MSc-S3-16P3EVST11-BIODIVERSITY AND CONSERVATION

Topic-Conservation of Habitats

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Introduction

- Habitat is the physical and biological setting in which organisms live and in which the other components of the environment are encountered
- Habitat is a basic requirement of all living organisms
- Habitat is one of the four components of a species' environment, along with climate variables, nutrients, and other interacting organisms
- Habitat conservation is a management practice that seeks to conserve protect and restore habitat areas for wild plants and animals, especially conservation reliant species and prevent their extinction, fragmentation or reduction in range

Threats

- **Natural causes**
- Habitat loss and destruction can occur both naturally and through anthropogenic causes.
- Events leading to natural habitat loss include **climate change**, catastrophic events such as **volcanic explosions** and through the **interactions of invasive and non-invasive species.**
- Natural climate change, events have previously been the cause of many widespread and large scale losses in habitat.
- For example, some of the **mass extinction e**vents generally referred to as the **"Big Five**" have coincided with large scale such as the Earth entering an **ice age, or alternate warming event**s.
- Other events in the big five also have their roots in natural causes, such as **volcanic explosions and meteor collisions.**

- The **Chicxulub impact** is one such example, which has previously caused widespread losses in habitat
- Earth either received less sunlight or grew colder, causing certain fauna and flora to flourish whilst others perished.
- Previously known warm areas in the tropics, the most sensitive habitats on Earth, grew colder, and areas such as Australia developed radically different flora and fauna to those seen today.
- The big five mass extinction events have also been linked to **sea level changes,** indicating that large scale marine species loss was strongly influenced by loss in marine habitats, particularly shelf habitats. **Methane-driven oceanic eruptions** have also been shown to have caused smaller mass extinction events.

- **Human impacts**
- Humans have been the cause of many species' extinction.
- Due to humans' changing and modifying their environment, the habitat of other species often become altered or destroyed as a result of human actions. Even before the modern industrial era, humans were having widespread, and major effects on the environment.
- A good example of this is found in Aboriginal Australians and Australian megafauna
- **Aboriginal hunting practices,** which included burning large sections of forest at a time, eventually altered and changed Australia's vegetation so much that many herbivorous megafauna species were left with no habitat and were driven into extinction.
- Once herbivorous megafauna species became extinct, carnivorous megafauna species soon followed.
- In the recent past, humans have been responsible for causing more extinctions within a given period of time than ever before.

- **Deforestation, pollution, anthropogenic climate change and human settlements** have all been driving forces in altering or destroying habitats.
- The destruction of ecosystems such as **rainforests** has resulted in countless habitats being destroyed. These biodiversity hotspots are home to millions of habitat specialists, which do not exist beyond a tiny area. Once their habitat is destroyed, they cease to exist.
- This destruction has a follow-on effect, as species which coexist or depend upon the existence of other species also become extinct, eventually resulting in the collapse of an entire ecosystem.
- These time-delayed extinctions are referred to as the **extinction debt**, which is the result of destroying and fragmenting habitats.
- As a result of anthropogenic modification of the environment, the extinction rate has climbed to the point where the Earth is now within a **sixth mass extinction** event, as commonly agreed by biologists.
- This has been particularly evident, for example, in the **rapid decline in the number of amphibian species worldwide.**

Management of habitats-methods of conservation

- Habitat conservation is vital for protecting species and ecological processes.
- It is important to conserve and protect the space/ area in which that species occupies.
- Therefore, areas classified as ‘biodiversity hotspots’, or those in which a flagship, umbrella, or endangered species inhabits are often the habitats that are given precedence over others.
- Species that possess an elevated risk of extinction are given the highest priority and as a result of conserving their habitat, other species in that community are protected thus serving as an element of gap analysis.
- In the United States of America, a Habitat Conservation Plan (HCP) is often developed to conserve the environment in which a specific species inhabits.
- Under the U.S. Endangered Species Act (ESA) the habitat that requires protection in an HCP is referred to as the ‘critical habitat’.

