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Abstract:

Tribhuvan International Airport (TIA), the only international airport in the Himalayan Kingdom of Nepal, is geographically situated in the middle of the country at an elevation of 4,390 feet (AMSL) in a valley surrounded by hills. The airport was in an isolated area at the time of its establishment in 1949, but now is in the middle of dense human settlement and local market places. The polluted rivers on either side of runway, un-scientific municipal solid waste management, and emergence of earthworms near the runway and taxiways after monsoon rains in late summer are some of the bird attractants. Birds of prey such as kites, eagles, vultures, and falcons are major bird types hazardous to aircraft operations at TIA. There were 6 separate bird strike incidents to civil aircraft during August-October 2000. In one of these incidents, an engine of a B-757 aircraft was heavily damaged. The Airport authority took several immediate measures to prevent bird strikes, including minimizing garbage dumping near airport and shooting birds that would not disperse. Short, medium and long-term plans have been developed to solve the problem systematically. In order to address the bird strike problem, a national level Bird Strike Control Committee and individual airport-level Bird Strike Committees have been formed following the incidents in 2000. The Royal Nepal Academy of Science and Technology (RONAST) presently is carrying out research on bird activities in and around the airport. The Civil Aviation Authority of Nepal is committed to reducing bird and other wildlife hazards at all airports in Nepal by developing integrated management programs.

1. Introduction:

1.1. The green pastureland amid the Kathmandu Valley, "Gaucharan", was used as a landing strip by a single-engine aircraft in 1949. This was the first landing of aircraft in the aviation history of Nepal. Following this historic landing, the airport went through various stages of development to evolve into today's Tribhuvan International Airport.

1.2. Tribhuvan International Airport (TIA) is 6 km east of Kathmandu City center. Geographically, TIA is situated on 085^0 21'28" E longitude and 27^0 41'50" N latitude at an elevation of 1,330 m (4,390 feet). The airport covers 320 ha of land area. The Aerodrome Reference Temperature is 27.8^0 C.

1.3. In 1950, 1 year after the first landing of aircraft at Kathmandu Gaucharan (now TIA), scheduled flights using Dakota (DC-3) aircraft were started to and from Patna, Calcutta and Delhi. Similarly, the capital city of Nepal was linked with the northwestern mountainous city of Pokhara and Biratnagar, Bhairahawa, and Simara, the southern Terai belt airports, in 1952.

1.4. The TIA was declared an international airport in 1964. An historic landing of a Concorde in Kathmandu was made in 1989, followed by landings of a Galaxy (C-5) and AN-124 in 1993.

1.5. Then the Government, following liberal policy, opened Nepalese sky to private airline operators, which resulted in improved air services in different parts of Nepal. The total passenger movements in the years 1999 and 2000 were reported to be about 2 million people.

1.6. Bird strikes were not a pronounced problem during the early years of the airport. Solid waste dumping at Gokarna, a landfill about 3 km NE of the northern boundary of TIA, started in 1986 and continued until July 2000. This site attracted many birds, especially house crows (*Corvus splendens*), black kites (*Milvus migrans*), and steppe eagles (*Aquila rapax*) (Hahn et al. 1999). In addition, the Gokarna Ban, a jungle area just north of the landfill site, and the jungle area near the Pashupatinath Temple and Guheshwori (about 1-1.5 km NW of TIA) have increasingly been used as convenient roosting and nesting places by these birds.

1.7. The first major bird strike incidence that took place in Nepal involved a Thai Airways Airbus 300 in 1996. The left engine was damaged after striking eagles. About 5-6 eagles were found dead on the runway. The aircraft was grounded for 4 days in Kathmandu.

1.8. During 2000, HMG Nepal used garbage from Kathmandu and Lalitpur Municipalities as filling material in the construction of a road along the bank of the Bagmati River from Guheshwori Temple to Gokarna. This area lies only a few hundred meters north of the runway at TIA.

1.9. Bird activities at TIA increased tremendously during 2000, to a level that was never before experienced. Despite TIA's extreme care and vigorous effort, 6 separate bird strikes occurred from 20 August-21 October 2000. There were no casualties or accidents, but the economic loss seemed substantial in terms of damage and business loss due to aircraft on ground.

1.10. During August-October 2000, the following bird strikes were recorded at TIA in Kathmandu.

Strike num.	A/C Make Model	Location	Date	Damage	Injuries/ Fatalities
1.	BC-1900D	TIA Kathmandu, Patan Area	20 Aug 2000	Minor	0
2.	B-757-200	TIA, Kathmandu	23 Aug 2000	Substantial	0
3.	B-757-200	TIA, Kathmandu	29 Sep 2000	Substantial	0
4.	B-757-200	TIA, Kathmandu	10 Oct 2000	Minor	0
5.	B-767	TIA, Kathmandu	12 Oct 2000	None	0
6.	B-1900D	TIA, Kathmandu	21 Oct 2000	None	0

2. Studies made on the bird strike situation at TIA

Personnel from the CSL Bird Strike Avoidance Team, UK; a German Team on solid waste management; a joint German-English Team; and the USA Department of Agriculture made separate studies on the bird strike situation at TIA in the past, which are as follows:

2.1. Bird strike hazards associated with landfill sites in the Kathmandu valley and bird strike prevention recommendation, 1995.

