



BIRD-STRIKE RISK AND AIRPORT ZONING REGULATIONS: A COMPARATIVE STUDY OF BANGLADESH AND INDIA

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Abstract

Bird strikes pose a persistent threat to aviation safety worldwide, particularly in rapidly developing nations where urban expansion encroaches upon airport vicinities. This paper undertakes a comparative legal analysis of bird-strike risk management and airport zoning laws in Bangladesh and India, two South Asian countries experiencing significant growth in air traffic and urbanization. The study critically examines the legislative frameworks, institutional practices, and enforcement mechanisms in both jurisdictions to assess their effectiveness in mitigating bird-strike incidents. This article highlights regulatory frameworks, enforcement mechanisms, and the impact of incompatible land use practices—such as waste dumping and slaughterhouses—in the vicinity of airports. The paper further analyzes relevant international standards, including ICAO Annex 14, and evaluates how both countries have integrated or deviated from these norms. While India has made notable strides through centralized aviation safety guidelines and state-level zoning enforcement, Bangladesh faces challenges due to fragmented regulatory oversight and limited coordination among urban, environmental, and aviation authorities. The research concludes with policy recommendations aimed at enhancing inter-agency collaboration, improving land-use planning, and strengthening legal accountability in both countries. The findings provide insightful information for policymakers, and aviation stakeholders who are working to improve air safety in countries in the global south by implementing strong environmental and legal governance.

I. Introduction

Bird strikes have emerged as one of the most frequent and hazardous threats to aviation safety, particularly in countries with densely populated urban zones surrounding airports. Because of their diverse features and actions, birds pose varying threats to airplanes. Concerns about a possible aviation disaster are being raised by a drastic rise in the probability of bird attacks during aircraft takeoff and landing at airports around Bangladesh, especially at the Hazrat Shahjalal International Airport (HSIA) in Dhaka.

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However, data provided by Adani Airport Holdings Limited (AAHL) demonstrated a noticeable increase in bird strikes over time. The number of events increased from 20 in 2020 to 59 in 2024. Nineteen bird strikes have already been documented in the first half of 2025 alone.¹

Rapid urbanization and inadequate enforcement of airport zoning have led to a rise in animal strikes, particularly those involving birds, worldwide, according to the International Civil Aviation Organization (ICAO). In South Asia, where the conflicting goals of urban growth and aviation safety frequently collide, the issue is particularly noticeable. With their growing aviation industries and inadequate enforcement of airport regulations, Bangladesh and India have both seen an unexpectedly large amount of bird-strike events. Increased bird presence in airport airspace is mostly caused by open slaughterhouses, unlawful building, poor waste disposal techniques, and wetlands close to airports. Implementation on the ground has been unequal even though they have signed international aviation safety standards, such as ICAO Annex 14, which requires nations to reduce wildlife hazards in and around aerodromes.² At the international level, member states are bound by ICAO Annex 14's aerodrome safety requirements, which include enforcing land-use limitations, implementing wildlife hazard control programs, and maintaining a safe airside environment. Furthermore, comprehensive instructions on danger detection, bird dispersal techniques, and institutional coordination are provided in ICAO's Airport Services Manual Part 3.³ Even though India has created a fairly strong regulatory framework, which includes state-level environmental clearance procedures, wildlife hazard control plans, and coordination mechanisms between municipal and airport authorities, implementation gaps still exist because of weak enforcement and fragmented jurisdiction. Bangladesh, on the other hand, has implemented fundamental guidelines through its Civil Aviation Authority (CAAB), but it does not have a specific, legally obligatory zoning structure that involves local accountability or inter-ministerial coordination.

¹ 'Mumbai airport bird strike incidents nearly triple since 2020: What's causing the sudden surge? Here's what authorities reveal' *The Economic Times* (India, 28 June 2025), available at: https://economictimes.indiatimes.com/industry/transportation/airlines/-aviation/mumbai-airport-bird-strike-incident-nearly-triple-since-2020-whats-causing-the-sudden-surge-heres-what-authorities-reveal/articleshow/122124494.cms?utm_source=chatgpt.com > (last visited on 7 August 2025).

