EcoAdapt's Climate Vulnerability Assessment Cheat Sheet

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$$V = E*S * 1/AC$$

***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→loss of water supply)

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

> ***Adaptive capacity (AC)***: ability to adapt or respond 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

Figure 1. From Glick et al. 2011.
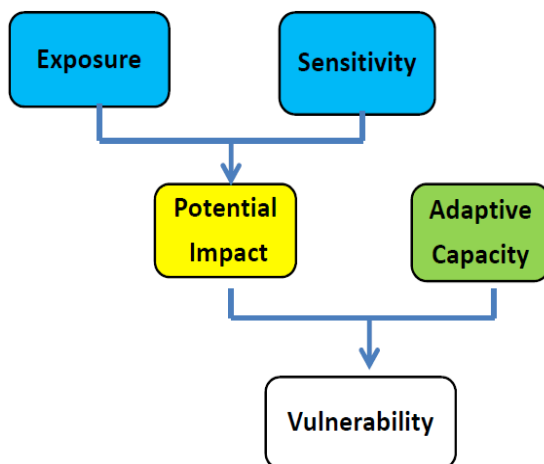
Factors to consider for assessing *Exposure*: primary factors (e.g., temperature, precipitation) and secondary factors (e.g., hydrology, wildfire, vegetation changes); non-climate stressors (e.g., development, invasive species)

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

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

OPTIONS FOR DECREASING VULNERABILITY OF A SPECIES OR A SYSTEM

1. Decreasing EXPOSURE
2. Decreasing SENSITIVITY
3. Increasing ADAPTIVE CAPACITY

1. **Examples of 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 landscape connectivity to support species range shifts**