

Chapter 3

Wildlife Conservation & Management: Concepts and Methods



Photo: Anurag Swaroop

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Wildlife Conservation & Management:

Concepts and Methods

3.1. Introduction

We use the word wildlife without worrying about the exact definition every day (Michael, R. Conover, 2001). It is wrong to say that wildlife refers only to wild animals because the word wild has many meanings. Wild words sometimes describe a person or animal that shows uncertain, unpredictable, and uncontrolled behavior. Wildlife not only refers to species of all vulnerable animals, but also refers to all those plants and other organisms that are wild in an area without the introduction of humans (Usher, M. B., 1986). In general, the term wildlife comprises all uncultivated flora and undomesticated fauna (Grigg, G. and Kirshner, D., 2015). The section 2 (37) of Wildlife (Protection) Act, 1972, defines wildlife as "*any animal, aquatic or land vegetation, which is part of any dwelling place*".

To avoid confusion over different versions of the wild, many science magazines prefer to use the word animals free in place of wild animals. (Michael, R. Conover, 2001). It is doubtful that the word wildlife will ever be replaced by a free life, but the second one is a more correct word. Wildlife is often known as a resource. According to the definition resources, people get benefits. Resources are human creations. Without people, wildlife is present, but they are not resources. Resources are in the environment of physical, observable and imaginative objects and services that are of the use and value for humans. One effect can benefit people, if there were no people, wildlife can not affect them and therefore they cannot be

given credit. Wildlife and humans are so attached that wildlife affects people in many different ways. Free animals have many values, some of which are positive and some are negative (Michael, R. C., 2001).

We often hear or read about word conservation, such as environmentalists, scientists, journalists, architects, social workers or people from different areas like common man who all talk about conservation. There is different meaning of conservation for different people. In the current context, conservation refers to “*the preservation of wild plants, and animals in natural ecosystems or even in gardens or zoos, detached from their natural environment*” (Wiens, A. J., 2016). Today wildlife conservation is a total concept and it not only involves plants and animals, but also the microorganisms, soil and the environment of the other physical elements in which they live or where they depend on. According to Odum (1971) “*Conservation is the process which is related to the use, preservation and proper management of the natural resources and their protection from destruction, misuse, decay, fire or waste*” (Odum, 1971).

The Oxford dictionary describes conservation as “*the protection to protect something*”. “*Actions that directly improve the likelihood of residents and species living in the forest*” (Williams, et al., 2011). The word's significance is well established in Western ideas; “*Wildlife conservation is a task to protect wild animals and plant species and their habitat*”. Wildlife plays an important role in the balance of the environment and gives power to various natural processes of nature. The purpose of wildlife conservation is to ensure that the coming generations can witness and enjoy wildlife. Nature will be surrounded by wildlife and to recognize the importance of wildlife for humans. In an effort to protect wildlife conservation

and utilization of natural resources, it is an effort to try wisely that these resources will be available for coming generations. Human progress has been completely beneficial to humankind, but it is a wild life that has been suffering for many years. The invention of refined weapons, industrialization, urbanization and even the increase in human population are the main reasons for the reduction of our rich resources. These activities have greatly reduced the natural habitats of our wildlife and many species are endangered or almost extinct.

IUCN defines a protected area as: *"An area of land and sea is specially devoted to the conservation and management of biodiversity, and managed through legal or other effective means."* Security is not only security, but it includes enduring use of resources, conservation, protection and proper management. Biodiversity conservation can try at three levels: genes, species, and ecosystems. Management of the diversity of ecosystem means the protection of species, for which the ecosystem of different species, ecosystem and genetic management should be preserved at a certain level, and therefore, principally for the protection of biodiversity. It is necessary to target species or biodiversity conservation and housing related safety. Protection of biodiversity is impossible without the help and participation of people associated with forest (Mishra and Sherpa, 1987).

3.2 History of Wildlife Conservation in India

India is blessed with a great heritage of wildlife as well as a comprehensive history and tradition of wildlife conservation. There are various traditions of nature and wildlife conservation in Indian history and culture. India has played an important role in the protection of various wild animals like elephants, monkeys, snakes etc. There was some strict supervision in the protected areas and some

animals, birds and fish were fully protected. (Thapar, Valmik., 2006). If these animals become cruel then they were trapped and killed outside the sanctuary, so they do not disturb the rest. For the removal of wood, burning of coal, collection of grass and leaves, for cane and bamboo cutting, fur, skins, teeth and bones were completely prohibited. These types of forests were called sanctuaries and they claim of the starting of nine national parks of modern day age (Thapar, Valmik., 2006).

