



ISSN Print: 2664-9926
ISSN Online: 2664-9934
Impact Factor: RJIF 5.45
IJBS 2022; 4(2): 244-250
www.biologyjournal.net
Received: 14-09-2022
Accepted: 21-10-2022

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Regional perception of urbanization, COVID-19 and their impact on Aves in southern landscape of Kashmir valley, India

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DOI: <https://doi.org/10.33545/26649926.2022.v4.i2d.126>

Abstract

Birds are considered as fascinating creatures and are acknowledged by humans for their beauty, melodious tonality and the magnificence attributed with their ability to fly. Bird community structure is considered as an inevitable component of vibrant ecosystem and is reflective of the quality of the habitats and truly offer pleasure, joy and spiritual enthralling to humans. Birds are truly considered as one of the best tools and parameters of environmental vitality of any ecosystem because of their sensitivity to various kinds of perturbances. Therefore any sort of fluctuation in avian community dynamics has serious ramifications for the entire ecosystem. The main purpose to understand urbanization, COVID-19 and their impact on avian community structure is to facilitate in depth analysis of the ecosystems that support all life forms on earth. In this study, a multidimensional questionnaire was designed and was circulated among 300 local people of Southern Landscape of Kashmir valley, India to generate varied responses without compromising the personal information of the respondents. The ultimate aim of coming with this research paper was to figure out conclusive perception and approach of regional populace in relation to urbanization, COVID-19 and their influence on aves. The data that surfaced from the survey was analyzed by employing standard statistical tools. The conclusive result of the study from the regional populace revealed that congested vehicular traffic, lack of vegetation, lack of proper nesting sites, unhygienic food, noisy surroundings, prevalence of aggressive species, large scale environmental pollution, least concern of humans towards the well-being of aves in an urbanized habitat has catastrophic and devastating bearing on majority of bird species in an urban setting. The respondents in unison reported the increased and frequent bird sightings during COVID-19 lock down. To overcome the challenges posed by urbanization to avifauna it was projected that mass scale awareness cum orientation initiatives need to be undertaken at governmental, non-governmental and community level to sensitize local people about the ecological role played by aves in a vibrant ecosystem.

Keywords: Urbanization, COVID-19, avian community, impact, regional perception

Introduction

Bird community structure is considered as an inevitable component of vibrant ecosystem and is reflective of the quality of the habitats. Birds, biologically Aves, homoeothermic vertebrates having pneumatic bones with average body temperature of 41-42 degree Celsius bearing wings and feathers. Birds have four chambered heart, precise vision, melodious voice and are therefore rightly remarked as mystifying and magnificent creatures. From humanistic point of view, birds have ecological, cultural, social and economic value as they play a significant role in the control of pests of agricultural crops, as predators of rodents, as scavengers and pollinating agents. Birds are sensitive to environmental perturbances and thus act as ecological indicators, thereby play significant role in maintaining ecological balance of varied ecosystems by supporting various food chains and food webs. As per various relied sources, it is estimated that there are 12000 living species of birds on planet earth and 13% species are found in India Though Indian sub-continent contributes immensely to avian diversity and India alone accounts for 13% of world species richness and their taxonomy, distribution and general habitat characteristics are well documented in India. Contrary to well documented data, very scarce information is available regarding avian community structure and their dynamics in India. The valley of Kashmir is inhabited by approximately 287 species comprising of both resident and migratory birds and the Southern landscape of Kashmir valley comprising four southern most districts namely Anantnag, Pulwama, Shopian and Kulgam is inhabited by 137 species of birds.

