



EcoAdapt's Climate Vulnerability Assessment Cheat Sheet

$$V = E + S - AC$$

Vulnerability (V) to climate change reflects:

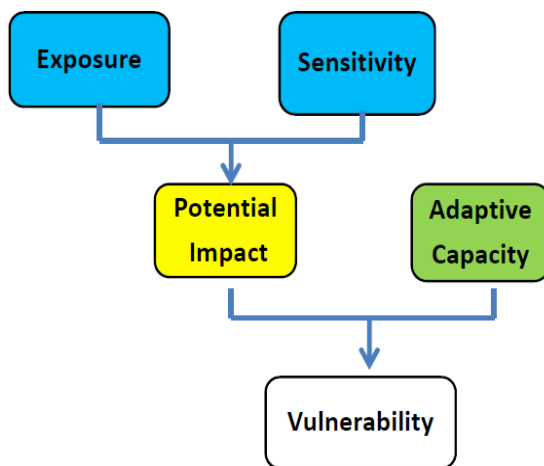
Exposure (E): how much change occurs, including changes outside the project area that affect the target (e.g. loss of glaciers → loss of water supply)

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
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 land- or seascape connectivity to support species range shifts