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Urbanization Causing Habitat Destruction and Loss of Birds Diversity in District Sargodha

Asif Bilal^{1*}, Ehtishama Noor², Ayesha Sajjad³*Department of Zoology, The University of Lahore, Sargodha Campus, Sargodha.***Corresponding author: Asif Bilal, Department of Zoology, The University of Lahore, Sargodha Campus, Sargodha.*

ABSTRACT

Rural “natural” landscape regions differ greatly from urban settings. The gap between urban regions’ anthropogenic constructions and resilient surfaces and non-urban places’ natural green ecosystems is significant. The conversion of agricultural fields to urban areas is a significant disadvantage and source of habitat degradation for bird species. Pollution levels rise as a result of a lack of flora and tree chopping, posing a hazard to birds and other living things. Birds must adapt to new conditions to survive in urban settings, or they will be forced to migrate. With the construction of highways and buildings, the expansion of the metropolitan area has resulted in patchy regions that function as barriers between appropriate habitats, even for high flying animals. The habitat structure of bird fauna has significantly changed as a result of these restored circumstances. Many species are vulnerable, endangered, or have low population density as a result this major biodiversity is lost in the surrounding regions.

Keywords: Avian fauna, Environmental stress, Habitat fragmentation.

A brief history of urbanization in district Sargodha

For ages, with the human settlements in different land areas, destruction and deforestation are continued [1]. Now, urbanization has become a global phenomenon that causes harsh implications for birds as well as other animals. The industrial revolution in developing countries is also increasing day by day which is also a threat for living creatures if safe zones are not implemented in industries. However, the impact of urbanization is expected to increase. Climate change and urbanization, both are considered the largest threats to wildlife including many bird species. One of the notable threat is habitat loss and fragmentation, forces immediate migrations towards the suitable places and the other option is to stay unfavorable places and cope with the new conditions [2, 3]. All over the world, two key factors are responsible for the unplanned and messy growth of urban areas and over-exploitation of agricultural land, Rural-urban settlement, and industrialization. This issue has become more complex and worse with time as these are associated with cities mainly in the built areas. The rapid increase in population resulted in overcrowding of urban areas which eventually become burdened for

available community resources. This condition forces the people to move far from heavily populated areas towards the free areas across the city and enhance the resources [4]. The extended residential areas, commercial and industrial areas, road facilities, and infrastructure of cities and other constructions fulfill the space in cities and transformed into no built-up space area all over the Sargodha region. The most prominent conversion as evident through the map is in cultivated land into non-cultivated or built-up areas. Fig shows the whole process of starting to the built-up land show a remarkable change during 1992 to 2010. Figure 1 and 2 define two major types of the usage of land that is built-up and non-built up and these noticeable figures show specifically the transformation of valued agricultural land into built-up areas. Table 1 discloses the change in statistics and answers to study questions related to “how” and “where” these vibrant and historical changes have taken place.

Table 1 and 2 illustrates the relative changes in land usage from 1992 to 2015 in Sargodha region. During 1992-2015, the overall change observed in water area is -38926.5 hectares and -16.4 percent. The urban areas are