2.2. Solid waste management in Nepal, report on fact-finding mission, 1996.

2.3. Study on bird strike risks at TIA, Nepal, 1998 (Hahn et al. 1999).

2.4. Workshop on bird strike prevention and an assessment of wildlife hazard management program at TIA, 2001 (Dolbeer 2001).

3. TIA Environment

3.1. TIA, when initially used as a landing strip in 1949, was remote from the city area. Human settlement around the airport was almost non-existent.

3.2. Bouddha on the north side and Koteswor towards south of TIA, are big local market areas which have many open slaughterhouses and other business establishments that generate food wastes. Apart from these, the residents of these areas often are careless in the disposal of kitchen and other household refuse. In some places, garbage is dumped openly in mini-collection centers.

3.3. The 2 rivers that meander within 0.3 km of the airport, Manohara to the east and Bagmati to the north and west, have become very polluted and attract kites, egrets, crows, eagles and other birds searching for food.

3.4. Organic fertilizer is commonly used on cultivated land in the village areas within 2 km of airport. This practice causes emergence of earthworms and insects that attract birds such as cattle egrets (*Bubulus ibis*).

3.5. There are jungle areas 1-3 km from TIA at Pashupati, Guheshwori and Gokarna, which provide safe roosting and nesting places for many birds close to ample supplies of food and water.

4. Measures taken for the control of bird activities at TIA in 2000-2001

4.1. Sweeping of the runway and taxiway surfaces:

At TIA during August and September, after the monsoon rains, earthworms emerge from grassy areas and crawl onto edges of the taxiways and runway. A crew has been formed to sweep the areas of runway and taxiways where the worms come up over the surface. This crew not only cleans the runway and taxiways in the morning, but they continue to watch these areas during the day to make sure no insects and worms are left on the area.

4.2. An inspection by soil and insecticide expert in the airport:

TIA urged Harvest Development Directorate at the Ministry of Agriculture to send their soil and insecticide expert to advise on the appropriate measure in preventing emergence of earthworms from the soft, wet soil near the runway and taxiways.

4.3. Spraying of Benomyl:

TIA sprayed Benomyl in the grass areas near runway and taxiways to prevent earthworms from coming up in the upper surface. The result was positive and additional evaluations will be done in summer 2001.

4.4. Cleaning the runway and blowing the siren to drive birds away:

Rescue fire fighters were kept in alert position to wash off the runway and taxiways as needed. The fire ambulances were used to drive the larger birds from the runway with the use of sirens.

4.5. Use of professional shooters:

A group consisting of 9 gun shooters from the Royal Nepalese Army are kept in runway area patrolling with necessary handheld communication equipment and a "follow me" vehicle to drive

the birds away. These shooters occasionally kill some birds if other activities fail to disperse the birds.

4.6. Issuance of NOTAM:

A notice alerting flight crews on bird activities was issued on 24 August 2000,

4.7. Closure of Aerodrome:

ATC personnel were instructed to close flight operations whenever they observed high levels of bird activity in and around the airport.

4.8. Removal of unauthorized food vendors from the airport premises:

Various food vendors, selling items such as tea, roasted cereals, and grilled mutton and chicken, used to have “open air” stands or carts on landside areas at TIA. These “open air” vendors have been removed from the airport premises now.

4.9. Issue of Directives to Airline Companies:

To ensure no food and other aircraft waste is disposed off openly in the airside areas, the Civil Aviation Authority of Nepal (CAAN) issued a directive to all international and domestic airline companies to dispose of their waste in closed containers. Non-compliance of this directive could lead to a serious action from CAAN.

4.10. Advice from ACI-Asia Region:

TIA wrote to the Chairman, ACI-Asia region in New Delhi, to obtain advice and experience in bird control at airports. Advice in this regard was received which corresponded well with the measures that TIA is taking now.

4.11. Proposed falconry program:

An initial proposal on implementation of a falconry program at TIA was received. It was decided to initially focus on more basic measures to reduce bird activity on the airport before considering the implementation of such specialized programs.

4.12. Acquisition and installation of bird dispersal devices:

TIA has initiated search for suitable bird deterrent equipment such as anti-perching devices, laser beams, and sound devices. Identification and procurement of such equipments will be done as appropriate.

4.13. Formation of a high level "Airport Bird Control and Reduction Committee":

HMG by its cabinet of Minster's decision formed a high level "Airport Bird Control and Reduction Committee" with the Secretary of the Ministry of Culture, Tourism and Civil Aviation as the chairman. The Director General CAAN is the member secretary in the committee, and representatives from the Ministry of Home, Defense, Population and Environment, and the Ministry of Local Development serve as members. Other members on the committee are Brig. General No. 11 Brigade of Royal Nepal Army, the Chairmen of Kathmandu, Lalitpur and Bhaktapur District Development Committees, the Mayor of Kathmandu Metropolitan City, and the Chairman of Royal Nepal Airlines. This committee was formed as envisaged by ICAO Airport Services Manual (Doc. 9137-AB/898). The main functions of this committee are to coordinate with different line ministries and to direct and evaluate bird control activities at all airports within the kingdom of Nepal.

