

Biodiversity Conservation and Management of Sariska Region, Rajasthan

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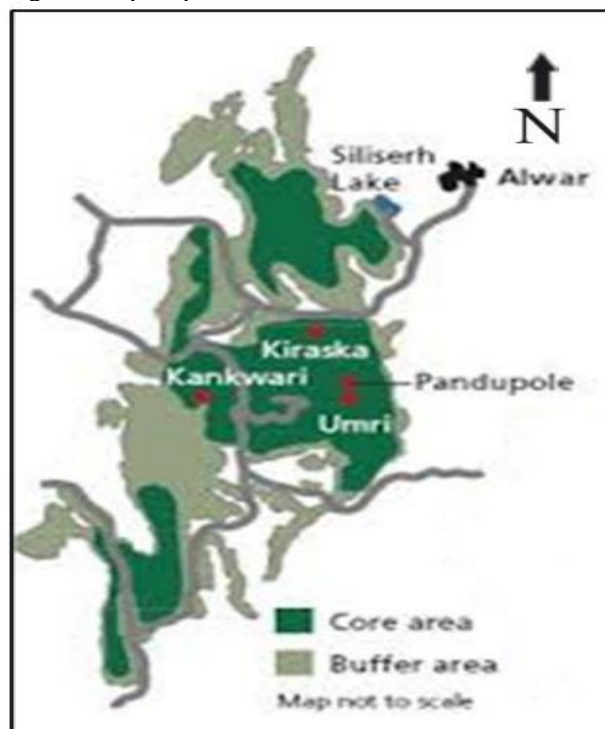
Abstract: The study area, Sariska Sanctuary established in the year 1955-56 is situated in Alwar district between parallels of 27° 14'5" and 27° 52'12" N latitude and 76° 14'20" and 76° 32'12" E longitudes and roughly shaped like jumping frog, covering an area of 866.13 sq. Kms. with core area of 492 sq. kms. (Fig.1.1) Situated amidst the high ranges of Aravallies, undulating plateau and wide valley, the Sariska Sanctuary occupies a pride place in Rajasthan for conservation of wildlife for more than a century. The Sariska Sanctuary is one of the 28 Tiger Project of India. Consist 4 forest ranges, Sariska (205 Sq.kms). Tehla (341 Sq.kms.).

Keywords: Sariska Region, Rajasthan

1. Introduction

Akbarpur (219 Sq. kms.) and Talvriksha (101 Sq. kms.) and 83 forest blocks is a classic example of a rare amalgamation of natural history and archaeology. The Sariska Sanctuary located at south-west bottom of Alwar district is about 36 Km. from Alwar and is about 140 Km. form Jaipur on Jaipur via Alwar Delhi state highway No. 8 and approachable all weather motarable road is girdled by Aravali ranges with precipitous

slopes, flat topped crests and cascading streamlets providing an ideal location for wildlife conservation. The Sariska Sanctuary is a highly fragile ecosystem and wellclad with forests and natural vegetation of grasses, shrubs and endemic trees a true ecotone between the semi-arid north and the sub-humid south. The Rupalali river covers the major part of Sariska Sanctuary flows towards east and other river streams and rivulets are also sessional also flow toward north-east direction.



Alwar district belongs to Aravalli hill region which is a district geographical identity due to its physical homogeneity, cultural, historical, social, ecological and economic coherence. The

district is situated between Yamuna-Satluj watershed divide. Physiographically, the district is characterized by north-eastern extension of the great Aravalli ranges, which runs unabated from Delhi to Gujrat. The Alwar tract of Aravallies may be

divided into two zones (i) Hilly area comprising, Thanagazi, Rajgarh, Bansur and part of Mandawar, Behror and Alwar sadar tehsils and (ii) the remaining second part having a more or less plain like appearance with very small and low hill like terraces or plateaus. Alwar town is well connected by railway network and metalled roads. The town is connected with Jaipur, Delhi, Ahmedabad, Ajmer, Jodhpur by broad gauge railway line, providing easy accessibility to Jaipur, the capital of Rajasthan state and Delhi, the capital of India. Thus, owing to easy accessibility Alwar has become a centre of tourists, nature lovers and wildlife conservationists besides its historical and mythological importance. The location of a few historical, picnic spots and religious places in Sariska like Pandupol, Bharthari, Naldeshwar and Talbriksh have made this area more adorable to be frequently visited by the pilgrims and tourists. The 9th and 10th century ruins of shiva temple of Grahrajor, the medieval fort of Kankwari also add to grandeur of this project. The study of biodiversity of any area naturally involves the interpretation of the habitats and its state of green coverage which has directly or indirectly plays a vital role in patterns of any sort of life form on this planet whether it may be at global level or at district level. As we know environment is a very broad word, many scientist, climatologist and environmentalist defined and tried their best to express its meanings, for example : Odum (1971) defined that, "environment is the surrounding complex of the nature in which each and every life form presents in its physical frame work". Thus environment has been divided three important parts : physical, climatic and biological. The components of physical factors in other words to say the topographical features of the area under study has already been described in the earlier chapter - second of the book.

Besides the biological part of the environment, the eco-system is the combination of certain environmental factors, the interdependence and inter link between various plants and animals and Humans on each other ecosystem is a self sustaining structural and functional unit of biosphere. Biosphere is the life supporting zoned of the earth, where atmosphere hydrosphere and lithosphere meet, interact and interact and make life possible.

Ecosystem is an open system and depends upon solar energy from outside as its energy source. Ecosystems can be small or large and are placed in nature contiguously between adjoining ecosystems there is frequent exchange vegetation. They are all inter connected and interrelated.

Ecosystem are mostly natural system which may be terrestrial as well as aquatic. The common examples of land ecosystem are a forest, grasslands, a desert or a hillside. Artificial system created by man are an agro ecosystem or cropland, a garden, a park or an aquarium.

