

Role of Migratory Birds and Animals in Agricultural Ecosystems of India

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Introduction

India, with its diverse climate and rich biodiversity, serves as a vital habitat and migratory corridor for numerous bird and animal species. The migration of these species plays a significant role in shaping the country's agricultural landscape. Migration patterns, driven by seasonal changes and environmental factors, influence the dynamics of agricultural ecosystems in multifaceted ways. While migratory species contribute positively by controlling pests and facilitating pollination, they can also pose challenges such as crop damage and the spread of diseases. Understanding the intricate relationship between migration and agriculture is crucial for developing sustainable agricultural practices and wildlife conservation strategies. This explores the diverse impacts of bird and animal migration on agriculture in India, highlighting specific examples and discussing both the benefits and challenges associated with these natural movements.

Natural Pest Control and Pollination

Migratory birds such as wagtails, storks, herons and swallows feed on insects, larvae, and rodents present in crop fields. By naturally controlling pest populations, they reduce farmers' dependence on chemical pesticides and help maintain ecological stability. Some migratory insects and animals also contribute indirectly to pollination, supporting crop reproduction and yield.

Soil Health and Nutrient Cycling

Animal migration, especially grazing by wild herbivores, contributes to nutrient cycling in agricultural ecosystems. Their droppings enrich soil organic matter and improve soil fertility. In wetland agriculture, migratory waterbirds enhance soil aeration and nutrient redistribution, benefiting crops such as rice.

Indicators of Environmental Health

Migratory species act as biological indicators of ecosystem health. Changes in migration patterns often signal environmental stress caused by climate change, habitat loss, or pollution. Monitoring these patterns helps farmers and policymakers understand ecological changes that may affect agricultural productivity.

Need for Balanced Conservation

Protecting migratory routes, wetlands, and buffer zones is essential for sustaining both agriculture and wildlife. Eco-friendly farming practices, habitat conservation, and community-based management can help reduce conflicts while preserving the ecological services provided by migratory species.

Positive Impacts

Pest Control: Migratory birds and animals play a crucial role in controlling pest populations that threaten crops. For example, many species of migratory birds feed on insects and pests that can cause significant damage to crops. The presence of these birds during certain seasons can reduce the need for chemical pesticides, promoting more sustainable agricultural practices.

Amur Falcons: These migratory birds travel through India during their journey from Siberia to Southern Africa. They feed on locusts and other agricultural pests, helping to control pest populations in states like Nagaland and Manipur, where they stop over.

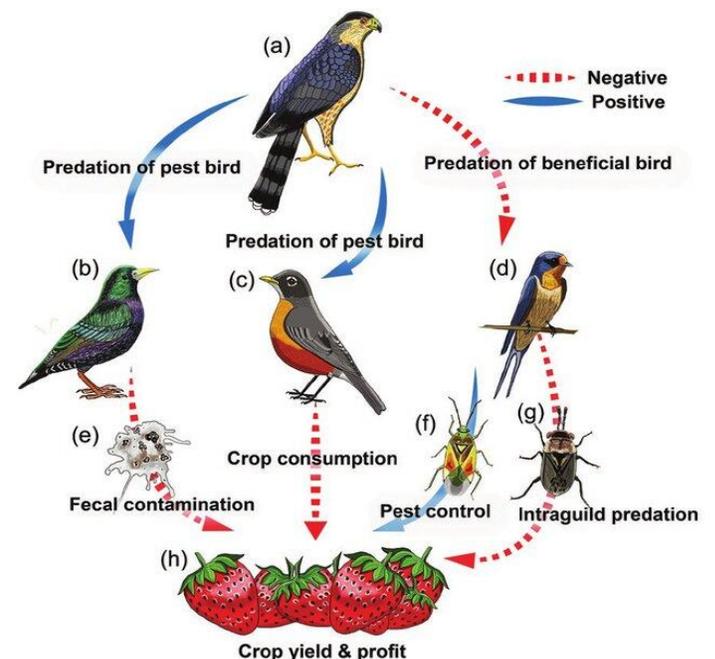


Fig. 1. The Potential Services and disservices that birds may deliver to agroecosystems

Pollination and Seed Dispersal: Some migratory birds and animals contribute to pollination and seed dispersal, which are vital processes for maintaining healthy agricultural ecosystems and improving crop yields. Birds, in particular, are effective pollinators for various fruit and vegetable crops.