The Mughals, the Rajputs and Marathas all liked the prey and kept their hunting alive. The Mughal emperors were famous as hunters from the 13th to the 16th centuries. It was also known that the great Akbar had placed a thousand trained cheetahs to hunt deer and his successor, Jehangir, shot 889 nilgai among other animals. Such royal hunting families were responsible for the destruction of wildlife in India. Many of these protected areas have now become wildlife sanctuaries. Wildlife conservation has been executed in India under the Indian Forest Act and the legal framework of protected areas of the areas focused on species and wildlife protection act. Under this approach, schemes like National Wildlife Action Plan, National Biodiversity Action Plan, Project Tiger, and Project Elephants etc. are being implemented.

3.3. Loss of Wildlife in India

India is one of the largest biodiversity areas in the world and home to 90,000 animal species and 50,000 species of plants. To maintain ecosystem stability, this biological diversity should be preserved. Deforestation and desertification has destroyed the natural treasure of the Earth. In India, the population of elephants, tigers and lions is rapidly decreasing, the cheetah is already extinct. Elephants were found all over the country some time ago, but now have disappeared from Andhra

Pradesh, Madhya Pradesh and Maharashtra. Asian lions, which were very common in Asia, have disappeared from Asia, except in some hundred square kilometers of area in India. In the last 100 years in India, four types of mammals and three species of birds have become extinct. Another 40 species of forests, 20 species of birds, and 12 species of reptiles are considered highly threatened due to overexploitations, of forests (Hosetti, B. B, 2005).

3.4. *The IUCN Red List Categories*

The International Union for Conservation of Nature (IUCN) Red List of Threatened Species, also known as the IUCN Red List or Red Data List, launched in year the 1964 is the most comprehensive list of global conservation status of biological species in the world. IUCN is the world's main authority on the conservation status of species. A series of regional Red Lists are produced by countries or organizations, which assess the risk of extinction to species. IUCN aimed to have the category of every species re-evaluated every five years or at least every ten years. Species are classified by the IUCN Red List into nine groups. While arguing the IUCN Red List, the official term threatened is a compilation of three categories: Critically Endangered, Endangered, and Vulnerable. In this publication, the pink pages contain seriously endangered species. Green pages are used for those species which were endangered in the past, but now they have reached the points where they are no longer threatened.

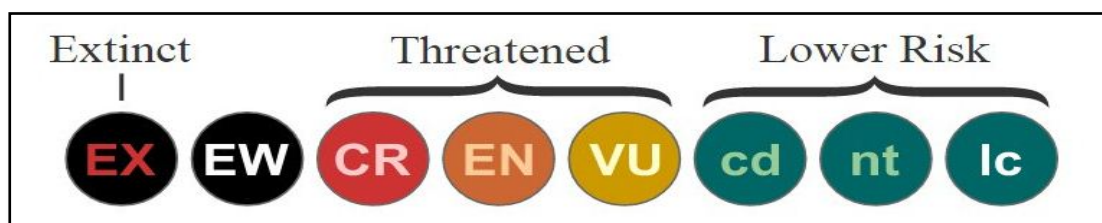


Figure 3.1: List of the IUCN Red List Category. Source: *birdlife.org*.

- 3.4.1. **Extinct (EX):** No known individuals remaining.
- 3.4.2. **Extinct in the Wild (EW):** Known only to survive in captivity, or as a naturalized population outside its historic range.
- 3.4.3. **Critically Endangered (CR):** Extremely high risk of extinction in the wild.
- 3.4.4. **Endangered (EN):** High risk of extinction in the wild.
- 3.4.5. **Vulnerable (VU):** High risk of endangerment in the wild.
- 3.4.6. **Near Threatened (NT):** Likely to become endangered in the near future.
- 3.4.7. **Least Concern (LC):** Lowest risk (does not qualify for a more at risk category; widespread and abundant taxa are included in this category).
- 3.4.8. **Data Deficient (DD):** Not enough data to make an assessment of its risk of extinction.
- 3.4.9. **Not Evaluated (NE):** Not yet been evaluated against the criteria.

