EcoAdapt™
Meeting the challenges of climate change

Climate Vulnerability Assessment Cheat Sheet

Vulnerability = (E*S) – AC

Vulnerability (V) to climate change reflects:

> ***Exposure (E)***: how much of a change in climate or other environmental factor a resource is likely to experience, including changes outside the project area that affect the resource
>
> ***Sensitivity (S)***: how much the resource is likely to be affected by a given amount of change
>
> ***Adaptive capacity (AC)***: ability of a resource to accommodate or cope with change through intrinsic traits (e.g. phenotypic plasticity of individuals, species diversity of communities) or extrinsic factors (e.g. degree of habitat fragmentation, ability to resist or recover from stressors)

Defining Vulnerability: Climate change vulnerability refers to the extent to which a resource (e.g., species, habitat, or ecosystem process) is susceptible to harm from climate change impacts. It explores both ***what*** things are most vulnerable and ***why*** are they vulnerable.

Vulnerability Components

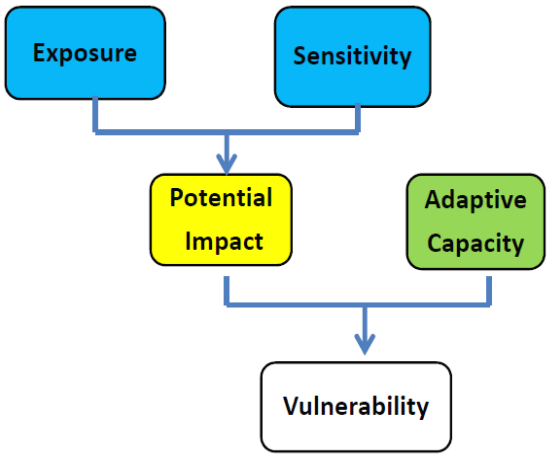

Figure 1. From Glick et al. 2011

Factors to consider for assessing *Exposure*:

- primary factors (e.g., temperature, precipitation)
- secondary factors (e.g., snowpack, sea level rise, vegetation changes)
- non-climate stressors (e.g., development, invasive species, pollution)

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 ability
- evolutionary potential
- integrity, continuity, extent
- institutional or management capabilities

Examples of Reducing Vulnerabilities and/or Enhancing Adaptive Capacity[1]

1. Decreasing EXPOSURE (i.e., how to limit change itself)

- Reducing greenhouse gas emissions to reduce rate and extent of global change
- Protecting resources and infrastructure from flood damage, sea level rise, and/or storm surge
- Planting riparian tree canopy to provide shading over open water to moderate exposure to warmer air temperatures
- Increasing use of permeable pavements and other low-impact approaches to decrease runoff and/or increase groundwater recharge, helping limit drought and flooding

2. Decreasing SENSITIVITY (i.e., how to limit the impact of change)

- Reducing or eliminating invasive species that outcompete native species for limited water resources
- Actively planting drought-tolerant species in an area projected to get drier
- Reducing frequency and/or timing of grazing during vulnerable periods (e.g., during drought periods)
- Increasing upland water storage (e.g., relocating beavers, installing beaver mimic dams) to help keep water in the system

3. Enhancing ADAPTIVE CAPACITY (i.e., how to spread risks):

- Diversifying water supply sources and/or increasing storage capacity
- Focusing protection efforts on areas with many climatic microhabitats and/or "enduring features" (e.g., geophysical features) that will support future diversification
- Maintaining or enhancing biological diversity across a range of functional groups to improve the ability of a system to recover from disturbances
- Increasing landscape connectivity to facilitate species movements over the landscape in response to changing conditions

[1] Examples modified from Gregg et al. 2011; Hansen and Hoffman 2010; and Stein et al. 2014.