Land or terrestrial eco-system the terrestrial eco-system basically depends upon the varied climatic factors and temperate zones and the rainfall. In terrestrial ecosystem based on the dominant vegetation (grass, tree etc.) and other climatic factors, several further types are recognized such as grass lands, forest desert, man-made ecosystems like agro eco-systems.

Nature has given so much to the humans, but he is never satisfied his greed have caused havoc to the environment. Nature never distinguish between one human being and another. Every human has a right to a healthy environment. Environment today is severely degraded due to modern developmental activities. Development has improved the living

conditions of human society, but at the same time it has depleted the natural resources, polluted the earth in various ways and caused the global environment to deteriorate. Because of reckless consumerism, many natural resources polluted the earth in various ways and caused the global environment to deteriorate, Because of reckless consumerism, many natural resources are getting depleted rapid use of fossil fuels by industries and automobiles is depleting the fuels and the atmosphere is being increasingly polluted, The forests are disappearing rapidly, soil fertility is decreasing, clean water for drinking purpose is becoming scarce.

There is a shortage of water for agricultural and industrial purposes in many parts of the region. Bio-diversity is declining. If this trend continues, the very existence of human civilization will be at stake. Environmental education is, therefore, very crucial, environmental education needs to be integrated into the school education system to provide knowledge, understanding, values and skills needed by the students the future citizens.

Environmental ethics and values relate to all those activities which safeguard the ecology and the environment. They relate the behaviour of humans towards the environment. They motivate us to care for the nature the Chipko movement of Khejli village in Jodhpur is a good example of environmental ethics. In (1740) the Bisnoi community had started this movement to save the 'Khejri' tree of Rajasthan. A large group of villagers lost their lives trying to protect trees from being felled by the soldiers of the Maharaja of Jodhpur.

Then (1973) the movement was led by a group of villagers in the Uttarakhand region of India who opposed commercial logging. The movement is known for its tactic of hugging trees prevent them from being cut down. They were called tree huggers by the environmentalist. The villagers hugged the trees and prevented the contractors from felling them.

Indian scriptures and methodologies like Charak Sanhita describe the destruction of forests as most sinful act by human being. The 24th Thirthankar Bhagwan Mahavir of the Jainism Preached non-violence as the highest religion and any act to exploit the plants and animals is treated as the most hateful act.

In (273-236 B.C.) Emperor Ashoka the great also organised many programmes to plant trees and conserve the forest resource. Akbar the great cannot be ignored as he laid great emphasis on plantation of trees on both sides of highways, roads and within the city.

Our constitution today also lays emphasis on plantation and protection of forest resources and wild life for this two special Acts 48A and 51A(g) have been passed and amended in 1975. Article 48A relates to the responsibility of the various Indian states to look after the protection and conservation of environment in their respective states. On the other hand Article 51A(g) relates to the various Fundamental rights and duties of an individual. A right without duty is unhealthy and even dangerous for society. Rights are conditional of India. It shall be the duty of every citizen of India.

There is a phenomenal variation in diversity across the entire range of living systems. No single process or theory can explain a phenomenon as complex as biological diversity. The intellectual challenge and scientific value of the study of diversity lies in the conceptual synthesis required to understand a complex phenomenon that is influenced by many different interacting factors and processes (McIntosh, 1987). The

escalating rate of erosion of biodiversity in India, which is one of the top twelve mega-diversity countries, in the world, is a cause for grave concern. With numerically the third largest scientific and technical manpower, India ought to be well placed to face new challenges. and reap benefits from new opportunities.

Unfortunately, we are poorly equipped to do so. Evidently, we need a new culture, new institutions to take good care of our human and natural resources. This new culture, these new institutions have to be appropriate to the new age of information. This requires that we embrace a new democratic culture of inform and share, eschewing the current bureaucratic culture of control and demand. At the same time, we must create a stake for the people in taking good care of the natural resource base. We must awaken in people the spirit of innovation and enterprise to marry the rich traditional knowledge base with modern science and to capitalize on our wealth of genetic resources (Gadgil and Rao, 1998).

We live in an age of affluent in difference where continuous : consumption partners reckless abandonment. We enrich our known private spaces but shut the door on the world outside. We share the earth's richest resources. air, water, flora and fauna but when it comes to safe guarding them, it is always somebody else's problem, somebody else's waste, somebody else's job. Therefore, there is a need to manage people not wildlife. High population growth rate, increased demand for goods increased dependency on forest resource for all daily needs. Grazing pressure, Mining activity, Fuelwood collection, Highways and Development projects.

1.3 CAUSES OF BIODIVERSITY LOSS :

This chapter discusses in detail all possible human pressures in the reserve areas, human influence in Sariska Sanctuary is very diverse and can be both positive and negative for the reserve biodiversity.

Biological diversity loss can be irreversible. its consequences uncertain and the environmental values that are lost are so difficult to assess and often unknown. However, caution in resource use is hardly an attribute of modern society today. Thus management of the current biological diversity crisis will require fundamental changes in our economic environmental and social relationships.

THREATS :

Over harvesting, heavy traffic, pollution, habitat fragmentation and outright habitat destruction and degradation.

DISTURBANCES :

Indeed, ecologists now believe that highest levels of diversity in terms of numbers of species present in a locality occur in a community with moderate levels of human intervention rather than in a biological community totally free of human disturbance. This is because disturbance can create more heterogeneous environmental regimes permitting not only species favouring less disturbed conditions to persist but also making room for other species thriving under more disturbed conditions (Gadgil and Rao. 1998).

This does not mean that disturbance is wholly favourable to diversity. Rather it plays a negative role in the protected areas. Drastic human disturbances often depress levels of diversity of life. Biological diversity is simply the wealth of life on earth, the millions of plants, animals and micro-organisms. the genes they contain, and the intricate ecosystem they help build into the living environment. Biological Diversity is simply the end result of four billion

years of evolution (WWF, 1989). Biological Diversity is therefore, the diversity of life itself.

