

GEOGRAPHY

Vulnerability and Resilience of Ecosystems Essay

Ecosystems everywhere function in a state of environmental equilibrium, meaning all the components of the ecosystem are in balance with one another. However, when natural and human induced modifications strain the environment too far, this balance can be lost and thus have destructive consequences for that ecosystem. To ensure that ecosystems worldwide are not irreversibly damaged by these modifications, management strategies must be implemented to ensure that the ecosystem remains sustainably existent.

The vulnerability of an ecosystem is how susceptible it is to change, and the impact this change has on it. There are several factors that define the vulnerability of an ecosystem, being biodiversity, extent, location and linkages.

Linkage is the range of various organisms that an ecosystem can support, as well as the interdependence between them. Naturally, the greater this interdependence the less vulnerable to change that particular ecosystem is. If a primary consumer is lost, for example, it will not greatly affect an ecosystem if there are various other primary consumers within it.

Extent is the size of an ecosystem. The larger the better, as large ecosystems can support larger organism populations and therefore recover faster from any human induced modification. These which are relatively small are especially vulnerable. For example, a rainforest supports a wide variety of animals and plants within a relatively small area, in small numbers. Due to factors of modification such as deforestation by humans, many of these organisms are forced onto the verge of extinction, as these dramatic changes to their environment cannot be supported. Without more room for habitats and land, many of these species will drop off in even further numbers, and eventually vanish.

Location plays a critical role in the vulnerability of ecosystems. Factors such as temperature, distance to the sea and altitude all define what the characteristics of an ecosystem will be, and in certain harsh conditions, the ecosystems inhabitants need to be highly specialised in order to survive in it. As a result, the more specificity about an ecosystem, the more fragile it is to change. For example, degrading plastic pollution within the world's oceans floats just under the water's surface, and is ingested by marine organisms. Due to the high specialisation of the organisms ingesting the plastic, it acts like a toxic sponge, poisoning creatures from the inside out, working its way up the food chain by killing internally.

Lastly, Biodiversity relates back to two things, species diversity & genetic diversity. Species diversity means the range of characteristics within a species that will give it a better chance of survival should the ecosystem change. Genetic diversity is the specific genetic variants within the individuals of the species, meaning that, ideally, if an ecosystem is altered, the few creatures with a separate genetic code will allow the species to survive, due to being better suited to the changes that have occurred. In both cases, the greater the biodiversity of the ecosystem, then the more likely the chance of recovery for that ecosystem from change, as alternate means for ecosystem processes (e.g. nutrient processing) could occur if one particular way was either blocked or destroyed.

Ecosystem resilience relates back to how easily an ecosystem can recover after any sort of change/modification. The factors in vulnerability above are the same for resilience, in that the larger the ecosystem & the more diverse it is, and then the more resilient to change it will be. Overall, for both vulnerability and resilience, the impact of any human induced modifications depends highly on 'BELL' - biodiversity, extent, location and linkages – and through this the diversity of an ecosystem.

For management strategies, there are four categories: Preservation – the protection and continued safety of an ecosystem, through excluding visitors and strict laws. Conservation – movements towards ensuring the survival of an ecosystem via education of people and protection acts. Utilisation – allowing an ecosystem to exist whilst using the resources within it sustainably. Exploitation – stripping the ecosystem for its resources without sustaining it, essentially killing it off.

Preservation and conservation are very effective management strategies, as well as Utilisation, as long as authority is demonstrated and it is ensured that Utilisation doesn't become Exploitation, which destroys the ecosystem.