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IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY IN WILDLIFE TOURISM

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ABSTRACT

Wildlife is a vital part of an ecological community as wildlife plays an important role in the environment. Wildlife Conservation is not just important for animals, but to all living things to prevent damages in biosphere and for the sustainability of life on planet earth. The biosphere and human living is endangered, because of environmental changes due to species extinction. Biodiversity loss can have significant direct impacts to human health if ecosystem services are no longer adequate to meet social needs. Conserving as much as species possible is important for the benefit of humans, ecosystems of an environment. It remains a challenge in species conservation and identification of the geographical patterns in underlying environmental associations of species with unique ecological niches and distinct behaviors. Wildlife resources constitute a vital link in the survival of the human species and have been a subject of much fascination, interest, and research all over the world. Today, when wildlife habitats are under severe pressure and a large number of species of wild fauna have become endangered, the effective conservation of wild animals is of great significance. Because every one of us depends on plants and animals for all vital components of our welfare, it is more than a matter of convenience that they continue to exist; it is a matter of life and death.

Keyword: Wildlife, Communication Technology, Tourism

1. INTRODUCTION

Wildlife plays an important role in balancing the ecosystem and provides stability to different natural processes of nature. Wildlife traditionally refers to undomesticated animal species, but has come to include all plants, fungi, and other organisms that grow or live wild in an area without being introduced by humans. Wildlife conservation has become an increasingly important practice due to the negative effects of human activity on wildlife. An endangered species is defined as a population of a living species that is in the danger of becoming extinct because the species has a very low or falling population, or because they are threatened by the varying environmental or prepositional parameters. The goal of wildlife conservation is to ensure that nature will be around for future generations to enjoy and also to recognise the importance of wildlife and wilderness for humans and other species alike. Many nations have government agencies and NGO's dedicated to wildlife conservation, which help to implement policies designed to protect wildlife. Numerous independent non-profit organisations also promote various wildlife conservation causes.

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2. WILDLIFE CONSERVATION IN INDIA

India is the seventh largest country in the world and Asia's second largest nation with an area of 3,287,263 km2, a national border of 15,200 km, and a coastline of 7516 km. For administrative purposes, India is divided into 28 states and union territories and is home to more than 1 billion people, which is approximately 16% of the world's population. Ecologically, India can be divided into three main regions:

- The Himalayan Mountain system
- The peninsular India sub region (woodlands and desert); and
- The tropical rain forest region.

1.1 Number of Species in India and the World.

An estimate of the numbers of species by group in India is given below. This is based on Alfred, 1998.

Taxonomic Group	World species	Indian species	% in India
PROTISTA			
Protozoa	31250	2577	8.24
Total (Protista)	31250	2577	8.24
ANIMALIA			
Mesozoa	71	10	14.08
Porifera	4562	486	10.65
Cnidaria	9916	842	8.49
Ctenophora	100	12	12
Platyhelminthes	17500	1622	9.27
Nemertinea	600	-	-
Rotifera	2500	330	13.2
Gastrotricha	3000	100	3.33
Kinorhyncha	100	10	10
Nematoda	30000	2850	9.5
Nematomorpha	250	-	-
Acanthocephala	800	229	28.62
Sipuncula	145	35	24.14
Mollusca	66535	5070	7.62
Echiura	127	43	33.86
Annelida	12700	840	6.61
Onychophora	100	1	1
Arthropoda	987949	68389	6.9
Crustacea	35534	2934	8.26
Insecta	853000	53400	6.83

Arachnida	73440	-	7.9
Pycnogonida	600	-	2.67
Pauropoda	360	-	-
Chilopoda	3000	100	3.33
Diplopoda	7500	162	2.16
Symphyla	120	4	3.33
Merostomata	4	2	50
Phoronida	11	3	27.27
Bryozoa (Ectoprocta)	4000	200	5
Endoprocta	60	10	16.66
Brachiopoda	300	3	1
Pogonophora	80	-	-
Praipulida	8	-	-
Pentastomida	70	-	-
Chaetognatha	111	30	27.02
Tardigrada	514	30	5.83
Echinodermata	6223	765	12.29
Hemichordata	120	12	10
Chordata	48451	4952	10.22
Protochordata (Cephalochordata+ Urochordata)	2106	119	5.65
Pisces	21723	2546	11.72
Amphibia	7533	350	4.63
Reptilia	5817	456	7.84
Aves	9026	1232	13.66
Mammalia	4629	390	8.42
Total (Animalia)	1196903	868741	7.25
Grand Total (Protosticta + Animal)	1228153	871318	7.09

Source: Alfred, J.R.B. (1998) Faunal Diversity in India: An Overview: In Faunal Diversity in India, i-viii Archived 10 April 2009 at the Way back Machine, 1-495. (Editors. Alfred, JRB, et al., 1998). ENVIS Centre, Zoological Survey of India, Calcutta**.**

Study Area

The town of Kodaikanal sits on a plateau above the southern escarpment of the upper Palani Hills at 2,133 meters (6,998 ft.), between the Parappar and Gundar Valleys. These hills form the eastward spur of the Western Ghats on the western side of South India. Kodaikanal is known for its rich flora and fauna

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A great wealth of biological diversity exists in these regions and in India's wetlands and marine areas. This richness is shown in absolute numbers of species and the proportion of the world's total they represent.

