



# Climate Change and Invasive Species

## What it means to tribes and how we can adapt

### What are invasive species?

There are several definitions for invasive species. The U.S. Department of Agriculture's (USDA) definition of an invasive species is one that is "(1) non-native to the ecosystem under consideration and (2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health<sup>[1]</sup>". According to the USDA, this definition applies to all organisms, including plants and animals.

### How are climate change and invasive species linked?

The natural range of a given species is often dictated by its optimal environment. Factors including geographic location, and precipitation and temperature patterns provide the framework for a region's climatic conditions and influence species distribution.

Climate change-induced fluctuations in precipitation and temperature will vary substantially across the United States. For instance, areas like the Southwest are projected to become markedly hotter while the Northwest may only experience a couple of degrees in temperature change<sup>[2]</sup>. Regardless of regional variations in temperature change, the U.S. Environmental Protection Agency warns that in response to temperature increases, "the habitat ranges of many North American species are moving northward in latitude and upward in elevation<sup>[3]</sup>". These range shifts may threaten critical habitat or may stress certain native species, in turn creating a welcoming environment for invasive species.

An added concern with greenhouse gas emissions is that higher atmospheric carbon dioxide (CO<sub>2</sub>) concentrations will have variable effects on vegetation. The Southwest Climate Change Network (SCCN) points out that "increased levels of carbon dioxide encourage growth in some plants and decrease the necessary amount of water intake, which could put invasive plants at even more of an advantage over native plants<sup>[4]</sup>".

### Why does it matter?

Non-indigenous species can threaten many aspects of natural ecosystems, the economy, and human health. One example of a famous and very successful invasive plant is the tumbleweed, or Russian thistle. This iconic symbol of the West is actually an invasive species from Russia that causes serious ecological problems. For instance, tumbleweeds play an active role in wind-induced soil erosion. When tumbleweeds die, they uproot from the ground and as the wind blows them across the desert terrain, they loosen the top soil layer making it more prone to wind erosion.

Importantly, once an invasive species becomes established in a region, it can be challenging to restore the native ecosystem. According to the SCCN, "many invasive species are so well-adapted to diverse conditions that they can outcompete their native counterparts, leading to environmental damage and decreased biodiversity<sup>[4]</sup>".

An added concern is that invasive species are costly to control. Every year land managers spend billions of dollars to stop the spread of invasives through management and eradication efforts<sup>[5]</sup>. Unfortunately, these crucial efforts are expensive and result in varying levels of success.



*Russian olive and non-native tamarisk in Canyon De Chelly National Monument*

*Photo: National Park Service*

Yet another concern associated with invasive species is the potential for increased incidence of vector-borne and zoonotic diseases (VBZD) as climate zones shift under increased global warming. According to the Centers for Disease Control, it is difficult to model or predict the incidence of VBZD (ex: malaria, dengue fever, or West Nile virus), however they note that climate is one of the factors known to influence the rates of said diseases<sup>[7]</sup>. This could be problematic in instances where warming temperatures create hospitable conditions for vector species which previously could not survive in the United States.

### What can tribes do?

Invasive species present a serious problem that must be addressed. Ecosystem adaptation and change in the wake of climate change has yet to be fully understood. While some invasive species will die out leaving room for land managers to regain control over the land, other species will likely proliferate and continue to cause problems for vulnerable ecosystems. Ultimately, the most effective approach to limiting the spread of invasive species is to prevent introduction of invasives and to adopt an early detection and rapid response (EDRR) management strategy.

Traditional knowledge plays a vital role when analyzing the impacts of invasive species within ecosystems. Often, indigenous peoples can provide insight into a landscape's state prior to colonization of invasive species. Having knowledge of the pre-invasive species habitat composition can be a highly useful management tool both for early detection of invasive species as well as for ecological restoration efforts following establishment of invasive species.

### Practical tips for preventing the spread of invasives:

- ⇒ Learn which invasive species are present in your area and support local eradication efforts. Tribal and state agencies are an excellent resource for obtaining this information.
- ⇒ Use native plant species for landscaping whenever possible
- ⇒ Encourage local officials to adopt the National Invasive Species Council's early detection and rapid response (EDRR) approach to invasive species management
- ⇒ Remove and destroy invasive plants found on your property. Make sure to dispose of them appropriately so that seeds are not dispersed in the process.



*Invasive salt cedar eradication efforts  
Photo: U.S. Fish & Wildlife Service*

### References

1. U.S. Department of Agriculture, National Invasive Species Information Center: <http://www.invasivespeciesinfo.gov/whatis.shtml>
2. Intergovernmental Panel on Climate Change, Fourth Assessment Report - Ch.11 Regional Climate Projections: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter11.pdf>
3. U.S. Environmental Protection Agency, Ecosystem Impacts and Adaptation: <http://www.epa.gov/climatechange/impacts-adaptation/ecosystems.html#Range>
4. Southwest Climate Change Network, Invasive Species: <http://www.southwestclimatechange.org/impacts/land/invasive-species>
5. Oregon State University, The Economics of Invasive Species [http://cms.oregon.gov/OISC/docs/pdf/economics\\_invasive.pdf](http://cms.oregon.gov/OISC/docs/pdf/economics_invasive.pdf)
6. Centers for Disease Control, Climate and Health Program— Vector-borne and Zoonotic Diseases <http://www.cdc.gov/climateandhealth/effects/vectorborne.htm>

### To learn about funding opportunities, please visit the following sites:

Tribal Climate Change Funding Guide: <http://tribalclimate.uoregon.edu/publications/>

Tribes & Climate Change Funding page: <http://www4.nau.edu/tribalclimatechange/resources/funding.asp>

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