ENVIS Centre
AVIAN ECOLOGY

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ENVIS

ENVIS (Environmental Information System) is a network of subject specific centers located in various institutions throughout India. The focal point of the present 78 ENVIS centres in India is at the Ministry of Environment and Forests, New Delhi, which further serves as the Regional Service Centre (RCS) for INFOTERRA, the global information network of the United Nations Environment Programme (UNEP) to cater to environment information needs in the South Asian sub-region. The primary objective of all ENVIS centres is to collect, collate, store and disseminate environment related information to various user groups, including researchers, policy planners and decision makers.

The ENVIS Centre at the Bombay Natural History Society was set up in June 1996 to serve as a source of information on Avian Ecology and Inland Wetlands.

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CONTENTS

BNHS projects on climate change and bird migration studies

Impact of Climate Change on the Conservation of Birds

This project commenced in April 2009 as a BirdLife, Durham University and BNHS collaborative work in Asia. This is the largest climate change project on birds in Asia till date, funded by MacArthur Foundation. Goal of the project is to assess the impact of climate change on birds in the Eastern Himalaya and the Mekong Delta, in particular to examine the ability of the Important Bird Areas (IBAs) network (including both protected and non-protected areas) to face climate change impacts. Methodology selected for this project includes collection of distributional data of birds in India and use of the current climatic variables to describe bird distribution. In next stage further climatic variables will be used to predict the distributional data of birds in future. Preparation of digital outlines of the IBAs for the comparative distributional study of the birds by overlaying IBA boundaries over distribution map of species will be done. All the above data will be used to develop measures to minimise impact of climate change on the birds of India. For further details please send an email to **Dr. Asad R. Rahmani,** Director, BNHS bnhs@bom3.vsnl.net.in or call at Tel: (91-22) 22821811.

BNHS Bird Migration Study Centre at Point Calimere, Tamil Nadu

The BNHS Bird Migration Study Centre was inaugurated on 22nd February 2009 by Mr. R. Sundararaju, Principal Chief Conservator of Forests and Chief Wildlife Warden, Government of Tamil Nadu. Dr. P.L. Gautam, Chairman, Biodiversity Authority presided over the function. Dr. Asad R. Rahmani, Director and Mr. J.C. Daniel, Honorary Secretary BNHS also participated and highlighted the importance of the Bird Migration Study Centre. The Centre is the brainchild of Dr. S. Balachandran, Assistant Director, BNHS. The major aim of the Centre is to disseminate knowledge on bird migration and the importance of wetlands in maintaining the biological diversity of India. The Centre will organize bird ringing training, and special training for researchers on wetlands and waterbirds. School, college and postgraduate students, teachers, media personnel and general public will also be trained through workshop and field visits. The BNHS Bird Migration Study Centre is the first of its kind in India, established exclusively to study bird migration and possible climate change study of the birds. The major funders are Sanmar Chemplast, Mr B. Ugamraj Nahar, Mr. P.R Ramasubramania Raja¸ Citi Bank and Ion Exchange. For more details please contact **Dr. S. Balachandran** at bnhsbala@rediffmail.com or call on mobile number 09443453088.

Migratory Movement of Waterbirds through Uttar Pradesh and the Surveillance of Avian Diseases

This project is funded by Wildlife Department, Govt. of Uttar Pradesh. Main objectives are to monitor population changes, productivity and turn-over of the migratory birds with help of regular bird census. Other objectives are: to investigate movement and dispersal patterns of short and long distance migrants through bird ringing and color banding; to study of the breeding origins of migratory birds with help of satellite telemetry; to assess the role and current status of selected wetlands and their importance to migratory birds by long-term monitoring; to undertake active surveillance for detection of Avian Flu strains using serum and swab analysis with collaboration of High Security Animal Disease Laboratory (HSADL), Bhopal. Identification of the threats to waterfowl habitat is another objective. This project will also cover the training programmes on bird population studies. For further details please send an email to **Dr. Asad R. Rahmani,** Director, BNHS bnhs@bom3.vsnl.net.in or call at Tel: (91-22) 22821811.