Basic Census Methods of Wild Life

There are three main methods for counting wildlife.

- Total counts
- Sample counts
- Index counts.

Total Count

A total count aims to count all the animals in a specific area. This area is called the census unit. Because of under-counting total counts can only provide a minimum estimate of the total population size. Total counts should be used only when:

- The wildlife area is relatively small (under 10 km2) and completely fenced, which means that no animals can enter or leave.
- A single species is being counted in a restricted area.

Use of Total Counts

Other than in small or restricted areas, total counts are rarely used because:

- They only provide a minimum estimate,
- The level of precision cannot be measured and,
- They are much more costly than sample counts.

Sample Count

A sample count aims to estimate the numbers of animals in the total area within the census units from the number counted in a smaller area (sample unit). Sample counts make two important assumptions:

- That all the animals in the sample area or unit are seen and accurately counted
- That animals are spread evenly throughout the whole wildlife area or census unit for which the population is being estimated

Sample Surveys Carried Out

Three factors will determine how to carry out a sample survey:

- The size of the wildlife area
- The kind of habitat
- The resources (human and financial) at your disposal

In very large wildlife areas (usually more than 1000 km2) the only feasible method of undertaking a sample count from an aircraft. Even though it is a sample count, it will be very expensive because of this. In areas

where there is a strong element of community involvement in natural resource management, sample surveys may be carried out on foot.

3. INDEX METHOD

An index method aims, by using a standard approach, to produce an indirect measurement of the status of the population in the total area. For an index to provide useful management information, data for it must be collected repeatedly over a period of time using exactly the same method each time. The choice of how to do the count, whether on foot, from a vehicle or from an aircraft, will depend on the species to be counted, the size and relief of the area, the resources available and the objective of the count.

Types of Index Methods:

- An index of abundance gives an indication of the status of an animal population based on the numbers of animals seen per unit of time or distance, in a particular area over several seasons
- An index of 'hunting effort' gives an indication of the status an index of trophy quality gives an indication of the status of the population, based on the average time taken to find of the population, based on the annual average trophy size and shoot an animal. If over several years it regularly takes of a given species in a particular area over several years.
- An index of 'hunting success rate' gives an indication of the status of the population, based on the percentage of the allocated quota which is hunted over several years. If the entire quota is shot every year this implies that there is no shortage of trophy class animals. If the quota is not fully used this might mean that there is a shortage of trophy animals and the problem needs further investigation

Wildlife Tourism

Wildlife tourism mostly encompasses non-consumptive interactions with wildlife, such as observing and photographing animals in their natural habitats. It also includes viewing of and interacting with captive animals in zoos or wildlife parks, and can also include animal-riding (e.g. elephant riding) and consumptive activities such as fishing and hunting, which will generally not come under the definition of ecotourism and may compromise animal welfare. It has the recreational aspects of adventure travel, and usually supports the values of ecotourism and nature conservation programs.

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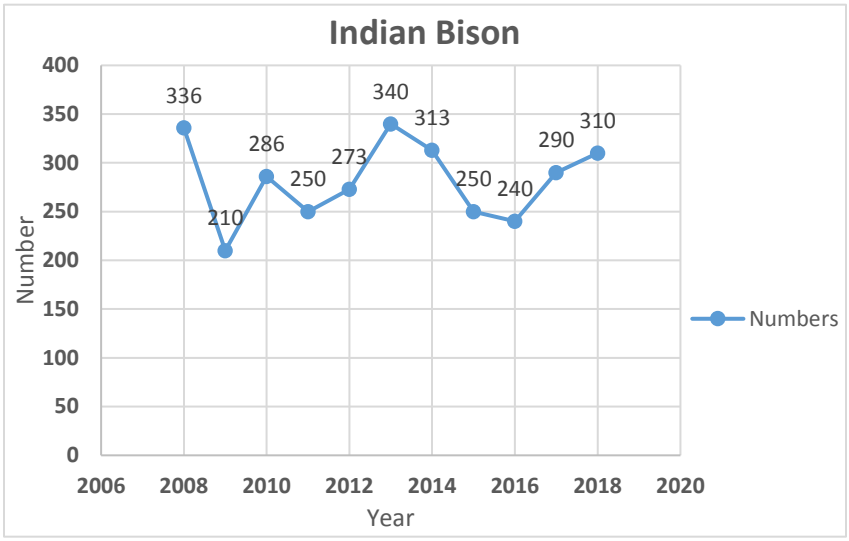
Data Analysis:

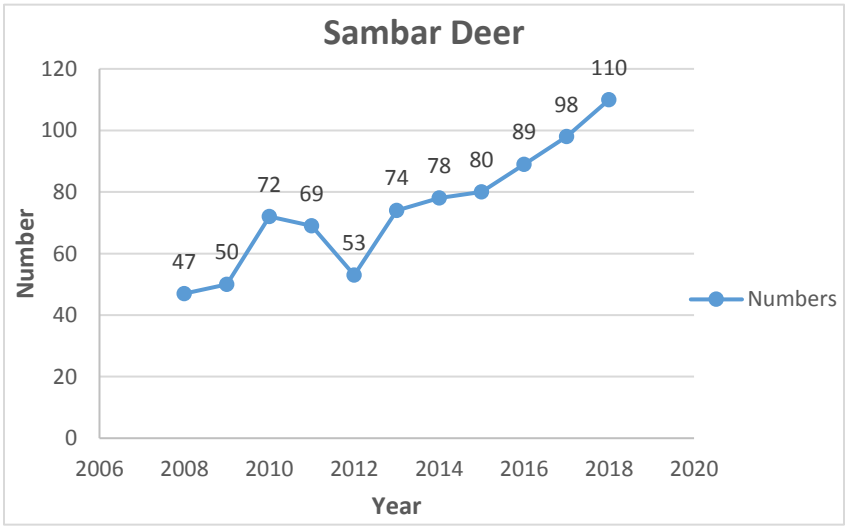
Chart 2.1 Indian Bison



The gaur also called the Indian bison, is the largest extant bovine. This species is native to South and Southeast Asia. It has been listed as Vulnerable on the IUCN Red List since 1986. Population decline in parts of its range is likely to be more than 70% during the last three generations. However, population trends are stable in Kodaikanal and Source: Primary

the area were well-protected and are rebuilding in a few areas which previously had been neglected.

Chart 2.2 Sambar Deer



Indian Bison The **sambar** is a large deer native to the Indian subcontinent, southern China, and Southeast Asia that is listed as Vulnerable on the IUCN Red List since 2008. In kodaikanal Populations have declined substantially due to severe hunting, insurgency, and industrial exploitation of habitat. Source: Primary

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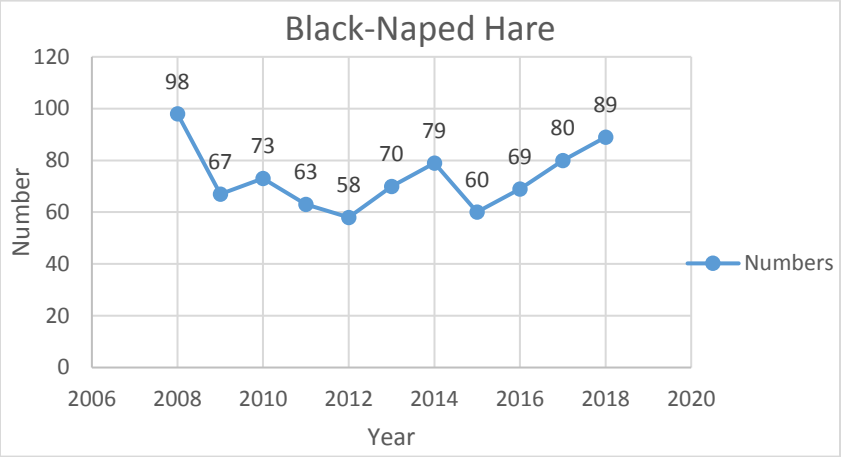
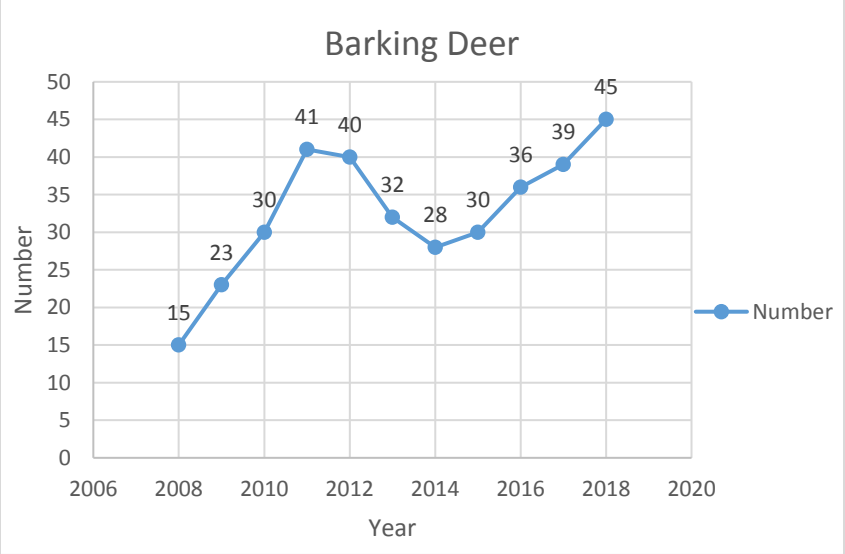
Chart 2.3 Black-Naped Hare