4.14. Formation of TIA Bird Control Committee:

The national level Airport Bird Control and Reduction Committee on its first meeting decided to form airport-level committees throughout Nepal. The TIA Bird Control Committee is working on the various measures outlined above to control bird activities at TIA.

4.15. Proposal for Environmental Study:

Various national as well as international institutions have offered proposals for environmental studies of TIA. Some equipment suppliers have shown their interests in supplying bird scaring devices at TIA.

4.16. TIA and COSCAP-SA initiated periodic, joint inspections of TIA:

ICAO COSCAP-SA personnel visited in and around the airport area to assess the extent of bird hazards to aircraft. As a follow-up action, TIA and COSCAP-SA started periodic, joint inspections of TIA and surrounding areas in November 2000 with a view to reduce and control bird and other wildlife activities at the airport. The joint inspection team has recommended various steps to be taken by airport authority, many of which are outlined above. In addition, TIA invited bird specialists and arranged their visits in and around the airport to evaluate the bird situation. COSCAP-SA also arranged a workshop on Wildlife Hazard Management for Airports in January 2001.

4.17. Visit to JFK International Airport:

CAAN sent a 2-member official delegation to USA in December 2000 to see demonstrations of various bird dispersal devices and to learn about the bird-hazard management program at JFK International Airport, New York.

4.18. Workshop on "Wildlife Hazard Management at Airports":

COSCAP-SA, CAAN, the Nepali Tourist Association, and Royal Nepal Airlines provided support for a 2-day workshop in Kathmandu in January 2001 for about 50 delegates from Nepal, Bangladesh and Pakistan. Representatives from 19 international and regional airlines using TIA attended the workshop. The workshop covered all aspects of defining and managing bird and other wildlife hazards at airports. The workshop used the recently published manual by the USA Federal Aviation Administration and Department of Agriculture entitled "Wildlife Hazard Management at Airports" as the reference text (Cleary and Dolbeer 1999). In addition, the workshop instructor spent 8 days inspecting TIA and surrounding areas, reviewing current bird and other wildlife control activities at TIA and Pokhara Airport, implementing a rodent population study at TIA, and making recommendations for improvements in the management programs (Dolbeer 2001).

5. Future Plans

5.2. **Short-term Plan**

5.2.1. Continue the present control measures.

5.2.2. Staff and equip TIA Bird Control Unit sufficiently.

5.2.3. Provide sufficient logistic support to TIA Bird Control Unit.

5.2.4. Implement a long-term (at least 1 year) study to document the species, numbers, behavior and migratory patterns of birds at TIA and surroundings by season to provide an ecological basis for long-term solutions to the bird strike problem.

5.2.5. Carry out study of food attractants in TIA environment, including rodent populations on airport and area-wide garbage-disposal practices, so that large, predatory birds such as kites, eagles and vultures are discouraged from the airport area.

5.2.6. Identify and procure appropriate bird-scaring devices for TIA.

5.2.7. Evaluate appropriate and environmentally safe chemicals to prevent emergence of insects and earthworms near the runway and taxiways.

5.2.8. Regularly inspect and repair airport fence to prevent feral dogs and livestock from entering airside areas.

5.3. **Mid-term Plan**

5.3.1. TIA should continue the effective measures taken in short term.

5.3.2. Explore various technologies and methods for dispersing or discouraging birds from airport environment.

5.3.3. Implement Bird Control Program based upon findings of bird and environmental studies.

5.3.4. Train and familiarize staff on bird controlling strategies and techniques.

5.3.5. Create databases of bird activities and bird strikes and analyze the data for future planning. Ensure that bird species are properly identified.

5.3.6. Conduct educational and awareness programs to the nearby residents of airport on the seriousness of bird strike hazards and the need for environmental cleaning.

5.3.7. Develop policies and rules suitable to implement airport zoning with reference to bird control.

5.4. **Long-term Plan**

5.4.1. Implement all aspects of the Bird Control Program.

5.4.2. Keep airport and its environment clean to minimize the attractiveness of airport to birds.

5.4.3. Evaluate mid-term plan and correct the shortcomings.

5.4.4. Make a continuous study to develop the best combination of controlling measures.

6. References Cited

Cleary, E. C., and R. A. Dolbeer. 1999. Wildlife hazard management at airports: a manual for airport personnel. U.S. Federal Aviation Administration, Office of Airport Safety and Standards, Washington D.C., USA. 243 pages.

Dolbeer, R. A. 2001. Recommendations for wildlife hazard management at Tribhuvan International Airport, Kathmandu, Nepal. Report for the Civil Aviation Authority of Nepal and International Civil Aviation Authority (COSCAP-South Asia). 21 January. 11 pages.

Hahn, E., K. Hahn, and M. Betts. 1999. Study on bird strike risks at Kathmandu Airport, Nepal. Final report. German GTZ, Project number PN 93.2203.3-01.100 (E. Reichenbach, Program Coordinator). March. 37 pages and 6 appendices.