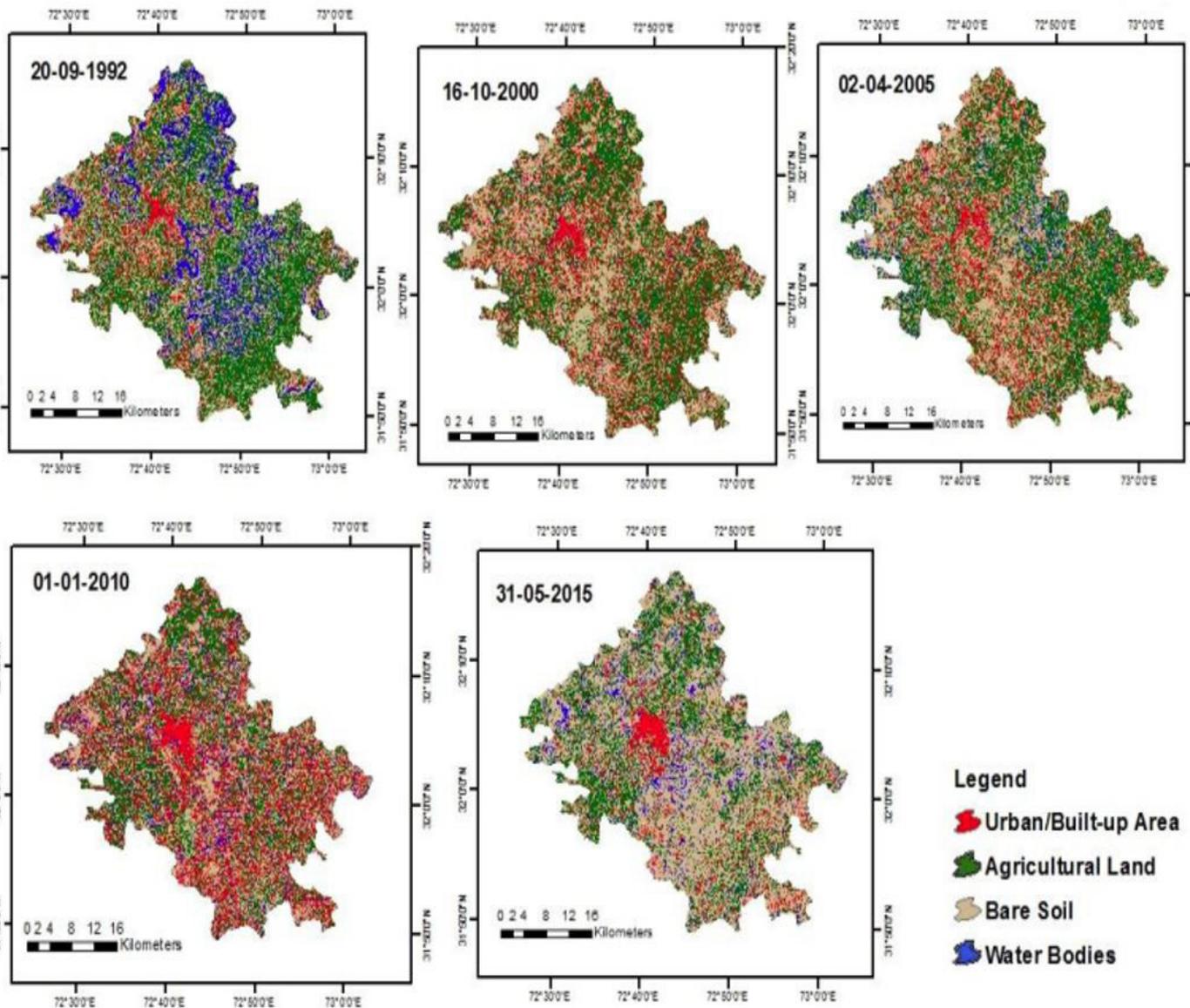


Figure 1: Land use Maps of Tehsil Sargodha 1992-2015.

Table 1: Change in land use from 1992-2015.

Year	Urban/Built-up Area		Agricultural Land		Bare Soil		Water Bodies	
	Area Hectare	Area %	Area Hectare	Area %	Area Hectare	Area %	Area Hectare	Area %
1992-2000	3191.7	2.2	18143.2	12.5	17855.9	12.3	-39190.8	-26.9
2000-2005	2840.8	1.9	-1380.1	-1	-1584.1	-1.1	123.4	0.1
2005-2010	7461.6	5.1	-11382.4	-7.8	3100.9	2.1	819.9	0.6
2010-2015	11886.7	8.2	-16389.4	-11.2	-9880	-6.8	-679	9.8
1992-2015	25380.8	17.4	-11008.5	-7.5	9492.7	6.5	-38926.5	-16.4

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Table 2: Build up and non built up area from 1992-2015.

Land use Type	Urban/Built-up Area		Non-Built-up Area		Total Area	
	Area Hectare	%	Area Hectare	%	Area Hectare	%
1992	2361.9	1.6	143338.1	98.3	145700	100
2000	5553.6	3.8	140146.4	96.1	145700	100
2006	8394.4	5.7	137305.6	94.2	145700	100
2010	15856	10.8	129644	89.1	145700	100
2015	27742.7	19	117957.3	80.9	145700	100

expanded rapidly. In 1992, the total urban area of Sargodha city was 2361.9 hectares and in 2015 it was recorded 27742.7 hectares. Over the past 24 years, Sargodha has experienced variation in urbanization speed which remains some and some low. During this time, the growth rate trend to increase over time. The land for human colonization is also more consumed. The overall land usage is 25380.8 hectares and it is 17.4 %. All the other observations are showing a decline or negative trend as compared to the use of land for colonization. The overall bare soil land area is 9492.7 hectares and 6.5 %. The agricultural land is showing continuously decreasing trend during the whole time. The agricultural land area is -11008.5 hectares and -7.5 % which is an alarming situation not only for birds but also for all other creatures of the area. The agricultural land is continuously transformed into urban areas. The urban/built-up land is increasing in 2000, 2005, 2010, and 2015 and at the rate of 2.2%, 4.1%, 9.2% and 17.4% respectively. These noticeable changes in usage of agricultural land into urban areas are a highly important target for high authorities as agricultural land is decreasing day by day.