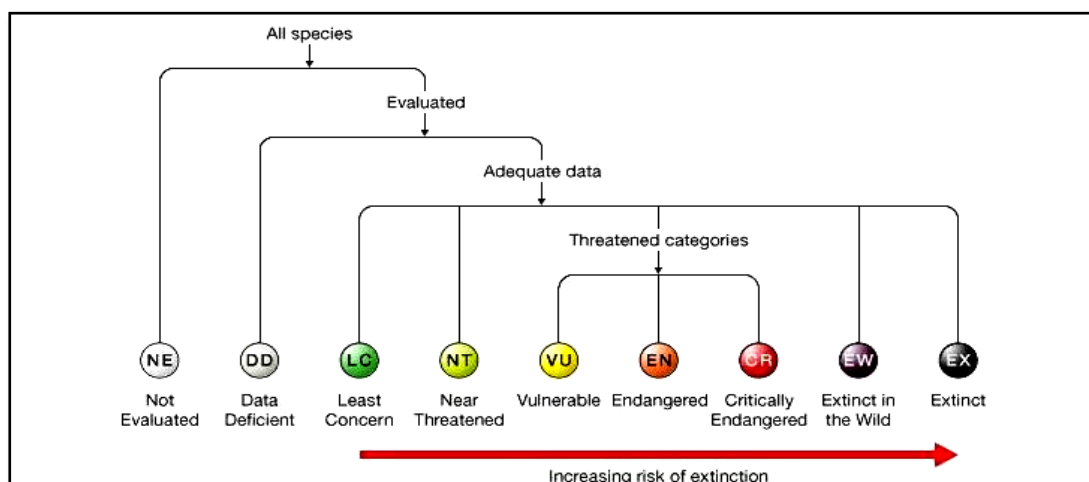


Figure 3.2: Red List Categories. Source: britanica.com.

3.5. Wildlife Conservation Strategy in India

To preserve the rich wildlife and rich areas of biodiversity, India has adopted a strategy to build networks of protected areas. There are several measures being taken to conserve biodiversity including plants and wildlife.

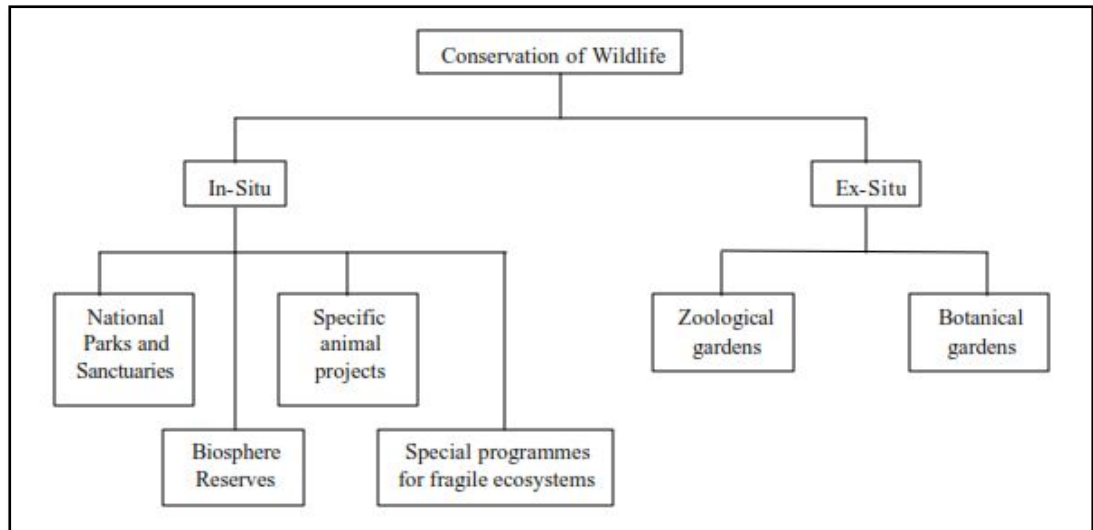


Figure 3.3: Flow Chart of Conservation of Wildlife. Source: environmentalpollution.in.

3.5.1. In-Situ

In-situ protection is on-site protection of genetic resources in the natural population of plant or animal species. This is the process of protecting an endangered plant or animal species in its natural habitat, either by protecting itself or by rehabilitation, or by protecting species from predators (Negi, S. S., 1993).

- Establish a system of protected areas or areas where special measures are needed to conserve biological diversity (National Parks, Wildlife Sanctuaries, Biosphere Reserve, Community Reserves and Biodiversity Hotspots).
- Develop necessary guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity.
- Promote the safety of maintenance of the ecological system, habitat and population of natural environment.
- Promote environmentally sound and sustainable development in areas adjacent to protected areas.

- Regenerate and restore degraded ecosystems and promote the recovery of threatened species, through the development and implementation of plans or other management strategies.

3.5.2. *Ex-Situ*

Ex-situ conservation is off-site conservation. It is the process of protecting an endangered species of plant or animal outside their natural habitat; for example, by removing part of the population from a threatened habitat and placing it in a new location, which may be a wild area or within the care of humans. Ex-situ management can occur within or outside a species' natural geographic range.