² ICAO, *Annex 14 to the Convention on International Civil Aviation: Aerodromes* (Vol I, 8th edn, ICAO 2018) para 9.4.

³ *Id.*, paras 3.4–4.2.

The paper provides a comparative legal assessment of the ways in which national laws, zoning regulations, policy frameworks, and international commitments are used in Bangladesh and India to mitigate the danger of bird strikes. It examines the relationship between urban governance, aviation safety, and environmental management, emphasizing the institutional difficulties in enforcing zoning regulations near airports. The study aims to find compliance gaps and suggest legislative and policy solutions for reducing the risk of bird strikes by looking at statutory instruments, case studies, and administrative procedures. By doing this, it adds to the larger discussion about managing aviation safety sustainably in the Global South, where development priorities and regulatory capability frequently overlap.

II. Bangladesh: Bird-Strike Risk Management & Zoning Laws

The growth of domestic carriers, greater foreign travel, and government efforts to update airport infrastructure have all contributed to Bangladesh's civil aviation industry's notable expansion over the last 20 years. The busiest airport in Bangladesh, Hazrat Shahjalal International Airport (HSIA) in Dhaka, has seen an increase in both passenger and cargo traffic, as have Shah Amanat International Airport in Chattogram and Osmani International Airport in Sylhet. However, this rapid growth has increased the risks connected with bird strikes, which are still one of the Civil Aviation Authority of Bangladesh's (CAAB) most important safety concerns. This risk is increased by Bangladesh's geographical and ecological surroundings—wetlands, agricultural fields, open waste dumps, and seasonal migratory bird routes close to airports all greatly increase the risk of birds. Specifically, Dhaka's HSIA is encircled by quickly growing urban areas where scavenging bird populations are drawn in by illegal building and poor waste management, raising the risk of aircraft collisions. Every year, the nation reports numerous instances of bird strikes, some of which result in engine obstruction and cancelled takeoffs. Even if there haven't been any catastrophic accidents in a while, the frequency of incidents indicates that there are still issues with airport zoning enforcement and urban development.

Current Initiatives

Although there are still issues with its effective implementation, CAAB has adopted a number of wildlife hazard management measures that are essentially in accordance with ICAO recommendations.

Physical Bird Control

To keep bird flocks away from runways, airports use limited falconry techniques and auditory deterrents including gas cannons, crackers, and distress sounds.⁴

Habitat Modification

Airport grass cutting and water-logged area clearance are done on a regular basis, though they are frequently irregular and rely on financing availability.⁵

Waste Management Measures

CAAB has sent out circulars mandating that local governments move open landfills, slaughterhouses, and wetlands close to airports, especially those near HSIA.⁶

Monitoring and Reporting

CAAB maintains safety databases based on reports of bird strikes, which pilots and airlines are urged to submit.⁷

Notwithstanding these steps, Bangladesh does not have a particular, legally binding zoning law for airport land-use planning. Rather, general safety instructions, CAAB guidelines, and ad hoc local cooperation are the basis of bird-strike management.

Regulations for Aviation Safety in Bangladesh

As a party to the 1944 Convention on International Civil Aviation (also referred as the Chicago Convention), Bangladesh is subject to ICAO regulations, notably Annex 14, which mandates governments take steps to reduce the risks of birds at and near aerodromes.⁸ The main regulatory body responsible for aerodrome safety is the Civil Aviation Authority of Bangladesh (CAAB), which was founded in accordance with the Civil Aviation Authority Ordinance 1985

⁴ Civil Aviation Authority of Bangladesh (CAAB), *Bird Hazard Management Operational Guidelines* (CAAB 2020) 4.

⁵ Civil Aviation Authority of Bangladesh (CAAB), *Bird Hazard Management Operational Guidelines* (CAAB 2020) 5.