Recovery programme for Great Indian Bustard

At least some of the species of bustards including Great Indian Bustard *Ardeotis nigriceps* have been shortlisted for initiating their recovery programme, environment minister Jairam Ramesh told Lok Sabha that financial provision of Rs. 10 crore for such recovery programmes have been made in the existing centrally-sponsored scheme 'Integrated Development of Wildlife Habitats', also adding that conservationists have been requesting for launching 'Project Bustard'. Replying to a written question, he said that financial assistance to the extent of Rs. 39.58 lakh has been provided during the current year for conservation of Great Indian Bustard in Rajasthan.

For more details: http://timesofindia.indiatimes.com/home/environment/flora-fauna/Recovery-programme-for-Great-Indian-Bustard-/articleshow/5268257.cms

The Great Indian Bustard *Ardeotis nigriceps* (male)
(Credit: Asad R. Rahmani)

Back on menu: bird nest soup

The Union Ministry of Environment and Forests has adopted an unusual conservation strategy to save the dwindling population of Edible-nest Swiftlets *Aerodramus fuciphagus* in the Andamans. The species has been taken off from Schedule-I list of the Wildlife Protection Act, 1972, which accords the highest protection to a species. Till eight years ago, rampant poaching of Swiftlet nests had reduced the bird's population considerably. The nests of these Swiftlets, made of hardened saliva, are used by Chinese to make birds' nest soup. According to officials, poachers would harvest the nests every time the bird made new ones. This prevented the birds from breeding. The de-listing would allow local people to protect the nesting colonies at home and harvest the nest after breeding is over. The plan was the brainchild of Dr. Ravi Sankaran, an ornithologist, who was inspired by a similar experiment in Indonesia. The plan involves protecting of nesting colonies in the wild and developing of new colonies by egg transfer to the nests of White-bellied or Glossy Swiftlet *Collocalia esculenta* that breeds in human houses. The newborn Edible-nest Swiftlets will learn from their adoptive parents to live in human habitations. Edible-nest Swiftlets always return to their birthplace to nest and so will provide ready-to-harvest nests to the breeders.

For more details: http://www.indiaenvironmentportal.org.in/node/289111

Second blow for Asian vultures

Research results published by the BirdLife Partnership in the journal *Biology Letters* has discovered a second veterinary drug causing lethal effects in Asian vultures, adding further pressure to already beleaguered vulture populations. Alarmingly, researchers looking into safe alternatives have now identified that another livestock treatment drug in Asia - ketoprofen - is also lethal to the birds. Vultures feeding on the carcasses of recently-treated livestock suffer acute kidney failure within days of exposure. Following this discovery, the RSPB, the Bombay Natural History Society and Bird Conservation

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Nepal are calling for tighter controls on the use of this second drug in veterinary use in southern Asia. The organisations are keen to see the promotion of drugs that are safe, and currently the only similar livestock treatment known to have no harmful effects on the continent's vultures is meloxicam.

Meloxicam is no longer under patent and is currently manufactured by at least 20 companies in South Asia. Everyone interested in conservation, quite rightly knows about the plight of India's tigers, but in the race towards extinction the vultures will get there far sooner. Dr Vibhu Prakash, Director of the Vulture Programme of the Bombay Natural History Society in India, added that only meloxicam has been established as a safe alternative for vultures, while at the same time being an effective drug for treating cattle. Scientists would like to see other safe alternatives, but it should be the responsibility of the Indian pharmaceutical industry to test these to determine their safety to vultures. Ketoprofen is lethal to the birds in the dosages that would be administered to livestock to reduce pain and swelling of those animals suffering from rheumatism or arthritis. Worryingly, researchers have already recorded the drug in one in 200 carcasses in southern Asia, with 70% of those occurring in potentially lethal concentrations. The authors add that ketoprofen could already be contributing to further decline of the remaining vulture populations caused by diclofenac, and this is a trend likely to increase if ketoprofen replaces diclofenac. In addition to ketoprofen and diclofenac, other non-steroidal anti-inflammatory drugs sold by veterinary pharmacies for treating livestock include meloxicam, phenylbutazone, analgin, nimesulide, flunixin and ibuprofen. Just three of these have been tested to determine their effects on vultures. Diclofenac and ketoprofen cause lethal kidney failure and only meloxicam is known to be safe.

