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THE IMPACT OF LAND USE CHANGES ON WILDLIFE AND ITS HABITS IN GONDIA DISTRICT OF MAHARASHTRA

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Abstract

Our native wildlife populations are under tremendous stress as a result of all development sites regardless of whether they are located in rural or urban areas, which is exacerbated by an ever-increasing human population. Land that was formerly a wildlife habitat is now being developed for agricultural, residential and commercial purposes, as well as highways and other uses. The amount and quality of wildlife habitat are both impacted by changes in land use pattern and related activities. The current study takes a broad look at the effects of changing land use on wildlife and their environment. Using the land classification, the impact of various levels of agricultural development on wildlife habitats has been established. Forestry, tourism, vehicles and roads, pollution, pesticides, herbicides, fertilisers, hotels and lodges, and sewage disposal have all had an impact on wild ecosystems' carrying capacity. The paper concludes with a list of challenges that must be addressed immediately. As a result, effective mitigation methods are urgently needed to resolve this problem in its entirety.

Keywords: Gondia district, land use changes, wildlife

抽象的

由于所有开发地点，无论它们位于农村还是城市地区，我们的本土野生动物种群都承受着巨大的压力，而不断增加的人口加剧了这种压力。以前是野生动物栖息地的土地现在正被开发用于农业、住宅和商业用途，以及高速公路和其他用途。野生动物栖息地的数量和质量都受到土地利用模式和相关活动变化的影响。目前的研究广泛研究了土地利用变化对野生动物及其环境的影响。利用土地分类，确立了不同农业发展水平对野生动物栖息地的影响。林业、旅游、车辆和道路、污染、杀虫剂、除草剂、化肥、旅馆和旅馆以及污水处理都对野生生态

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系统的承载能力产生了影响。该文件最后列出了必须立即解决的挑战。因此，迫切需要有效的缓解方法来全面解决这个问题。

关键词：贡迪亚区，土地利用变化，野生动物

Introduction

Species extinction is a serious problem in developing countries because most development locations entail land use changes, whether in rural or urban regions, will have some wildlife or habitat significance. Forest loss and degradation in rural areas are primarily caused by human encroachment into the forest and conversion of forest land into agricultural land and residential areas (Balmford et al., 2012; Woodroffe et al., 2005), habitat fragmentation as a result of linear developments like railroads and roads (Ito et al., 2013), overgrazing (Middleton, 2003), and intensive harvesting of timber, wood for fuel, and other forest products (Mishra, 1997).

Gondia District is one of the newest districts located on the Maharashtra's eastern border, having been created on May 1, 1999, when it was split from Bhandara District. Land use management in the district is mainly under Agriculture and forestry. Rice is the most important cereal crop in the area, followed by wheat; in the pulses category, the district grows tur, gramme, mung, urad, lentil, and other crops. Groundnut, mustard, sesamum seed, soyabean, sun flower, and other oilseeds are also farmed in the district. Vegetable and fruit farming can be found in practically every Tahsil. The forest here is a combination of planted and natural. In these forests, high-quality teak trees can be found. Other trees found in these forests include Bija, Holda, Sisam, Moha, Khair, Goradi, and others, as well as Tendu leaves, Moha flowers, and other helpful plants (Bhuskute and Jha, 2014; Census, 2011).

Due to the lack of large-scale industry in this region, it is economically backward; however, due to the start of construction of the Adani Power Plant, it is now developing, and many existing rice mills in the city are expected to generate substantial amount of pollution, especially air pollution as a result of fugitive emissions from various operations, as paddy is the main agricultural product here (Katre and Pandey, 2012). The socioeconomic structure of Gondia leads to the local population misusing and abusing biotic resources, often at the expense of traditional knowledge and methods (Bhuskute and Jha, 2014).