⁶ Civil Aviation Authority of Bangladesh (CAAB), *Safety Circular on Bird Hazard and Waste Management* (Circular No 01/2021) 2.

⁷ *Supra* note 3.

⁸ International Civil Aviation Organization (ICAO), *Annex 14 to the Convention on International Civil Aviation: Aerodromes* (Vol I, 8th edn, ICAO 2018) para 9.4

which was later substituted by the Civil Aviation Authority Act 2017.⁹ Regarding the management of animal hazards, CAAB has released several safety circulars;

- i. Airport operators and local authorities are instructed by CAAB Safety Circular 01/2021 (Bird Hazard and Waste Management) to implement appropriate waste disposal procedures near aerodromes.
- ii. Risk assessments for bird strikes are incorporated into the Aerodrome Safety Management System (SMS) Guidelines as part of the broader aviation safety framework.
- iii. Although they are not well linked with zoning enforcement, Environmental Directives (which are in line with Department of Environment regulations) place a strong emphasis on limitations on garbage dumping and wetland encroachment near airport zones.

Bangladesh does not yet have a complete Airport Zoning Act, in contrast to India, which has created state-level zoning rules as well as clearance procedures for developments near airports.¹⁰ Rather, separate local ordinances, CAAB guidelines, and urban development regulations are used to handle airport zoning concerns, which results in inadequate enforcement and jurisdictional overlaps.

III. India: Bird-Strike Risk Management & Zoning Laws

With more than 140 airports under the control of the Airports Authority of India (AAI) and multiple additional aerodromes in development, India possesses one of the world's fastest-growing civil aviation sectors. However, the risk of bird strikes has increased due to the quick development of urban areas surrounding important airports including Indira Gandhi International Airport in Delhi, Chhatrapati Shivaji Maharaj International Airport in Mumbai, and Kempegowda International Airport in Bengaluru. Between 2018 and 2022, over 1,400 bird-strike occurrences were reported at Indian airports, the majority of which occurred during the takeoff and landing phases, according to the Directorate General of Civil Aviation (DGCA).¹¹

Bird dangers are particularly significant in India due to its geographical and socioeconomic context. Airports are frequently situated next to agricultural areas, wetlands, and unplanned urban

⁹ *Civil Aviation Authority Act 2017* (Bangladesh)

¹⁰ Airports Council International (ACI), *Wildlife Strike Hazard Reduction Strategies* (ACI 2019) 7

¹¹ Directorate General of Civil Aviation (DGCA), *Annual Safety Review 2022* (DGCA 2023) 12

settlements where a lot of birds gather due to open trash disposal, slaughterhouses, and stagnant water bodies. Kite, pigeon, and migratory bird strikes are common at high-risk airports including Delhi, Ahmedabad, and Kolkata. A number of incidents have resulted in aborted takeoffs, precautionary landings, and expensive aircraft repairs, causing significant financial losses for airlines and raising worries about passenger safety even if the majority only cause minor damage.¹²

Current Control Mechanism

In India, the DGCA, AAI, and state governments cooperated to establish a multi-layered bird hazard management program. The main techniques consist of:

- i. Wildlife Hazard Management Committees (WHMCs) are set up at every airport who are in charge of evaluating regional bird threats, working with local authorities, and putting mitigation plans into action.¹³
- ii. Airports use a variety of physical and auditory deterrents to keep birds away from runways, including gas cannons, pyrotechnics, laser beams, distress sounds, and trained falcons.¹⁴
- iii. Airports frequently cut grass, drain flooded areas, and disrupt habitat within a 10-kilometer radius. According to DGCA regulations, local governments must limit land uses that draw birds, like slaughterhouses and landfills.¹⁵
- iv. Avian radar systems are used by major airports, such as Delhi and Mumbai, to track the movements of birds and notify air traffic controllers of any changes.¹⁶

Despite these efforts, state and local authorities' uneven execution of zoning regulations continues to be a problem, especially at smaller local airports.