For more details: http://www.birdlife.org/news/news/2009/12/vultures.html

INTERNATIONAL NEWS

War on terror drives away migratory birds?

An unusual delay was noticed in the arrival of migratory birds at Sindh in the past few years. According to the Deputy Conservator of Sindh Wildlife Department (SWD), Ghulam Sarwar Jamali, it seems military action in Pakistan and Afghanistan has rendered the natural flight routes of these birds unsafe (However this has to be proved scientifically: Editor's note). The journey of migratory birds, especially waterfowls, starts from Siberia and ends in South Asia. This is a 4500-kilometer long journey, during which the birds stay at different water bodies. The birds fly through Afghanistan over the natural route called 'Indus Flyway No.4' or 'Green Route'. They cross the Khyber Pass, and follow the Indus, Bolan and Hub rivers to different areas. The frequent war in Pakistan and Afghanistan, however, possibly forced these birds to change the routes that they have been using for years. Another major reason for the delay in the arrival of these birds in Sindh is climate change. Local wildlife conservationists cite increasing pollution, hunting, and depleting vegetation at natural freshwater lakes for the decrease in the number of migratory birds. Meanwhile certain uplift projects and increasing industrialization have also poisoned several water bodies, which earlier were attractive sites for the birds.

For more details: http://www.thenews.com.pk/daily_detail.asp?id=206866

Birds and climate change: indicators of a changing world

Climate change is already having multiple impacts on birds and their habitats, and is exacerbating many of the factors which have put one in eight of the world's birds at risk of extinction. Many species may have to shift their ranges to survive, and considerably more losers than winners are expected. One global study estimates that 15–37% of species could be committed to extinction by 2050 as a consequence of climate change;

another that each degree of warming could drive another 100-500 bird species extinct. Temperature rises beyond 2 °C are predicted to lead to catastrophic effects on birds, nature, people and the global economy.

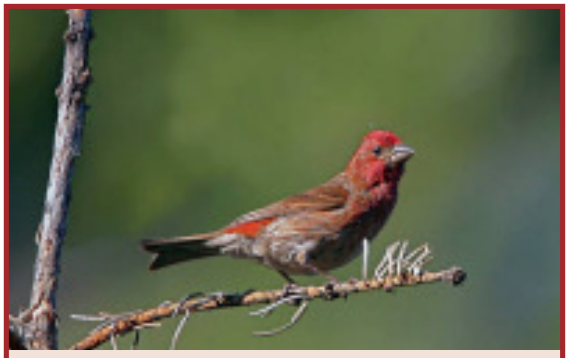
Climate change is impacting birds in several ways:

- Range shifts and contractions (poleward in latitude and upward in altitude)
- Population decline
- Changes in behaviour and phenology such as the timing of egg-laying, breeding and emergence of insects as food source
- Disruption of species interactions (predators and prey) and communities
- Exacerbation of other threats and stresses, such as disease, invasive species and habitat fragmentation, destruction and degradation
- Increased extreme weather events
- Loss of coastal habitats including feeding areas for shorebirds and nesting sites for seabirds, or entire island ecosystems, due to sea-level rise
- Ocean warming affecting ocean productivity, bringing knock-on effects further up the food change

According to Melanie Heath, BirdLife's Senior Advisor on Climate Change, the BirdLife Partnership is involved in several ground-breaking studies monitoring the impacts of climate change on birds. For example, analyses of citizen-gathered data from the past 40 years by Audubon (BirdLife in the USA) revealed that 58% of the 305 widespread species that winter on the continent have shifted significantly north since 1968, some by hundreds of kilometers. In this study, movement was detected among species of every type, including more than 70% of highly adaptable forest birds. Only 38% of grassland species exhibited movement however, reflecting the constraints of their severely-depleted habitat and suggesting that they now face a combined threat of the loss of habitat and climate space. Audubon scientists say the ongoing trend of movement by some 177 species - closely correlated to long-term winter temperature increases - reveals an undeniable link to the changing climate.