Material and Methods

Study Site

Several survey sites in the Gondia district, located at latitudes 20°40' and 21°38' north and longitudes 79°47' to 80°42' east, were chosen for the current investigation. On the northern side, Gondia is bordered by Madhya Pradesh's Balaghat district, and on the eastern side, Chhattisgarh's Dongarghad city. Sakoli Tahasil and Bhandara district in Maharashtra are to the south and west, respectively. The city is located on the Mumbai-Calcutta railway line. In Figure 1, the location of Gondia city is depicted. Tirora, Amgaon, Goregaon, Gondia, Salekasa, Sadak Arjuni, Arjuni Morgaon, and Deori Tahsils provided primary and secondary data.

Sampling, Data Collection, and Data Analysis

Data was collected on a monthly basis from numerous important stakeholders from April 2019 to March 2020. From the office

records, secondary data was gathered and analysed (registers, reports and other records available at State, District, Block and Gram Panchayat levels). Secondary data was also gathered from a variety of sources, including journals, newspapers, and the internet. Primary data was acquired through interviewing respondents at various levels in accordance with the objectives. The samples were chosen using the stratified sampling approach, which was based on the village data. Respondents' samples were chosen at random from the population that fell within each group.

The responses of the respondents were graded according to a pre-set criterion. Each respondent was given a score for each variable, which was subsequently awarded to him. The numerical values of the individual components were connected with the scores.

Result and Discussion

1. Agriculture and wildlife go hand in hand

Agriculture is most likely the primary field that contributes negatively to wildlife and habitat damage, depending on the amount of development (FAO, 2009). Agriculture used to be based on the "slash and burn" practise of shifting cultivation, which resulted in the destruction of large forests and soil loss due to water and wind erosion. Water bodies in advanced stages of development have chemical toxicity and mineral enrichment. The influence of varying levels of agricultural development on wildlife habitats has been demonstrated using the land classification below (Karaba, 1980).

I. Agricultural Holdings on a Small Scale

These are locations where the average farm size is less than 5 hectares, with only three hectares of cultivated land. Family labour is the most major limitation.

II. A large-scale livestock industry

All current grazing areas, and pastoral land-use systems are included in this land-use. They are classified as follows: **a.** The main grazing block area (current or anticipated) **b.** The group agricultural areas **c.** Commercial farming areas on the verge of achieving Advanced Technological status

III. Large-scale agriculture

They are above 20 hectares in size, according to the Ministry of Agriculture. There are two types of farming areas: mixed farming regions and plantations. These two are categorized as sophisticated technology since their environmental impact is comparable to that of developed countries.

IV. Large scale irrigation schemes

In Gondia, Maharashtra, this form of land usage is unusual. It falls under the category of intermediate technology and is designated as land use type II.

The following are the reasons why this land use classification was chosen:

1. It is entirely consistent with the government's a development planning and agriculture systems. As previously stated, pastoral areas have recently become target areas for adjudication into group marginal farms, and individual large farms held on freehold (FAO, 2009). Pastoralists had a legal basis for intensive land management for the first time. While the government wished to identify the best land uses for specific land areas in terms of their long and short-term benefits, intensive farming precludes wildlife conservation habitat utilisation. Extensive group farming may permit wildlife coexistence up to a specific livestock/human/wildlife interface density.

2. The system is simple because wildlife conservation and agriculture are different lands

uses (FAO, 2015). It's simple to see how wildlife uses vegetation, land, and point resources like water. This is critical for assessing wildlife interactions with humans and their activities. Resource utilisation can be changed, and new management options can be investigated to reduce conflict between land uses. Wildlife resources can be considered in terms of habitat and food, predicting subsequent vegetation changes. In this context, a new concept of ecological capacity emphasises economics emerges. Because each land classification has a different impact on habitat and wildlife composition, land use has an economic carrying capacity that must be considered when developing wildlife and habitat management strategy.