Regulations for Aviation Safety in India

Both domestic laws and international commitments are included into India's legal and regulatory framework for managing the risk of bird strikes. India is subject to ICAO requirements

¹² S Rajesh and A Mehta, 'Urban Ecology and Bird Hazards in Indian Aviation' (2021) 14(2) *Journal of Air Transport Safety* 77

¹³ Directorate General of Civil Aviation (DGCA), *Civil Aviation Requirements (CAR) – Aerodrome Design and Operations* (CAR Section 4, Series B Part I, 2021) 9

¹⁴ Airports Authority of India (AAI), *Annual Report 2021–22* 16.

¹⁵ Directorate General of Civil Aviation (DGCA), *Annual Safety Review 2022* 10

¹⁶ 'Delhi Airport Deploys Avian Radar System' *Times of India* (New Delhi, 12 July 2021) <https://timesofindia.indiatimes.com> accessed 26 August 2025

as a signatory to the Chicago Convention 1944, especially Annex 14, which requires wildlife hazard management systems at airports.¹⁷

- i. Under Section 4, Series B, Part I (Aerodrome Design and Operations), the DGCA has issued specific CARs requiring airport operators to create plans for managing wildlife hazards and incorporate them into aerodrome safety management systems.¹⁸
- ii. The national government has the authority to control construction near airports through the Aircraft Act 1934 and the Aircraft Rules 1937. For construction projects within a specified air funnel and within 20 kilometers of airports, the DGCA mandates a No Objection Certificate (NOC).¹⁹ In order to reduce bird attractants like slaughterhouses and garbage disposal sites, these zoning limitations are essential.
- iii. In accordance with DGCA regulations, the responsibility for moving garbage dumps and implementing land-use restrictions falls on State Pollution Control Boards and urban local governments.²⁰

A prime example is Delhi Airport, where, following multiple incidents of bird strikes, the Delhi High Court ordered the withdrawal of meat stores and waste disposal sites located within ten kilometers of the airport.²¹ Following ICAO compliance audits, Ahmedabad's municipal officials were also instructed to move open slaughterhouses outside the airport's boundaries.²²

IV. Comparative Summary: Bangladesh and India

Important similarities and differences in the approaches used by the two South Asian countries to address bird strike hazards and enforce airport zoning regulations are highlighted by the comparative study of Bangladesh and India. Both nations are subject to international duties under ICAO Annex 14 and the Chicago Convention 1944, which require states to detect and minimize wildlife risks around aerodromes. The degree of success in resolving the issue is shaped

¹⁷ International Civil Aviation Organization (ICAO), *Annex 14 to the Convention on International Civil Aviation: Aerodromes* (Vol I, 8th edn, ICAO 2018) para 9.4

¹⁸ Directorate General of Civil Aviation (DGCA), *Annual Safety Review 2022* 13

¹⁹ *Aircraft Act 1934* (India); *Aircraft Rules 1937* (India) r 91

²⁰ Ministry of Environment, Forest and Climate Change (India), *Solid Waste Management Rules 2016* (MoEFCC 2016) r 15

²¹ *Delhi High Court v Union of India* WP(C) No 15835/2006 (Delhi HC, 2007)

²² 'Ahmedabad Airport Declared Bird-Hazard Sensitive Zone' *Indian Express* (Ahmedabad, 20 March 2020) <https://indianexpress.com> accessed 26 August 2025

by the major differences in how these international norms are translated into domestic law, institutional procedures, and enforcement practices. Over the past 20 years, aviation has expanded rapidly in both Bangladesh and India, increasing its vulnerability to bird strikes. Three international airports in Bangladesh are the hub of the country's aviation expansion, with Dhaka's Hazrat Shahjalal International Airport (HSIA) being the most at risk because of nearby wetlands, garbage dumping, and unplanned urban expansions. With more than 140 airports, India, on the other hand, oversees a far larger aviation sector, increasing the likelihood of bird strikes, particularly at high-density airports like Delhi, Mumbai, Kolkata, and Ahmedabad.