Another important project that BirdLife has been involved in is 'A Climatic Atlas of European Breeding Birds'. Described as a 'landmark' of how climate change will affect wildlife, the atlas uses 'climate envelope modelling', and predicts that without vigorous and immediate action against climate change, the potential future distribution of the average European bird species will shift by nearly 550 km north-east by the end of this century, reduce in size by a fifth, and overlap the current range by only 40%. Three quarters of all Europe's nesting bird species are likely to suffer decline in range. Arctic and sub-Arctic birds, and some Iberian species, are projected to suffer the greatest potential range loss. Projected changes for some species found only in Europe or with only small populations elsewhere, suggest that climate change could set some on a path to extinction.

For more details: http://www.birdlife.org/news/news/2009/12/climate_impacts.html



Purple Finch *Carpodacus purpureus* has undergone an overall northward movement of 643 km in the last 40 years.
(Credit: Ashok Khosla)

INTERNATIONAL NEWS

ARTICLE

Impact of climate change and habitat degradation on the avifauna

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Introduction

At present, the world over, there is a great concern about climate change and the urgent steps that everyone should take to arrest its rapidity. Climate change is generally used synonymously with global warming. Global warming refers to the increase in the atmospheric temperature that affects the global climate patterns. This is mainly due to the increase in the emission of greenhouse gases which trap heat in the atmosphere. On the other hand, climate change indicates significant changes in the climate pattern, in addition to rise in temperature, fluctuation in precipitation, wind etc. (Commonwealth Scientific and Industrial Organization – CSIRO, 2003). Climate change may result from natural factors (like sun's intensity, natural processes like ocean circulation) and also anthropogenic activities that change the atmosphere (due to burning of fossil fuels), use of land surface such as deforestation, reforestation, urban and industrial development and desertification. The climate has changed many times during the history of the planet mainly due to natural factors. During the last 100 years, the temperature rise has been about 0.6ºC (Root *et al.*, 2003; Walther *et al*., 2002) and the warmest years have been experienced after 1990s. Variation in rainfall pattern, decrease in snow and ice cover, rise in the sea level and shrinking glaciers are some of the visible effects of climate change. As the present climate change is accelerated by human activities (CSIRO, 2003), it is difficult to predict which part of the earth will be affected more by the climate change.

The impact

Climate change affects plants, animals and people. In the past, when natural processes have been responsible for climate change, plant and animal species have adapted to these changes (Root *et al.*, 2003). Those that did not adapt became extinct. The present rate of change is faster than that in the last 1000 years (Walther *et al.*, 2002) and it is predicted that extinction rate of species will be at a greater rate than when the dinosaur disappeared from the earth (CSIRO, 2003). In the near future, there is a threat to the decrease in the species population, decline in genetic diversity of the species and their increased vulnerability. Biological responses are very sensitive to climatic changes as the organisms integrate climate for long periods. They also have an in-built threshold above which perceptible changes occur (Walther *et al.*, 2002). As a result of long term monitoring of distribution, abundance and life cycles of several organisms by international phenological organizations, the impact of climate change on species has come to light. As per the Intergovernmental Panel on Climate Change (IPCC), third assessment report, nearly 100 physical processes and 450 species have been identified as most vulnerable (CSIRO, 2003; IPCC, 2001). Though the impact of climate change on biodiversity can be observed qualitatively, it cannot be quantified due to constant human activities, such as pollution, fragmentation, introduction of invasive species that damage the habitats of both plant and animal species.

Impact on avian fauna

An environmental indicator is a species or a group of species that responds predictably and sensibly and that can be readily observed and quantified (due to disturbances in the environment) both in terms of the distribution and the behaviour (CSIRO, 2003). Of the various organisms, birds are more suitable as indicator organisms to monitor the climate change (Crick, 2004).There has been a tradition of monitoring birds over long periods both for pleasure as well as for scientific study. Extensive phenological studies have been done on birds, next to human beings. Birds are also a part of the food chain and breeding of birds should synchronize with the abundance of food prey (Crick, 2004). Larval development of the insect (prey) should match the growth of leaves in a plant. One of the best examples of this type of phenological study is Oak (*Quercus robur*) - Winter Moth (*Opheroptera brumata*) -

Great Tit (*Parus major*) (Visser and Both, 2005). The bird has to time its reproduction so that the needs of the offspring match with the abundance of caterpillars. Similar studies have been done with other species of Great tit (Visser and Both, 2005; Walther *et al*., 2002).