- Adopt measures for the ex-situ conservation of components of biological diversity, preferably in the country of origin of such components.
- Adopt measures for the recovery and rehabilitation of threatened species for their reintroduction into their natural habitats under suitable condition.
- Cooperate in providing financial and other support for ex-situ conservation.
- Regulate and manage collection of biological resources from natural habitats for ex-situ conservation purposes so as not to threaten ecosystems.

3.6. *Challenges to Wildlife Conservation*

It is clearly evident that the level of wildlife is declining incredibly in years. Animals and plant species are endangered or extinct. There are several factors that make this problem a reality. Some major factors like human-wildlife conflict, poaching, illegal wildlife trade, destruction of habitats, climate change, pollution, exploitation of resources etc. are destroying our wildlife. Although many efforts have been made around the world to preserve biodiversity and use it permanently, so far the approaches and strategies are not enough to solve the level of loss of

biodiversity or to reduce the pressure (Butchart, et al., 2010). Wildlife conservation, however, has become a major area of concern. Conservation of animals and plant species mainly intended at protecting the endangered species from becoming extinct because of different human activities. Due to human encroachment and their activities as well as some natural factors, wildlife is facing many threats.

3.6.1. Human-Wildlife Conflict

Human-Wildlife Conflict is an increasingly unusual problem for conservation of wildlife. Human-wildlife conflict is generally seen when the needs and behaviors of wildlife have a negative impact on human goals or when human goals have negatively impacted the needs of wildlife (Madden, 2004). The term human-wildlife conflict is now generally used to explain the circumstances that explain any negative interaction between humans and wildlife. These conflicts can be real or perceived, financial or aesthetic, social or political, such as those that may be originated from federal, state or local wildlife laws, rules or policies, which have the rights of wildlife, public benefit, and personal property rights are ready to defend or preserve (Messmer, 2000). Human-Wildlife Conflict also occurs when humans intentionally injure or kill wildlife because of their property, livelihood, lifestyle, livestock, person or family, covered or actual threats. For example, when a lion attacked someone's cattle, or the elephant attacked someone's crops, or someone has poisoned the tiger due to the threat to his family and animals. Human-wildlife conflict has so many different negative consequences (Woodroffe, R; Thirgood, S; Rabinowitz, A., 2005). The major consequences of human-wildlife conflict are:

- Injury and loss of life of humans and wildlife.

- Crop damage, livestock depredation, predation of managed wildlife stock.
- Damage to human property.
- Destruction of habitat.
- Collapse of wildlife populations and reduction of geographic ranges.

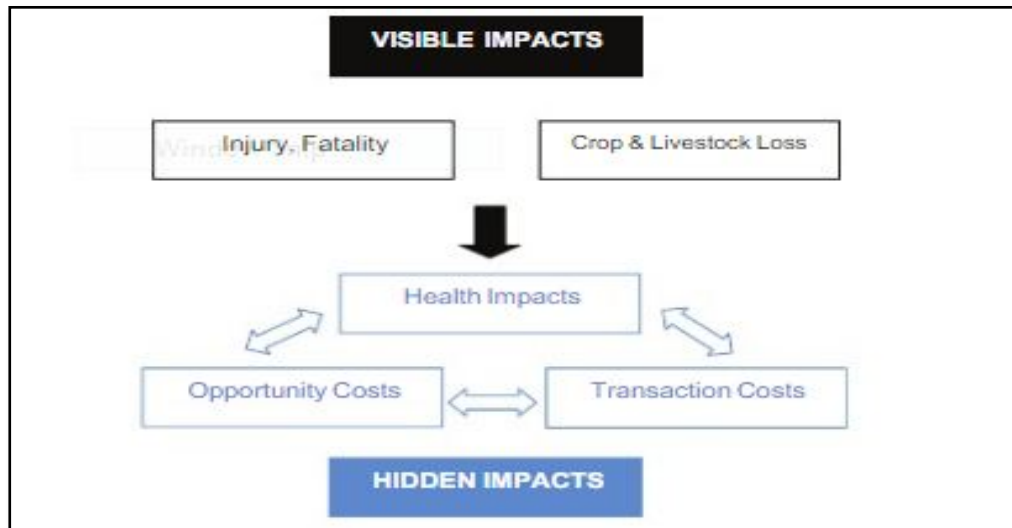


Figure 3.4: Visible and Hidden Impacts of Human-Wildlife Conflict. Source: sciencedirect.com



Figure 3.5 and 3.6: Consequences of Human-Wildlife Conflicts. Photo Credit: firstpost.com

3.6.2. Poaching Activities

Poaching has usually been defined as the illegal hunting or catching of wild animals (Webster, N., 1968). Encyclopedia Britannica says that, “*poaching was executed by indigent farmers for their livelihood purposes and a supplement for their scanty diets*” (Encyclopedia Britannica, Inc., 2010). According to Lemieux, “*poaching is an illegal capturing of wildlife, protected by national and international laws and conventions. Poaching of excessive numbers of definite number of animal species is an important factor leading to dangerous decline in their numbers*” (Lemieux, 2014).

