

Stability and change Give evidence that ecosystems can be stable.	Stability and change Four requirements for ecosystem stability
Stability and change Tipping point	Stability and change Why does the Amazon need a large area of forest?
Stability and change Percentage change formula	Stability and change Mesocosm
Stability and change Keystone species	Stability and change Condition for sustainable harvesting

Supply of energy, recycling of nutrients, genetic diversity, climatic variables within tolerance levels.

Some have persisted for tens of millions of years, e.g. rainforest in the Daintree region of Australia and the Namib Desert (arid for at least 55 million years).

Transpiration generates water vapour, causing cooling, air flows and rainfall inland. The minimum area needed is uncertain.

A critical threshold beyond which a small change causes a large, often irreversible, shift to a different state.

A small experimental ecosystem used as a model; best in sealed glass vessels so matter cannot enter or leave but energy can.

$$(\text{final} - \text{original}) \div \text{original} \times 100.$$

The rate of harvesting is lower than the rate of replacement.

A species with a disproportionate impact on community structure; removing it risks ecosystem collapse, e.g. sea otters in kelp forests.

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How is the sustainability of cod fishing assessed?

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Factors affecting sustainability of agriculture

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Biochemical oxygen demand (BOD)

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Why do fish die in eutrophication?

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Which fertilizers cause eutrophication by leaching?

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Biomagnification

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Effect of DDT on birds of prey

Stability and change

Mercury biomagnification

Soil erosion, leaching of nutrients, supply of fertilizers and other inputs, pollution by agrochemicals, carbon footprint.

Stock assessments of breeding adults from catches and surveys; age structure of the catch; quotas and mesh sizes set accordingly.

Dead algae and plants are decomposed by aerobic bacteria; BOD rises, dissolved oxygen falls.

Oxygen used by microorganisms in a water sample over a set time to break down organic matter.

Increase in concentration of a toxin in the tissues of consumers at each higher trophic level.

Nitrogen (nitrate) and phosphate fertilizers.

From coal burning and mining; bacteria make methylmercury; highest in large predatory fish such as tuna; damages the nervous system.

Thin eggshells that broke, so populations of ospreys and peregrine falcons crashed.

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Why are plastics persistent?

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Macroplastic vs microplastic effects

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Three methods of rewilding

Stability and change

Hinewai Reserve

Macroplastic: entanglement and swallowing (blocked guts). Microplastic (under 5 mm): eaten by plankton and filter feeders, passes along food chains.

They are non-biodegradable: decomposers lack enzymes to break them down.

Former farmland in New Zealand where, with grazing removed and minimal interference, native forest regenerates through gorse.

Reintroduce apex predators and keystone species; reconnect habitats over large areas; minimise human impact.