EcoAdapt’s Climate Vulnerability Assessment Cheat Sheet

\[ V = E + S - AC \]

**Vulnerability (V)** to climate change reflects:

*Exposure (E)*: how much change occurs, including changes outside the project area that affect the target (e.g. loss of glaciers \( \rightarrow \) loss of water supply)

*Sensitivity (S)*: how much the target is affected by a given amount of change

*Adaptive capacity (AC)*: ability to adapt to change; reflects intrinsic traits (e.g. phenotypic plasticity of individuals, species diversity of communities) or extrinsic factors (e.g. degree of habitat fragmentation)

**Defining Vulnerability:** Climate change vulnerability refers to the extent to which a species, habitat, or ecosystem process is susceptible to harm from climate change impacts. **What** things are most vulnerable and **why** are they vulnerable.

**Vulnerability Components**

*Factors to consider for assessing Exposure:* primary factors (e.g., temperature, precipitation) and secondary factors (e.g., hydrology, sea level rise, vegetation changes); non-climate stressors (e.g., development, invasive species)

*Factors affecting Sensitivity:* narrow environmental tolerances or thresholds; dependence on interactions with other species; specialized habitat requirements; disturbance regimes; additional stressors

*Factors that can influence Adaptive Capacity:* plasticity; dispersal abilities; evolutionary potential; landscape permeability; institutional capabilities

Figure 1. From Glick et al. 2011.
OPTIONS FOR DECREASING VULNERABILITY OF A SPECIES OR A SYSTEM

1. Decreasing EXPOSURE
   - Reducing greenhouse gas emission to reduce rate and extent of global change
   - Restoring wetlands to limit increases in drought and flooding
   - Replanting riparian vegetation to limit in-stream water temperature increases
   - Increasing use of permeable pavements and other low-impact approaches to decrease runoff/increase groundwater recharge, which limits increases in drought and flooding

2. Examples of decreasing SENSITIVITY
   - Reducing or limiting levels of pollutants that increase temperature sensitivity
   - In restoration projects, replanting with a mix of species that can cope with a range of climatic conditions
   - Breeding or supporting the evolution of tolerance for likely future conditions in key populations of plants and animals
   - Anticipating and preventing (e.g. through programs to increase efficiency of water use by farms or municipalities) increased demands on resources by people as a result of climate change

3. Examples of increasing ADAPTIVE CAPACITY:
   - Making sure populations of plants and animals are healthy enough and genetically diverse enough that they can adapt evolutionarily to changing conditions
   - Supporting connections across the landscape and between different populations to support recovery from adverse events in part of a species’ range
   - Focusing protection efforts on areas with many climatic microhabitats
   - Increasing land- or seascape connectivity to support species range shifts