

ESTIMATING VULNERABILITY

Researchers use various methods to estimate a species' vulnerability to climate change. One popular class of assessments takes a trait-based approach, calculating organisms' vulnerability on the basis of their exposure to climate change, their sensitivity to that change, and their potential to adapt to new conditions, termed their adaptive capacity.

SENSITIVITY

A measure of how likely a species is to experience negative effects of climate change. Failing to account for traits that confer higher sensitivity can result in overoptimistic estimates of species' vulnerability.



A **low reproductive rate** can reduce a species' capacity to recover following adverse events.



Narrow tolerance ranges for abiotic conditions such as temperature heighten a species' sensitivity.



Epigenetic variation can help a species acclimate to a rapidly changing environment.



High levels of **genetic diversity** set the stage for faster evolution in a population under environmental stress.



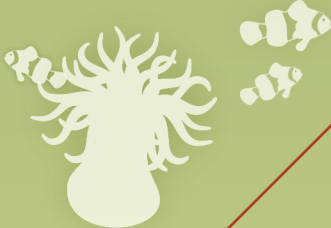
Small population sizes magnify the effect of die-offs.

Specialization on a particular habitat or food source increases a species' sensitivity.



The capacity to **migrate** or **disperse** quickly can help organisms avoid the harmful effects of climate change.

A higher number of **species interactions** can multiply the harmful consequences of climate change via indirect effects.



EXPOSURE

The magnitude and type of environmental changes that a population is likely to experience under future climate scenarios. Estimates of exposure are strongly affected by the choice of climate forecast model, and add a considerable source of uncertainty into climate change vulnerability assessments.



Phenotypic plasticity allows individuals to tolerate a wider range of conditions or to shift the timing of life-history stages such as reproduction.



Coastal organisms will experience **rising sea levels**.



An increasing frequency of **fires** will decrease habitat stability.



Increasing **aridity** will lead to more frequent droughts.

Temperature fluctuations and **extreme weather events** will become more frequent around the globe.



Organisms living in the polar regions will be exposed to accelerating and more expansive **ice melt**.