3.6.2.1. Levels of Poaching

Poaching can generally be divided into three separate classes. All poaching levels are as equally critical because they are often interlinked and intelligence passes through all these levels. Poaching threatens many large species of animal. The tiger, snow leopard, jaguar and cheetah are hunted for their skins, rhinoceros for their horns and elephants for their ivory tusks.

- **Subsistence Level:** These kinds of persons usually hunt for themselves and their family. They often live in the vicinity of their poaching site and know the territory, habitat, infrastructure, routines and species extremely well, they often grow up in and around the wilderness area.
- **Commercial Poaching:** These kinds of persons can't be easily profiled. They may be the farmhouse managers or the subsistence level poachers who have enhanced their needs or requested to get some products. There

are also those who are simply opportunists who go forward to the fence lines looking for vulnerable.

- ***Syndicate Poaching:*** This is sophisticated organized crime, well financed, fine networked and internationally coordinated. They hire large organizations of individuals, generally local people to do the actual poaching.

3.6.3. Illegal Wildlife Trade

Along with the trade of illegal drugs, weapons and human trafficking, in connection with the economic values involved in crime, illegal wildlife business has consistently kept above the major illegal trade in the world (Warchol, 2007; Zimmerman, 2003; South and Wyatt, 2011; Wyatt, 2013b; UNODC 2012). According to Interpol, “*Wildlife crime is the taking, trading, exploiting or possessing of the world’s wild flora and fauna in contravention of national and international laws*” (Moreto, W., 2017). The use of uncontrolled natural resources reduces resources for countries and local communities, which depend on their livelihood. In the illegal wildlife business, there is a high mortality rate due to the nature of trafficking of living species. (Cantu, et al., 2007; Clark, Van Thai, and Phuong, 2008; Franke and Telecky, 2001). Wildlife is smuggled for various reasons including alternative medicines, goods or luxury goods, meat and live pet business. For their estimated medicinal properties, wildlife business is one of the largest contributors to animal parts, both quantities and species are affected as well. Illegal wildlife trade is a serious conservation problem, it has a negative impact on wildlife and it is one of the major threats to the existence of many species.








Type of network	Illustrative architecture (harvesters – intermediaries – consumers)	Explanation
a) Subsistence and local use		Harvest principally for household or very local use
b) Harvester directly to consumer		Harvesters have direct market access, usually due to geographic proximity
c) Restricted resource access		Resources access at source is limited by species distribution, a requisite harvest technology, user group rights, and/or enforcement
d) Gatekeeper		Market access is limited by a small number of intermediaries, potentially because of their ability to circumvent legal restrictions, access to technology, or market monopolization
e) Restricted market access		Market access relies on a limited number of sites or platforms (e.g., markets, internet sites)
f) Multiple barriers to market		Market access limited by multiple barriers, such as geographic distance, high enforcement and/or processing demands
g) Redundant pathways		There are few barriers to participation in illegal trade, potentially because resource is abundant or widely distributed, and/or enforcement is low

Figure 3.7: Common Illegal Wildlife Trade Network. Source: sciencedirect.com.

3.6.4. Habitat Destruction

Habitat destruction is a process in which natural habitat is unable to support species. In this process, the organisms that first use the site are displaced or destroyed, reduce biodiversity. The main reasons for the loss of habitat and destruction and the change in the abundance of organisms are the main reasons. The loss of housing and destruction is usually considered as a matter of conservation interest (Collinge, 2001). In ecological studies of endangered species, hunting is considered to be one of the most important factors of extinction. However, recently the destruction of environment and habitat is considered equally important, which is the cause of extinction.