Honey Buzzards: These migratory birds contribute to the pollination of various flowering plants. Their movement across regions like the Western Ghats helps in maintaining the bio diversity necessary for healthy crop production.

Negative Impacts

Crop Damage: While migratory birds and animals can benefit agriculture, they can also cause significant damage to crops. Large flocks of birds or herds of animals may feed on crop plants, leading to substantial losses for farmers.

Rose-ringed Parakeets: These birds are known to cause extensive damage to sunflower, maize, and other grain crops in Punjab and Haryana. Their feeding habits can lead to significant yield reductions, affecting the livelihoods of farmers. **Spread of Diseases:** Migratory species can act as vectors for diseases that affect both crops and livestock. The movement of these species across regions can facilitate the spread of pathogens, posing a threat to agricultural productivity and animal health.

Avian Influenza: Migratory waterfowl such as ducks and geese can carry avian influenza viruses. Outbreaks in India have been linked to migratory birds, leading to culling of poultry in states like Kerala and West Bengal to prevent the spread of the disease, causing economic losses to farmers.

Competition with Livestock: Migratory animals, particularly herbivores, can compete with domestic livestock for grazing resources. This competition can lead to overgrazing and degradation of pasture lands, affecting the availability of fodder for livestock and the sustainability of pastoral agriculture.

Wild Elephants: In states like Assam and West Bengal, migratory elephant herds often raid crops and compete with cattle for grazing. These interactions not only lead to crop losses but also create conflicts between wildlife and local communities.

Case Studies

Great Indian Bustard: The Great Indian Bustard, a critically endangered bird, migrates across semi-arid regions of India. Conservation efforts to protect this species have involved changes in agricultural practices, such as the promotion of bustard-friendly farming techniques. This includes leaving fallow patches in fields and reducing pesticide use, which can benefit other wildlife and promote biodiversity.

Blackbucks in Rajasthan: In Rajasthan, blackbucks migrate in search of water and forage, often entering agricultural fields. While they can cause crop damage, they are also seen as important cultural and ecological species. Farmers in some areas have adopted traditional practices that accommodate these migrations, such as planting less preferred crops along the migration routes to minimize damage.

Adaptation and Mitigation Strategies: To balance the positive and negative impacts of bird and animal migrations on agriculture, several strategies can be implemented:

Integrated Pest Management (IPM): Encouraging the presence of beneficial migratory birds as natural pest controllers can reduce reliance on chemical pesticides.

Crop Diversification: Planting a variety of crops can mitigate the impact of migratory species that prefer certain crops, spreading the risk and reducing overall damage.

Community-Based Conservation: Involving local communities in wildlife conservation can help manage human-wildlife conflicts and promote coexistence. For instance, compensating farmers for crop losses due to wildlife can reduce antagonism towards migratory species.

Habitat Management: Creating buffer zones and protected areas can ensure that migratory species have access to their natural habitats without encroaching on agricultural lands. Wetland restoration projects can provide crucial stopover points for migratory birds, reducing their impact on farmland.

Challenges to Agriculture

While migratory species provide benefits, they can also pose challenges. Large flocks of birds may damage standing crops, and migrating animals can cause crop loss or infrastructure damage in farming regions near forests. Human wildlife conflict remains a major concern, especially in areas close to migration corridors.

Problems, lacunae and future prospects

Ornithology, especially agricultural and economic ornithology, has always been and still is an area of low priority in the field of research, particularly in India. The major problem faced by ornithologists is lack of financial aid. There was no funding available in the related field until about mid-1960s. However, some local projects were funded by state governments and ICAR in Punjab and Andhra Pradesh. All India Coordinated Research Project on Agricultural Ornithology has been continuously run by ICAR since 1983 but at lowest priority in terms of allocation of funds. Secondly, dearth of scientists in concerned field of research is yet another problem. However, the situation in the past few years is not as worst as was previously since the number of researchers preferring this field still very low but increasing

slowly as compared to other areas in Zoology. The problems may be because of scanty job opportunities available in these fields and also because applied research is considered to be less prestigious and less attractive in academic circle.