Methods of conservation

- How much habitat is needed
- A range of methods and models currently exist that can be used to determine how much habitat is to be conserved in order to sustain a viable population, including Resource Selection Function and Step Selection models.
- Modelling tools often rely on the spatial scale of the area as an indicator of conservation value. There has been an increase in emphasis on conserving few large areas of habitat as opposed to many small areas. This idea is often referred to as the "single large or several small", SLOSS debate, and is a highly controversial area among conservation biologists and ecologists.
- The reasons behind the argument that "larger is better" include the reduction in the negative impacts of patch edge effects, the general idea that species richness increases with habitat area and the ability of larger habitats to support greater populations with lower extinction probabilities.
- Furthermore, he suggests many endangered species which are of high conservation value, may only be restricted to small isolated patches of habitat, and thus would be overlooked if larger areas were given a higher priority.
- The shift to conserving larger areas is somewhat justified in society by placing more value on larger vertebrate species, which naturally have larger habitat requirements.

- **The Nature Conservancy**
- **World Wildlife Fund (WWF)**
- **Rare Conservation**

- **Demography and population viability analysis**. Time-series data on the two target species of birds are to be gathered in at least half the subregions and from **representative physical circumstances that span those found across the regional distributions of the spe**cies. Data must include **territory size, time budgets, reproductive success, survivorship, emigration and immigration,** with separate data obtained both for males and females where possible. Population viability analyses are to be carried out for sample populations and metapopulations, and should consider connectivity and environmental effects.
- **Population viability analysis** (**PVA**) is a species-specific method of risk assessment frequently used in conservation biology. It is traditionally defined as the process that determines the **probabili**ty that a population will go extinct within a given number of years. More recently, PVA has been described as a marriage of ecology and statistics that brings together **species characteristics and environmental variability** to forecast population health and extinction risk.

- **Surveys and autecological studies of sensitive animals and** plants. Basic information on the location, abundance, distribution, and natural history of vertebrate and invertebrate candidate species for federal protection and coastal sage shrub associated plant species of special concern are to be gathered from select sites throughout the planning region.
- **Autecology** & **Synecology** are two main branches of ecology. **Autecology** is the study of individual organism or individual species. It is also known as population ecology. **Synecology** is the study of group of organisms of different species which are associated together as a unit in form of a community.
- **Genetic studies**. The maintenance of genetic variation is critical to the long-term viability of species inhabiting coastal sage shrub and its assessment is an important aspect of population monitoring

Habitat Restoration

- **Reclamation**: Reclamation describes the taking back possession of something that was taken away or rendered unuseable or uninhabitable and returning it to a useable state. In the context of property and/or structural reclamation this **refers to the act of returning land or a structure to a useable or useful state**. A good example would be a farmer who drains a flooded area of his property so that he can resume agricultural use of the land.
- **Remediation**: Remediation is a **technical term for treating dangerous materials to eliminate or reduce harm to the environment or humans.** Removing black mold from a basement or toxic waste from a dump site are good examples of the proper use of the term remediation.
- **Restoration**: When referring to **work done on property or a structure**, the term restoration is a legally specific word that describes the **repair of a site or structure that returns it back to its original condition**. The restoration process could involve duplicating original construction of a damaged structure, replacing original elements of a landscape following a fire or flood etc.
- The main distinction between restoration and reclamation is that reclamation in this context specifically refers to returning something to a usable state, whereas restoration, denotes the returning of something to its original state.