Birds and the City

About 10,000 bird species are present in the world [5], more than 50 species are found in the Sargodha region. Some cosmopolitan species are also present and found in cities across the globe (e.g., Feral Pigeon *Columba livia*, House Sparrow *Passer domesticus*, Common Starling *Sturnus vulgaris*, Barn Swallow *Hirundo rustica* [5], most of the species represent the biogeographical species pool of the region. Birds can be divided into three groups depending upon the reliability of human resources: urban avoiders, urban adaptors, and urban exploiters [6]. Due to the difference in responses to urbanization, the species response will be change, as some species tend to adapt towards the new environment and the others vanishing when an area is urbanized once. 34 bird species are observed in the Sargodha region including rural and urban areas [7]. Most of the species at that time are threatened due to loss of habitat and availability of resources. Over urbanization is a major cause of these losses in the Sargodha region.

Species under threat in the City

Habitat destruction is a key driver of this decline in avian biodiversity and a clear negative association has been observed between the density of avian species and urban areas [5,8]. Out of 34 species present in Sargodha these species Brown rock chat (*Cercomela fusca*), Black drongo (*Dicrurus macrocercus*), Red-wattled lapwing (*Vanellus indicus*), Common cuckoo (*Cuculus canorus*), Temminck's stint (*Calidris temminckii*), Little stint (*Calidris minutus*), Greater coucal (*Centropus sinensis*), White-throated kingfisher (*Halcyon smyrnensis*), Crested lark (*Galerida cristata*), Spotted owl (*Athene brama*), Pied bushchat (*Saxicola caprata*), Indian Roller (*Coracias benghalensis*), Alexandrine parakeet (*Psittacula eupatria*), Sind sparrow (*Passer pyrrhonotus*), Red avadavat (*Amandava amandava*), Little green bee-eater (*Merops orientalis*) are threatened species [9].

Urban Environment as a Barrier for Movement

Reproduction is an important phenomenon for the survival of a species besides all other factors. A species needs tend to increase in several individuals to increase genetic diversity. For a long time, urban landscapes were not considered the main barrier for flying creatures such as birds. Although, over-exploitation of vegetative lands and extension of urban areas lead towards habitat loss due to cutting of old trees has proved a major problem for the birds as well as other species as this all resulted in limited resources and viability and lethargic and sluggish habitats [10]. By studying the genetic diversity of a population is another tactic to check the strength of a genetic barrier. Isolated population and founder effects population, both are estimated to show low genetic diversity as compared to conspecifics specie population [11, 12]. A population with low genetic diversity means that natural selection has less variation to act on environmental changes. Populations with reduced genetic diversity are more sensitive to environmental alarms [13, 14].

The Urban Drivers

All the geographical zones have at least four drivers (environmental stress factors) that are directly correlated

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with urban landscape viz, noise, chemical pollution, artificial lights at night (ALAN), and the presence of human beings. Urban areas are highly polluted mainly due to excessive usage of chemicals, which are excessively generated by traffic- the combustion of fuels which give high rise to the level of nitrogen oxides (NO_x) and soot [15], chemicals produced from different factories that are the major cause of water pollution, air pollution noise pollution. Apart from all the factors which are mentioned above, some factors are required to be highlighted such as pathogens, perching, the abundance of food, and predation [16]. These all environmental factors are the foremost cause of the loss of avian fauna in the Sargodha region.

Concluding Remarks

Urbanization has an immense cause of change in the avifauna. Most of the species have vanished, threatened in response to urbanization. It is an obvious clear image that urbanization is a basic threat to the loss of biodiversity. So, zoologists, conservationists, and District authorities have an important task for the future. Necessary actions will have positive effects on bird species if green areas are managed for birds in urban areas by planting more and more trees and this step must be continued throughout the years and if construction is reduced in surrounding areas. In the Sargodha region, the population is increasing day by day rapidly because of the settlement of people from rural to urban areas for useful resources and a better lifestyle. Due to these factors, more land is required for the human population. These all factors lead towards the conversion of agricultural lands into housing societies which resulted in a reduction in bird diversity in Sargodha. It is also a fact that many people made these housing schemes as a business. Due to an increase in environmental stress, avian fauna is also leading towards destruction.

Recommendations

The study required serious recommendations. The number of parks, gardens enriched with trees should be increased rapidly for the birds. Factors that are a major cause of pollution must be reduced at a safe level.

Deforestation should be banned immediately in rural areas. Old trees should be protected with the help of agriculturists and botanical experts. For local and migratory bird species, feeding sites should be constructed in an open field area. Campaigns should be started which create awareness among the local habitants to protect the local species

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