Resident birds can easily adapt to the climate change and the phenology of the prey; migrant birds do not have this advantage. However, loss of habitat can result in their disappearance from the area. Migrant birds have characteristic well defined departure dates, stopover or passing dates and arrival dates (Visser and Both, 2005). Migrant birds can be short-, medium- and long-distance migratory birds. The start of migration and its speed must match the phenology of food sources at the stopover sites and also at the breeding grounds at the destinations. As the climate change is not the same at different sites, the birds do not have a cue as to what is in store for them. This results in bird mortality or failure to migrate.

Many of the short- and medium-distance migrants have adapted to the climate change and have advanced their time of migration (Schaefer, 2008; Zalakevicius, 1999). It is the long distance migrants that are at a lesser advantage, because many a times there is a mismatch in the phenology of the bird and the prey (Crick, 2004); the abundance of food does not match with the breeding date of the bird. This has been well studied in the case of long distance migratory passerine Pied Flycatchers (*Ficedula hypoleuca*) in Netherlands which shows a population decline (Both *et al*, 2006).

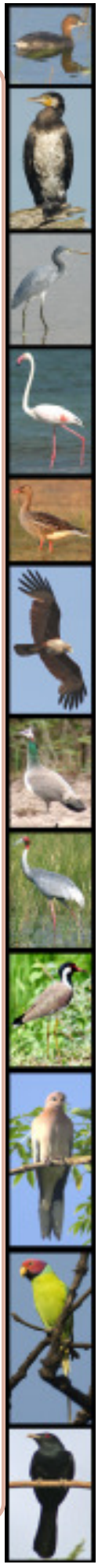
The migration rhythm of long-distance birds is more fixed and they find it difficult to readjust to the changing climate. Due to this rigidity, they suffer more than other birds (Crick, 2004). Many African-Eurasian migrants have to cross ecological barriers; lot of them fail and perish (Crick, 2004). To overcome these difficulties, they chose to change their routes, shorten or cancel their journey. According to IUCN, due to extensive loss of habitat, rate of extinction of birds is likely to increase in continents (RSPB, 2008). Many bird species have been upgraded to threatened categories. For example, the Eurasian Curlew (*Numenius arquata*) and Dartford Warbler (*Sylvia undata*) which were of least concern has been upgraded to Near Threatened category. Due to loss of habitat (Tundra) and the degradation of tidal flora (at migratory site), the Spoon-billed Sandpiper (*Eurynorhynchus pygmaeus*) has been up-listed from Endangered to Critically Endangered (RSPB, 2008).

The abundance of water birds is related to nutrient availability in the food chain; the plankton and the prey living on it (Crick, 2004). Loss of habitat near the coastal zone, presence of impregnable dykes near the coast has detrimental effects on the distribution and abundance of marine birds. Inland freshwater birds depend on precipitation for their life cycle. Loss of habitat near ponds and other fresh water bodies affect the wetland birds (Butler and Taylor, 2005). Many studies have indicated either the decline or the loss of bird species (Wormworth and Mallon, 2006), as below.

- A study of 63 year data for 96 species of bird migrants in Canada showed that 27 species have altered their arrival dates significantly, with most arriving earlier, in conjunction with warming spring temperatures.
- The populations of the endangered Galapagos Penguins (*Spheniscus mendiculus*) have halved since the early 1970s because of reproductive failure in adult penguins during severe *El Nino* years.
- A 25 year study of birds in UK indicated that out of the 65 species studied, 20 were laying eggs 8.8 days earlier on an average.
- There was a decrease in the growth and success of fledglings of Tufted Puffins (*Fratercula cirrhata*) in Canada from 1975-2002 due to climate change.
- Due to the warming of the California current flowing from Southern British Colombia to California, a 90% decline in the population of Sooty Shearwaters (*Puffinus griseus*) was observed from 1987-1994 on the California coast.

