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Abstract
In the near future, natural resources are very rapidly diminishing all over the globe. Which is very unhealthy for land ecosystem services. In the biodiversity, Tiger is an icon of healthy wildlife which is considered as a vital factor for maintaining Universal Food Chain System. This research paper is based on “Geo-Spatial Mapping of land use and land cover changes in the Core and Periphery Area of Ranthambore Tiger Reserve, Rajasthan, India, 1975-2015, it’s a micro level Study based on primary and secondary data through GIS mapping and consider as a Socio-Economic & Physical factors to inter-connect with Tiger habitats. Especially, core and periphery LULC have been obtained from the Multispectral images from ETM and ETM+ sensors of Landsat and LISS-III and AWIFS sensors of Resourcesat-satellites. This study examines the spatial and temporal patterns of LULC change along the boundary of Ranthambhore in the Rajasthan from 1975 to 2015. Tiger Landscape change within all ecological zones will be evaluated. The Landsat TM and ETM imagery will be used to produce LULC classification maps for both areas using a hybrid supervised/unsupervised methods. LULC changes are measured using landscape metrics and change maps created by post-classification through change detection. Using all the raster maps and the final change detection of the reserve will be done through spatial analysis using the raster calculator tool in ArcGIS and Erdas and MS Excel 13. The study comes out with land use and land cover change in core and periphery areas of the reserve. The research also describes Human Encroachment, Impact on human colonization, interfere with domestic animals, Inter-breeding, and the Migration in core and periphery areas, finally, the situation would be alarming for biodiversity of tiger habitat due to the high pressure of anthropogenic activities.

Keywords: Land Ecosystem Services, LULC, Human Encroachment, Tiger conservation

1. INTRODUCTION

Our past, present and future earth depends on our land ecosystem services. But currently, climate change, environmental degradation, overpopulation, Genetic engineering, Pollution, and Resources depletion are very rapidly growing in the whole world. All these issues emerge due to massive anthropogenic activities encroach on the forest habitat. Therefore, the world is experiencing high rates of biodiversity loss (Butchart et al., 2010). Biodiversity deterioration is accompanied by ecosystem degradation, which in turn impacts human well-being through the loss of benefits (“ecosystem services”) that ecosystems provide (Diaz et al., 2006).

According to IPCC (2006), around 1.86 billion tons of carbon are out annually due to land use land cover changes & climate change but especially impact on tropical areas due to unsustainable practices of land resources. This is a key source of carbon emissions and an active supplier to global warming and climate change.

LULC is caused by external and internal drivers and it has been influenced by many traditional and modern resource management practices (Campbell et al., 2005). The changes in the land use in nature is the result of human encroachment through urbanization, agriculture development, and different developmental activities.
Almost biodiversity areas face the growing problems of human-wildlife conflict, loss of natural vegetation and open space. The process of degradation of biodiversity often leads to haphazard growth through envies species of flora and fauna in the terrestrial ecosystem.

In order that tiger is an icon of wilderness and good fortune of the ecosystem. By conserving and saving tigers the entire wilderness ecosystem is conserved. Tigers play a crucial role in the health of the ecosystem. Tigers constitute the top carnivores in the ecosystem and are at the zenith of the food chain. The removal of a top carnivore from an ecosystem can have an impact on the relative abundance of herbivore species within a guild. But this species is going on the endangered level. Thus, we are doing million dollars invested in this wild animal. Because of Tiger Supports Livelihood, Protects Genetic Diversity brings Rain, Prevent Climate Change, a symbol of our National Pride. Therefore, Recently Animal Planet surveyed, the tiger was voted the world’s favorite animal (Source: Animal Planet, 2011)

The vulnerability of tiger landscape is depending on physical and socio economic factors, all these factors is the relation with flourish of tiger ecosystem services, if high vulnerability of land resources it means very low flourish of tiger ecosystem services but if a very low vulnerability of land resources that means high tiger ecosystem services flourish in this areas, which is a sign for contributing ecosystem services of all categories such as supporting, provisioning, regulating and cultural services.

2. STUDY AREA

Ranthambhore tiger reserve is located between latitudes 25°52’07” N to 26°33’71” N to Longitudes 75°085’84.0” E to 77°02’48.0” E at the junction (Great boundary fault) of Aravalis and Vindhyan ranges. It is Core area 1113.36 sq.km. And Buffer area is a 297.92 sq.km. It is a total geographical area of 1411.28 sq. km.

![Figure 1. Location of Study Area](image-url)
It is the single largest expanse of dry deciduous Anogeissus pendula Forest left intact in India. In the present time, total tigers above 60 in the Ranthambore tiger reserve. Through it conservation, there are so many land ecosystem services provide to stakeholders through tiger conservation. As well as Ranthambore the most hotspot tiger reserve and marks the transition zone between the true deserts and seasonally wet peninsular India.

It is estimated that the Ranthambore Tiger Reserve (RTR) provides flow benefits worth 8.3 billion (`0.56 lakh/hectare) annually. Important ecosystem services originating from RTR include gene-pool protection (7.11 billion year-1), provisioning of water to the neighboring region (115 million year-1) and provisioning of habitat and refugia for wildlife (182 million year-1). Other important services emanating from Ranthambore include generation of cycling of nutrients (34 million year-1) and sequestration of carbon (69 million year-1), apart from housing the Ganesh Temple visited by about 10 lakh pilgrims every year. (Source: Economic Valuation of Tiger Reserves In India A Value+ Approach, January 2015)

3. RESEARCH METHODOLOGY

The Integrated Vulnerability of Ranthambhore Tiger landscape is assessment through numerous tools, techniques, methods, and observations. In this research, data analyzed through physical and socio economic landscape information’s.