Legal and Regulatory Framework

In Bangladesh, safety guidelines, CAAB circulars, and non-binding regulations play a major role in controlling bird strikes. Ad hoc collaboration with local authorities is also used. Aviation safety is based on general environmental and urban rules that are not strictly enforced, and there is no specific airport zoning regulation.

There is a thorough legal framework in India, with the Aircraft Act 1934 and the Aircraft Rules 1937 giving the government the power to control land use close to airports.²³ Zoning regulations require No Objection Certificates (NOCs) for any building or land use within a 10- to 20-kilometer radius,²⁴ while the DGCA's Civil Aviation Requirements (CARs) mandate wildlife hazard management programs at all aerodromes.²⁵ These duties have been further strengthened by Indian courts, especially the Delhi High Court, which has ordered the closure of slaughterhouses and landfills close to airports.²⁶

Thus, Bangladesh depends on fragmented administrative procedures devoid of statutory force, whereas India has a more formalized and enforceable framework.

Control Methods and Use of Technology

Both countries utilize conventional deterrents, such as falconry, pyrotechnics, gas cannons, distress calls, and habitat manipulation (draining wetlands, trimming grass). But when it comes to

²³ *Aircraft Act 1934* (India); *Aircraft Rules 1937* (India) r 91

²⁴ Directorate General of Civil Aviation (DGCA), *Civil Aviation Requirements (CAR) – Aerodrome Design and Operations* (CAR Section 4, Series B Part I, 2021) 9

²⁵ *Id.*, 11

²⁶ *Delhi High Court v. Union of India* WP(C) No 15835/2006 (Delhi HC, 2007)

adopting technology, India is well ahead. Avian radar systems are used at major airports like Delhi and Mumbai to monitor bird movements and notify air traffic controllers in real time.²⁷ Bangladesh, in comparison, still relies nearly entirely on physical and manual dispersal techniques, which is a reflection of both technological and economic constraints.

Organizational Structures

Although CAAB is primarily in charge in Bangladesh, it has no real control over local governance, environmental protection, or urban planning. Because of this fragmentation, regulations are not properly enforced, and land uses that attract birds continue to exist close to airports.

A more organized system is in place in India, where state governments, local governments, the DGCA, and the AAI share accountability. However, this multi-tiered governance frequently results in jurisdictional overlaps and enforcement delays, especially when it comes to moving slaughterhouses and dumpsters. As a result, although India has better organizational framework, governance limitations in both countries jeopardize efforts to reduce bird strikes.

Compliance and Enforcement

The most obvious area of difference between Bangladesh and India is in enforcement. The lack of legally binding zoning laws and the unwillingness of local governments to move dangerous land uses are the main causes of Bangladesh's poor compliance. Safety is still being jeopardized by neighborhood objections, particularly with relation to the relocation of trash disposal close to HSIA.

In India, zoning laws have been enforced more strictly by the courts, especially in Delhi and Ahmedabad, where they have mandated the closure or relocation of establishments that attract birds. However, there are still disparities in compliance, especially at smaller regional airports with fewer resources and technology.

India's structure, in summary, gives enforcement more legal legitimacy, but socio-political realities continue to hinder its implementation. Bangladesh, on the other hand, lacks the legal capacity to impose any kind of compliance.

²⁷‘Delhi Airport Deploys Avian Radar System’ *Times of India* (New Delhi, 12 July 2021), available at: <https://timesofindia.indiatimes.com> (last visited on August 27, 2025).

Common Challenges

Despite having different levels of regulatory development, Bangladesh and India have a number of significant problems with how to properly control bird-strike threats through management strategies and zoning rules. Bangladesh's Civil Aviation Authority is reliant on administrative cooperation and non-binding circulars with little enforcement authority because the country lacks a comprehensive regulatory framework for airport zoning. Despite being more developed, India also has poor execution because zoning laws are frequently delayed or lessened by the overlapping jurisdiction of the DGCA, Airports Authority of India, state governments, and municipal agencies. Community opposition to moving slaughterhouses, trash dumps, or bird-attracting wetlands close to airports is a problem in both countries, underscoring the socioeconomic and political sensitivities involved.