The first problem can be solved by appreciating the importance of avian species in agriculture by funding agencies as birds are an important part of agro-ecosystems and necessary in balanced numbers in cultivated lands for sustainable agricultural production. In order to keep them existing, research and funds in this field are required necessarily. The ease of availability of funds would certainly enhance the job opportunities and may solve the second problem to some extent. However, only the self-realization about the importance of applied research by ornithologists can eliminate this problem for which interaction among ornithologists doing applied and basic research is must to put together the theory and practice. There have been many challenges faced by economic and agricultural ornithologists in India and many more are to be faced to combat with which future research aimed at meeting such challenges is must.

The foremost challenge in agricultural field is the management of the most injurious pest species, rose-necked parakeet. Despite having enough data on costs and benefits of several common species of agricultural importance from some parts of the nation, such data is lacking from most of the regions of the country, even from Haryana, Karnataka, Uttar Pradesh, etc. which are states of intensive cultivation. Therefore, stress should be given on survey regarding bird problems from different agriculture practicing regions and on surfacing the cost-effective strategies based on integrated approach for control of this species. These surveys may specify the most crucial regions in agricultural ornithology research which require intensive research. Information related to bird problems in agricultural areas such as bee keeping, fish and dairy farming is almost negligible and hence requires intensive research approach.

Furthermore, studies are also essential on conservation and ecology of birds of prey, populations of whom are declining in cultivated lands. Indiscriminate and heavy use of herbicides and pesticides in agricultural regions must have contaminated the birds with their residues and the birds of prey present at top of the food chain are most probable victims of such contamination. An important query or issue for future research in concerned field is whether the benefits obtained from conserving birds and habitats within agricultural lands can outweigh the costs arisen due to support to pest birds that also become liable of using these habitats. Based on recent reports from 2025 and early 2026, here is an update on migratory birds and ecological events in India:

1. Fishing Ban Boosts Bar-Headed Geese in Karnataka (2026)

A 3-month fishing ban has transformed Hadinaru Lake near Mysuru into a thriving haven for bar-headed geese, which arrive from Mongolia. While this local policy aids conservation, a 2025 report highlighted that overall bar-headed geese migration to Karnataka saw a 34.4% decline (from 41,338 in 2024 to 27,081 in 2025) due to climate change and earlier-than-usual departures from sites like Magadi lake.

2. Investigation into Bird Deaths near Koonthankulam (2026)

The Forest Department is actively investigating reports of migratory bird deaths near the Koonthankulam Sanctuary in Tirunelveli district, Tamil Nadu. While initial inspections did not recover carcasses (suspected to be scavenged), authorities are monitoring the area for potential environmental stress, such as water shortages, amid the annual 16th Tamiraparani Waterbird Count.

3. Inaugural Bird Festival at Siliserh Lake, Alwar (2026)

Following its designation as a Ramsar site in December 2025, the Forest Department launched the first annual 'Alwar Bird Festival' at Siliserh Lake in February 2026. The event highlights conservation awareness for species like the Bar-headed Goose and Ruddy Shelduck (Surkhah), aiming to protect the habitat from encroachment and promote eco-tourism.

4. Decline in Common Coots at Wadhvana & Northern India Wetlands (2026)

Surveys in early 2026 indicated a decline in migratory bird numbers at several Northern Indian sites. The Delhi stretch of the Yamuna River recorded a decrease in waterbirds (from 2,123 in 2025 to 1,564 in 2026), with species like the Black-headed Gull showing lower counts. Similarly, the Sultanpur National Park reported lower overall bird counts, which experts attribute to fluctuating water levels and delayed winters.

5. Chhari Dhand Recognized as Ramsar Site (Gujarat)

Chhari Dhand, a critical wetland habitat in Gujarat known for supporting thousands of migratory birds during good monsoon years, was highlighted in recent reports for its continued international recognition as a Ramsar site, boosting local ecological conservation efforts.

6. Emerging Threats: Water Hyacinth Spread (2026)

Scientists have identified that migratory birds are unintentionally aiding the spread of Eichhornia (water hyacinth) in urban lakes like Ambazari Lake in Nagpur. This invasive weed is threatening the ecological health of water

bodies, causing further stress on both migratory and resident bird populations.

Conclusion

The migration of birds and animals has profound impacts on agriculture in India, offering both benefits and

challenges. By understanding these dynamics and implementing sustainable management practices, it is possible to harness the positive effects while mitigating the negative impacts. This balanced approach not only supports agricultural productivity but also contributes to the conservation of biodiversity and the health of ecosystems.