The black naped hare or the Indian hare is not endangered. In fact it is a species enlisted as of least concern in the red list of IUCN. But lately, this abundant species has become the target of poachers, making the animal's life vulnerable and hastily raising concern for the future of the animal.
Source: Primary

Chart 2.4 Barking Deer



The Indian muntjac is called barking deer due to the bark-like sound that it makes as an alarm when danger is present. It is also called *Kakar*. They have played a major role in Southern Asia, being hunted for sport and for their meat and skin. Often, these animals are hunted around the outskirts of agricultural areas, as they are considered a nuisance for damaging crops and ripping bark from trees.
Source: Primary

Chart 2.5 Indian Wild Boar

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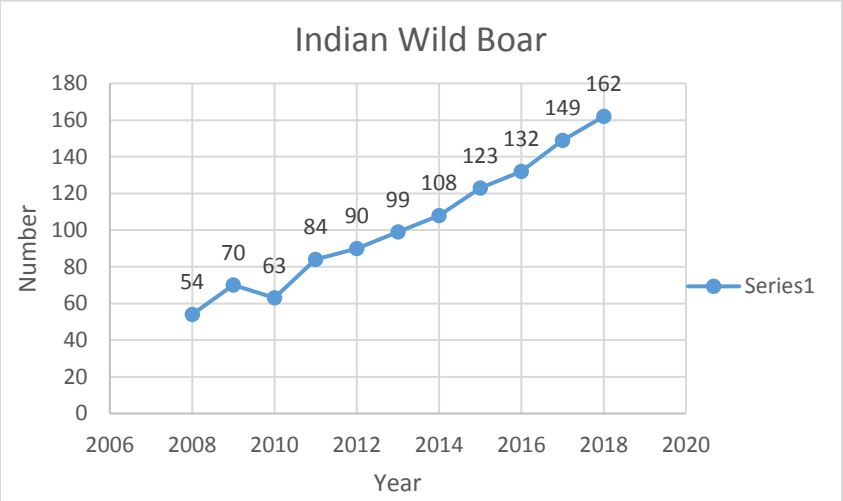
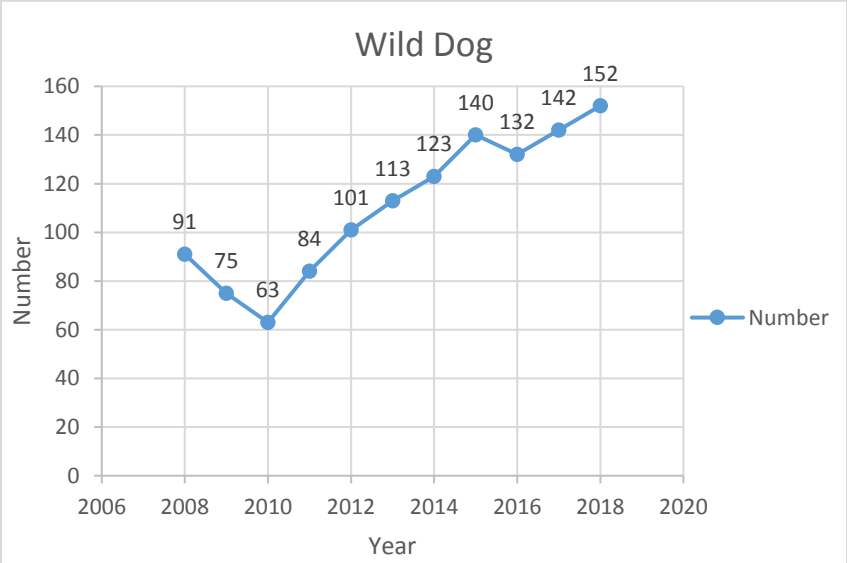


The Indian Wild Boar has a wide distribution through India, Nepal and Sri Lanka. A sub species is found in the Andaman & Nicobar Islands, the Andaman Wild pig). The species enjoys a much wider range stretching across Europe and Asia.

Source: Primary

Chart 2.6 Wild Dog



The African wild dog also known as the painted hunting dog, or African painted dog, is a canid native to sub-Saharan Africa.

