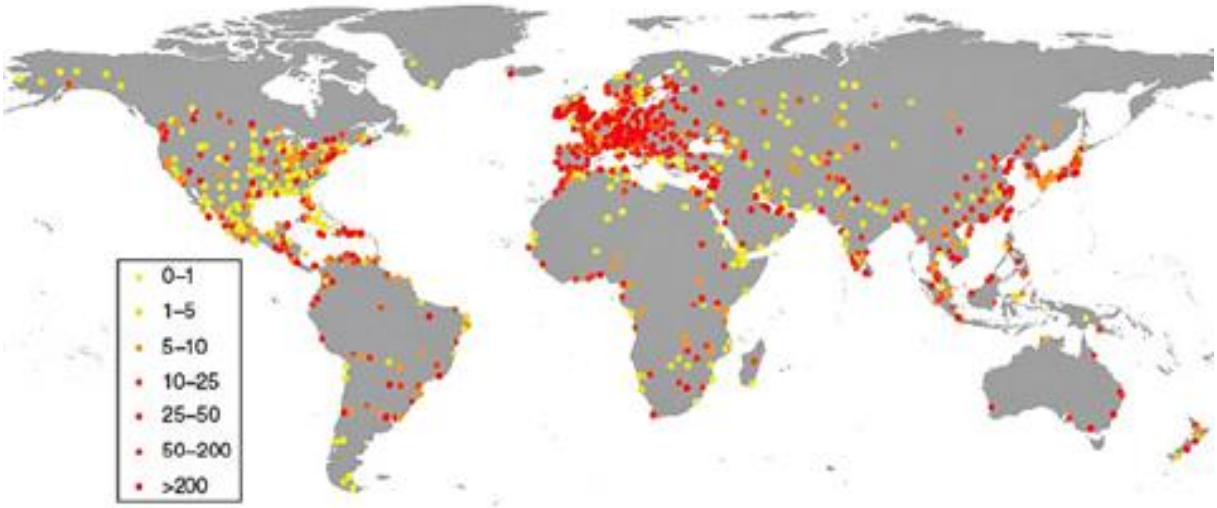

Figure showing the amount of invasive alien species around the world (Hoddle, CISR)

Though it is often by accident, "invasive alien species are primarily spread by human activities" (NWF). They can be on goods, people, or even the transportation itself, and travel all over the world (NWF).

The Negative Impacts

Invasive species give negative impacts on biodiversity, ecosystems, human health and economy. Recently, the negative impact has been changed and sometimes extended by climate change.

The most significant of these is the widespread loss of habitat. For example, the hemlock woolly adelgid is an invasive insect from Asia that rapidly kills infested hemlock trees (Jacob Hill). In some parts of the Eastern United States, it is estimated that up to 80% of hemlock trees have been killed (Jacob Hill). These forests represent an important habitat for many animals and with crucial habitat gone, species that rely on them may face extinction. Thus, this will give negative impacts on the natural biodiversity. There are also cases that as the result to introduce fish for edible use into river and lakes, original aquatic creatures and plants have exposed to extinct.

One of the most dangerous effects of invasive species is as a carrier of disease such as HIV and malaria, which kill humans. The Asian tiger mosquito has been linked to more than 20 diseases such as yellow fever and chikungunya fever. There are also some cases when ecosystems affected by

invasive species, human health is affected indirectly. In some cases, ecosystems altered by invasive species may be less able to provide important ecosystem services which support human activity. In the past, invasive species brought about 1 million deaths to Ireland. In 19 century, Phytophthora which comes from America invaded potatoes which are major food, and then The Irish Potato Famine happened. The infestation ruined up to one-half of the potato crop that year, and about three-quarters of the crop over the next seven years(Hstory.com Editors).

To manage and prevent the introduction of invasive species costs a lot to countries' economy. The major impacts on the economy are for control and management. Also, invasive species can reduce productivity in forestry, agricultural, and fishing sectors, and cause export and import trade restrictions. Estimates suggest that invasive species cost £1.7 billion each year to the UK economy (Williams et al., 2010); €12 billion to European Union's (EU) (EEA, 2012) and US$ 120 billion to the United States' (US) (Pimentel et al., 2005; USFWS, 2012).

