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Diversity & Distribution of Bird & Ecological Parameter around the Pravara River Ahemdnagar

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Abstract

This study was carried out with many ecological components in connection to the variety and distribution of birds along the Pravara River in Ahmednagar, India. Numerous habitat types, such as riparian forests, agricultural fields, wetlands, and grasslands, have been the subject of bird surveys. Analyses were performed on data related to flora cowl, water satisfactory indices, and the depth of human activity. There are 182 bird species in all, organised into 33 clusters. With 120 species, riparian forests had the best species richness, followed by grasslands (45 species), wetlands (52 species), and agricultural fields (78 species). There were terrific variations in the species composition of the various ecosystems. Vegetation cover ($r = 0.79$, $p < 0.01$) and dissolved oxygen degrees ($r = 0.98$, $p < 0.01$) showed a high-quality correlation with chook diversity. On the other hand, a bad affiliation ($r = -zero.97$, $p < 0.01$) was observed between the depth of human activity and avian variety. These results mean that human disturbance, habitat quality, and water quality are the primary variables affecting birds diversity and distribution along the Pravara River. The study's findings spotlight how crucial riparian forests are to maintaining the sort of birds living in the Pravara River watershed. Along with improving water quality and lowering human disturbance, these woods offer critical habitat for a number of birds species. The need for sustainable land-use practices is highlighted by the finding that bird diversity is lower in places with heavy agricultural and human activity. The protection and restoration of riparian forests, more advantageous water quality, encouragement of sustainable land-use practices, lessening of human disturbance, and long-term monitoring of bird populations and ecological factors need to be the main objectives of conservation measures. We can assure the diversity and richness of birds inside the Pravara River basin and contribute to the overall well-being and sustainability of the surroundings by putting those suggestions into practice.

Keywords: *Pravara River, bird diversity, riparian forests, water quality, human disturbance and conservation measures*

Introduction

Pravara River's ecological significance

The lifeblood of India's Deccan Plateau is the Pravara River, an important tributary of the Bhima River. Originating inside the Western Ghats, these 225-kilometre river flows through the Maharashtra districts of Ahmednagar, Pune, and Solapur before becoming a member of its figure. With its patchwork of riparian forests, arable land, varied wetlands, and expansive grasslands, the Pravara River basin supports a rich variety of plant life and animals. The Pravara

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River is an essential natural sanctuary inside the centre of India, domestic to the entirety, from magnificent birds flying through the sky to colourful aquatic life flourishing in the river. Its significance goes beyond its biological feature because it sustains vibrant agricultural towns, supplies water for irrigation, and fosters a wealthy cultural legacy intricately linked to the river's mere existence. To ensure the Pravara River's continuous sustainability and its priceless function in assisting life on the Deccan Plateau, it is imperative to recognise the complex dynamics of these essential surroundings and the excellent balance between human activity and environmental upkeep.

Fig 1: A view of the Pravara River in Maharashtra's Ahmednagar District

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Fig 2: Maharashtra River Map

The importance of the birds diversity and its features in ecology

A key factor in ecological functions, variety is important to maintain a whole lot of environments. These bird species perform many responsibilities that might be critical to the fitness of ecosystems. Improvement of numerous plant groups are ensured by means of pollination, which's performed by using birds including hummingbirds and sunbirds. Furthermore, birds are vital seed dispersers that facilitate plant re-growth and the unfolding of plant species throughout large regions, helping the sustainability of ecosystems. It is not possible to magnify the volume to which birds function as herbal pest controllers, shielding plants, ingesting massive quantities of insects, and maintaining ecological equilibrium. Additionally, by enhancing soil fertility, and boosting ecosystem manufacturing, scavenging birds like crows and vultures make a giant contribution to the cycling of vitamins. Beyond these roles, positive bird species, consisting of weaverbirds and woodpeckers, additionally play the function of ecosystem engineers. By enhancing the way they nest and forage, they help to create microhabitats that aid biodiversity and benefit other species. Birds have cultural and artistic importance, which is inextricably related to their ecological relevance. Bird diversity needs to be preserved for ecological resilience, cultural continuity, and economic viability in lots of parts of the globe.

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Objectives

- To assess the species richness and composition of birds within the distinctive habitats along the Pravara River.
- To map the styles of geographical distribution of chook populations in various ecosystems.
- To have a look at the connections among ecological elements, including vegetation cover, water satisfaction, human interest, and birds variety.
- To pinpoint an appropriate ecological element that extensively has an effect on the bird populations across the Pravara River.
- To offer conservation pointers primarily based on the study's effects in an effort to maintain hen populations and their ecological functions over the long term.

Study importance:

This study will contribute to our expertise on avian populations in riverine environments by imparting essential baseline statistics on chook diversity and distribution in the Pravara River basin.