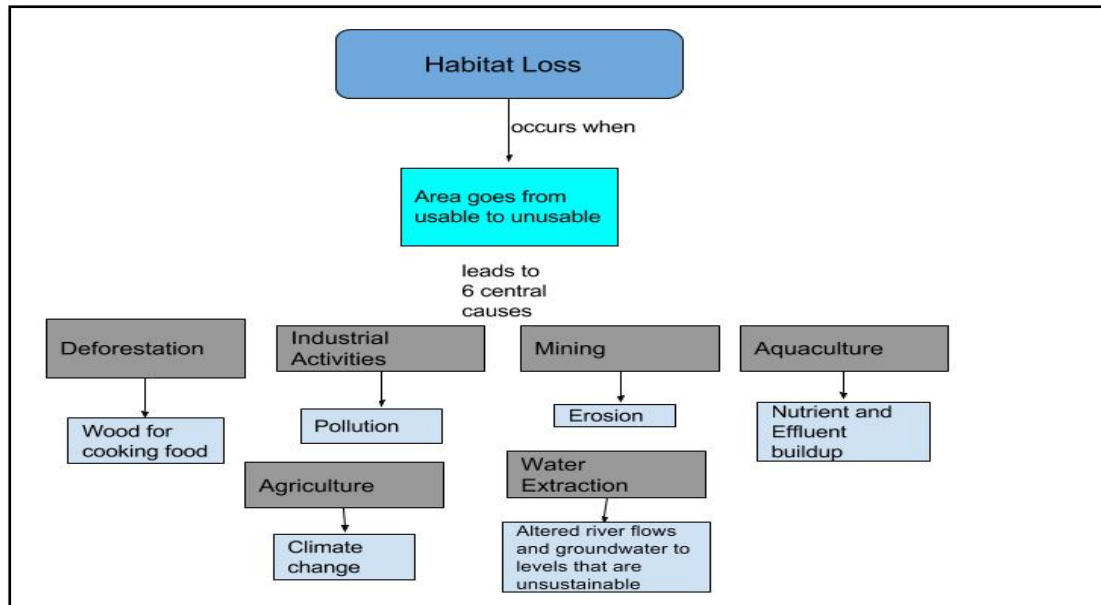


Figure 3.8: Causes of Habitat Loss. Source: our perspective blog.

3.6.5. Climate Change

Climate change is identified as a change in weather conditions, when this changing situation persists for an extended period of time. Climate change occurs due to factors such as biological conditions, various solar radiation conditions and volcanic eruption. Some human activities have consistently been identified as the main reasons for climate change, which are often referred to as global warming. The most common definition of climate change is a change in the statistical properties of the climate system, when the time is considered over a period of time. Climate change is how climate change changes for decades or more. Climate change occurs due to natural changes and human impact due to changes in the use of greenhouse gases and aerosol emissions and land use, humans contribute to climate change, as a result, global temperature has increased. Due to the increase in global temperature, there may be various effects, such as storms, floods, droughts and sea level rise, and the decline of ice sheets, sea ice and glaciers.