Norwegian Examples

In 2007, The Norwegian Black List, an overview of alien species in Norway, was first published by the Norwegian Biodiversity Information Centre. The total number of observations of alien species in Norwegian territories has increased, with peaks in the periods 1850-1950 and from 2000 to the present.

Since there are too many alien species in Norway, two examples are selected to explain. First, Branta Canadensis, the greater Canada goose, has the most damaging impact of all alien bird species in Europe, having first been introduced to Norway in 1936. The geese have the destruction of crops and vegetation, which have a huge impact economically and aesthetically. They also lead to soil compaction. Besides, they spread several diseases and parasites, including avian flu and salmonella, which can infect humans.

The second example is the Garden Lupin (Lupinus polyphyllus), which have now reached every state in Norway. They are mainly pollinated by bumblebees and disperse seeds. However, they have negative effects on local plant diversity, transforming ecosystems from diverse herbaceous areas to a monotonic spread of the plant. They can also alter mineral levels in their soil, forming Nitrogen high environments while reducing Potassium and Phosphorus stocks.

Positive Impacts

Alien species are always regarded as a hazard to the environment. However, sometimes some scientists think it is not devils completely. It can serve important ecosystem functions. Many invasive species are used in ecological restoration projects because of their capacity to survive harsh conditions, recolonize degraded lands, and create habitat for the establishment of native species.

For example, Gorse (Ulex europaeus), a weedy perennial European shrub introduced to New Zealand, acts as a nursery plant for the regeneration of native species, provides a source of nectar for bees, and habitat for some endemic species. Also, Lantana camara can provide dense ground cover and hiding places to some animals. The chemicals contained in its leaves have antibacterial, antimicrobial, anti-inflammatory, and antitumor properties Its woody stems can be used for making charcoal, producing biogas and bio-ethanol, and making paper baskets or even garden furniture.

Relations to Other SDGs

SDG15.8. relates to other SDGs as well, and in this paper, we have focused on the main ones. In relation to SDG2, *Zero Hunger*, invasive alien species can lead to the extinction of all kinds of birds, mammals, reptiles and plants (Rosane, 2019), all of which are food resources for either people or animals. However, a positive relation to this SDG is the possibility of using invasive alien species as

food, as a way to control them. Because of the economic costs that invasive alien species causes, SDG8, *Decent Work and Economic Growth*, is affected. It is difficult to achieve economic growth when so much money is going into controlling invasive alien species, and less into technological upgrading and innovation. Because invasive alien species causes environmental problems, SDG13, *Climate Action*, is affected. Without this problem, there would be more focus on other climate problems. Invasive alien species are present in the ocean as well, so naturally, SDG14, *Life Below Water*, relates highly to this. The invasive alien species in the ocean are different from those on land, but they cause the same problems. SDG17, *Partnerships for the Goals*, relates to invasive alien species because partnerships are necessary to deal with this problem. Thus, this might be the most important relation to SDG15.8. of the other SDGs. (SDGs Knowledge Platform)

Measures to Prevent the Introduction and Reduce the Impacts

Cultural control methods: Employ management strategies that can reduce invasive species' ability to spread the invasive species so its reproductive capacity or its ability to spread is reduced. For example, the damage caused by some invasive agricultural pests can be lessened by using crop varieties that are resistant to plant disease, planting dates are altered so the crop is not growing when an insect pest is present to attack it.

The chemical control method: Invasive weeds, insects, mites, and plant diseases have all been controlled to varying levels with pesticides. This provides rapid control of an invasive species over very large areas. However, they are often expensive to apply, need repeated applications, may be found on food, in water supplies, or in the air, which raises concerns for human safety.

Biological control: Natural enemies like predators, parasites, and pathogens have been used most commonly to successfully control invasive weeds, and insect pests. Effective natural enemies can provide permanent control.

Harvesting is a way to control them: A collaborative effort between nongovernmental organizations and the villages in L. camara-infested forests in India have started a cottage industry for harvesting and processing its stems to make furniture, baskets, and paper.

Using invasive species as food: Invasivory, a new food movement, has created Internet-based platforms for sharing recipes for cooking-up invasive species, for example, US city of Chicago, has started to sell Asian carp burgers.

Conclusion

Invasive alien species have proven to be severely damaging, causing several negative effects. Yet, there are measures that can be taken to prevent the introduction and reduce the impact of them. This problem relates to other SDGs, and therefore it is important to know how it affects, and what can be done about it.

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