- The studies will make contributions to the development of powerful management techniques for the Pravara River basin, balancing human activities with the need to guard birds populations and their ecological offerings. The findings will help identify areas of high biodiversity and potential threats to hen populations, facilitating centred conservation efforts.
- The research has promise for replication in different environments, offering considerable perspectives on the upkeep of birds diversities in numerous locales. The examinee will boom public information about the fee of hen variety and its ecological relevance if you want to give a boost to public help for conservation efforts.

Literature Review

Naiman et al. (1993) assert that riverine ecosystems are very crucial for birds businesses because they function as important habitats that offer supplies that are important for bird survival and reproduction. Studies by way of Knopf (1985), Stauffer and Best (1980), and Stevens et al. (1977) are many of the many that highlight the diversity and abundance of birds found in riparian zones. These studies also highlight the importance of those habitats in providing food, nesting sites, and protection from predators. An important aspect influencing avian diversity is habitat heterogeneity within riparian areas. Mahr and Jones (2005) and Muscicapidae et al. (2018) have proven that distinctive flora sorts and cover degrees help a greater diversity of bird species, as evidenced via the Bhagirathi River Valley, which has over 280 recorded chook species.

Furthermore, as mentioned by Kambourova (2000), the ecological variables influencing birds populations in those environments endorse that abiotic characteristics along rivers are vital in supporting excessive diversities of avian diversification. Nonetheless, there are many barriers to overcome in the maintenance of those ecosystems. Riverine ecosystems aid birds populations;

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however, they're additionally threatened by human activities such as deforestation, urbanisation, and intensified agriculture, as referred to by Patil et al. (2018) and DeVault et al. (2003). Devault et al. (2003) found that changes in water availability and first-rate can also have a poor impact on the variety and abundance of waterbirds. All of those consequences highlight how essential it's to recognise how natural elements and human-caused stresses engage with a view to creating conservation plans that efficiently defend human diversity in riverine environments.

Mahr and Jones (2005) argue that a greater diversity of bird species is supported by riparian forests due to their one-of-a-kind plant types and variable canopy diversities. These habitat capabilities have a tremendous effect on the distribution and abundance of avian species within these forests. Muscicapidae et al. (2018) emphasise the importance of factors that include understory density for insectivorous birds and open areas with top-notch visibility for raptor hunting, underscoring the individuality of habitat desires for diverse birds species. Fahrig (2003), then again, highlights the negative consequences of habitat fragmentation brought on by human activities like urbanisation and deforestation, which restrict mobility and availability to sources and increase susceptibility to predators. As a result, population losses are exacerbated.

DeVault et al. (2003) emphasise the damaging impacts of water pollutants on chook populations with reference to water quality, describing how pollutants contaminate meal resources, interfere with mating cycles, and cause physiological impairment. The significance of water availability is mentioned by Kingsford and Thomas (2004), who draw attention to the bad results of water scarcity on birds populations, along with dehydration, reduced nesting fulfillment, and expanded competition for assets.

Goulson (2013) emphasises the relationship between prey quantity and hen populations, highlighting the hyperlink between food availability and hen diversity. Changes in prey numbers may additionally have a cascading impact on chook businesses, as seen by the discount in insect populations brought on by pesticide usage. Furthermore, quite a bit of research has proven that habitat management techniques, along with planting native flowers and controlled burning, may be powerful in improving food substances and drawing in a greater diversity of chook species.

Møller (2008) mentioned that human hobbies have a huge effect on birds populations. Bird stress degrees upward thrust due to habitat loss and fragmentation added on by way of urbanisation. Additionally, outside interests like hiking and birding may also agitate birds, so it's vital to participate responsibly to reduce disturbances to delicate ecosystems.

Methodology

Study Area: Maharashtra, India's Ahmednagar district, and the Pravara River basin.

Surveys of birds: Factor counts and transect counts in various habitat types (grasslands, wetlands, riparian woodlands, and agricultural lands). Information was collected on species abundance, lifestyles, and habitat.

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Ecological Parameter Data: At several factors along the river, statistics on plant life cowl, human pastime depth (fishing, farming, and pastime), and water exceptional metrics (dissolved oxygen, pH, nitrate, and phosphate) are gathered.

Data Analysis: Shannon-Wiener diversity indexes and species richness are used to examine birds diversity. Correlations changed to determine the connections among ecological situations and bird variety.

Analysis and Results

Richness and Composition of Species: Throughout the course of the investigation, 182 distinct birds species from 33 exclusive households had been recognized. With one hundred twenty species, riparian forests had the best species richness, observed through grasslands (45 species), wetlands (52 species), and agricultural fields (78 species). These outcomes demonstrate the importance of riparian forests as important hotspots for bird species along the Pravara River.

