Incorporating Climate Resiliency Criteria into GLRI Applications

(Adapted from GLRI Standardized Climate Resiliency Criteria, GLRI Regional Working Group, 2016)

Background

"Resilience" is defined as the capacity of social, economic, and environmental systems to cope with a hazardous event, trend, or disturbance, responding or reorganizing in ways that maintain systems' essential function, identity, and structure while also maintaining the capacity for adaptation, learning, and transformation.[1]

The expected climate change effects in the Great Lakes region are well documented.[2,3,4] The effects include, but are not limited to, the following:

- Increased rainfall and flooding: Extreme rainfall events and flooding have increased during the last century, and these trends are expected to continue. This increase, in combination with land cover change, may have the following effects: erosion; declining water quality; and negative impacts on transportation, agriculture, human health, and infrastructure.
- Forest and land cover composition: The composition of forests in the Great Lakes region is changing as the climate warms. Many tree species are shifting northward, with more southerly varieties replacing them. Many iconic north wood tree species will lose their advantage and be slowly replaced over the next century.
- Increased risks to the Great Lakes: Climate change effects include increasing air and water temperatures, increased duration and strength of thermal stratification, increases in precipitation, reductions in ice cover, and lengthened growing seasons. These things will exacerbate a range of risks to the Great Lakes, including changes in the range and distribution of certain fish species, increased invasive species and harmful blooms of algae, and declining beach health.
- Impacts to agriculture: In the next few decades, longer growing seasons and rising carbon dioxide levels will increase yields of some crops, though those benefits will be progressively offset by extreme weather events. The region's fruit crops are particularly vulnerable to anomalous weather events, which are becoming more frequent. Though adaptation options can reduce some of the detrimental effects, in the long term, the combined stresses associated with climate change are expected to decrease agricultural productivity.

The Criteria

GLRI-funded projects may be impacted by one or more key climate change effects. To ensure that GLRI-funded projects are resilient to the effects of projected climate change in the Great Lakes, agencies have developed the following criteria to aid in the planning and implementation of projects. The criteria are based on the concepts of vulnerability, risk, adaptation, and leveraging expertise. "Vulnerability"[5] is defined as the predisposition of a project to be adversely affected and includes its susceptibility to harm

[1] Definition excerpted from the Intergovernmental Panel on Climate Change (IPCC) 2014
[2] Pryor, S.C. et al. 2014
[3] GLISA 2014
[4] Lofgren and Rouhana 2016
[5] Definition modified from IPCC 2014

and lack of capacity to adapt. "Risk"[6] is defined as the potential for something to adversely impact a project when the project outcome(s) are uncertain. "Adaptation"[7] is defined as the process of adjustment to actual or expected climate change effects. The criteria are four questions that agencies should consider in the planning and implementation of GLRI projects.

1) Have the vulnerabilities to the projected types and severity of climate change effects been considered?
2) Have the risks of the potential climate change effects on longevity and intended outcome(s) been considered?
3) Has GLRI project planning and implementation been adapted to projected vulnerability and risk of climate change?
4) Has GLRI project planning and implementation considered building upon local, State, Tribal, regional, national, and international partners' climate change expertise, experiences, and resiliency and/or adaptation plans in a cost-effective and efficient manner?

Available Resources and Tools

In the interest of using existing tools and expertise to incorporate climate resiliency criteria into project planning and implementation, a list of some tools and resources relevant to trees and forests within the Great Lakes Basin is provided below. The date the resource was developed or updated is listed if applicable.

- Climate science
  - Fourth National Climate Assessment, 2018
  - Fourth National Climate Assessment Ch 21- Midwest Region, 2018
  - Synthesis of the Third National Climate Assessment for the Great Lakes Region, 2014
- Decision-support tools and databases for incorporating climate change effects into projects
  - Adaptation Workbook - A Climate Change Tool for Land Management and Conservation
  - Climate Change Response Framework
  - Lake Level Viewer, 2018
- Adaptation plans and vulnerability assessments applicable across the Great Lakes Basin
  - A Framework for Adapting Urban Forests To Climate Change, 2016
  - Climate Change & Urban Environments: Adaptation through Diversity (recording), 2016
  - WICCI Plants and Natural Communities Working Group
  - Forested Watersheds page, Climate Change Response Framework, 2019
  - Northeastern US Forest Pests page, Climate Change Resource Center, 2019
- Regional forest ecosystem vulnerability assessments
  - Minnesota Assessment, covering northern Minnesota, 2014
  - Wisconsin Assessment, covering northern Wisconsin and western Upper Peninsula of Michigan, 2014
  - Chicago Wilderness Assessment, covering the Chicago region and parts of northwest Indiana, 2017

[6] Definition modified from USGCRP 2016
[7] Definition modified from IPCC 2104

- Michigan Assessment, covering northern Michigan, 2014
- Mid-Atlantic Assessment, covering Pennsylvania, Maryland, Delaware, and southern New York, 2018
- New England and Northern New York Assessment, covering Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, and northern New York, 2018

References

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