Wildlife conservation, Types and Measures

BSc. Part I Zoology (Hons) Paper II

Introduction

Wildlife conservation refers to the practice of protecting wild species and their habitats in order to prevent species from going extinct and to preserve natural Ecosystems. Major threats to wildlife include habitat destruction/degradation/fragmentation, overexploitation, poaching, pollution and climate change. The IUCN estimates that 27,000 species of the ones assessed are at risk for extinction. Expanding to all existing species, a 2019 UN report on biodiversity put this estimate even higher at a million species. It is also being acknowledged that an increasing number of ecosystems on Earth containing endangered species are disappearing. To address these issues, there have been both national and international governmental efforts to preserve Earth's wildlife. Prominent conservation agreements include the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the 1992 Convention on Biological Diversity (CBD). There are also numerous nongovernmental organizations (NGO's) dedicated to conservation such as the Nature Conservancy, World Wildlife Fund, and Conservation International.

Threats to wildlife

Habitat destruction

Habitat destruction decreases the number of places wildlife can live in. Habitat fragmentation breaks up a continuous tract of habitat, often dividing large wildlife populations into several smaller ones. Human-caused habitat loss and fragmentation are primary drivers of species declines and extinctions. Key examples of human-induced habitat loss include deforestation, agricultural expansion, and urbanization. Habitat destruction and fragmentation can increase the vulnerability of wildlife populations by reducing the space and resources available to them and by increasing the likelihood of conflict with humans. Moreover, destruction and fragmentation create smaller habitats. Smaller habitats support smaller populations, and smaller populations are more likely to go extinct.

Overexploitation

Overexploitation is the harvesting of animals and plants at a rate that is faster than the species' ability to recover. While often associated with overfishing, overexploitation can apply to many groups including mammals, birds, amphibians, reptiles, and plants. The danger of overexploitation is that if too many individuals of a species are taken, then the species may not recover. For example, overfishing of top marine predatory fish like tuna and salmon over the past century has led to a decline in fish sizes as well as fish numbers.

Poaching

Poaching for illegal wildlife trading is a major threat to certain species, particularly endangered ones whose status makes them economically valuable. Such species include many large mammals like African elephants, tigers, and rhinoceros. [traded for their tusks, skins, and horns respectively]. Less well-known targets of poaching include the harvest of protected plants and animals for souvenirs, food, skins, pets, and more; Because poachers tend to target threatened and endangered species, poaching causes already small populations to decline even further.

Culling

Culling is the deliberate and selective killing of wildlife by governments for various purposes. An example of this is shark culling, in which "shark control" programs in Queensland and New South Wales (in Australia) have killed thousands of sharks, as well as turtles, dolphins, whales, and other marine life. The Queensland "shark control" program alone has killed about 50,000 sharks — it has also killed more than 84,000 marine animals.

Pollution

A wide range of pollutants negatively affects wildlife health. For some pollutants, simple exposure is enough to do damage (e.g. pesticides). For others, it is through inhaling (e.g. air pollutants) or ingesting it (e.g. toxic metals). Pollutants affect different species in different ways so a pollutant that is bad for one might not affect another.

- **Air pollutants**: Most air pollutants come from burning fossil fuels and industrial emissions. These have direct and indirect effects on the health of wildlife and their ecosystems. For example, high levels of sulfur oxides (SO_x) can damage plants and stunt their growth. Sulfur oxides also contribute to acid rain, harming both terrestrial and aquatic ecosystems. Other air pollutants like smog, ground-level ozone, and particulate matter decrease air quality.
- **Heavy metals**: Heavy metals like arsenic, lead, and mercury naturally occur at low levels in the environment, but when ingested in high doses, can cause organ damage and cancer. How toxic they are depends on the exact metal, how much was ingested, and the animal that ingested it. Human activities such as mining, smelting, burning fossil fuels, and various industrial processes have contributed to the rise in heavy metal levels in the environment.
- **Toxic chemicals**: There are many sources of toxic chemical pollution including industrial wastewater, oil spills, and pesticides. There is a wide range of toxic chemicals so there is also a wide range of negative health effects. For example, synthetic pesticides and certain industrial chemicals are persistent organic pollutants. These pollutants are long-lived and can cause cancer, reproductive disorders, immune system problems, and nervous system problems.