Indian scene

Many birds, both terrestrial and aquatic, migrate to India for breeding and feeding especially during monsoon and winter (June to February). The aquatic birds reach various Important Bird Areas



(IBAs) from India which include Bharatpur, Chilika Lake, Ranganthitoo, Pulicat Lake, Vedanthangal, Point Calimere and Gulf of Mannar. Migrants are either long-distance or local migrants; the latter usually migrate from the Himalayas to the plains during winter. Many of the long-distance migrants are from the Caucasian and Siberian areas. Rosy Starling (*Sturnus roseus*) is an important terrestrial long-distance migrant. Different species of swallows, flycatchers, orioles, Indian Pitta (*Pitta brachyura*), Eurasian Woodcock (*Scolopax rusticola)*, and Black Redstart (*Phoenicurus ochruros*) are some of the terrestrial local migrants. Different species of ducks, wagtails, storks, herons, plovers, stints, sandpipers and terns are some of the other long-distance migratory water birds.

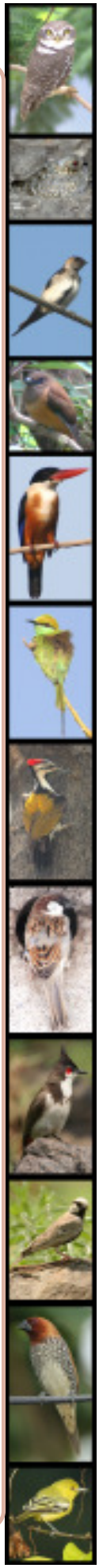
Not much is known about phenology of terrestrial migrants to India. However, people voice concern about the late arrival of water birds because they come in flocks. Moreover, ringing activities are also being done with water birds by Bombay Natural History Society (BNHS). These studies have shown the pathways of the Bar-headed Geese (*Anser indicus*). One of the definitive investigations on wetland birds has been reported by Balachandran (Balachandran, 2006) of BNHS. He has done both bird ringing as well as population estimations of nearly 13 waders in Pulicat Lake, Point Calimere and Gulf of Mannar. It is a decadal study of the estimates during 1980s, 1990s and 2000s. According to the above mentioned study, the habitat has been degraded by human interference resulting in the reduction in the wader populations (Balachandran, 2006). The decline has been highest in Curlew Sandpiper *(Calidris ferruginea)* and Little Stint *(Calidris minuta)*. Pied Avocet *(Recurvirostra avosetta)* and Black-winged Stilt *(Himantopus himantopus)* have become scarce. Two species, Crab-plover (*Dromas ardeola*) and Eurasian Oystercatcher (*Haematopus ostralegus*) have not been sighted since 1992 at Point Calimere.

Observations about habitat change in Anushaktinagar

Anushaktinagar, situated in the North-east of Mumbai, is the residential colony of the Department of Atomic Energy (DAE). It is enclosed by the Trombay Hills and has water bodies both on the top of the hill as well in the colony . Thanks to the foresight and the keen interest in nature shown by Dr. Homi Jehangir Bhabha, the founder of the Indian Atomic Energy Programme, Anushaktinagar is endowed with rich flora and fauna both in diversity. It is one of the greenest areas in Mumbai. The temperature here is usually cooler than adjacent areas like Chembur, Govandi and Trombay.

An old Baobab (*Adansonia digitata* L.) tree and open land with grass and reeds in 1980s (Navy Colony and Anushaktinagar)
(Credit: B. Venkataramani)

After 1990s, many migrants such as wagtails, Lesser Whistling Teal (*Dendrocygna javanica*) and Little Stint (*Calidris minuta*) have greatly declined and some do not visit the colony. All are the results of the loss of habitat due to human interference. A notable feature of the degradation of the micro-habitat is the observation on Baya Weaver (*Ploceus philippinus*). Baya Weavers were earlier nesting in five places in Anushaktinagar, but since the 1990s, none of them could be sighted (Venkataramani, 1997). However, in the adjacent Navy Colony enclosed within Anushaktinagar, one can see many Baya Weavers making nests year after year. It is interesting to note that though both Anushaktinagar and Navy Colony have witnessed developmental activities, Baya Weaver visits Navy Colony and not Anushaktinagar. The bird requires a particular species of grass to build its nest. It is possible that this type of grass is present nearby the Navy Colony and not at Anushaktinagar.