3. The classification can simply present the comparative intensities of conflict and land use in most district areas. Land classification type 1 demonstrates this conflict and is not conducive to wildlife coexistence. The current subdivision of large-scale farms into small 5-acre plots, on the other hand, has hurt habitat and wildlife. Due to the stress imposed on wild animals, their natural range and habitat have shrunk, causing them to attack crops. The carrying capacity of wild habitats has been reduced due to range degradation and overgrazing. Severe soil erosion occurs as a result, and silt is washed away by surface runoff and deposited in lakes. The district lakes like Itiadoh, Sirpur, Kharboandha, Navegaobandh, Chikhaldara, and Bodalkasa Chorkhamara have been threatened with silting, putting aquatic life at risk. The Wainganga, Bagh, Chulbandh, and Pangoli rivers risk silting up swamps along the coast. Chemicalization is prevalent in advanced technology agriculture, which hurts water bodies. Lakes will be enriched with nitrates and phosphates from agricultural

surface runoff. As a result, aquatic weeds and eutrophication are relatively new problems that have grown in importance as development progresses.

2. Management of forests and wildlife

The law renders any use of natural resources within the forest illegal. In the Gondia district, the forest-covered area is crucial in defining land use. Even though the amount of India's forest-covered territory is shrinking, forest still covers 40% of the Gondia district. In 1991, forests covered 32% of the district's entire geographical area, compared to 40% in 2001. This represents an increase of 8% in the area covered by trees. (Bhuskute and Jha, 2014). Sadak Arjuni taluka in the Gondia district is the most forested, with 64 percent of its territory covered in forest, followed by Deori taluka with 53 percent. The city of Gondia has the least amount of forest cover, with only 7%, followed by Amgaon Tehsil at 13% (Bhuskute and Jha, 2014). Growing trees for domestic use is a priority on farms. Fuelwood and building poles account for 90% of forest product usage.

3. Forests that provide protection

Examples are forests in Darekasa, Deori, Sadak Arjuni, Morgaon Arjuni, and Wildlife Sanctuary (Table-1). The Forest Reserves also serve as wildlife conservation areas. The growth in indigenous forests provides cover and food for various birds, mammals, reptiles, and insects.

Table1: Extent of Forests in eastern Vidarbha districts of Gondia (Plan and Lines, n.d.)

Name of Unit	Gondia district (sq. km)
Gondia Forest Division	1731.785
F.D.C.M.Ltd.	327.196

Research Wing	-
Nagzira Wildlife Sanctuary	153.663
New Nagzira WL Sanctuary	72.877
Navegaon National Park	129.552
New Navegaon N P	122.757
Total Forest Area	2537.83
Total Geographical area	5425
% Forest area to Geographic. Area	46.78%

4. Tourism puts a strain on people.

Tourists are drawn to Gondia primarily because of its diverse habitats and wildlife at Navegaonbandh and Nagzira wildlife sanctuaries. Compared to the previous decade, the total number of visitors to the wildlife sanctuary has increased. The number of visitors to historical and ancient sites including Pratapgarh, Itiadoh, Hazrafal, Gadhmata, Mahadev Pahari, and Mandodevi has also increased. Another tourist attraction is the Gond Adivasi 'Kachargarg festival,' which takes place in a cave in Dhanegaon (Darekasa) during Magh Poornima and lasts four days. To grasp clear picture of the impact of tourism on environment, tourism demands should be viewed together with other factors affecting it (Mamahooana et al., 2013).

5. Conservation areas have incalculable significance

The district's final refuges for wildlife gene pools, unusual habits, and dwindling fauna and flora are Darekasa, Deori, Sadka Arjuni, Navegaonbandh, and Nagzira wildlife sanctuary. To determine the trajectory of other unprotected ecosystems, keeping them as intact as possible is necessary as reference points from which

"background values" can be obtained. As a result, their disruption should be kept to a minimum. Wildlife is accustomed to unrestricted movement. Roads, which are unnecessary in some parks, are large enough to support animals. Not only have these roads reduced the amount of land available, but some of them also cross rare habitats. National Highway has always resulted in higher wildlife mortalities per kilometre (Forman and Alexander, 1998).