It was classified as endangered by the IUCN in 2016, as it had disappeared from much of its original range. The 2016 population was estimated at roughly 39 subpopulations containing 6,600 adults, only 1,400 of Source: Primary

which were reproductive.

The decline of these populations is ongoing, due to habitat fragmentation, human persecution and disease outbreaks

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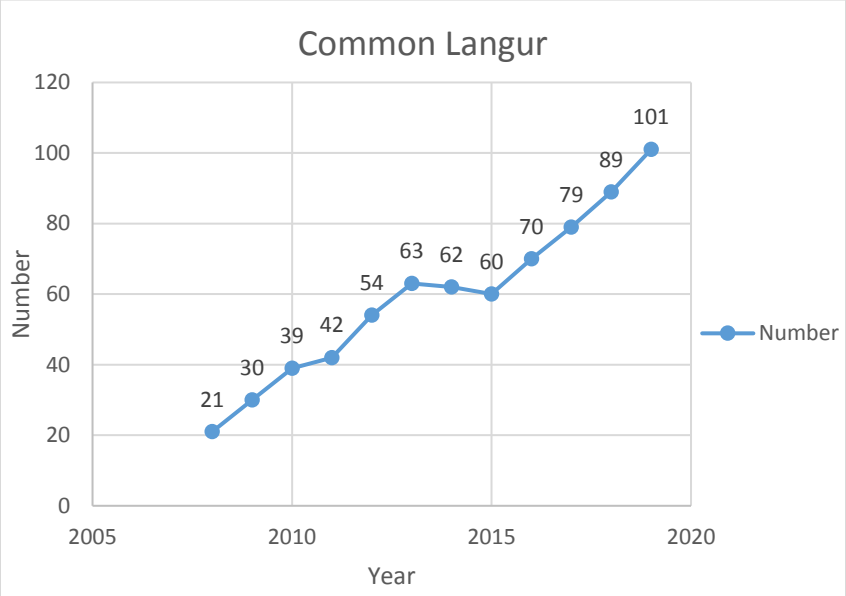
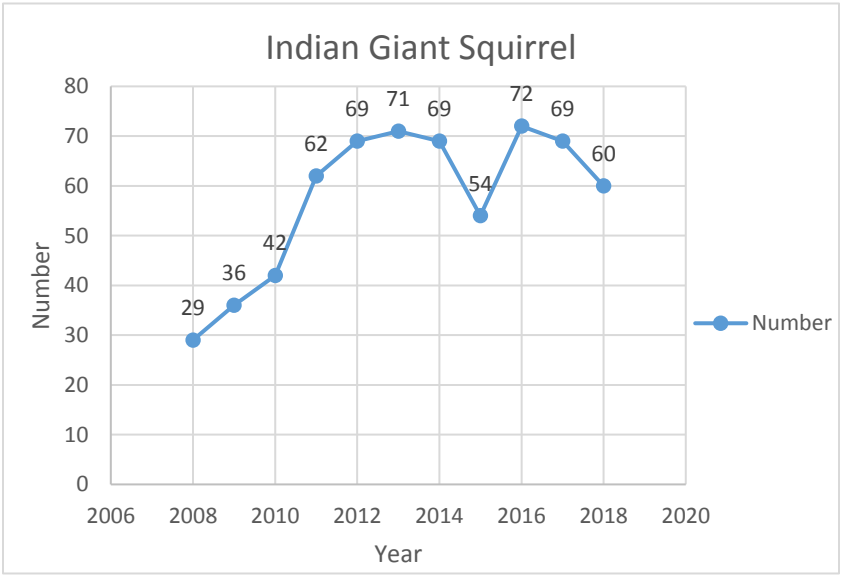
Chart 2.7 Common Langur



General, some of the biggest threats to natural forest habitats including Common Langur habitats in India include logging, encroachment as well as plantation and slash-and-burn (jhum) agriculture . Other local activities which may threaten or degrade Common langur habitats include open cast mining, fire damage, grazing, ground litter removal, and non-timber forest products including wood for fuel, fodder, fruits, gums, seeds, and medicinal plants .

Source: Primary

Chart 2.8 Indian Giant Squirrel



Found mostly in forests of peninsular India, the squirrel, also called the Malabar Giant Squirrel (ratufa indica) is about two-feet long — bigger than other squirrels — and has a long tail. They have been classified as endangered species, categorised under 'near threatened' on the International Union for Conservation of Nature (IUCN) red list.