The problem of managing biological diversity is fairly straight forward conceptually. Biological diversity is generally used to describe the variability among living organisms and the ecological complexes of which they are a part. Without this variability in the living world, ecological system and functions would breakdown. With detrimental consequences for all life including humans.

Consequently as biological diversity is essential to survey the basic ecological services and resources necessary to maintain human welfare and even existence, then a minimum level of biological diversity is required to sustain the well-being of not only current but also future generations (Forlke et al., 1994).

This implies that biological diversity conservation does not require complete preservation of all species in the world or an immediate moratorium on all uses of the environment including habitat conservation. It suggests that we must ensure that current rates of biodiversity loss do not take humankind beyond the minimum threshold level necessary to sustain human welfare and even existence.

The real questions facing ecologists today centre on how much biological diversity and particular ecosystem needs to remain functional, self-sustaining and life supporting. Conservationists have long argued that every specie counts to some degree in keeping the earth's life-support system working. Organisms were not designed by natural selection to fill slots on an assembly line; each organism strives to make a living and reproduce itself. But as it eats, grows. excretes waste and moves about, disturbing the physical environment. it unwillingly plays a part in generating grander processes that alter the flow of water, the recycling of energy and materials. the renewal of the atmosphere (Baskin, 1997).

DRIVING FORCES :

The main driving forces behind biodiversity loss arise from human activities, and can be distinguished in terms of proximate and underlying causes. Aproximate causes refer to the direct over-exploitation of species (e.g.: hunting, fishing, poaching) and the indirect impact of ecosystem degradation or destruction that leads to species loss (e.g.: habitat alteration).

Underlying causes refer to the economic, social and cultural factors that lie behind the economic activities that lead to the direct depletion of species, and the destruction and degradation of their habitat. These underlying causes include the scale and growth of human population, culture and ethics, economic incentives and institutions (Barbier et al., 1994).

The major threat for species extinction arises from habitat destruction and alteration, and to lesser extent from direct exploitation. Habitat change by humans is caused directly through land-use changes. urbanization. infrastructure development and agricultural expansion.

Habitat change is also caused indirectly through environmental effects caused by the use and extraction of resources from the environment and the introduction of species to new areas. Biodiversity loss is also affected by the discharge of wastes to air, soil and water. and by the global climatic changes due to fossil fuel burning, and the emission of green house and ozone depleting gases. The main underlying cause of biodiversity loss is the adverse impact of human activities.

1.4 HUMAN INFLUENCES ON BIODIVERSITY :

Throughout history humans have influenced and altered biodiversity in many ways (McNeely et al., 1995). In many regions biodiversity has increased through the domestication of plants and animals. Human activities have traditionally supported the maintenance of species and genetic biodiversity. For example, shifting cultivation systems throughout the world have had a profound effect on biodiversity. In the cultivated areas a high diversity of domestic plants and animals was generally maintained, whereas the fallow fields provided productive habitat and feeding grounds for many non-domestic species.

With the increasing population pressures and the development of modern agriculture, the sustainable use of biodiversity has lost its role in these systems. This trend has rapidly led to the destruction of local and regional biodiversity in agricultural systems and marginalized natural vegetation and wildlife as a natural resource.

India has a rich and varied heritage of biodiversity, encompassing a wide spectrum of habitats from tropical rainforests to alpine vegetation and from temperate forests to coastal wetlands. India figured with two hotspots: the western ghats and the eastern Himalayas in an identification of eighteen biodiversity hot-spots carried out in the eighties (Myers, 1988). Recently, Norman Myers and a team of scientists have brought out an updated list of 25 hot-spots (Myers et al., 2000).

In the revised classification, the two hot-spots that extend into India are The western ghats/Sri Lanka and the Indo-Burma region (covering the eastern Himalayas); and they are included amongst the top eight most important hot-spots. In addition, India has 26 recognised endemic centres that are home to nearly a third of all the covering plants identified and described to date.

However, this rich biodiversity of India is under severe threat owing to habitat destruction, degradation, fragmentation and over-exploitation of resources. According to the Red List of Threatened Animals (IUCN, 2000), 44 plant species are critically endangered, 113 endangered and 87 vulnerable. Amongst animals, 18 are critically endangered, 54 endangered and 143 are vulnerable. Ten species are lower risk conservation dependent while 99 are lower risk near threatened. India ranks second in terms of the number of threatened mammals. While India is sixth in terms of countries with the most threatened birds (IUCN, 2000).

The most obvious threatening factors are those that alter habitats of species, introduce new exotic species, over-exploit species and habitats, and change environmental conditions. Many of the causal factors impacting biodiversity are demographic, cultural, and socio-economic. The establishment of protected areas can compensate some of these aspects.

The comprehensive analysis of plausible linkages between the societal developments (i.e., the causes of biodiversity decline), the subsequent resources use and its consequences for ecosystem functioning and biodiversity is more than just describing an alarming trend of biodiversity decline.

HUMAN INFLUENCES ON FLORA :

Following Hamel and Dansereau (1949), cited by Frenkel, (1970), we can recognize five principal degrees of

interference each one increasingly remote from pristine conditions. These are:

NATURAL HABITATS : Those that develop in the absence of human activities.

DEGRADED HABITATS: Those produced by sporadic, yet incomplete disturbances: for example, the cutting of a forest, burning or the non-intensive grazing of natural grassland.

RUDERAL HABITATS : Where disturbance is sustained but where there is no intentional substitution of vegetation. Roadsides are an example of a ruderal habitat.

CULTIVATED HABITATS : When constant disturbance is accompanied by the intentional introduction of plants.

ARTIFICIAL HABITATS : Which are developed when humans modify the ambient climate and soil as in green house cultivation.

An alternative model for classifying the extent of human influence on vegetation is provided by Westhoff (1983), who adopts a four-part scheme:

NATURAL : A landscape or ecosystem not influenced by human activity.

