Adaptive Capacity

Session Goals

- Review the concept of adaptive capacity
- Explore why it matters
- Understand factors influencing adaptive capacity in species and habitats

Definitions

"the potential, capability, or ability of a system to adjust to climate change, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences" (IPCC 2007)

"the potential for that species, system, or process to respond, move, or even transform in a way that allows persistence or maintenance of key functions as conditions rapidly change" (Winkler 2014)

"…capacity of a system to adapt if the environment where the system exists is changing. It is applied to e.g., ecological systems and human social systems." (Wiki)

Adaptive Capacity

- As applied to ecological systems, the adaptive capacity is determined by:
  - genetic diversity of species;
  - Behavioral plasticity;
  - biodiversity of particular ecosystems;
  - heterogeneous ecosystem mosaics as applied to specific landscapes or biome regions.
- As applied to human social systems, the adaptive capacity is determined by:
  - the ability of institutions and networks to learn, and store knowledge and experience;
  - creative flexibility in decision making and problem solving;
  - the existence of power structures that are responsive and consider the needs of all stakeholders.

Adaptive capacity confers resilience to perturbation, giving ecological and human social systems the ability to reconfigure themselves with minimum loss of function.

Adaptive capacity: species

Evolutionary potential

Phenotypic plasticity

Dispersal abilities

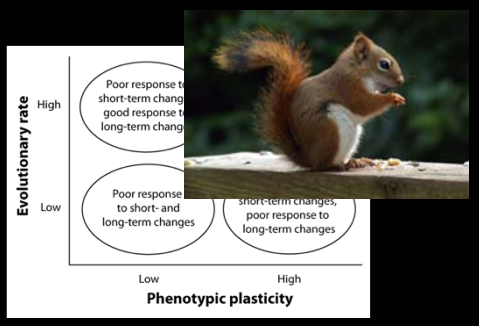
Behavioral plasticity

Plasticity

Melilotus officinalis *Cornus ru*

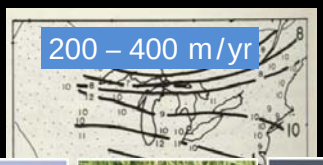
Concord, Mass.

Evolution



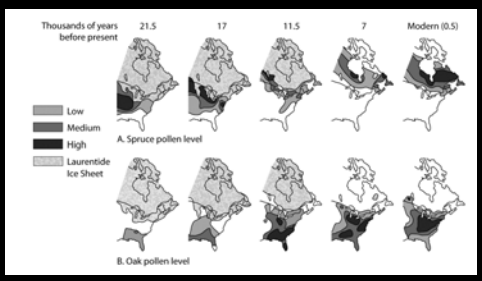
After Berteaux et al 2004

Dispersal



Audubon 2009

Species respond idiosyncratically



After Davis and Shaw 2001

Adaptive Capacity: Communities

Intrinsic vs. extrinsic

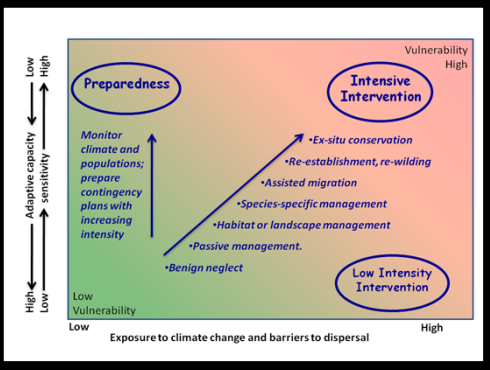
Extrinsic adaptive capacity: management potential

Activity. Adaptive capacity

Adaptive Capacity Example

- Family Farm
  - My family lives on a farm and we want to increase our resilience. Can we consider adaptive capacity as a means to improve resilience to climate change?
    - What might be exposed (biological, financial, cultural values).
    - What climate stressors are these valued things sensitive to?
    - What are the intrinsic and extrinsic adaptive capacities that can improve resilience?

EXTRAS



Source: Dawson et al. 2011

Removing barriers to landward shifts

Sea turtle nesting beaches

Measure:

- Slope
- Land use behind beach
- Habitat type behind beach

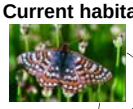
WIDECAST The Nature Conservancy

Supporting range shift, behavioral change

Future habitat

Quino butterfly Critical Habitat Ruling includes current, future, and transitional habitat !

Current habitat



Solid evidence for range change, novel host plant use