

# Consequences of climate change



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Recently, several researches have been conducted to determine the effect of climate change on invasive species. Frank J. Rahel and Julian D. Olden (2008) conducted a research to assess the effects of climate change on aquatic invasive species. Their researchers present a conceptual framework based on empirical evaluation of all interactive impacts of environmental change and the invasive species found in fresh water ecosystems. The review gives the expected impacts of global warming which include alteration of stream-flows, higher salinization, warmer temperatures of water, higher demand for reservoirs and other water storage structures. The study explains how the changes would affect population of aquatic life in that fish-culture species will be expanded and species would increase and spread especially during floods. Newer species of organisms are expected to flourish due to the elimination or reduction of cold seasons. Ecological impacts of invasive species will be modified by the climatic changes which will enhance their predatory and aggressive effects on the native species and thereby increasing the virulence of several diseases. The research suggests a couple of strategies to mitigate the adverse effects of climatic changes including barrier construction or removal efforts. They note that some invasive species that do well in cold water may not survive through the changed climate. The researchers' findings highlight the compound interactions between environmental change and the invasive species that affect how aquatic life and their surroundings are expected to respond to the new climatic conditions.

In the article Five Potential Consequences of Climate Change for Invasive Species (2008), Jessica J. Hellmann, James E. Byers, Britta G. Bierwagen, and

Jeffrey S. Dukes note that unidentified social and scientific concepts pose as a challenge in the prediction of environmental changes globally, for instance, biological invasions and climatic changes which affect ecological balance. The researchers use the methodology dubbed “invasion pathway” for purposes of identifying non-exclusive effects of changes in climate for the invasive species. The first step is the identification of the altered transport and introduction mechanisms, followed by the establishment of new invasive species, then studying the altered impact of existing invasive species, then study the altered distribution of existing invasive species, and finally knowing the altered effectiveness of control strategies. These impacts as studied are used to identify testable hypotheses on the reaction of invasive species to changes in climate and provide the necessary suggestions for invasive-species management plans. The researchers emphasize that the above five impacts also emphasize the requirement for improved environmental supervision and expanded harmonization among bodies involved in the invasive-species management.

Frank, Britta & Yoshinori (2008) carried out a research on Conservation Biology, where they looked at “Managing Aquatic Species of Conservation Concern In The Face of Climate Change and Invasive Species”. The observed that the task of managing conservation species is likely to become much more challenging and difficult due to the link between invasive species and climate change. Climate change effect on invasive species will not only affect habitat quality, it will advance invasive species expansion into new areas and further more magnify the already present effects of invasive species by increasing the rate of predators, alter competitive dominance and more

severely foster virulence of diseases. In some instances there is a likelihood that parapatric species could expand into very new habitats and have damaging effects that are more similar to those of invading non-invasive species. If climate changes in a manner that favors invasive species, then traditional strategies used to isolate imperiled species will not be adequate enough if habitat environment changes beyond ranges that have been experienced in history. Consequences climate change brings will require far more active measures and management paradigm. This will include improving habitat that minimizes effects of climate change and creation of migration barriers which prevent influx of both invasive and parapatric species. Other actions that should be taken include putting in place dispersal corridors that enable species to track climate changes in its environment; management can also include translocation of species to new suitable habitats where migration is impossible. Lastly management should establish new plans that enable early detection and eradication of invasive species.

According to a research conducted by Mainka & Howard (2010) on climate change and invasive species, they first note that the two key drivers of loss in our biodiversity are climate changes and invasive species. Climate changes specifically were observed to have a huge effect on reproduction, distribution and behavior of species, furthermore, all signs and evidence point out that the effect will get more and more worse even if we put action plans and measures tomorrow to minimize future increase of the greenhouse effect, gas emission. Furthermore, on the same note invasions species continue to be a major threat to our biodiversity; they foster loss of species, distribution changes and more worse habitat degradation. These two drivers

act together and the impact they have is compounded. They are substantial and will become magnified with time. The interactions between the two pose a big challenge to habitat conservationist and policy makers.

Awareness of the link between climate change and invasive species will help to underpin actions, plans and policies of all biodiversity management.

Schlincher & Montes (2012) did a research on invasive species, climate change and forest health. They found that since the beginning of the earth species have constantly been invading new habitats and territories. With recent colonization, globalization and movement of people worldwide, lots of human-associated species have been spread in the world. Despite some being useful and beneficial to humans, most have negative effects on the ecosystem. These harmful impacts are widespread in a long-lived ecosystem like forests. Using the indigenous mountain pine beetle, North American forest insects and the alien gypsy moth, the study found the most fundamental biology aspects that determine the possible range of invasive species on a new environment and then discusses the mitigation plan and adaptation of invasive species in the context of climate changes.