6. The impact of automobiles and roads

Numerous vehicles' constant roads entering the Navegaonbandh and Nagzira wildlife sanctuaries cause wildlife disturbance. In the effort to see as many species as possible in the shortest time, off road driving has recently become a major concern to the conservationists. Vehicle use impact is not yet fully understood and very little research has been done in this field. However, it is obvious that off-road driving is likely to have a considerable impact on vegetation and soil (Assaeed et al., 2019). Apart from causing physical harm to plants, this well-known behaviour has caused so much disruption in some species' optimal habitats, such as leopards, that their activity patterns have been altered. In some wildlife protected areas, animal life has become extremely difficult to locate due to noise and close proximity (Larkin, 1996). While this is not in the best interests of conservation, it occurs when the number of vehicles increases, mainly when concentrated near a preferred species (McLaughlin, 1970). Furthermore, the vehicle's tyres have regularly deprived herbivores and grazers of considerable vegetation, resulting in the loss of hundreds of hectares in most wildlife protected areas. These compacted areas of land are prone to soil erosion,

reducing the wildlife protected areas carrying capacity even further (Lee, 1973).

7. Hotels and lodges have a variety of effects.

Due to developing countries' increasing need to maximise earnings from tourism, parks and reserves are suffering both environmentally and aesthetically (Green and Higginbottom, 2001). It is their duty to satisfy the demand of the tourist. However, this use can harm the ecological features of these areas and reduce their attractiveness to tourists. Lodges, for example, are unusual objects in Navegaonbandh and Nagzira wildlife sanctuaries. Their haphazard construction causes various forms of pollution, habitat loss, and a loss of the sanctuary's natural appearance (R. Fulton, 2002).

8. Pollution's effects

Agriculture and the use of natural resources are significant sources of pollution. The largest sources of organic matter, common plant nutrients, persistent pesticides, and silt are surface and near-surface runoffs from agriculture, urban areas, and pastures (Kour Reen et al., 2018). Because pollution takes numerous forms, comparative observation indicates that this is a high-risk potential threat.

9. Herbicides, pesticides, and fertilisers

Agriculture is central to the economy of Gondia. Efforts to increase productivity in the region have resulted in the extensive use of fertilisers, pesticides, herbicides, and other plant and animal protectants. The subsurface and surface runoff from this treated lands and cattle dips always finds its way into the lakes and rivers of the region. Birds, small rodents, fish, and some vital insects may have disappeared from these

places as a result of highly automated sprays and dust. (Köhler and Triebkorn, 2013).

10. Sewage removal

As the development process continues, and with the influx of people to Gondia city from neighbouring border states such as Chhattisgarh and Madhya Pradesh, the problem of industrial and municipal sewage disposal has taken on greater importance. Disposal encompasses dumping degradable residuals, non-degradable pollutants, and persistent pollutants into bodies of water. This, together with primary and secondary paddy cleaning, results in solid waste and fugitive emissions in the workplace. Fly ash, suspended particulate matter, smoke, and carbon oxides are all produced by the coal or husk fired Rice boiler.

As industrial and agricultural processes become more intensive, more sewage is discharged into lakes and rivers (Mateo-Sagasta et al., 2017; Friend, 1985). Increased plant nutrient delivery to water bodies as a result of human activities in watershed areas is attracting attention due to eutrophication concerns. It promotes algae growth, resulting in high blooms and higher aquatic plants that become weeds.

11. Adani Maharashtra Power Limited's Impact

Increased employment, asset value addition, local investment, and business, among other things, accrued throughout both the construction and operational phases of new thermal power units can be quantified. The construction and operation of a thermal power plant provides significant economic benefits to land and farm owners, yet the ash is responsible for wildlife habitat degradation and loss.

12. The environmental impact of rice mills

Environmental characteristics such as temperature, moisture, pH, and organic carbon were found to be identical in both contaminated and non-polluted areas. However, the concentration of Rice mill effluent varied greatly between sites, with the nonpolluted plot having the lowest concentration. Further analysis revealed a substantial negative association between Rice mill and total arthropod population in all studied sites, but no significant relationship between Rice mill and total arthropods at the non-polluted site.

