

State of India's Birds report- a brief review

India, a mega biodiverse country, is losing out its unique biodiversity to rapid economic development across different landscapes. Birds are one of the victims and they are among the best visible indicators of ecosystem health. To assess the status of India's bird populations, there is a lack of structured surveys nationwide and systematic collation of data from scientific research in India. This has contributed to either the lack of data or disproportionate data and hinders the much-needed understanding of any species or group of species to plan conservation actions and policy.

To overcome this shortcoming, one way is to gather huge amount of data across the country through the process of citizen science. With advancement of technology, citizen science applications are gaining more popularity among Indian birdwatchers and nature enthusiasts through platforms like India Biodiversity Portal, eBird, and iNaturalist, as well as globally.

The State of India's Birds (SolB) report is one such attempt to assess the distribution of birds that regularly occur in India, trends in their abundance and conservation status using one such citizen science program called eBird, developed by Cornell Lab of Ornithology, a unit of Cornell University, United States of America. SolB is a collaborative effort of 13 organizations (six government institutions and seven conservation NGOs). The first assessment was published in February 2020 and the latest assessment report in August 2023.

Methodology

The 2023 assessment is based on the data uploaded to eBird until 31 May 2023. The final filtered dataset contained 1,496,558 unique 'complete' checklists, containing a total of 26,647,037 unique observations. A complete checklist is a list of all species observed during the period of birding.



SolB 2023 report cover.

Only 'completed checklists' were chosen to create the 'index of abundance.' Index of abundance indicates the 'frequency of reporting' for any species. As Dr. Rajah Jayapal, Senior Principal Scientist, Salim Ali Center for Ornithology, Coimbatore stated, "frequency of reporting here, is a combination of detection probability which can vary on certain site specific factors like season, visibility and birder's ability to detect the bird and a species' abundance in a particular geographical area" (Rajah



Indian Roller. © H. Byju.

Jayapal pers. comm. 06 January 2024). Initial data categorization is based on ‘presence/absence information’ for each species in each checklist to derive an index of reporting frequency for that species. By following changes in frequency of reporting over several years, an idea of ‘trend in abundance’ was estimated.

To overcome the variabilities and discrepancies in eBird data, a statistical model was used to standardize frequency of reporting. They used the generalised linear mixed-effects model (GLMM) to estimate the standardized frequency of reporting of each species, modelling its India-wide results (SoIB 2020). As stated by Dr. Jayapal “they calculated Confidence Intervals (CI) for the insufficient data using which a trend could not be concluded. CI is used to indicate how much maximum tolerable limits are there in data variability. In SoIB, they examined CI about the mean (which is computed by multiplying standard error (SE) of the mean with 1.96 as they had earlier fixed the confidence level at 95%). When

the CI exceed 50% of the ranges below and above mean, any inference about the data is statistically unreliable” (Rajah Jayapal in. litt. 05 January 2024). Keeping that data, the SoIB assessed the population trend of a species based on three indices:

1. Long-term trend is the percentage change in frequency of reporting in 2018 when compared to pre-2000 levels.
2. Current annual trend is the mean percentage annual change in frequency of reporting in the last eight years, from 2015 to 2022.
3. Distribution Range- The area covered by all the 25 × 25 km² grid cells that are occupied by a species within the country during the last five years. Country is divided into 100 × 100 km² grid cells, each of which is further subdivided into 25 × 25 km² sub cells.

The report states that out of a total of 1,358 species reported from the country on eBird (as of 31 May 2023), 942 met the data requirement criteria for assessments. The species for assessments were not just based on their availability of data for trend calculations but also in a few cases their importance in the Indian context were also considered (e.g., endemics).

Number of species		
Trend status	Long-term trend	Current annual trend
Rapid decline	98	64
Decline	106	78
Stable	98	189
Increase	19	17
Rapid increase	17	11
Trend inconclusive	185	284
Insufficient data	419	299
Total	942	942
Reference: SoIB (2023)		

Table 1. Summary of the distribution, population trend and conservation status of the five selected bird species.

Species	Scientific name	Long-term trend	Current annual trend	Distribution range size	SoIB status	Global IUCN Red List status
Malabar Pied Hornbill	<i>Anthracoceros coronatus</i>	Trend inconclusive	Trend inconclusive	Moderate	Moderate Priority	Near Threatened
Indian Roller	<i>Coracias benghalensis</i>	Decline	Decline	Very large	High Priority	Least Concern
Sarus Crane	<i>Antigone antigone</i>	Rapid decline	Rapid decline	Large	High Priority	Vulnerable
Black-headed Ibis	<i>Threskiornis melanocephalus</i>	Rapid increase	Stable	Very large	Low Priority	Near Threatened
Oriental Darter	<i>Anhinga melanogaster</i>	Trend inconclusive	Stable	Very large	Low Priority	Near Threatened

Out of the 942 species, 523 of them qualified based on the criteria for countrywide long-term trend analyses, and 643 qualified for current trend analyses.

Based on these three indices together with the IUCN global Red List of Threatened Species 2022 (hereinafter 'IUCN Red List'), species were classified into categories—High, Medium, and Low—conservation priorities for the assessments in SoIB.

High conservation priority status species are when abundance indices have declined considerably in the long-term and continue to decline today. Species were also categorized as High Priority species for India, if their abundance trend could not be assessed or conclusive trends could not be derived from eBird data but they are classified as globally threatened in the IUCN Red List 2022. A species is reported as 'Rapid Decline' if it is less than half in 2022 as it was before the year 2000. For the present review, the following five bird species were selected randomly from different habitat types. Malabar Pied Hornbill *Anthracoceros coronatus* of tropical dry or tropical moist lowland or riverine forests, Indian

Roller *Coracias benghalensis* & Sarus Crane *Antigone antigone* of open natural habitats, and Black-headed Ibis *Threskiornis melanocephalus* & Oriental Darter *Anhinga melanogaster* of wetlands. Table 1 summarizes the population trends, distribution ranges and conservation status of these species.