Baya Weavers (*Ploceus philippinus*) nesting in Navy Colony in 1990s and 2000s. (Credit: B. Venkataramani)

CONCLUSIONS

Climate change is a reality and one can see its impact on many life forms and other natural occurrences. Long term phenological studies of life forms must be undertaken to understand and appreciate the rapid changes taking place in the available habitat. Observing plants alone can only give qualitative information about the extent of climate change. However, monitoring the phenology of indicator organisms like birds can give a more quantitative insight into the impact of climate change. More studies need to be done on both resident and migratory terrestrial birds where impact of climate change is human driven.

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ABSTRACTS

Comparison of avifauna at the edges of contrasting forest patches in Western Ghat hills of India

A. Aich and S.K. Mukhopadhyay

Avifauna of shola and semi-evergreen forest patches belonging to three different sanctuaries and National Parks in the southern part of Western Ghat range of Tamil Nadu and Kerala was studied. Altogether 36 species from 17 families were recorded. One globally threatened species *(A1),* two restricted range species *(A2)* and one Palearctic-Asian migrant species have been recorded from forest edges during the relatively short study period. The highest population density of 47.59 ind./ha at Varagaliar Shola was followed by 43.69 ind./ha at Anapaddy, 27.53 ind./ha at Karian Shola, and 23.25 ind./ha at Punnumalai Shola. As Punnumalai Shola is least disturbed by human activity it got the highest number of avian families (15) and was followed by Karian Shola (9) and Vargaliar Shola and Anapaddy (8) in both cases. Punnumalai Shola having varied bird families showed lower dominance (0.075) and higher evenness value (0.957). In contrast, the edge of semi-evergreen forest at Anapaddy, although very much disturbed by various human activities, showed almost comparable diversity value (2.890) to that of Punnumalai Shola (2.913). More open canopy and much vegetational intergradations at the ecotone of semi-evergreen biotope inherently shelter avian community of high diversity. Conversely, the edges of Karian Shola and Varagaliar Shola having much anthropogenic interferences and with edges showing much lower intergradations of vegetations, exhibited a low avian diversity.

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Regional variation in the composition and structure of mixed-species bird flocks in the Western Ghats and Sri Lanka

E. Goodale, B.Z. Nizam, V.V. Robin, H. Sridhar, P. Trivedi, S.W. Kotagama, U.K.G.K. Padmalar, R. Perera, P. Pramod and L. Vijayan

Mixed-species bird flocks are attractive models for the investigation of geographical variation in animal communities, as they represent a subset of the avifauna in most forested regions of the world. Yet studies of the regional variation in flock size and the composition of flocks are few, due to the predominance of studies carried out at a single study site. Here, we review nine studies of mixed-species flocks conducted at 16 sites along the Western Ghats in India and in Sri Lanka. We find that flock size varies as much within this region as it does globally, with observation time being a confounding variable. Flock composition, however, is predictably related to elevation. Flocks at high elevations (>1200 m) in the Western Ghats strongly resemble flocks at high elevations in the mountain ranges of Sri Lanka in their composition, especially at the family level. We compare these flocks to flocks of other regions and make recommendations on study methodology that can facilitate comparisons across studies.

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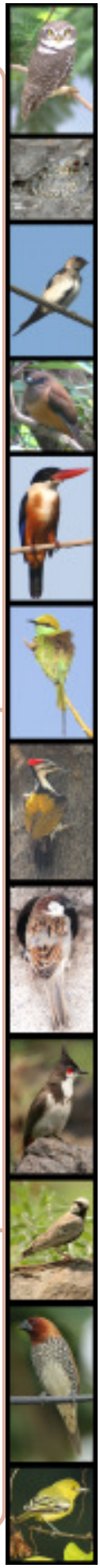

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