Source: Primary

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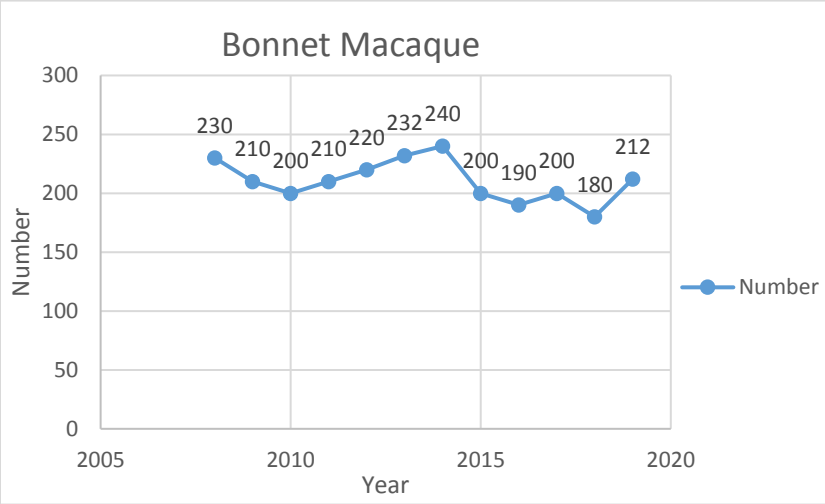
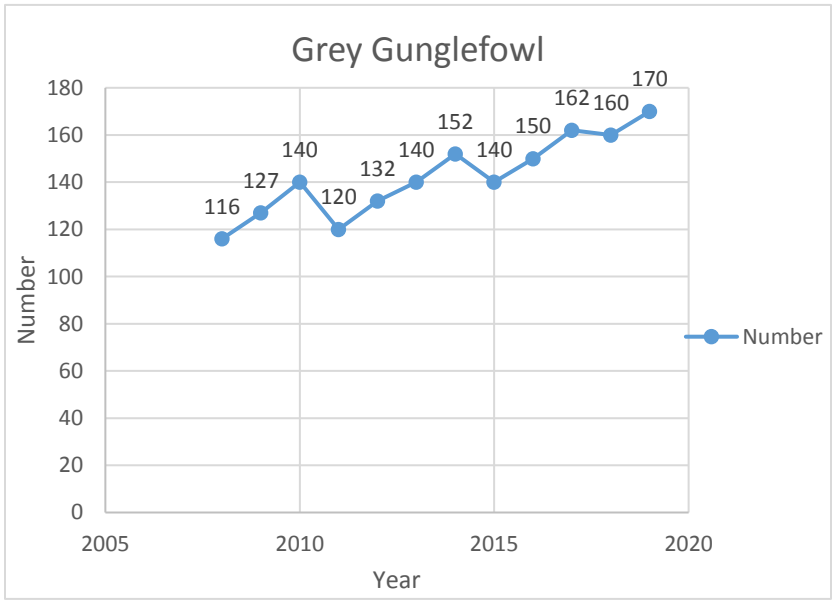
Chart 2.9 Bonnet Macaque



The Bonnet Macaque population in Tamil Nadu is estimated to approximately 16,000 animals. Overall, Bonnet macaques are currently classified as Least Concern (LC), but their numbers are decreasing. The bonnet macaque feeds on fruits, nuts, seeds, flowers, invertebrates, and cereals. In southern India, this macaque exists as commensal to humans, feeding on food given by humans and raiding crops and houses

Source: Primary

Chart 2.10 Grey Gunglefowl



The species is mainly in the Indian Peninsula buextends into Gujarat, Madhya Pradesh and south Rajasthan. The red junglefowl is found more along the foothills of the Himalayas; a region of overlap occurs in the Aravalli range although the ranges are largely non-overlapping. An endogenous retroviral DNA sequence, of the EAV-HP group noted in domestic fowl is also found in the genome of this species Source: Primary pointing to the early integration of the virus DNA into the genome of *Gallus*.

4. IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY IN WILDLIFE TOURISM

Basic Data Collection

ICTs have many uses in the field of data collection, either in the form of laptop computers, palm top computers or Personal Digital Assistants (PDAs). Cyber tracker allows non-ICT-literate users to accurately log and record wild life data using a specially designed icon-driven system. It is a hand-held device that

allows rangers and animal trackers to record what they see at that very moment. The device will then plot maps showing exactly where the observations were made, using GPS.

Creating Database for Endangered Species

ICT is also being used to build up databases or catalogues of a wide range of species. A database of critically endangered, vulnerable and rare species can also be created. There is an array of digital tools such as instant messaging, text messaging, blogs, videos, and social networking sites that are inexpensive ,easy to use and enable people to upload pictures, videos and views about wild life which can help in increasing database on wildlife and the identification of animals from existing database.