A Study on avifauna (Gichuki, 1999) [29] documented that regional populace who regularly come across birds in their immediate environment may develop in depth understanding of the life cycle, behavior (breeding and habitat use), migration and seasonal changes in bird diversity composition and abundance. Another study (Huntington 2000) [33] pointed out that the traditional knowledge is overwhelmingly used by academicians, policy makers and other relevant stake holders as a source for deeper understanding on ecosystem management, restoration and conservation of biodiversity. Urban habitats and geographical landscapes are variedly different from non-urban "natural" habitats. The major difference is the transformation of land, from natural green areas to anthropogenic structures and impervious surfaces. To survive in the urban habitat, birds are forced to either accept or avoid the new conditions. Urban areas have low species richness than non-urban habitats, because the environmental stress factors such as chemical pollution, noise, artificial light at night and anthropogenic presence has rendered urban habitat as a major threat to avian diversity. In fact mass scale rapid urbanization along with climate change is regarded as one of the catastrophic threat to avifauna and their collective contribution has lead to decline in the avian population in urban area at rampant pace. Urban expansion has led to a highly fragmented landscape, with islets of suitable bird habitat surrounded by highways and buildings that frequently act as barriers. These adverse conditions have changed the avifauna dramatically, with many species vanishing once an area is urbanized. In exceptional and rare cases, some species seem to thrive in the urbanized area, and these urban-dwelling species often show prominent phenotypic differences e.g., marked change in behavior, physiological and morphological characteristics. Thus it is quite evident and ample clear that due to increased rate of urbanization and the rapid loss of wild habitats, urban areas are now viewed as challenging ecosystems for sustaining biotic communities. Some researchers are even of the opinion which is also corroborated by research data reflected in the work of Beissinger and Osborne (1982) [44], Marzluff (2001), Chace and Walsh that urban areas normally have higher bird abundances in comparison with adjacent, more natural ecosystems. Higher bird abundance in urban areas is supported by the research conducted by Emlen (1974), Bolger (2001), Marzluff (2001), Mennechez and Cleurgeau (2001) as they documented in their published work that increased availability of food in urban settings is responsible for increase in bird densities. Connor and McCoy (1979) too established through their research that urban environment should possess higher species density because urban habitat has the potential tendency to attract more individuals from the regional species pool. In total contrast to these research finding, most of the studies conducted on birds in urban settings have unanimously pointed out that urban areas are comparatively poor in species richness and diversity as compared with areas bestowed with more natural habitats such as rural areas and forest dwelling areas. Data available on avian diversity and richness in urban settings is contradictory and debatable and is truly a grey area in research that further needs to be explored by researchers to arrive at a unanimous conclusion regarding avifauna diversity in an urban habitat. Urban habitats witness increased anthropogenic disturbances. Anthropogenic disturbance is considered as an important

parameter in determining the shape of the bird community which is supported by the research work conducted by Marzluff (2008) [73], who has pointed out through his research that when anthropogenic disturbance is extreme, synanthropic species dominate bird community and when disturbance is rare native forest species dominate but when disturbance is intermediate a rich diversity coexists. Urbanized areas are a better habitat for those few species which are tolerant/acclimatized themselves to the disturbances. Such urban environments favor ground feeding granivorous or omnivores species and cavity-nesting species or need nesting sites resembling to cliffs or ledges, whereas most of the bird species avoid urban habitat because of disturbance factors such as walking, driving, pollution, crowding, transportation, waste solid material etc. Another important reason being noise pollution because birds use vocalization to warn danger, defend their territory and also attract their mates, so due to noisy surroundings which is main result of congested traffic, the birds are there by compelled to avoid urban dwellings. In urban habitat though food is in abundance but not in good quality, which thus severely affects the health and growth of the birds, so most of the birds try to avoid urban settings and is considered one of the prime determining factor in low species diversity in urbanized areas. The huge abundance of food in an urban habitat attracts feral animals (predators of birds) such as cats and dogs. The piece of research conducted by Chace and Walsh (2006) [71] concluded that cats cause unprecedented damage to birds in an urbanized habitat. Another important factor that has direct bearing on low species density and richness in an urban setting is loss of vegetation in an urban habitat. Vegetation is important factor for bird community, as birds perform majority of functions on it but scant and fragmented vegetation has severely impacted the urban ecosystem. Besides birds are highly sensitive to alterations in habitat structure and function: consequently they serve as excellent indicators of changes and stresses in urban ecosystems.

The Corona virus are a large family of viruses having sRNA genome which causes illness in humans and other animals and the recently discovered coronavirus caused disease is COVID-19 which has severely affected the entire landscape of the globe and has led to unprecedented restrictions, never witnessed before to contain the movement of people to curb the speedy transmission of this dreadful virus. The origin of novel coronavirus (SARS-CoV-2) in Wuhan China with controversial Sea food market in Wuhan being the epicentre has caused human casualties never experienced before in the history of mankind (Spain research paper on covid) After the declaration of the COVID-19 Pandemic in March 2020 by World Health Organization, majority of nations have executed and implemented social and health measures never experienced before in recent history. These initiatives, aimed at containing the virus spread (20-23) have primarily stressed on social distancing and population confinement. Over all these interventions have resulted in scaling down of human activities globally (24). This mass scale abrupt and sudden dramatic disruption of most human social and economic activities had quantifiable effect on environment by high scale reduction in air pollution (25-27) and noise (28-30). The strict population confinement measures has literally emptied cities globally and virtually silent. This situation provides once in a life time opportunity to assess avifauna responses to less crowded, least noisy and less

polluted cities and gain thoughtful insights on how anthropogenic activities affect avifauna. In this piece of research work we aimed to ascertain the regional perception of native inhabitants about the impact of Urbanization and COVID-19 on avifauna of southern Landscape of Kashmir Valley.