SUB-NATURAL : A landscape or ecosystem partly influenced by humans but still belonging to the same (structural) formation type as the natural system from which it derives (for example, a wood remaining a wood).

SEMI-NATURAL : A landscape or ecosystem in which flora and fauna are largely spontaneous but the vegetation structure is altered so that it belongs to another formation type (for example, a pasture, moorland or heath deriving from a wood).

CULTURAL : A landscape or ecosystem in which flora and fauna have been essentially affected by human agency in such a way that the dominant species may have been replaced by other species (for example, arable land).

HUMAN INFLUENCES ON ANIMALS :

The range of impacts that humans have had on animals, though large can be grouped conveniently into five main categories: domestication, dispersal, extinction, expansion and contraction.

The concern for biological diversity is, however, a concern for man himself. All forms of life-human, animal and plants, are so inter-linked that disturbance in one gives rise to imbalance in the others. If species of plants and animals become endangered they signify degradation in the environment, which may threaten man's own existence.

The love and regard for flora and fauna is a part of India's culture. A hymn of Yajur Veda involves universal peace with special mention of the let there be peace of air, peace of earth, peace of water, peace of plants and peace of trees.

1.5 ADVERSE IMPACTS OF HUMAN ACTIVITIES :

The biodiversity of Sariska Sanctuary is impacted adversely by human activities in many different ways such as habitat destruction, over harvesting, mining, environmental pollution, subsistence use of rare plants and animals, introduction of alien species, and uncontrolled tourism activities.

Human population pressure is considered an important underlying cause of species over-exploitation and habitat biodiversity loss. Relationship between humans and biodiversity at the Sariska and Ranthambhore are quite alarming.

The exponential growth of the human population, making humans the dominant species on the planet, is having a grave impact on biodiversity. This destruction of species by humans will eventually lead to a destruction of the human species through natural selection. The human impact is taking place through five primary processes: over harvesting, alien species introduction, pollution, habitat fragmentation, and outright habitat destruction.

Today, the reserve is managed by the state wildlife department. The reserve management imposes a number of restrictions on villagers' forest use, intended to ensure non-degrading use practices. Open tropical dry forests is a habitat for the endangered bengal tiger and for a number of other carnivores, herbivores and bird species. Village commons are comprised of:

(1) Cultivable wastelands, common property lands belonging to the village Panchayat (local council);

(2) Uncultivable wastelands, formally owned by the state revenue department, but de facto used by villagers as part of the commons; and

(3) Temple lands, small forest patches preserved for religious reasons.

Cultivable wastelands were allocated in the (1950) to villages in proportion to their livestock population at that time. Since then, livestock populations have increased manifold and village commons are insufficient for meeting grazing requirements. Interestingly, even in the complete absence of de jure rights in the reserve, villagers operate un-demarcated in the domains of influence within the reserve from where they extract forest produce for their day-to-day needs.

This all is leading to, destruction of habitat due to grazing of the cattle; withdrawal of water below critical limit that leads to water-crisis in the : Protected Area personnel and people conflict; increasing population of people and the livestock: unsustainable tourism; increasing traffic on the two highways that cross-cross : poaching of animals for various purposes and fuel wood and fodder collection by villagers.

Sharp implements are prohibited inside the reserve. It is allowed to collect dry and fallen wood, but it may only be head loaded. that is, motor and animal-powered transportation of forest products is prohibited. There are restrictions on where animals can be grazed. Commercial forest products, including timber, fuel wood and animal manure cannot be exported out of the reserve.

This is an attempt to be commercial exploitation of the reserve. While conceding to villagers' subsistence needs, enforcement of the restrictions on resource use is weak. Illicit felling, grazing; encroachment and export of forest products appear to be rather widespread. A number of forest guards patrol the reserve. They can impose fines and register court cases against offenders. The villagers are facing problems because of constant cattle lift by wild animals.

The domestic cattle are the easy prey base for the wild animals. Because of the existing forest laws particularly wildlife protection Act (1972) and forest conservation Act, (1980) very few development activities would be taken up. The villages are deprived of all development activities. Because of remoteness very few teachers are willing to serve in the villages. The educational standards are very poor.

HABITAT DESTRUCTION :

Destruction of habitat for all kinds of purposes, including agriculture, mining, construction of roads, clearing of forest for

agriculture and pasturing is probably the most important threat to biodiversity in Sariska Sanctuary .

Biodiversity will continue to decline as long as we continue to remove and constrict the natural habitats in which wild species live. This loss is bound to be costly, because natural ecosystems provide vital services to human societies. Recreational, aesthetic, and commercial losses will be inevitable. The loss of wild species, therefore, will bring certain and unwelcome consequences, because it is linked directly to the degradation or disappearance of ecosystems.

A forest is cleared, it is not just the trees that are destroyed; every other plant and animal that occupies the destroyed ecosystem, either permanently or temporarily (e.g., migrating birds), also suffers. The idea that this wildlife simply will move "next door" and continue to live in an undisturbed section is erroneous. Any loss of natural habitat can result in only one thing: a proportional reduction in all populations that require that habitat.

Data on forest degradation were obtained in the village survey through visual inspection of the extent of forest degradation while interviewing (comparing the cover in core zone and buffer zone); by asking villagers to compare the condition of the forest today with earlier times (25 years back); and by visual determination of forest use penetration, that is the depth into the forest from the village boundary where use pressure was evident.

The recurrent conflict with the villagers on the matter of grazing in Sariska Sanctuary has alienated the villagers from the forest authorities. There is an ever-increasing threat by the villagers and their cattle. The forest is severely getting overgrazed and exploited for extraction of fuel wood and other forest produce.

The grazing pressure is all dependent on the forest. The grazing settlements have major source of income to be dairy and rearing of goats. The other villages have revenue lands for agriculture. Though this land is not a part of Sariska Sanctuary land but over harvesting leads to ground water depletion. The forest authorities are making for ground water retrieval, but the situation is not improving.



