

A closed ecosystem

Most ecosystems are open. Closed systems exchange energy but not matter. No natural system on Earth is considered to be a closed system, but the entire planet can be considered 'almost' closed (large amounts of light energy enter earth and eventually return to space as heat, but no matter is exchanged).

A closed ecological system (CES) could be a space station (-> doesn't rely on exchange of matter with its surroundings). In a CES, waste products made by a species must be used by at least one other species and converted into eg oxygen, food and water -> involves at least one autotroph and sunlight must be available.

Disturbances influence the structure and rate of change in an ecosystem

Disturbance = new environmental condition that affects structure and rate of change in a ES

-> can be natural (eg fire, flood, wind) or caused by humans (eg clearing of a forest, road)

- Joseph Connell: disturbance is a common phenomenon + can have beneficial affect on diversity

High levels of disturbance

- reduce diversity
- community only consists of few species that can complete life cycle between disturbances

Low (infrequent) disturbances

- decline in diversity -> species that are best competitors will dominate

Intermediate levels of disturbances

- most effective at maintaining diversity
- enough time between disturbances for colonisation
- slows the growth of dominant species

Preview from Notesale.co.uk
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Potential impacts:

- accumulation, these plastics don't break down
- ingestion by marine organisms, damaging their digestive system
- absorption of components or chemicals by ingesting organism
- accumulation of those chemicals in body of ingesting organism

Impact of microplastic debris on lugworm

- lugworm (*Arenicola marina*) = earthworms of the sea, common in USA and Europe
- used as bait by fisherman
- feed on ocean floor sediments by stripping the sediment of debris and organic matter
- eat sand particles and their nutrients and microorganisms
- therefore, their health can tell us about the health of the oceans = indicator organism
- pollutants on microplastic pieces found in lugworm's tissues
- makes them vulnerable to pathogens which cause them to not churn up sediments
- > one of their most important functions in ocean ecosystem
- = key finding (USA considers microplastics to be non-hazardous)

Biological control and eradication programmes to reduce the impact of alien species**Biological control**

Using a natural predator to control unwanted or invasive species

Pro: environmentally friendly

Con: risk when introducing new species

Introduced alien species

Biological control can be backfired when the introduced alien species becomes invasive

Example: Cane toad in Australia -> see above

- competitive exclusion -> affects endemic species -> decline of small reptile species

Example: Kudzu in America -> see above

- absence of predators -> affects endemic species -> population explosion

Example: Kudzu in USA -> see above

Invasive species are a threat to the environment and the economy. Attempts to eradicate them:

Example: Black striped mussel, Australia

- multiplied fast and tacked to ships -> threat to tropical waters -> damage to pearl industry
- eradication: poured chemicals into the sea -> death of all organisms

Example: Oriental fruit fly, Japan

- larvae ate fruit -> damaging crops
- eradication: sterile insect release (SIR): released sterile males, eggs not viable

Analysis of data illustrating the cause and effects of biomagnification

Bioaccumulation is the net accumulation over time of POPs or heavy metals within an organism from both biotic and abiotic sources.