Materials and Methods

The current piece of research work executed in Southern landscape of Kashmir valley was qualitative in nature (questionnaire survey, online driven group discussions and face to face interviews) and directed to gauge the perception of local populace on urbanization, COVID-19 and their impact on avifauna in the study area. A set of questionnaire was designed and a total of 200 respondents (100 rural and 100 urban) above 25 years of age were interviewed (face to face as well as virtually) in South Kashmir during the survey period 2020-2021. Primary data was collected during the survey and thereafter appropriate literature was analyzed to corroborate with secondary data. Final questionnaire was designed by utilizing the findings of pre-testing of questionnaire survey. Stratified random sampling technique has been employed as sampling procedure. The data collected was tabulated and analyzed statistically using SPSS software (version 21).

Result and Discussion

The data depicted in Table 1 projects that majority of the respondents from urban as well rural settings exhibited inclination towards birds. 43% urban respondents and 30% rural respondents under study projected through their responses that they are observing 1-4 birds on daily basis, 34% urban respondents and 37% rural respondents reported that they are observing 5-7 birds around their residential establishments regularly, while as 23% urban respondents and 33% rural respondents projected that they are visualizing 8-11 birds on daily basis. Thus it is quite evident

that rural settings cater to increased species diversity and richness than urban settings which proves to be a challenging habitat for majority of birds as they are unable to cope with circumstances prevalent in an urban setting. Statistically, it was observed that there was significant correlation between nature of habitat and avian diversity.

Table 1: Birds observed by the respondents under study around their residential areas

Location	Birds observed by respondents around their residential areas		
	8-11 birds (%)	5-7 birds (%)	1-4 birds (%)
Urban	35(23)	51(34)	64(43)
Rural	50(33)	55(37)	45(30)
Chi-square == 6.08, p-value <0.01			

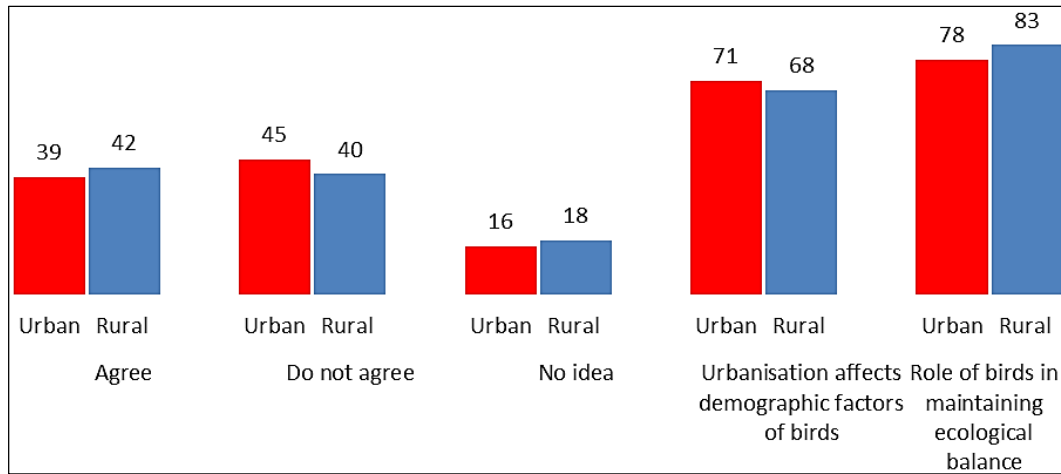
The data depicted in table 2 demonstrates that the majority of respondents in both urban and rural settings agreed with all the statements pertaining to perception of regional populace on Urbanization and COVID-19 and their impact on avifauna in southern landscape of Kashmir valley, except statement number 2 i.e.; availability of quality driven abundance of food resources in all the seasons of the year which is disagreed by most of the respondents. Statistically, there was non-significant difference in the opinion of urban and rural respondents ($p>0.05$) as highlighted in the table. Majority of respondents in both urban and rural settings have unanimously agreed that bird sightings have increased in their immediate environment during COVID-19 lock down which is quite evident from the higher frequency of chirping of bird's sounds which was otherwise very rare during pre-COVID-19 era. It is equally reciprocated by bird watcher enthusiasts and environment crusaders Like Dr. Raja Muzaffar, Bhat who has an in depth insight on avifauna of Jammu and Kashmir especially those inhabiting Wetlands of Kashmir that frequent sighting of birds is norm of the day in the era of COVID-19 pandemic.