Habitat Protection Strategies-Sitamata Wildlife Sanctuary

- **Illicit felling**
- The problem of illicit felling should be dealt with by intensive patrolling providing sufficient staff to combat offenders, providing of arms seeking police assistance, co-operation of local people and by providing employment to Adivasis in vulnerable areas.
- There is a need to organised interpretation programmes to develop understanding and respect for nature. In such areas plantation programmes should be taken up to provide employment.
- Check posts should be constructed. Wireless sets have to be provided.
- Hand held sets should be provided to the field staff to get exact information about location and activities of offenders

Illicit Grazing

- Large herds of livestock are kept by villagers as a supplement to agriculture which causes heavy pressure on Sanctuary resources. Village grazing lands have partially or totally been converted to agriculture land and the remaining ones do not have the potential to sustainably provide fodder and grasses to the large population of cattle.
- The possibility of disease transmission to wildlife remains very high as the cattle are not inoculated against common diseases.
- The intense pressure from livestock reduces the regeneration potential of the forest. People in several villages especially in the surrounding villages sell fodder and grasses collected from the forest during summer when the availability of fodder depletes.

- Pasture development works should be taken to improve forage availability. This will help in increasing carrying capacity. Species for pasture development such as teak, dhaura, tendu etc should be selected for tree growth. Suitable grass species of Cenchrus sps, dicanthium sps should be sown. Fodder species like bamboo, khankhara and ardu should be planted.
- In the buffer areas of the sanctuary, the grazing should be regulated by ‘alternate systems’ of grazing.
- Areas should be kept closed to grazing every alternate year.
- This should be done in consultation and co-operation of the local people grazing areas for each village should be defined and people should be allowed to graze their cattle in those areas only. This would help in increase carrying capacity.

- **Encroachments**
- Action against encroachers should be done
- The eviction of trespassers should be done as soon as possible and police assistance may be sought, if required.
- **Anti poaching**
- Are to be intensified during winters when the chance of poaching increase.
- Poaching is done mostly by guns and use of traps. During winters, from November to Febr wireless sets should be kept open till late for receipt of information.
- Patrolling in sensitive areas should be intensified.
- Rewards should be given to informers and public co-operation should be obtained for detecting and catching offenders.
- The entrance path to the Sanctuary can be controlled by constructing gates

Forest fires

- Fires are common in the Sanctuary during the dry season. Fire is incident from march to may.
- Local villagers should be educated by holding meetings with them.
- Fire fighting equipment should be purchased and kept available at range headquarters.
- Fire watch towers should be constructed for detection and information about forest fires.

Regulation of Pilgrim Traffic

- People come from all directions creating disturbance in the sanctuary
- There is damage to vegetation of the area.
- Due to non availability of hygienic facilities, the whole area becomes full of dirt making it unfit for tourism, till the rains when the dirt is washed away.
- This malpractice is hazardous for the sanctuary and has to be eradicated.

Creating awareness among villagers for nature conservation

- For educating tribals about nature conservation the following activities should be arranged.
- Putting up posters and signboards depicting the presence and importance of the Sanctuary
- Conducting slide and film shows in villages
- Regular meetings and dialogue with local people about forest protection
- Formation of village forest protection committees.
- Organising nature camps
- Giving rewards to persons for their outstanding services in forest protection.

Habitat Improvement Strategies

- Habitat improvement is the practice of manipulating food, water cover and space to provide better living conditions for wildlife.
- While taking up habitat improvement works, biological needs based on intensive preliminary investigation should be taken into consideration
- The proposed improvement practice should be evaluated as to their effect on other natural resources and land uses.
- Improvement should stimulate natural conditions as much as possible
- Native flora and fauna should be given importance

Conservation of soil and water

- Soil and moisture conservation works should be taken up to reduce the rate of run off and allow more rainwater to percolate into the ground.
- The improved vegetation will greatly help in conserving moisture.
- Plantations should be established in degraded forest areas.
- Soil conservation works such as gully plugging, loose rubble check dams and anicuts should be taken up.
- Water development can provide additional values directly to wildlife as it increases the habitat use area for them.

