

GLG 110 - CHAPTER 4 - ECOLOGY AND GEOLOGY

Intro to Envir. Geol. – E.A. Keller

- **Ecology** – the study of controls over the distribution and abundance of living things
 - Species – a group of individuals capable of interbreeding
 - Population – a group of individuals of the same species living in the same area
 - Ecological community – a group of populations of different species living in the same area, interacting to various degrees
 - Habitat – where a particular species lives
 - Niche – how a particular species makes its living
 - Indigenous species – species that are found in the area where they evolved (e.g., Kangaroos in Australia)
 - Exotic species – species brought into an area or region by humans, either purposely or by accident
 - Invasive species – exotic species which compete with and may replace indigenous species in their habitat
 - Biosphere – part of Earth where life exists
 - Biota – all organisms living in an area or region
- **Ecosystem** – an ecological community (organisms) and its nonliving (geologic) environment in which energy flows and chemicals (such as nutrients and water) flow (Keller, p. 108)
- Succession – the systematic change of species as an ecosystem evolves after a large disturbance (e.g., fire, flood, volcanic eruption) starts things over from scratch
 - Primary succession – new land surface (e.g., lava flows adding land to island of Hawaii) gets populated
 - Secondary succession – reestablishment of previously existing ecosystems (e.g., regrowth of forest after a major fire)
- Balance of nature in a static state is non-existent – **disturbance** and **change** are natural
 - Humans put themselves in harm's way and become frustrated when attempting to ignore this fact or rely on it “taking a break” during their lifetimes
 - Climate change occurs naturally
 - ♣ “Global warming” as currently discussed should be focusing on what portion of the current trend has been artificially increased by man's activities, not on trying to halt any/all change in climate
- Human-constructed ecosystems can be used to aid in cleaning up environmental problems
 - Marsh plants use and remove nutrients in water that may represent unwanted waste
- Plants on steep slopes stabilize soil – naturally/artificially
- Removal of helpful ecosystems (like slope vegetation or coastal marshes) can increase hazards to human life and property, such as coastal flooding, and reduce ability to naturally clean the water
- **Biodiversity** – the number/abundance of species in an ecosystem
 - Geology influences biodiversity from small (hillside) to large (mountain range) scales
 - ♣ Example: trees in post-glacial Europe vs. N. America
 - Increased by diverse habitat with many potential niches, moderate disturbances, harsh environmental conditions in places within a diverse region, relatively constant climate/elevation, heavily life-modified environments
 - Decreased by extreme or very frequent disturbance (e.g., inside a volcanic crater), extreme environment locally decreases diversity, human transformation of the land

(dams, urban sprawl, etc.), pollution and other environmental stresses, habitat simplification (e.g., farming, flood control, etc.), introduction of invasive species, inopportune orientation of mountain ranges (esp. during ice ages)

- Keystone species – have a disproportionately large effect on ecosystems
 - Examples – wolves in Yellowstone, sea otters in kelp forests, bison on prairie, corals
- Urban and agricultural land transformations produced by humans over the past 2000 years have greatly decreased biodiversity and we are in the middle of a human-produced mass extinction
- Human footprint on the environment – impact we have on our planet
 - Can be reduced by either population reduction (gradual vs. catastrophic) or to use resources and manage our waste more efficiently
- **Ecological restoration** – altering an area in order to recover historical indigenous ecosystems
 - Waste clean-up
 - Replanting trees and other plants
 - Dam removal
 - Reintroduction of native species
 - Everglades as a LARGE example
 - “Big 3” – hydrologic/water conditions/soil and rock/vegetation
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