S. No.	Parameters	Habitat type	Mean \pm S.D	P-value
1.	Reduced nesting sites	Urban	4.28 \pm 0.56	> 0.05
		Rural	4.16 \pm 0.55	
2.	Availability of quality driven abundance of food resources in all the seasons of the year.	Urban setting	2.12 \pm 0.82	<0.05
		Rural setting	2.05 \pm 0.89	
3.	Urbanization has led to dominance of aggressive species of birds	Urban setting	4.10 \pm 0.57	>0.05
		Rural setting	4.05 \pm 0.58	
4.	Urbanization has severely impacted the breeding behaviour of avifauna	Urban	4.14 \pm 0.51	>0.05
		Rural	4.16 \pm 0.55	
5.	Urbanization has led to loss of vegetation cover thus affecting foraging activity of avifauna	Urban setting	3.45 \pm 0.52	>0.05
		Rural Setting	3.37 \pm 0.51	
6.	Urbanization is main contributory factor of climate change	Urban	4.18 \pm 0.67	> 0.05
		Rural	4.21 \pm 0.56	
7.	COVID -19 has resulted in increased sighting of birds	Urban	3.87 \pm 0.48	> 0.05
		Rural	3.66 \pm 0.51	
8.	People have become more concerned towards birds and were seen feeding birds during Lock down period	Urban	4.31 \pm 0.55	>0.05
		Rural	4.16 \pm 0.49	

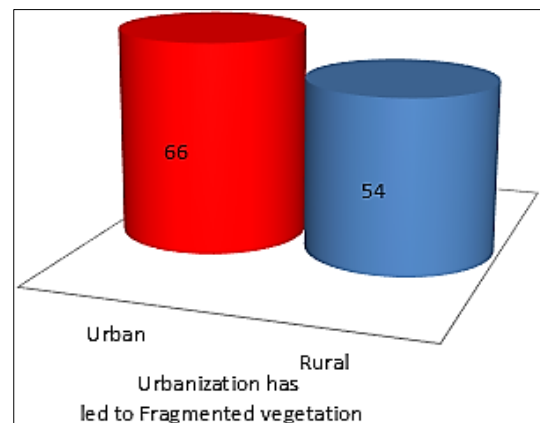
5 Point Likert Scale has been used here, Disagree=1, strongly disagree=2, Neutral=3, Agree=4, strongly agree=5

The data depicted in Figure 1, reveals that 55% urban and 67% rural respondents feed avifauna in their immediate surroundings on daily basis, 78 % urban respondents and 46% rural respondents reported that urbanization has resulted in change in bird phonology, 80% urban respondents and 77% rural respondents revealed that there will attitudinal shift among people towards conservation of

avifauna post COVID-19 pandemic, 71% urban and 68% rural respondents agreed that demographic factors of birds got affected due to rampant urbanization, 78% urban respondents and 83% rural respondents revealed that birds play a significant role in maintaining ecological balance in nature. The conclusive results of our research are in sync with other similar types of studies conducted across globe.



The Data presented in figure 2, reveals that majority of respondents under study (66% urban and 54% rural) agreed that urbanization has led to fragmented vegetation thus severely impacting the foraging activity of the avifauna. Vegetation is the considered a major factor in determining bird community composition. Alteration in vegetation composition could impact the quality and quantity of habitat for birds in terms of food, water and cover which can further affect the diversity, abundance and distribution of birds. Due to vegetation changes along complex biological and environmental gradients, a particular bird species can appear, increase or decrease in number and vanish as the habitat change. Abundance of numerous bird species is highly influenced by the composition of the vegetation that forms the major element of their habitat. Increase in vegetation cover increases the species diversity. Analysis of varied research data on role of vegetation cover indicates an important trend that high vegetation cover in suburban and wild land areas supports rich avian diversity in comparison to urban landscape. Vegetation is important factor for bird community, as birds perform majority of functions on it but scant and fragmented vegetation has severely impacted the urban ecosystem. Besides birds are highly sensitive to alterations in habitat structure and function: consequently they serve as excellent indicators of changes and stresses in urban ecosystems.



The data demonstrated in figure 3, revealed that 56% urban respondents and 61% rural respondents agreed with the statement that avian conservation is the obligation and responsibility of every citizen. The benefits that birds possess for humans are not just aesthetic but they play a significant role in economy and food production as they are crucial in controlling pests, pollinate plants, purify surroundings through their scavenging nature and facilitate seed dispersal. Birds normally occupy apex level of food chain and are important indicators of the overall state of the biodiversity.