Natural landscapes generally have large patches of habitat that are well connected to other, similar patches. For the continued survival of any natural population, the number of individuals must never fall below a critical number, and that requires a certain minimum area. If development reduces the habitat to a point where it cannot support the critical number during an adverse year, the entire population will perish.

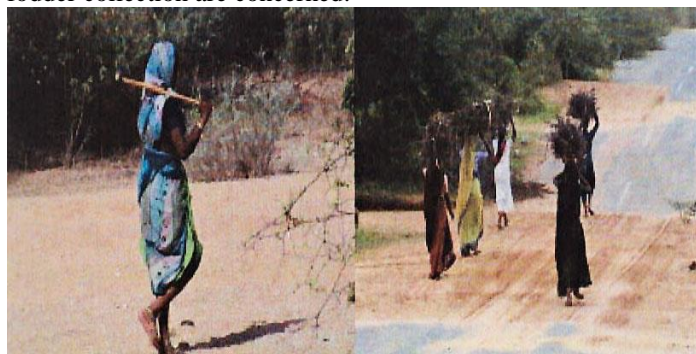
Similarly, development (such as a highway) that fragments a territory and prevents migration between the two fragments will cause a population to perish if neither can adequately support the critical number. Human use of habitats often simplifies them. We might, for example, remove fallen logs and dead trees from woodlands, for firewood, thus

diminishing an important microhabitat on which several species depend.

When a forest is managed for the production of few or one species of tree, tree diversity obviously declines, and with it so does the diversity of a cluster of plant and animal species dependent on the less favoured trees. Streams are sometimes channelized their beds are cleared of fallen trees and rimes, and sometimes the stream is straightened out by dredging. Such alterations inevitably bring on a loss of diversity of fish and invertebrates that live in the stream.

FUEL-WOOD AND FODDER COLLECTION :

Over harvesting, over cultivation or over exploitation of natural resources in the Sariska Sanctuary is a major threat to biodiversity. The village outside and inside the reserve pose severe biotic interference so far their needs of fuel wood and fodder collection are concerned.



The conflicts are intensifying every year because of excessively higher population growth rate and the changing traditional lifestyles of the people. Anogeissus pendula constitutes more than 90% of the requirements of the human and livestock population ranging from firewood to timber and fodder in the villages. The maximum consumption of wood is during winters. Villagers and the townships are heavily dependant on forest for the firewood. Women and girls collect fuel wood used for cooking and heating of water and rooms from the Reserves and village commons. Crop residues, dried animal dung and wood from trees on the farm provide additional sources of domestic energy. Fuelwood is mostly collected in the winter season where demand for domestic energy peaks, while demand for agricultural labour is low, reflecting the importance of the opportunity cost of time.

INFRASTRUCTURE :

The two major causes are location of mines in the vicinity and the heavy traffic on the state highways that cross-cross. Roads and other infrastructure also impact wildlife by modifying animal behaviour and species distribution in areas with infrastructure.

Wildlife is impacted directly by infrastructure through substantial noise, disruption of the physical environment, alteration of the chemical environment and introduction of exotic species but most of all, by accelerating processes like hunting, logging, slash and burn and tourism.

Animals avoid areas near infrastructure, breeding success decreases in developed areas, and habitats become fragmented. The ecological impacts of losses of habitats and redistribution of animals away from development may again affect foraging success or survival substantially in areas beyond these initial zones of disturbance, and, hence, result in overgrazing, erosion, changes in predation pressure and breeding success.

A voidance of developed areas therefore affects much larger areas than that of the physically altered footprint of development. The extent of the zones within where wildlife will become affected by infrastructure vary according to species, season, type of disturbance, habitat, and other environment factors.

The cumulative effects of construction of roads, Hooding, changes in vegetation composition may result in the disruption in ecosystem function. The out come is that infrastructure, by propagating the entire human associated activity, is leading to loss of biodiversity.

With rapid rise in human population and developmental activities, mining has expanded leaps and bounds and a greater threat is caused to the environment. it is also an environment damaging activity causing large-scale deforestation, destruction of wildlife and other natural resources (Triwidi and Sinha, 1990).

MINING :

Mining has been one of the earliest occupation of man and naturally in India, which has been the cradle of oldest civilization. It has had a theory of tradition dating back to the pre-historical times when minerals and their mining were one of the most potent and is of state craft. Even in the present industrial age, minerals play an initial role in the generation of internal resource and industrial growth.

As an integral part of mining operations, there is always a need to clear the trees and jungles in the mining areas that are to be exploited for their extraction of the two mining operations (opencast and underground). Open cast mining operations cause serious land degradation in the form of vast tracts of dug quarries and mountains of overburden, and the waste piles in hilly terrain often at tect the stability of the slopes. To control adverse effects well in time, no mining plan is approved now unless it has an Environmental Management Plan properly designed and framed.

Modest-sized stone mines are located in the periphery of the reserve, but none were found within the reserve border. Mines tend to be located on state-owned revenue lands. Although local people in some cases benefit through employment in the mines, they also incur losses due to reduced commons and blocked paths. Mines have an adverse ecological impact. Sometimes they block access routes to the reserve for wildlife and livestock and frequent dynamite blasts scare away wildlife.

In an article in The Hindu, March 26, 2003, 'Implement ban on mining activities in reserved areas', it is mentioned that the environmental investigation agency, an international non-governmental organisation, has called upon the Prime Minister to ensure implementation, in letter and in spirit, of the resolutions of the Indian Board for Wildlife, prohibiting mining activities within 10 km of reserved areas, to protect the rich wildlife of the country.

Citing several examples of the harmful effects of mining on wildlife, particularly the fast-depleting tiger population, the environmental investigation agency appealed to international mining companies to draft a binding code of practice for strict adherence to the laws and regulations that govern the protection of protected areas and forests in India.