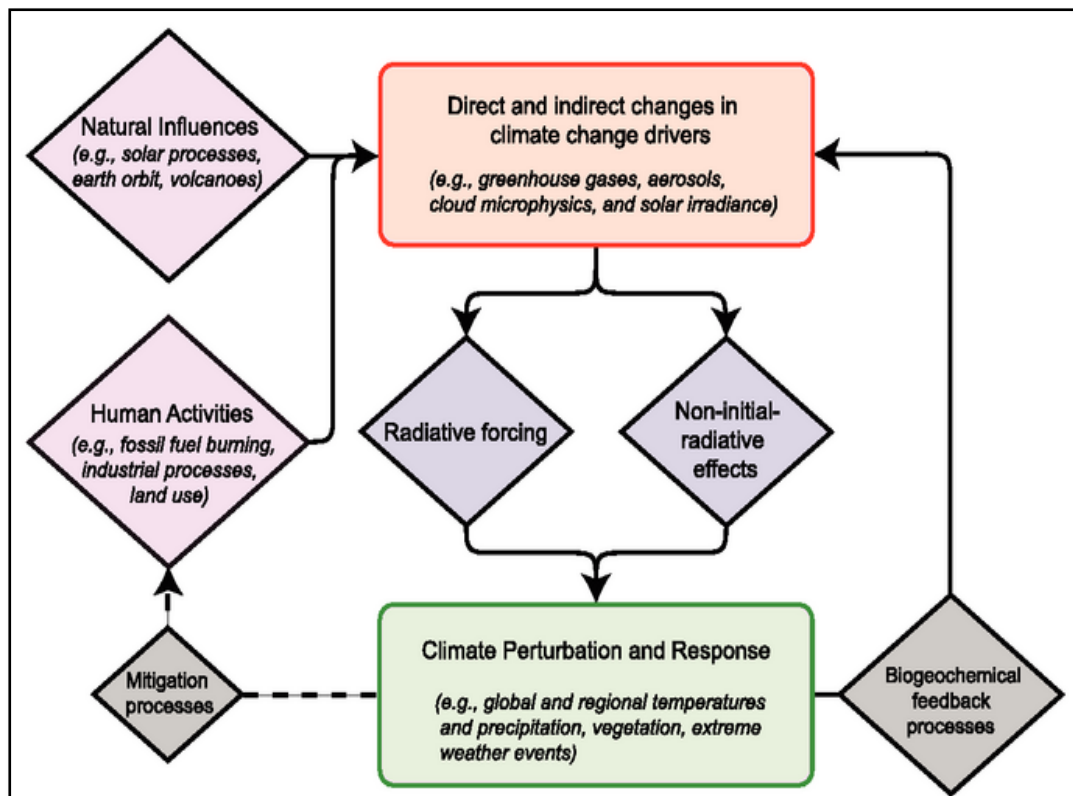


Figure 3.9: Impact of Climate Change. Source: climetnexus.org.

3.7. Wildlife Conservation & Management: Tools and Techniques

Wildlife management tries to meet wildlife requirements with the needs of people using the best available science. Due to the negative consequences of human activities on wildlife, wildlife conservation has become an increasingly important exercise. According to Salphey and Safer, “*there are two general types of wildlife management*” (Sulphey, M. M. and Safer, M. M., 2017):

- **Manipulative Management:** This involves controlling the numbers of animals straightly by harvesting or by controlling numbers by changing food supply, habitat and density of predators.
- **Custodial Management:** It is a preventive or protective and it decreases external impact on the population and its habitat. This is done by the

establishing National Parks where the ecological conditions are protected and threatened.

3.7.1. Elements of Wildlife Management

The management of wildlife depends on some special elements such as public participation, awareness and education for the protection and management of wildlife and their habitat.

- ***Public Participation:*** It is necessary to make local people understand and acknowledge the initiative and significance of wildlife protection. Public interaction can help in making local people accountable and cooperate in implementation of wildlife management laws and regulations.
- ***Public Awareness:*** People should recognize the concept of conservation of natural resources. The wildlife managers and other eminent persons should held public discussions, shows, and talks and should also take help of other media like newspapers, magazines, radio and television to make people aware about the fundamental concepts behind wildlife management. This can stop people from exploiting natural resources.
- ***Education:*** The role of education in public awareness programs is very significant. There should be environmental subjects based on wildlife conservation in school and college curricula. The well-educated and trained specialists on environmental and wildlife issues should participate in public training and interact with people and solve their queries to make them more accountable towards their wildlife management duties.
- ***Nature Interpretation Centers:*** Nature interpretation centers may include setting up of educational camps or exhibition in nearby regions of

protected areas such as zoological gardens, parks and wildlife sanctuaries. It is usually taken up by the concerned forest departments. The interpretation centers should be handled by qualified and trained staff in order to explain and motivate the concepts of wildlife management to the tourists and people of the nearby-protected areas.

- **Coordination:** Wildlife management is operated at four basic levels- local, state, national and international. Government agencies plan the policies of protecting, conserving and managing wildlife. All the management levels participate in passing wildlife management tools and many a time, conflicts arise.

3.7.2. Forms of Wildlife Management

- **Habitat Restoration and Management:** Habitat management is a principal tool that wildlife biologists use to manage, protect, and enhance wildlife populations. Increased wildlife diversity in an area may be a wildlife management goal. Managers may enhance grassland areas by clearing brush and removing trees, as well as over-planting them with native grassland species. This helps reduce cover used by periphery predators and develops the quality of the habitat for grassland animals.
- **Harvest:** Managers may attempt to reduce or maintain populations so animals conflict less with human activities. This is a present challenge for wildlife managers because hunting with firearms is not allowed. The most effective solution has been controlled hunting. Monkey population in urban India can be controlled by capture and release in wild areas.