In the research methodology, both qualitative and quantitative methods used for data collection and data analysis. Secondary has been taken from Survey of India, Census of India 2011, The National Tiger Conservation Authority (NTAC), The Ministry of Environment and Forest (MoEF), Wildlife Institute of India (WII), USGS, Earth Explore, World Wildlife Fund (WWF), Department of Forest (Government of Rajasthan), Survey of India topographic sheets, National Remote Sensing Agency (NRSA), Earth Explorer, GLCF and BHUVAN etc.

The primary data has been collected through group discussions and interviews with local elder people and patrons, semi-structured interviews with local households, in-depth interviews with local authorities and semi-governmental officers, expert interviews with senior government and NGO/development agencies, staffs, and participant observation.

The software used for the purpose are Erdas 14, ArcGIS 10.3, and QGIS3. The data collected through the primary survey will be analyzed using the software like Microsoft Excel 2013 and SPSS 15.0. Linkert scale will also be used to quantify the perception of respondents.

4. RESULT AND DISCUSSION

Ranthambhore Tiger habitat support tigers, their prey, and a vast amount of biodiversity. They also contribute to human wellbeing at locally and globally, through ecosystem services such as water harvesting, carbon sequestration, plant genetic materials, food security and medicinal plants, and opportunities for community-based sightseeing. Most of these benefits are directly and indirectly contributed to human well-being and future earth also.

The study area has 60 plus tigers and about 1.5 million people directly or indirectly depend on these ecosystem services and their livelihood also as well as main sources of livelihood are creating through tiger ecosystem services in the Ranthambhore. According to result, core and periphery area have a massive human encroachment going on by rapid haphazard development activities.
Fig. 2: LULC of Peripheral Area of RTR, 2km., 1975  

Fig. 3: LULC of Peripheral Area of RTR, 2km., 2015

Source: NTCA, 2015 & Census of India, 2011

Fig. 4: LULC of Peripheral Area of RTR, 2015  

Fig. 5: Human Encroachment Spots in the RTR

Source: NTCA, 2015 & Census of India, 2011
Land use and land cover changes of Ranthambhore is a major concern of environmental vulnerability. It has a unique terrain characteristic, but continuously natural and man-made drivers are accelerated towards rough land ecosystem.

LULC of RTR, especially human encroachment is rapidly going on in the from buffer areas to core areas, in the southern side of RTR, built areas (Red colour) is constantly increasing due to semi urbanization of Khandar town as well as an extension of small villages. According to result, the higher growth rate in the Ranthambhore national park rather than Kaila Devi wildlife sanctuary and northern side one place have a built-up area which is district headquarter Sawai Madhopur and that is a particular place of major service provider for the region.

Extension of agriculture services is rapidly increasing due to the growth of food markets in terms of demand and supply increase in the near areas, transmission of new agro-technology, illegal encroach to public land resources and unsustainable cultivation rapidly increasing. These are the main reason for agriculture services are spreading out which is alarming for biodiversity of Ranthambhore tiger landscape.

Meanwhile, the vegetation of Ranthambhore is continuously changing due to spread prosopis juliflora plantations. Prosopis juliflora is fast scattering into at the Ranthambhore National Park, Sawai Mansingh Sanctuary, and Kaila Devi Sanctuary, The area covered with Prosopis juliflora is likely to be doubled in next ten years. Though there has been no coppicing, the regeneration through seeds is causing concern. It is one of environment vulnerability on the land resources.

Continuously, LULC is changing of the physical and socio-economic environment of Ranthambhore, which is an upsetting condition for a man-environment relationship. Nowadays, a scenario of development activities happening in near protected areas due to the requirement of basic needs, scarcity of land resources and “No Go Zone areas” etc. In order that some forest habitat pockets have a high vulnerability and some areas have a less vulnerable. But ultimately they are decreasing biodiversity of Ranthambhore.

5. CONCLUSION

Restoration of tiger species can lead to the better sustainable development of land ecosystem services in Ranthambhore. Through the sustainable development of land, resources are contributed to many scientific, policy, planning or management purposes. Within each of these areas a wide range of needs exists. Such as Relief inventories, Water inventories, Land use inventories, forest inventories, as well as socio-economic inventories. The research has been finding out how the existence of tiger contributes to land ecosystem services and how management of tiger is regulating and monitoring for LULC.

The result has been identified the geographical, social, economic and political indicators, which determine the flourishing and diminishing of the land ecosystem. The research has been looked at the existing management plan of the tiger reserve and will suggest better management strategy for tiger conservation in the reserve.

Tiger conservation influence both environmental quality and the quality of life. Changes in habitat, water and air quality and the quality of life are some of the environmental, social and economic concern associated with stakeholder in a protected area.

The status of land resources has automatically preserved the habitat, water quality, quality of life, global carbon cycle, population growth, economic growth, demographics, agriculture and forest products, regional and planning and policies. Ultimately, the aim of the study is to the sustainable development of tiger habitat areas and land resources in the Ranthambhore.

In the coming time, land resources should be managed by restoration of forest habitat, maximum public participation, work for community development, inclusive and holistic development of corridor, consensus building for management, and sustainable development for all stakeholders. The main outcome of tiger ecosystem service is providing a valuable framework for
analyzing and acting on the linkages between local people and other stakeholders with their environment. Finally, better tiger conservation can lead to the better sustainable development of land ecosystem services.

REFERENCES


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