Climate change

Humans are responsible for present-day climate change currently changing Earth's environmental conditions. It is related to some of the aforementioned threats to wildlife like habitat destruction and pollution. Rising temperatures, melting ice sheets, changes in precipitation patterns, severe droughts, heat waves that are more frequent, storm intensification and rising sea levels are some of the effects of climate change. Phenomena like droughts, heatwaves, intense storms, and rising sea levels, directly lead to habitat destruction. Meanwhile, a warming climate, fluctuating precipitation, and changing weather patterns will affect species ranges. Overall, the effects of climate change increase stress on ecosystems, and species unable to cope with rapidly changing conditions will go extinct. While modern climate change is caused by humans, past climate change events occurred naturally and have led to extinctions.

Species conservation

It's estimated that, because of human activities, current species extinction rates are about 1000 times greater than the background extinction rate (the 'normal' extinction rate that occurs without additional influence). According to the IUCN, out of all species assessed, over 27,000 are at risk of extinction and should be under conservation. Of these, 25% are mammals, 14% are birds, and 40% are amphibians. However, because not all species have been assessed, these numbers could be even higher. Yet, because resources are limited, sometimes it's not possible to give all species that need conservation due consideration. Deciding which species to conserve

is a function of how close to extinction a species is, whether the species is crucial to the ecosystem it resides in, and how much we care about it.

Habitat conservation

Habitat conservation is the practice of protecting a habitat in order to protect the species within it. This is sometimes preferable to focusing on a single species especially if the species in question has very specific habitat requirements or lives in a habitat with many other endangered species. The latter is often true of species living in biodiversity hotspots, which are areas of the world with an exceptionally high concentration of endemic species (species found nowhere else in the world). Many of these hotspots are in the tropics, mainly tropical forests like the Amazon. Habitat conservation is usually carried out by setting aside protected areas like national parks or nature reserves. Even when an area is not made into a park or reserve, it can still be monitored and maintained.

Conservation genetics

Conservation genetics studies genetic phenomena that impact the conservation of a species. Most conservation efforts focus on ensuring population growth but genetic diversity also greatly affect species survival. High genetic diversity increases survival because it means greater capacity to adapt to future environmental changes. Meanwhile, effects associated with low genetic diversity, such as inbreeding depression and loss of diversity from genetic drift, often decrease species survival by reducing the species' capacity to adapt or by increasing the frequency of genetic problems. However, not always the case, certain species are under threat because they have very low genetic diversity. As such, the best conservation action would be to restore their genetic diversity.

Conservation methods

Wildlife population monitoring

Monitoring of wildlife populations is an important part of conservation because it allows managers to gather information about the status of threatened species and to measure the effectiveness of management strategies. Monitoring can be local, regional, or range-wide, and can include one or many distinct populations. Metrics commonly gathered during monitoring include population numbers, geographic distribution, and genetic diversity, although many other metrics may be used.

Monitoring methods can be categorized as either "direct" or "indirect". Direct methods rely on directly seeing or hearing the animals, whereas indirect methods rely on "signs" that indicate the animals are present. For terrestrial vertebrates, common direct monitoring methods include direct observation, mark-recapture, transects, and variable plot surveys. Indirect methods include track stations, fecal counts, food removal, open or closed burrow-opening counts, burrow counts, runaway counts, knockdown cards, snow tracks, or responses to audio calls.

For large, terrestrial vertebrates, a popular method is to use camera traps for population estimation along with mark-recapture techniques. This method has been used successfully with tigers, black bears, and numerous other species. Mark-recapture methods are also used with genetic data from non-invasive hair or fecal samples. Such information can be analyzed independently or in conjunction with photographic methods to get a more complete picture of population viability.

Other measures taken to conserve wildlife

- To protect habitat by protecting forests
- To delimit areas of the natural habitat of wildlife
- To protect wildlife from pollution and other natural hazards
- To impose complete restriction on hunting and capturing of wildlife
- To impose restrictions on export and import of wildlife products and appropriate punishment to those who indulge in such activities
- To develop wildlife sanctuaries for wild animals
- To make special arrangements for protection of endangered species
- To develop general awareness at national and international level regrading protection of wildlife
- To develop a system of wildlife management through trained personnel