Tracking and Monitoring Wildlife

Along with GIS systems, satellite and radio tracking is a widely used and popular technology in the conservation world (9, 10). The advances in the technology, principally in the reduction of the size and weight of 'collars', an increase in battery life and the incorporation of solar cells, has meant that tracking and monitoring capability is being extended to include smaller species as well. Further advances mean that environmental data can also be collected, such as air temperature and, for marine animals, depth and heart rate, all of which contributes to a much greater understanding of a species. Depending on the type of system used, tracking and monitoring technologies enable the monitoring of animal movements over vast distances, often providing data which would either simply not be available, or would take a considerable amount of time and effort to gather. Through the ability to locate specific animals, or groups of animals, and monitor their movements over a period of time, conservationists are able to draw conclusions of various parameters related to their behavior which can be the basis of their conservational strategies.

Estimation of Population Size and Composition

The demography of a species is the most powerful tool in assessing its status. GIS and satellite tracking help in quantification and monitoring of a species. FIT is an effective censuring and monitoring tool especially for nocturnal and otherwise elusive species. This method is used effectively in identifying and monitoring Rhino in South Africa, Indian Bengal tiger, Cheetah in Namibia and polar bear in Canada

Home Range Determination

Locations of each animal are used to calculate a home range size which is recalculated each time the animal is relocated. Graphs for different ages/sexes/individuals may be compared to see how much variation exists between different groups, and what number of relocations is necessary to differentiate between groups. The distances between consecutive radio locations of an individual are often used as an index of the total daily movement for that individual.

Habitat Utilisation Studies

Radio-telemetry can provide detailed information about an animal's use of habitat like habitat preference, different habitat of males and females, circadian patterns of habitat use: occupying nocturnal or crepuscular habitats which differ substantially from daytime ones.

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Monitoring Migrational Patterns of Birds

The birds show varied difference in their migration. Some species take long journey with many stopovers so the habitat of these areas are crucial in conservation of migratory birds. The migratory patterns of 15 species of Asian birds were studied by the use of radio transmitters placed on birds and PTT with ARGOS satellite .The data was used to determine migration routes and stopovers to examine habitat use. Locational data was overlaid with topographic and vegetation layers to find priority areas for conservation.

Mortality and Survival Radio-telemetry techniques are enable to find the cause specific mortality factors because tagged animals can be located soon after death and the agent of mortality ascertained in lesser time.

Long Term Patterns of Habitat Use

To understand patterns over time that may be related to habitat changes or human activity, it is needed to look back over decades. This means archival maps, photographs, field notes, and other relevant data acquired in the field by numerous researchers in the past is required. So the researchers digitised historic database and compare it with the current information to reveal the long-term patterns of habitat use. In the conservation plan of mountain gorilla (Gorilla *beringei beringei*) in central East Africa, the hand drawn maps made about two decades before of daily gorilla group locations were digitised and compared with current ranging patterns. This helped to understand the changing patterns of gorilla behavior and the gorilla's relationship to their environment and to quantify and understand the impacts of poaching and encroachment.

Group Ranging Pattern

Using GPS the group movements of the animals are logged from which group ranging pattern of that species can be established.

National park management and planning key in the process of creating protected areas is first determining the range and migration routes of the species in question. Without this information it is difficult to identify the most crucial, ecologically relevant sites. Niassa in Mozambique is one of the last sites containing a vital gene pool of tuskers (large bull elephants with tusks) and satellite tracking of individual elephants was crucial in determining their range, prior to establishing the boundary of Niassa National park.

Evaluating Population Dispersal

Population dispersal is a highly valued measurement for conservation biologists because it can indicate the period at which the species headed for trouble. Although large population declines have been projected, very little is known about the movements and threats faced by individual albatross at sea, especially during their post breeding dispersal. The post breeding movements of 18 black-footed albatross tagged in California's Cordell Bank National Marine Sanctuary were tracked. Albatross are known for flying long distances, and the study confirmed these incredible journeys. Overall, four out of nine males traveled west of the international dateline (180º W) yet only one of the nine tracked females ventured into the western North Pacific. This preliminary data suggests that male and female birds segregate at sea. So, albatross remain threatened because they travel well beyond the safe zone into unregulated waters. This is an exciting observation with important conservation implications.

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5. EVALUATING DISTRIBUTION

Using GIS, scientists can assess the distribution of the endangered animals relative to management zones and protected regions particularly in the far ranging species. This can help in making the multiple nations accountable for their conservation. The world's largest seabird, the albatross, is critically endangered. Each year, thousands of albatross die at the end of fishing hooks. Using the satellite-tagged birds and remotely sensed information from satellites, scientists are investigating and quantifying movements of black-footed albatross. Findings showed that post breeding black-footed albatross do not remain within the Cordell Bank National Marine Sanctuary or the U.S. EEZ waters but range widely across high seas areas harvested by pelagic long line fisheries. Based on the known breeding colonies, Japan and the United States have jurisdiction over the black-footed albatross. During the post breeding season, however, the birds tracked during this study ranged within territorial waters of Canada, Japan, Mexico, and Russia. By overlapping albatross satellite telemetry tracks with boundaries of jurisdictional waters and fishing effort data, GIS graphically highlights those fisheries and countries with responsibilities for albatross conservation. So, the integration of satellite tracking, remote sensing, and GIS mapping is empowering resource managers to tackle large-scale conservation questions.