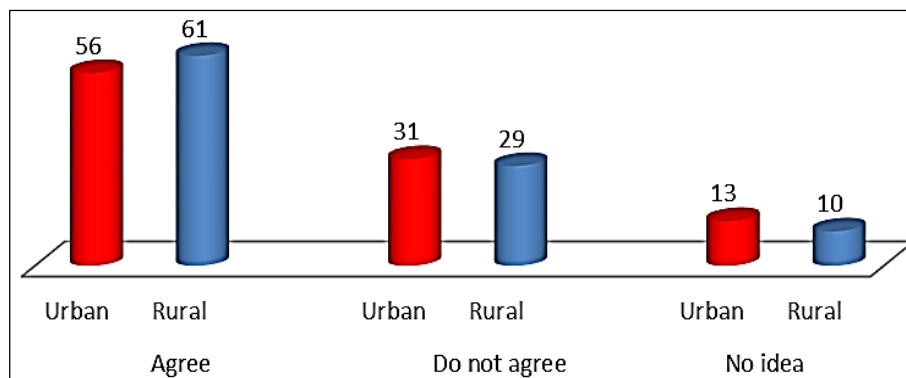


Fig 3: Bird conservation is personal obligation and responsibility of every citizen

The data depicted in figure 4, reveals that that 39% urban respondents and 42% rural respondents consider rampant urbanization as a significant contributor in transmission of COVID-19 at a faster rate and is substantiated by the data surfaced from other reliable sources that COVID-19 has

wracked havoc more in urban areas than the rural areas. While as a significant proportion of respondents do not agree that urbanization has any influence on speedy transmission of COVID-19.

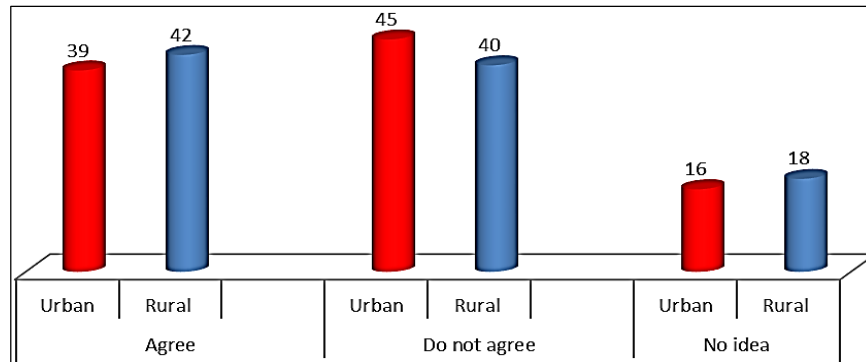


Fig 4: Rampant urbanization had led to increased transmission of COVID-19

Conclusion

The ultimate purpose of this research work was to gauge the perception of local populace in Southern Landscape of Kashmir valley regarding the impact of urbanization and COVID-19 on local avifauna. The study pointed out that majority of the local populace had not sound understanding of avifauna. The respondents were found wanting when interviewed about the conservation and management of avifauna, although they aware that birds are ecologically significant in any type of ecosystem. Research data has pointed out strong patterns of association between bird community structure and the physical configuration of the environment. Analysis of diverse avian literature points towards some starking revelations that have jeopardized the entire avian community structure. The negative consequences of urbanization has severely affected the urban avifauna in multifaceted ways, be it availability of unhygienic food, diminished nesting sites, noisy surroundings because of high scale vehicular movement which has direct bearing on their communication channels there by affecting their mating pattern leading to reduced reproductive success. These negative consequences of urbanization on urban avifauna are highlighted by majority of the researchers through their published research work. On the impact of COVID-19 on avifauna, although respondents were of the opinion that birds sightings have increased during COVID times but it is still inclusive to generalize it at the global and there is need for extensive research in this area to arrive at some concrete conclusion. Majority of the respondents under study agreed that it is obligation and responsibility of every citizen to protect avifauna diversity as birds play multidimensional roles in an ecosystem ranging from contributing to economy by acting as pollinating agents, seed dispersal agents, controlling pests and rodents to being of aesthetic value to human mind and soul. In order to mitigate the negative consequences of urbanization on biodiversity in general and avifauna in particular, extensive awareness cum sensitization programmes need to be initiated at every level regarding the ecological significance of birds and management of biodiversity that will be in the larger interest of every stake holder concerned.

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