Likewise, smaller regional airports in both jurisdictions continue to lack adequate resources and rely on outdated manual deterrents rather than advanced surveillance technology like avian radar. Long-term ecological planning is another area of vulnerability that both Bangladesh and India share: growing, unplanned urbanization continues to encroach on airport habitats because neither country has adequately incorporated bird-strike risk management into urban development laws. Therefore, both India and Bangladesh need a comprehensive, ecologically conscious, and community-integrated approach to sustainable bird-strike risk reduction, but Bangladesh's issues stem from a lack of regulations and India's from implementation gaps.

A holistic strategy is needed to close these gaps. While India should concentrate on standardizing enforcement across all airports, improving technological capacity at regional airports, and actively engaging communities to improve compliance, Bangladesh must create a statutory zoning law with clear enforcement mechanisms and strengthen intergovernmental coordination. By combining these focused measures, important gaps would be filled, enabling both countries to transition from reactive hazard management to environmentally conscious, legally sound, and sustainable aviation safety systems.

Key Insights of both countries

A number of important implications are drawn from the comparison of Bangladeshi and Indian airport zoning regulations and bird-strike risk management, which will be helpful to policymakers and aviation safety professionals equally.

First, enforcement capacity is greatly impacted by legislative and regulatory development. India serves as an example of how statutory zoning laws combined with court supervision offer a more robust framework for reducing bird dangers. The limitations of informal regulation in guaranteeing compliance, however, are highlighted by Bangladesh's reliance on administrative circulars and non-binding directives.

Second, a key differentiation is the utilization of technology. While Bangladeshi airports continue to rely on conventional physical deterrents, Indian airports, especially large international hubs, use avian radar and data-driven monitoring to proactively manage wildlife dangers. This suggests that while technology can significantly improve risk prediction and mitigation, it also necessitates operational capacity and investment.

Third, governance structure and institutional coordination are just as important as actual legislation. Overlapping duties between aviation authority, local governments, and environmental organizations provide difficulties for both countries. In Bangladesh, the lack of legislative requirements makes coordination more difficult, while in India, execution gaps continue because of fragmented responsibility despite clearer statutory lines.

Fourth, socioeconomic factors and community involvement are crucial. Reluctance to move slaughterhouses, waste disposal facilities, or wetland areas close to airports compromises compliance in both countries, highlighting the need for community-focused policies and awareness campaigns in addition to legal and technological measures to effectively manage the risk of bird strikes.

Lastly, there are still significant gaps in environmental integration and urban planning. Bird-strike risk evaluations have not yet been completely integrated into urban development planning in either country. The necessity for a proactive, multi-sectoral approach that unifies city planning, ecological management, and aviation safety is highlighted by the rapid, uncontrolled urban expansion that continues to worsen wildlife threats close to airports. All of these observations point to the interdependence of governmental coordination, technological innovation, community involvement, regulatory strength, and urban integration as key components of successful bird-strike risk control. These lessons can be used by policymakers in Bangladesh and India in moving away from reactive, fragmented approaches and toward environmentally conscious, legally sound, and sustainable aviation safety systems.

V. Comparative Recommendations

Both Bangladesh and India must implement comprehensive, holistic approaches that address organizational, technological, legal, and socio-environmental factors in order to improve aviation safety and reduce the danger of bird strikes. While Bangladesh suffers from legislative gaps while India enjoys the advantages of a reasonably developed regulatory framework, the comparison reveals that both nations deal with issues of community compliance, urban encroachment, and enforcement.

Legal and regulatory recommendations urge the adoption of a specific Airport Zoning Act is Bangladesh's top goal. Such laws should outlaw land uses that draw birds, such as wetlands, landfills, and slaughterhouses, clearly specify buffer zones around airports, and implement severe fines for noncompliance. To guarantee coordinated action, the law should explicitly give CAAB control over environmental, urban planning, and municipal agencies. In India, the emphasis should be on improving implementation consistency by making sure that DGCA regulations, zoning limits, and CAR standards are followed consistently, especially at regional and smaller airports. It is possible to further institutionalize judicial systems to encourage proactive enforcement and discourage non-compliance.