- ***Endangered Species Management:*** Endangered or threatened species require critical management. Significant habitat and locations of existing populations must be identified so they can be managed successfully. Threatened species' populations are showing signs of unnatural decline or they are vulnerable to becoming endangered. Many endangered or threatened species are specialists that have very limiting habitat needs and eat specialized foods. The leading cause for a species becoming endangered or threatened is habitat loss.
- ***Species Reintroduction:*** Another wildlife management goal may be to re-establish species in suitable habitat. The lost species can be reintroduced from other areas once again in reintroduction programs and management efforts.
- ***Conservation and Preservation:*** Wildlife conservation helps ensure coming generations can enjoy our resources. Conservation can include harvesting natural resources, activities such as hunting, fishing, trapping and harvesting timber as well as non-consumptive activities such as bird watching, photography, and hiking. Conservation must balance issues between wildlife and human populations. Conservation of wildlife implies insuring threatened and endangered species receive special management to protect their presence in the future. Conservation may include preservation or protection of natural resources that emphasizes non-consumptive activities. A habitat or ecosystem can be preserved by manipulation and an area also may be managed by doing nothing at all.
- ***Biodiversity Conservation in Forest Ecosystems:*** Conservation of natural forest ecosystems is the main function of most protected forest areas and

the term “*protected area*” includes a vast variety of approaches for the management of natural and semi-natural forest types. National parks and forest reserves are no longer the only methods that can be used for the conservation of biological diversity. A possible alternative is multiple use forest management, which incorporates harvesting of forest products within a framework of sustainable management that aims at both conserving biodiversity and supplying benefits to local people and the national economy.

- ***Protected Areas:*** Various problems occur in relation to the management of protected areas. Problems comprise conflicts with local people over land rights and illegal extraction of animal and plant resources. These problems are often intensified due to the incapability of state authorities to protect such areas. Hence, stated conservation achievements do not always reflect reality. In practice, even though there are good examples of effective national parks and forest reserves, the past hundred years or more have witnessed a parallel increase in both the number and surface area of protected areas and a growing number of extinct or threatened species.
- ***Buffer Zones:*** Experience has shown that legal protection alone is not enough to ensure effective conservation activity. In particular, protected areas will only fulfill their conservation goals if the land around them is managed appropriately. In reality, many protected areas suffer from encroachment by farming and cropping activities. Currently therefore, the objective of biodiversity conservation in forests can only generally be ensured by the creation of substantial areas of natural forest for

production around them. Such a “*buffer zone*” can support the protected area while, at the same time, provide local people with benefits. Buffer zones are meant to form a physical barrier against human encroachment of the centrally protected area. Furthermore, the support of local people in conservation objectives can be promoted by their participation in the harvesting and management of buffer zones.

- ***Sustainable Wildlife Management:*** Wildlife is being used for tourism. Besides the financial value of these activities, this method of utilizing wildlife resources should be ecologically and socially viable, but it is important to remember that wildlife also has considerable socio-cultural and religious importance. In the past, authoritarian management of wildlife resources has often failed. Total bans on the use and marketing of game have also forced communities to poaching. The implication is that it is not generally possible to manage natural resources and fauna without the active participation of local communities in decision-making and subsequent benefits.
- ***Fire Protection:*** Although the fire is a natural component of many forest ecosystems, it can damage vegetation and consequently damage the soil erosion and fertility if it is not properly used. Similarly, there may be harmful effects in the fire, which can cause carbon emissions during combustion. It has been proved that most of the forest fires are due to human intervention due to various reasons. Effective fire control with direct control and reaction is a matter of popular education and agricultural policy.

- ***Management for Soil and Water Conservation:*** Forest watersheds which provide water to the densely populated areas should be avoided by changing farming and unplanned urbanization. In such cases, the only management forest cover should be effectively monitored for safety. Generally any technical problems are not available to work in water supply and work in the same watershed for the life of wildlife and plants, and the management made from underwater from these areas can be successful.

3.8. Chapter Summary

We use the word wildlife without worrying about the exact definition every day. It's wrong to say that wildlife refers only to wild animals because the word wild has many meanings. Wild words sometimes describe a person or animal that shows uncertain, unpredictable, and uncontrolled behavior. Wildlife not only refers to species of all vulnerable animals, but also refers to all those plants and other organisms that are wild in an area without the introduction of humans. We often hear or read about word conservation, such as environmentalists, scientists, journalists, architects, social workers or people from different areas like common man who all talk about conservation. There is different meaning of conservation for different people. In the current context, conservation refers to *“the preservation of wild plants, and animals in natural ecosystems or even in gardens or zoos, detached from their natural environment”*. *The word's significance is well established in Western ideas; “Wildlife conservation is a task to protect wild animals and plant species and their habitat”*. *Wildlife plays an important role in the balance of the environment and gives power to various natural processes of nature. The purpose*

of wildlife conservation is to ensure that the coming generations can witness and enjoy wildlife. Nature will be surrounded by wildlife and to recognize the importance of wildlife for humans. In an effort to protect wildlife conservation and utilization of natural resources, it is an effort to try wisely that these resources will be available for coming generations.

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