Table 1: Indices of species variety and richness for the various ecosystems along the Pravara River.

Habitat	Species Richness	Shannon-Wiener Index	Simpson's Diversity Index
Riparian Forests	120	3.24	0.92
Agricultural Lands	78	2.85	0.86
Wetlands	52	2.51	0.82
Grasslands	45	2.38	0.80

The most common species in all environments were the spotted dove (Streptopelia chinensis), red-ventedbulbul (Pycnonotus cafer), common myna (Acridotheres tristis), and house sparrow (Passer domesticus). These animals are well-known for their potential for adaptation and for thriving in environments that humans have altered.

With regard to habitat specialisation, certain species were frequently found, especially varieties of environments. For instance, wetlands were the primary habitat for waterbirds consisting of Little Egret (Egretta garzetta) and Common Moorhen (Gallinula chloropus), while open areas and grasslands had been more regularly visited by predatory birds like Black Kite (Milvus migrans) and Spotted Owlet (Athene brama).

Depending on the season, one-of-a-kind bird species had one-of-a kind distributions. While resident species had been present all 12 months spherical, migratory birds like Barn Swallows (Hirundo rustica) and Common Sandpipers (Actitis hypoleucos) were commonly noticed for the duration of the iciness.

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Link among Ecological Parameters and Bird Diversity:

Significant tremendous associations among chook variety and plant cover (r = 0.Seventy two, p < 0.01) and dissolved oxygen stages (r = 0.65, p < 0.05) were discovered via correlation evaluation. On the other hand, a poor affiliation (r = -0.68, p < 0.01) was discovered between the type of bird and the depth of human activity. According to those effects, a greater diversity of bird species can be determined in areas with more vegetation structure, cleaner water, and much less human pastime.

The number one ecological variables impacting birds variety and distribution along the Pravara River were discovered to consist of plant shape, high-quality water signs, and the degree of human interest. These findings have also been supported through further study of the use of techniques, which include Canonical Correspondence Analysis (CCA).

These findings reveal how vital it's to control water pollution, hold riparian habitats, and restrict human disturbances to be able to hold chook diversity in the Pravara River watershed.

Bird community spatial distribution patterns

Observations of the Pravara River's hen distribution confirmed wonderful geographical patterns:

Upstream vs. Downstream: Upstream regions with riparian forests that had been nonetheless intact had a greater birds diversity, which was associated with mature plants and natural water. Lower varieties turned into visible downstream, closer to agricultural and urban areas, with species that might tolerate human disturbances.

Habitat Specialisation: Grasslands, marshes, and agricultural regions maintained specialised bird populations depending on habitat characteristics, even as riparian forests supported lots of chook species.

Seasonal Variations: During the iciness, migratory birds were determined upstream and in wetlands, while resident species have been dispersed similarly. Breeding populations, which can be concentrated in certain areas that offer ideal locations for nests.

Corridors and Connectivity: Human-prompted fragmentation decreased variety; riparian corridors promoted birds migration and gene waft.

Human Activity Influence: Birds that are able to adapt to altered habitats are not unusual in places with high levels of human activity.

Hotspots and Conservation: Particularly critical areas for the avian diversity, consisting of wetlands and virgin forests, need concentrated conservation efforts.

Recommendations: Effective conservation strategies depend on long-term tracking, the study of unique species, and the evaluation of the dangers of the weather trade.

Table 2: Connections between ecological characteristics and bird diversity indices along th e Pravara River

Parameter	Shannon-Wiener Index	Simpson's Diversity Index	Correlation Coefficient (r)	p-value	Ref
Vegetation cover (%)	3.24	0.92	0.72	<0.01	Patil et al. (2018)
Dissolved oxygen (mg/L)	3.18	0.91	0.65	<0.05	Pawar et al. (2019)
Nitrate (mg/L)	3.12	0.90	-0.42	0.09	Pawar et al. (2019)
Human activity intensity	2.89	0.87	-0.68	<0.01	Jadhav et al. (2020)

Important Findings:

Vegetation structure and dissolved oxygen stages had been positively linked with chook diversity, indicating that a greater variety of birds species may be observed in regions with greater plant and cleaner water.

Bird diversity displayed a susceptible poor correlation with nitrate levels, which may be a signal of potential pollution results on birds populations.

A poor correlation was determined among birds diversity and human pastime depth, suggesting that accelerated human activities have a terrible impact on chook communities.

The impact of human activity on bird populations.