Releasing a report 'undermined - destruction of tiger habitat in India' that highlights the devastation of vital tiger habitat by mining companies for luxury items consumed in India and abroad, the environmental investigation agency has asked the international companies investing in or buying from

the Indian mining industry to ensure that the raw material is extracted in a sustainable and environmentally responsible manner and that protected areas tiger habitat and vital watersheds are not destroyed in the process.

COMMERCIAL TRADE :

Commercial trade of living animals and plants as well as in products derived from these is also a severe threat to biodiversity. Demand for medicinal plants in the state can never be satiated. Unspecified and unknown quantities of produce are harvested from the forests, which is a serious threat to the sustainability of the resource base.

Especially the hunting communities and forest dwelling communities, with commercial interest involved in illicit trade in animal products such as skins, horns, bones and meat and animal oils is common. This is a very serious threat to the rare and endangered fauna of the reserve.

In Sariska Sanctuary, the Tiger count has considerably reduced and is a cause of concern. It is a debatable issue in Sariska Sanctuary at present. Several articles have been published in the local newspapers, national daily and several magazines on the decreasing count of tigers at Sariska Sanctuary .

NON-NATIVE SPECIES :

Introduction or accidental emergence of alien species is a significant threat to the native vegetation at Sariska Sanctuary. People from outside have to be employed many times for removing such weeds. Due to uncontrolled grazing of domestic cattle in the open areas of the reserve- weeds like Xanthium Zylocarpa and Acaranthus Hispides, Adhatoda Vasicaand Barru grass have come up. They are spreading and deteriorating the range conditions. Very large number of cattle, sheep, goat and camel graze inside the protected area.

The months from July to October are the most problematic since most of the cattle on nearby villages move into the protected areas. The villagers persistently attempt to invade into the core areas. The grazing by cattle has adversely affected the regeneration. The quality of grasses has deteriorated in the buffer zone. The deteriorated buffer zone is not conducive to the growth of the ungulate population.

HOUSEHOLD RESOURCE DEPENDENCY :

The trend in development of agriculture and animal husbandry in the villages of core zones and buffer zone is promoting a limited number of varieties of crops and breeds of animals. Changes in soil environment have triggered further ecological changes including displacement of local species by weeds and aliens. This leads to erosion of the valuable domesticated biodiversity of the Sariska Sanctuary. People depend on collection in the commons and state-owned forests for a variety of needs, including animal, fodder, fibre, building material, medicine, fruit and food.

Household forest use may not be degrading depending on the quantity and technique of use. Grazing, unless carefully managed, prevents re-growth of perennials. Fuelwood collection is not degrading when confined to dry wood but collection of green wood is except when measures are taken to replant or to permit natural re-growth.

TOURISM:

The unregulated tourism is affecting the reserve's capacity to with stand the tourist pressure. There are number of temples in the area. Bharathari temple near Bharathari, and Hanuman temple at Pandupole in the core area are visited by several hundred thousand people every year. Tuesdays and Saturdays are days of free entry for the pilgrims. Pilgrim pressure increases panicularly during monsoon and virtually becomes unmanageable on festival occasions. Also, in the buffer zone Nahar Sati, Sati Mata Narayani Ji, Talvriksh and Garbaji are the religious places visited by several hundred thousand people every year. A temple within the park's core area attracts pilgrims, particularly on Tuesdays and Saturdays, causing disturbance to wildlife. They come in groups by vehicle or on fool. and are never refused entry.

The local people have been visiting road checkpoints into the core area. There is enforced ban on commercial exploitation. The effectiveness of the check points appears a little weak. There are a number of reasons for the weak monitoring and enforcement of rules. One reason is the inadequate pay, education and equipment of forest guards, and the fact that single unarmed guards often live in villages they are supposed to control.

A second reason is the failure to formally settle the rights of local villages. This prevents the declaration of Sariska as a national park, in that case. utilisation would be much more restricted. At present. not all villagers appear to be aware of the rules.

The third reason is the slow legal system in India. Court cases are delayed for years. This makes the sanctioning mechanism available to the reserve management in effective. The fourth reason is that the reserve employs a fairly large but low-paid staff.

In discussion with the field director and conservator of forests. Saiska, following details were noted about the tourists visiting the park. The local people have been visiting Pandupole Temple located inside the Core-I area of the Sariska Sanctuary since the State times. A toll tax of Rs. 1.00 was charged from people going on foot in the park. Later motorized vehicles changed the whole scenario in a negative way.

Due to an old lower court order, the entry inside the Park was made free on Tuesdays, Saturdays and Mela days. However, it is being experienced that many people from Delhi and surrounding towns of Jaipur and Alwar are coming in their private cars on these two special days with the main objective of enjoying the nature and picnicking.

Unfortunately, incidences of alcohol consumption in the park by some of these 'devotees' have also been reported. The vehicles entering the park are a major source of disturbance to the wild animals and it has been observed that sighting of herbivores and predators is significantly reduced. The sighting of langoors and monkeys increases as they come near the road for the food through by the ignorant people for them to eat. This is changing the behavioral pattern of these animals. Apart from disturbing the wild animals, the free entry into the Park causes loss of revenue to the State exchequer..

A munsif court had passed orders that entry inside the park for people visiting Pandupole on Tuesdays and Saturdays would be kept free. This order has resulted in drastic loss of Government revenue and has certainly affected the development of the park. Since there is no limit of vehicle entry in the park on these special days, there is lot of disturbance to the wild animals as the pucca road to Pandu Pole runs through the heart of the core area.

TRANSPORTATION :

There is a free entry for the Rajasthan roadways buses inside the park. There are twelve such buses that enter the park from Sariska and Tehla gates. The buses stand from Alwar and go to Dausa via Tehla. Similarly the buses standing from Dausa reach Alwar via Tehla and Sariska. As discussed with the field director and conservator of forest of Sariska, if we take a general estimate, then 12 multiplied by Rs. 25 is equal to Rs. 1500 per day is straight loss to the park. For the whole year on multiplying with 365, it comes to Rs. 5,47,500.