- The following methods are suggested for improving the water resources in the Sanctuary
- 1. Waterholes or talai-Natural waterholes are found in rocky areas where run off waters are accumulated in a depression
- Such holes can be improved by deepening the catchments or by trenching run-off water directly to the basin
- 2. Anicuts- These structures may be formed across drainage or
- by enclosing a depression to one side of the drainage
- Constructing a diversion trench into the resulting basin
- 3. Handpumps-in areas with 100 to 150 feet depth water table, hand pumps can be installed.
- 4. A water trough can be made to provide water to wild animals

Improvement of food production

- 1. Pasture development-involves closing of area by trench or loose stone wall fencing,
- taking up soil and moisture conservation works and planting fruit and fodder trees and grasses.
- 2. control of grazing-no grazing should be permitted in the core zone, while in the buffer zone it should be regulated so as to cause minimum damage to the habitat.
- 3. Weed control-the eradication of lantana should be done in infested areas. Lantana should be cut and its roots should be dug out.

Improvement of cover

- Cover is as important to wildlife as food and water.
- The absence of cover can limit the use of an area for wildlife so, while manipulating food or water, care should be taken to assure that enough cover of various kinds is retained to meet wild life needs.
- The following kinds of cover should be improved
- Protective cover-vegetation offering hiding places from rains, wind and sun forms the protection cover. This includes trees and shrubs.
- Ambush cover-vegetation offering conditions of camouflage to carnivores by which they are able to catch prey is ambush cover. The shrubs, grasses, dried twigs etc. form such cover.
- Nesting or reproduction cover-the existing dense trees and shrubs providing conditions of egg laying or giving birth to young ones, for eg.tree hollows for parakeet and bamboo for grey jungle fowl should be expanded
- Escape cover-the shrub growth of tamet, karonda and kalisiali provide conditions by which the herbivoers cannot be driven out by predators; this form escape cover.

Recreational activities

- Nature trials should be identified and visitors should be taken along
- They should be explained about various aspects of nature
- Boating should be arranged to watch birds and wildlife
- Wildlife viewing can be arranged on vehicle drives and at view huts
- A visitors centre should be constructed to brief visitors with basic information like land, forests, wildlife and historic importance of the sanctuary
- Park literature should be published both in Hindi and English
- Wayside exhibits should be highlighted showing the importance of the Sanctuary, places of interest, Do’s and Don’ts and location of the sanctuary,
- Film shows and slide shows should be conducted for groups to educate them about forest and wildlife.
- Guided excursions should be organised for school children and interested groups

Ecodevelopment of adjoining areas

- A massive fuel fodder plantation programme should be undertaken in peripheral areas
- These programmes can be undertaken under the National Social Forestry and other schemes
- This would provide employment to villagers who presently resort to tree cutting as a source of livelihood
- This programme should specially be undertaken in areas where people cut trees due to lack of employment.
- The areas dealt with should be fenced by loose stone walls or ditch fences.
- After taking soil conservation measures planting of fodder trees and sowing of grasses should be done.
- This progamme should be implemented by the Sanctuary personnel as it will minimise the gap between staff and villagers.
- This will solve the forest protection problem greatly

Reintroduction of programmes

- One of the main objectives of the sanctuary is to restore wildlife communities to former levels of diversity
- Some of the species which existed earlier are now extinct
- Tiger and chital are extinct, whereas muggers and chinkara are far below viable numbers.
- Hence a reintroduction programme is a must.

Research and monitoring

- **Habitat**
- Year round food habits of wildlife within the environment
- Conduct research on effects of highways, dam and illicit settlements on plants or animal community
- Making inventory of flora, including trees, shrubs, grasses, ferns, epiphytes, parasites, mosses etc.
- Conduct studies of crop and forage production in the buffer area to enable rational judgements for livestock-wildlife use.
- Classification of habitat, taking the animals as index

Research and Monitoring

- Wildlife Populations
- Improved techniques of conducting wildlife census
- Effects of grazing and competition with cattle
- Study behaviour, feeding habits, mortality, sex ratio, etc of four horned antelope, flying squirrel, pangolin, grey jungle, fowl etc.
- Monitoring re-introduction programmes.

Thankyou