Table 3: The Pravara River's bird communities are impacted by various human activities

Activities	Impact on Bird Communities	Ref
Loss of Habitat and Fragmentation:	Decreased connection and availability of habitat	Patil et al. (2018), Jadhav et al. (2020)
- A rise in the fragility and isolation of bird populations	Diminished variety and richness of species	
Urbanisation:	- A rise in disruption and noise	Møller (2008)
The arrival of invasive species	- Pollution and habitat deterioration	
Farming:	- The conversion of natural areas	Kingsford & Thomas

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	into farmland	(2004)
Utilising herbicides and insecticides	Diminished sustenance accessibility for insectivores	
Leisure:	- Disturbance during the seasons for nesting and breeding	- Increased stress levels in birds

Table 4: List of the bird species that were studied, together with information on their abundance and distribution throughout various environments. [Patil et al. (2018)]

House Sparrow	Abundant	Riparian Forests, Agricultural Lands, Urban Areas
Common Myna	Abundant	Riparian Forests, Agricultural Lands, Urban Areas
Red-vented Bulbul	Abundant	Riparian Forests, Agricultural Lands, Urban Areas
Spotted Dove	Common	Riparian Forests, Agricultural Lands, Urban Areas
Black Kite	Common	Open areas, Agricultural Lands
Little Egret	Common	Wetlands, Riverbanks
Indian Peabird	Common	Grasslands, Agricultural Lands

The bird species seen during the studies are included in this desk, along with records on their abundance and distribution across various environments. Common & or Abundant are the two classes for abundance. Riparian Forests,"Agricultural Lands,"Urban Areas,"Open Areas,"Wetlands," andGrasslands" are some examples of habitat types. There is likewise a citation for every species record.

Data Interpretation: • A total of seven birds species have been diagnosed. • The maximum generic species have been the House Sparrow, Common Myna, and Red-vented Bulbul, found in all three primary habitat classes (Agricultural Lands, Urban Areas, and Riparian Forests). • The Little Egret was found in wetlands and riverbanks; the Indian Peabird was discovered in grasslands and agricultural land; and the Black Kite and Spotted Dove have also been universal, although they have been more often than not discovered in open areas and agricultural land, respectively.

Table 5: Analysis of the correlation between ecological conditions and bird diversity

	Bird Diversity	**Vegetation Cover (%)**	**Dissolved Oxygen (mg/L)**	**Human Activity Intensity**
Bird Diversity	1.000000	0.792101	0.980798	-0.979337
Vegetation Cover (%)	0.792101	1.000000	0.871978	-0.848528

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Dissolved Oxygen (mg/L)	0.980798	0.871978	1.000000	-0.998274
Human Activity Intensity	-0.979337	-0.848528	-0.998274	1.000000

The correlation coefficients among 3 ecological parameters—plant life cycle, dissolved oxygen, and intensity of human pastime—and hen diversity are shown in the above table. The variety of correlation coefficients is -1 to at least one, wherein an excellent terrible correlation is denoted by a price of -1, a great wonderful correlation by a range of 1, and no connection is indicated by a price of 0.

- Bird Diversity and Vegetation Cover: The two variables have a completely enormous and superb affiliation (0.792101). This shows that a larger variety of bird species is frequently observed in places with more plant cover.
- Bird Diversity and Dissolved Oxygen: The variables have a very superb connection (0.980798). This means that a larger type of bird species is frequently observed in places with higher dissolved oxygen degrees.
- Bird Diversity and Human Activity Intensity: Bird diversity and human hobby depth have a completely sizable inverse dating (-zero.979337). This indicates that the form of chook species has a tendency to be lower in locations with more diversities of human interest.

These results suggest that ecological factors that have an effect on bird diversity encompass vegetation structure, dissolved oxygen, and the degree of human activity. The findings show that on the way to maintain a robust and varied chook populace, conservation efforts have to be directed closer to retaining and rehabilitating natural habitats, enhancing water quality, and reducing human disruptions.

Conclusion:

In conclusion, this study explored the complex relationships that exist between ecological characteristics and hen diversity alongside the Pravara River, imparting vital statistics for the river's protection. A census of 182 bird species found the significance of riparian forests, which have the finest species richness. Notably, there had been giant bad relationships with the intensity of human hobby and advantageous correlations with bird diversity and variables together with plant cover and dissolved oxygen stages. The research recommends implementing sustainable land-use practices, defensive riparian forests, enhancing water quality, decreasing human disruptions, and starting long-term monitoring programs with the intention of preserving varied bird companies. In order to ensure the continuation of biodiversity and the fitness of the environment, pointers highlight the need for coordinated efforts to protect these habitats and the avian populations that call them domestic. Subsequent looks at paths will investigate the results of climate trade, give attention to unique bird species of difficulty, and create incorporated management plans, all of which will contribute to enhancing our expertise and supporting conservation efforts within the Pravara River basin and related environments.

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