Although it can be argued that the roadways is a government enterprise and there is seemingly no loss to the government but there is certainly a loss to the park once the government decides to allocate the funds to the park for development on the basis of revenue generated from entry fees. The buses are causing disturbance in the area and accidental killing of wild animals have been reported in the park.

1.6 OTHER IMPACTS :

Information on collection of other forest produce is available from the household survey. Households collect thatching material from the reserve, various edible plants, other materials such as small timber and grass, while only few collect medicinal plants. Except for thatching material, dependence on the reserve is larger, the poorer is the household. Since the demand for these products is basically subsistence oriented, their collection is not likely to be a major factor in forest degradation.

IMPACT ON SPATIAL DISTRIBUTION OF TIGER :

After making a detail survey of all possible issues and after discussion with the field director and conservator of forest, Sariska it can be said that earlier the tiger population was distributed throughout. In old times when the disturbance due to increasing population, agriculture and mining was minimum and the habitat was secure, the tigers were reported from Tehla, Akbarpur Sariska and TalnikshRanges. The Ramgarh-Sariska Corridor was intact and movement of tigers from nearby Jamva Ramgarh Sanctuary was reported earlier.

But due to encroachment on the revenue lands situated in the corridor area, increased mining and heavy biotic pressure, the movement of wild animals specially tigers have been adversely affected. The recent census has shown that the distribution of the tigers is restricted in Sariska range only. Movement of tigers is there in Akbarpur and TehlaRanges but the tigers have come back to Sariska range. This is due to heavy disturbance of mining and biotic pressure in the two ranges. Movement of tigers has been reported in Talvriksh range also but instead of residing in the area, the animal has preferred to come back to Sariska. The population of tiger is static and no change in its population has been observed. The cubs have also not been reported since last three years. This is quite disturbing and requires immediate management interventions.

1.7 BIODIVERSITY CONSERVATION :

Environmentally and socially disruptive economic behaviour must be changed if we intend to provide discarding environmentally insensitive forms of development can only bring about decent livelihood to all citizens of the present and future generations and this change. Rather, the stress should be on qualitative development based on efficient use of energy

and natural resources, recycling of end products and minimizing the use of non biodegradable products.

Ecological balance will definitely be adversely affected to create liquidity despite our best efforts not to do so. Primary and secondary forest industries will use more and more wood, cork, bamboo, cane, gum, resins, essential oils, seeds, medicines etc. for home consumption as well as export in a liberalized economy.

The strategy should be aimed at policy makers, all Government and non Governmental organisations, private organisations, individuals and intergovernmental organisations. This will help in achieving the objectives of biodiversity conservation and sustainable development. Any conservation measure has to be carefully planned so that:

(1) Environmentally and socially disruptive behaviour is altered to provide a decent living for all. (2) Production pattern is socially equitable. (3) A human centered, knowledge intensive civilization is built. (4) A balance is maintained between all forms of capital i.e. human, natural, physical and financial.

FOREST MANAGEMENT :

It has undergone rapid changes in the decades of 18th and the 19th. geographical information system and remote sensing techniques have the potential to provide a large amount of information on forest resources..

RECHARGE OF DEGRADED AREAS :

Efforts should concentrate on enhancing the soil micro fauna and fertility status so that sustainable production can be achieved by adopting agro-forestry systems that can support the economic development of the region. Research efforts should be made for genetic improvement and dissemination of multipurpose plant species that can grow in degraded land.

SOCIO ECONOMIC RESEARCH :

Socio economic aims are the best pursued if the policies regarding land use of degraded areas, benefit sharing, land and plant tenure, participatory planning and resource management are appropriate to the sustainable management and conservation of biological diversity.

BIOTECHNOLOGICAL RESEARCH :

Biodiversity conservation for sustainable development in present century will depend upon proper exploitation of economic potential of biological diversity using biotechnology for the production of goods and services by the increasing population. Foresters will have a vital role in future; one as in situ conservation and the other in ex situ conservation of biodiversity for commercial purpose. We are all, participants and decision makers in this struggle and can achieve the objectives by strength and determination with the participation of the people.

1.8 FOREST POLICY AND CONSERVATION :

The diversity of vegetation and domestic and wild life is found in abundance in any natural region is called biodiversity. In view of biodiversity is prosperous. The world's (40 percent) plant diversities are found in India. In India 45000 vegetations are identified yet. The plants are economically very useful. The plant diversity plays an important role in formation and consistency of nature. The destruction of any type of organism may be dangerous for nature and environment.

The plant diversity is getting destroyed mainly due to construction of large dams, industrialization, intensive cultivation, necessity of habitats and food for increasing population after independence till now. The balance of

environment is maintained by plants and animals. Due to loss of biodiversity, hole in ozone layer, increase in temperature owing to green house effect, decreases in rain fall, floods, droughts, problem of pollution and desertification has increased. The whole world is affected by this. The international nature and natural resources conservation union (IUCN) is working for the conservation of biodiversity at international level. Its headquarter is in Switzerland. (WWF) is also doing working in this direction.

The forests are the basis of life. The uncontrolled destruction of forests has affected the climate and landscape adversely, e.g. soil erosion, extension of desert, increase in waste land, irregularity in climate, drought, decrease in level of underground water, loss of in wild life and environmental polluton etc. The forests are being cleared to obtain more space for human habitation, agriculture and increasing industrialisation. The conservation of forest is of the necessity to meet the ever rising needs and to save from environmental hazards.

The first forest policy in India was adopted in 1894. According to the new forest policy declared on 31 may 1954 after independence there should be forest on (33 percent) part of land. In 1988 a new forest policy was declared in our country. Three aims were given of that environmental stability, protection of natural heritages like plants and wild life and meet out the basic needs of general people.