Conclusions

Wildlife and its habitat, as well as land use changes, are vital to the social and economic well-being of the Gondia district. Land use changes is considered as vital for sustained economic progress, and a compromise can be achieved between wildlife conservation and continued development. Gondia is home to a diverse range of wildlife, including habitats and species that are both nationally significant and relatively unique to Maharashtra. Land use changes can have a variety of negative effects on wildlife, including habitat destruction or fragmentation, as well as disturbance of animals and their breeding grounds. We believe that during the planning of land use changes, local governments and state governments should include wildlife and its habitat by ensuring that crucial issues are addressed as part of the planning process. This strategy guarantees that environments and species are given the protection they deserve, as outlined in our legislation. It is critical that we all work together to keep this system in place so that we can

continue to thrive while also protecting our natural environment. The above paper is merely a summary of some of the effects of land use changes on wildlife and their habitat, as well as potential mitigation measures.

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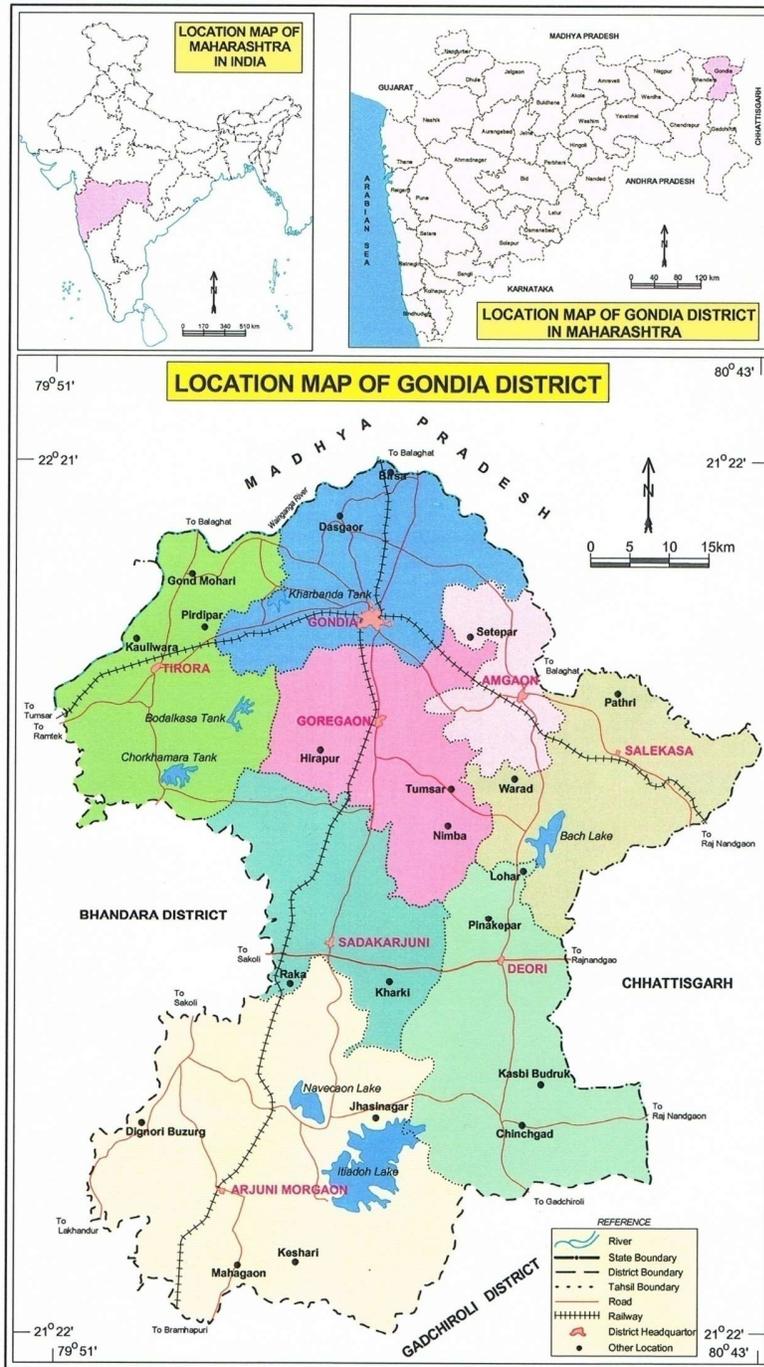


Fig. 1. Location map of Gondia District in Maharashtra state of India