Assessment and reduction of human and wildlife conflict identifying, tagging and tracking problem animals can reduce human/wildlife conflict by providing an early warning that an animal is near a village or populated area. Endangered species can then be darted and relocated without the loss of human or animal life.

Identification of Farm-Bred and Wild-Caught Specimens

A major problem facing conservation initiatives that seek to promote the ‘controlled farming and breeding ‘of endangered species (in order to relieve the pressure on wild populations) is finding ways of determining whether individual specimens are genuinely captive bred, or caught in the wild. By injecting small electronic tags into the scales of ranch-bred crocodiles, conservationists working in South-east Asia are able to identify individuals taken from wild stock. This discourages the poaching of wild crocodiles, since the implementation of such a system makes them harder to sell.

Community-Led Conservation Initiatives

Many conservation programmes are community based. The World Conservation Union (IUCN) has implemented a pilot project to see how ICTs can promote conservation and resource management in remote conservation areas of Mozambique. ICT is providing rangers with a means of communication, allowing them to contact their base station and each other, monitor threats to the wildlife and signs of deforestation, and alert communities to any dangers posed by wildlife

Fund Raising

The social media helps in fund raising for wild life conservation. It provide a forum to wildlife lovers to discuss wildlife conservation and help in fundraising through online giving.

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Prevention of Wild Life Trafficking

Wildlife enforcement monitoring system is an application of ICT to prevent the transboundry wild life trafficking using data gathered through a national data compilation and analysis**.** Wild life and Forest crime Analytic Toolkit is designed to assist the government officials in wildlife administration and customs to conduct comprehensive analysis of possible measures related to the protection and monitoring of wildlife and to identify technical assistance

CONCLUSION

Wildlife habitat and species around the world are facing a crisis. It is estimated that global warming may cause the extinction of 15–37% of species by 2050. This is another aspect which needs attention because we could lose about 1.25 million species. Unlike other environmental losses, this one cannot be reversed because nature does not give second chances to biodiversity.

Major Dangers to Wildlife

Fewer natural wildlife habitat areas remain each year. Moreover, the habitat that remains has often been degraded to bear little resemblance to the wild areas which existed in the past. Habitat loss due to destruction, fragmentation and degradation of habitat is the primary threat to the survival of wildlife.

- Climate change: Global warming is making hot days hotter, rainfall and flooding heavier, hurricanes stronger and droughts more severe. This intensification of weather and climate extremes will be the most visible impact of global warming in our everyday lives. It is also causing dangerous changes to the landscape of our world, adding stress to wildlife species and their habitat. Since many types of plants and animals have specific habitat requirements, climate change could cause disastrous loss of wildlife species. A slight drop or rise in average rainfall will translate into large seasonal changes.
- Unregulated Hunting and poaching: Unregulated hunting and poaching causes a major threat to wildlife. Along with this, mismanagement of forest department and forest guards triggers this problem.
- Pollution: Pollutants released into the environment are ingested by a wide variety of organisms. Pesticides and toxic chemical being widely used, making the environment toxic to certain plants, insects, and rodents.
- Over exploitation: Over exploitation is the over use of wildlife and plant species by people for food, clothing, pets, medicine, sport and many other purposes. People have always depended on wildlife and plants for food, clothing, medicine, shelter and many other needs. More resources are being consumed than the natural world can supply. The danger is that if too many individuals of a species are taken from their natural environment, the species may no longer be able to survive. The loss of one species can affect many other species in an ecosystem. The hunting, trapping, collecting and fishing of wildlife at unsustainable levels is not something new. The passenger pigeon was hunted to extinction, early in the last century, and over-hunting nearly caused the extinction of the American bison and several species of whales.

- Deforestation: Humans are continually expanding and developing, leading to an invasion of wildlife habitats. As humans continue to grow, they clear forested land to create more space. This stresses wildlife populations as there are fewer homes and food sources for wildlife to survive.
- Population: The increasing population of human beings is the major threat to wildlife. More people on the globe means more consumption of food, water and fuel, therefore more waste is generated. Major threats to wildlife are directly related to increasing population of human beings. Low population of humans results in less disturbance to wildlife.

Characterisation, quantification and monitoring of wild life is a major challenge in conservation. The traditional methods are not sufficient to tackle the conservation strategies of the threatened species whose number is increasing at an alarming pace. The ICT is helpful not only in tracking and monitoring the threatened wildlife but also in planning and management of their conservation efforts. It is a great tool in sensitizing people towards wildlife and create awareness about their conservation and need of sustainable management.

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