Distribution of Malabar Pied Hornbill is found



Oriental Darter. © H. Byju.

throughout peninsular India and Sri Lanka in the riverine forest habitats. For example, Anshi National Park, Dandeli, Karnataka, is the highest density area for these hornbills and so is for the birders and nature photographers. Review of the eBird data also shows the records are mainly concentrated from these hotspots. Hence, it can't be true representative of the status of this species as neither for entire Karnataka nor for the entire central Western Ghats. At the same time, it can't be excluded from the 'priority list' for Karnataka based on these observations. Some of the scientific research clearly show that Malabar Pied Hornbill has declined to around 85% in 12 years from 2007 to 2019 in the Western Ghats of Goa, Karnataka, and Maharashtra (see Reddy 1988; Mudappa & Raman 2009; Sneha & Davidar 2011). These findings are interesting as the period mentioned also falls in the categorization of the



Malabar Pied Hornbill. © H. Byju.



Sarus Crane. © H. Byju.

SoIB for species. In other states of peninsular India, enough data is not available on eBird. This may be due to lack of submissions from many regions. IUCN Red List categorizes this species as 'Near Threatened' in its entire distribution range of India and Sri Lanka when it was last assessed in 2016. This shows a clear knowledge gap of the actual conservation status of Malabar Pied Hornbills in India when we consider only the eBird data based SoIB report. In case of the Indian Roller, though it is globally categorized as 'Least Concern', assessment in India through eBird data shows rapid decline and gives 'High priority' status. SoIB report shows that Indian Roller population has seen 30% decline in 12 years in India.

Meanwhile, wetland birds like Black-headed Ibis population is reported to have increased as per the latest report. Black-headed Ibis & Oriental Darter are categorized as 'Globally Near Threatened Species.' In SoIB both the bird species are categorized as 'Low priority' species. With increased pressure on wetlands and decreasing

quality of the last remaining habitats, they may need further research to assess the actual status. There are no current population evaluations of darters from India. If the population is increasing despite various threats, that is also an indicator of ecological imbalance implying need of immediate attention. Just like the increase in Pea Fowl population is indicating greater crop damage in some parts of India, and may have negative impacts on snakes and other reptiles. More data analysis and research is needed on the Black-headed Ibis, at regional level, to understand the distribution.

Overall, the larger picture in India is bleak as stated earlier by assessing the randomly selected five species trends. The SoIB 2023 states that, “60% of species show long-term declines (out of 348 species that could be assessed for long-term trend), and 40% species are declining currently (out of 359 species assessed for current annual trend)”.

Strengths

The SoIB attempts to provide a comprehensive overview of the avian population in the country, shedding light on the current state of affairs in the realm of bird conservation. The report provides detailed picture of major trends and patterns across diverse habitats in detail with thoughts for future research and actions. It lists priority species for each state in India and for each habitat type like grasslands and wetlands. One of the

primary strengths lies in its potential to raise awareness. By presenting a consolidated view of the avian population, the report has the potential to catalyze public and policy attention towards bird conservation.

Weaknesses

Citizen science, has its own drawbacks. A more collaborative approach could provide a richer understanding of the challenges faced by birds and lead to formulating more effective conservation strategies. The data presented may be limited by temporal disparities, with certain regions or time periods having more robust data than others. This could affect the accuracy of the overall assessment. Birding is often done in day time and the assessment will naturally exclude species that are primarily nocturnal (including most owls and nightjars). Exceptions are Jerdon Courser *Rhinoptilus bitorquatus* and Forest Owlet *Athene blewitti* which are included in the SoIB report because they are known to be ‘Critically Endangered’ species according to the IUCN Red List.

Another major factor that influence these



Black-headed Ibis. © H. Byju.

herculean tasks of data curing is that we can't ignore the human errors involved in the detection and correct reporting of a bird when quantification in listing has become prioritized over the quality with only 150 reviewers (volunteers) across the country with this huge number of data being uploaded. Also, only relatively well reported birds on eBird are used for trend analysis. Some of the birds like Malabar Pied Hornbill in this case, may not get immediate attention for conservation action, though their riverine forest habitats are under severe threat. Some of the places are naturally less birded regions, like too interior areas, deserts or high elevation areas. Representations from such areas will make the SolB report more comprehensive. The priority species representatives for each state have high chances of excluding important birds whose data is scarce on eBird.

SolB analyzes only the overall trend and surface level understandings of the population which may help in informed conservation action plans for a few bird species or their habitats. Since index of abundance is not proportional to population size, only a population trend over the years can be inferred. The distribution range calculation is based on last five years and the grids may not cover the species not so common or whose data is scattered on eBird reports, which definitely leads to biases in the results.

Recommendations

Given the absence of a structured countrywide program that monitors all species in every habitat, assessments like SolB is a good approach even though it is based on a semi-structured information uploaded in eBird. There is more ground to be covered. This is a

significant challenge for a country like India of such varied landscapes. State of India's Birds report serves the purpose of creating awareness among common public and policy makers. Keeping this baseline data future reports should consider a more participatory approach, involving other stakeholders in the data collection and analysis process. Efforts should be made to fill data gaps, ensuring a more temporal and spatial coverage. This would enhance the accuracy and reliability of the report's conclusion. If the citizens themselves can be trained and involved in bird surveys at regional levels, the list can be more comprehensive with reduced errors or biases and have the potential to contribute to a countrywide movement of conservation awareness and policy change.

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