The government is running several programmes and plans in direction of forest conservation. In this direction important attempt are social forestry scheme, establishment of national parks and sanctuaries. The forest research institute of the Dehradun and the central arid zone research institute of Jodhpur are making efforts to increase the hand under forests and to check the expansion of desert. Conservation of forest cannot be possible only through government efforts, for that awareness and active cooperation of general people is necessary.

Different type of forest awards are given by the government of Rajasthan for the development of forest, social forestry, Aravalli tree plantation and on forest conservation programmes in view of giving importance to forests. These are Vaniki Pandit Award, Amrita Devi Award, Vriksha Vardhak Award, Vriksha Mitra Award etc.

1.9 FUTURE STRATEGIES :

Sanctuaries, national parks, tiger reserves and biosphere reserves have been adopted as the main act of achieving the objectives of conservation. Biogeographical diversity is an act opposed by the tribals already facing problems, with small land holdings, natural hazards, reduced productivity of fields. Biodiversity conservation strategies must address to the needs but should not neglect the present needs of the human societies.

conserved areas of available forests or geographical area of the particular region could be a markable question. There should be a critical review of the impact of people's attitude towards biodiversity conservation efforts on rural society. Economic and employment opportunities, cultural diversity crisis, depletion in indigenous knowledge systems.

Biodiversity conservation strategies of local needs, uses and values as priority of conservation. The present experience in the region is that there is lack of objectives of biodiversity conservation strategy, which need to be clear and achievable. It should not neglect the objective addressing the

local peoples priorities to provide, if not enhance, sustainable and economic benefits.

Many of the protected areas are indeed forests for wildlife shelter in the midst of intense human pressure and activities. Such islands of shelter cannot always afford to accommodate many of the wild animals who possess migratory instinct. There is, thus, the urgent need of identifying animal corridors and bringing such corridors within buffer zones or some kind of management practices in order to reduce man-animal conflicts or wildlife depredation.

In fact that there exists rich biodiversity even outside the people's attitude towards, such as in sacred groves, traditional community, in agricultural jhumfields and fallow lands. Such forests are under the control of the village councils, district councils, traditional chiefs or private individuals. These traditional socio-political institutions must be taken into confidence while formulating strategies for biodiversity conservation.

Management strategies and policies should ideally encompass the areas under the control of these institutions, which can be achieved through appropriate dialogue and negotiations without infringing on their land rights.

There is scope for traditional practices and modern scientific knowledge for solving the problems of people's attitude towards and biodiversity conservation in the region. Not that all traditional societies are always biodiversity practices are scientific conservation. Such practices should also be identified and discouraged.

Conservation of cultivated crops, medicinal species is a neglected frontier. This weakness must be rectified immediately as the region has a variety of medicinal plants, many of which are not much known outside the region and may have potential of providing alternatives for medicines in the region. Such type of crops have also been reported to be best resistant.

There is an urgent need for increase research activities. information processing and dissemination system, either to guide management of biodiversity conservation, Resources may be allocated to the best possible effect. Such knowledge should be exchanged between tribes for higher ecological and economic efficiencies, particularly conservation and management of biodiversity. Environmental education, and motivation on biodiversity issues using local arts, languages and cultures should also be part of the strategy. Wildlife knowledge should be identified, documented and used as educational tools. There is also the need to infuse traditional values, culture, and knowledge into the youngsters. Environmental education, particularly awareness in relation to implication of biodiversity trade, and extraction of endangered species, etc. should also be extended to the law.

The laws on the biodiversity conservation must be strengthened and biodiversity concerns should be reflected in the existing environmental impact assessment procedures. Current conservation programme should be reviewed. The conservation programme in India has focussed mainly on some glamorous animals while ignoring the rest of biogeographical diversity including a host of insects and invertebrate species and a majority of the plant species.

Conservation efforts should involve local communities by guaranteeing their land and forest rights and providing them a stake in the sustainability of their natural surrounds. Once the private hunting grounds of former royal family, today only (20%) of this vast expanse of jungle is tiger habitat. Biotic

pressure from humans and cattle is not the only cause for degradation of this forest. One must not underestimate the mining lobby, which remains a potential threat to wildlife for they can twist the verdict of the courts in their favour at any time. Sariska Sanctuary status that will restrict activities such as grazing and mining.

Growth of human and livestock population is one of the most important root causes of decline of biodiversity. Apart from growth of numbers, the patterns and levels of resource consumption have changed. Increasing population has diminished the extent of forest and other uncultivated lands, depleted lands of native vegetation and spoiled the remaining lands and ecosystems by disposal of waste and other forms of pollution. Increasing pressure of livestock for grazing has left these benefit of any vegetation for the wildlife at Sariska Sanctuary.

There is a direct link between poverty and biological resources at Sariska Sanctuary. Poor people are forced to hunt rare and endangered animals and sell in the illicit market is still to be established. Options for living for people here are limited like cultivation on a patch of forest, rearing livestock on basis of migration into forest, selling forest produce in local market, cause direct loss to the biodiversity in Sariska Sanctuary.

The extent status, and role of species, natural habitats, and ecosystems in supponing human life is lacking especially in the villagers. There is a shortage of knowledge and trained scientists in the domain of biogeographical diversity, and the traditional knowledge has not been recognized in the mainstream public domain. The process of policy development and decision-making in public domain in the villages of Sariska Sanctuary remain highly insular.

The future of Sariska Sanctuary hang in the balance. For its future depends on the awareness and action to maximize wildlife in a setting where nature is in harmony with wildlife, where there is water and an enhanced tiger and leopard population can roam in a much bigger ilderness. The need of the hour is to support less disturbed environment for the wildlife and better biodiversity in Sariska Sanctuary, so that no wildlife-cattle and villagers-foresters conflicts anymore.

If the rate of biodiversity loss is to be slowed down, a combined procedure, project and policy approach would be required. Procedural action would include giving more weightage to biodiversity conservation in project and programme design and appraisal. The project approach could provide immediate and targeted action on priority sites. Policy actions would include appropriate governmental intervention in various regions.

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