Both countries would gain from increasing the use of advanced bird monitoring and detection technologies, like avian radar and predictive tracking software, which have shown promise in important Indian airports. In order to assess the cost-effectiveness of radar deployment and integrate it with air traffic management systems, Bangladesh ought to take into account pilot programs at HSIA and other high-risk airports. India should concentrate on expanding this technology to minor airports so that manual deterrents are not the only option for smaller hubs.

Strong interagency coordination is necessary for effective bird strike control. To enable coordinated decision-making, Bangladesh has to set up official channels connecting the CAAB, the Department of Environment, local government representatives, and urban planning organizations. To avoid duplication or enforcement gaps, India should improve the clarity of roles and responsibilities among the DGCA, AAI, and local governments, even with its more structured system. Every airport in both nations should have a wildlife hazard committee with defined duties, sufficient manpower, and funding.

One important lesson from both countries is that technology and legal remedies are not enough on their own. One persistent obstacle is community opposition to the relocation of hazardous land uses. In order to encourage local stakeholder engagement and provide incentives for compliance, Bangladesh and India should both make investments in education, awareness, and participatory governance initiatives. Outreach initiatives could include encouraging neighborhood-supported trash management and urban planning solutions, as well as clarifying the connection between hazardous land use and aviation risks.

Bird-strike risk management needs to be incorporated into larger urban development plans in both nations. This entails examining planned building projects, controlling the growth of landfills and wetlands, and incorporating ecological studies into zoning permits. India could strengthen the enforcement of such evaluations and bring them into compliance with DGCA zoning regulations, while Bangladesh should create official environmental and aviation impact assessments for all developments close to airports. It is crucial to continuously enhance the capability of aviation planners, local government representatives, and airport staff. In addition to funding research projects on bird ecology, migration patterns, and regional enticements, both countries should fund training programs on risk assessment, mitigation strategies, and wildlife hazard management. Evidence-based methods will enable customized tactics instead of general deterrence, boosting sustainability and efficiency.

In the end, the comparative experience indicates that long-term bird-strike risk reduction requires integrated, multi-sectoral approaches that include organizational coordination, technology instruments, legal authority, community participation, urban design, and scientific research. India can improve implementation consistency and broaden coverage to regional airports, while Bangladesh can take use of India's regulatory approach while customizing interventions to its resource situation. Both nations may move from fragmented, reactive management to resilient, environmentally conscious, and legally sound aviation safety systems by taking a comprehensive and proactive strategy. This will bring their systems into compliance with ICAO requirements and promote the expansion of sustainable aviation.

VI. Conclusion

The comparison of Bangladesh's and India's airport zoning regulations and bird-strike risk management highlights the two countries' similar difficulties and differences in ensuring aviation

safety. Bangladesh is still limited by the lack of a specific statutory framework and fragmented governance, whereas India has established a very sophisticated legal and institutional structure that includes enforceable zoning restrictions, DGCA standards, and judicial scrutiny. Notwithstanding these distinctions, both countries deal with the same challenges, limited community compliance, resource constraints at smaller local airports, and fast urbanization close to airports. The analysis reveals that India's strengths lie in its codified regulations and technological integration, whereas Bangladesh must focus on enacting binding zoning laws, strengthening inter-agency coordination, and introducing advanced monitoring systems. Both countries can benefit from holistic, evidence-based approaches that align aviation safety with ecological management and urban development.

The study concludes by highlighting the necessity of proactive and integrated approaches for local aviation safety, which combine innovative technology, enforced legal frameworks, participatory governance, and urban ecological design. In addition to lowering the risk of bird strikes, Bangladesh and India may set an example for aviation hazard management in the Global South by tackling legislative gaps, implementation difficulties, and socio-environmental limitations. This will guarantee safer skies and more robust aviation systems.