RECOMMENDATIONS FOR WILDLIFE HAZARD MANAGEMENT AT TRIBHUVAN INTERNATIONAL AIRPORT, KATHMANDU NEPAL

Richard A. Dolbeer, Ph.D.
U.S. Department of Agriculture
Wildlife Services
National Wildlife Research Center
6100 Columbus Avenue
Sandusky, Ohio 44870 USA

REPORT FOR

THE CIVIL AVIATION AUTHORITY OF NEPAL

and

INTERNATIONAL CIVIL AVIATION AUTHORITY (COSCAP-SOUTH ASIA)

21 January 2001

RECOMMENDATIONS FOR WILDLIFE HAZARD MANAGEMENT AT TRIBHUVAN INTERNATIONAL AIRPORT, KATHMANDU NEPAL

A report presented to the Civil Aviation Authority of Nepal (CAAN) and International Civil Aviation Authority (ICAO, COSCAP-South Asia), 21 January 2001

Richard A. Dolbeer, Ph.D., U.S. Department of Agriculture and Chairperson, Bird Strike Committee-USA, 6100 Columbus Avenue, Sandusky, Ohio 44870 USA

INTRODUCTION

Tribhuvan International Airport (TIA) was plagued by a series of bird strikes in August-October 2000, and several airlines threatened to cease operations unless action was taken to reduce the threat. As a result of this situation, I was invited to Nepal to provide assistance with solving the problem.

I spent 6-16 January 2001 assisting CAAN in assessing the problem of bird strikes to aircraft in Nepal and in providing advice and training on wildlife hazard management for TIA in Kathmandu and the airport in Pokhara (see Appendix A for Itinerary). Accompanied by CAAN and ICAO (COSCAP) personnel, I made several visits to TIA and surrounding areas to assess the problem, and undertook an initial study with 71 traps to determine if rodents (a food attractant to raptors) were active in the airport grasslands in winter. The trapping survey was also used to train CAAN employees in methods used to assess and monitor wildlife hazards and attractants at airports. In addition, I taught a 2-day workshop (8-9 January) on "Wildlife Hazard Management at Airports" for about 50 delegates from Nepal, Pakistan and Bangladesh. Representatives from 19 international and regional airlines using TIA attended the workshop.

In introductory remarks at the workshop, I emphasized that 4 synergistically interacting factors are causing the wildlife strike problem to increase worldwide. First, populations of various wildlife species hazardous to aircraft have shown substantial increases. Second, many of these species have adapted to urban environments such as airports. Third, commercial air traffic, particularly in south Asia, has increased dramatically in the past 20 years. Finally, older 3- and 4-engine transport aircraft are being replaced by quieter 2-engine turbofan aircraft that are less apparent to birds. The problem is also receiving more attention because airports are increasingly exposed to liability issues related to wildlife strikes. Because of these factors and liability issues, all modern airports, especially international airports, must develop and professionally implement wildlife hazard management plans as a part of the normal cost of doing business. A summary of the 5 lectures I presented at the workshop is presented in a separate report.

THE WILDLIFE HAZARD SITUATION AT TIA AND RECOMMENDED ACTIONS

Background--A team from the German Agency for Technical Cooperation (GTZ) studied the bird strike problem at TIA from 18-29 August 1998, and produced a final report on their findings and recommendations in March 1999. Since the publication of their report, 2 significant changes related to the bird strike situation at TIA have occurred: 1) the landfill site at Gokarna (about 3

km from airport under left base for Runway 20) was closed in July 2000, and 2) as a result of closure of the Gokarna site, garbage from Kathmandu and Lalitpur Municipalities was dumped as filling material in road construction on the bank of the Bagmati River within 500 m of the north end of runway during late summer-fall 2000. The road-fill dumping, which has now stopped, was likely a causative factor for the increased incidences of bird strikes in August-October 2000.

As a result of the increased strike rate in August-October 2000 and the subsequent negative publicity, staff from ICAO's COSCAP-SC office in Kathmandu and a representative from CAAN made joint 1-day inspections of wildlife hazards at TIA on 14 November and 13 December 2000. The ICAO staff wrote a summary report of each inspection describing problems observed and recommended solutions.

The CAAN staff has developed an information paper based on these previous studies (GTZ) and inspections (ICAO) and their own investigations. This information paper, presented at the wildlife management workshop on 8 January 2001, provided an excellent overview of the root causes of the wildlife strike problem and steps being taken or planned by CAAN to alleviate the problem.

I agree with most conclusions and recommendations made in the GTZ, ICAO and CAAN reports and will not reiterate many of their details. The following recommendations are intended to reinforce certain recommendations made in these reports and to offer additional suggestions.

Recommendation 1. Bird Strike Database.

A problem must be measured and understood before it can be solved. Thus, all bird and other wildlife strike incidences need to be systematically recorded in a database so that the nature of the problem can be analyzed and understood. This database should include incidences in which a) pilots or ATC reported the strike, b) carcasses are found on runway even if the pilot did not report the strike, and c) a flight is affected (aborted takeoff or landing or runway closure) because of bird or other wildlife activity. It is especially important to accurately identify the species that are struck. This information provides the scientific foundation to develop, implement and evaluate wildlife hazard management plans for the airport directed at the species causing the problem.

It is essential that all bird and other wildlife strike incidences occurring at TIA and other Nepali airports are accurately documented and that a national database be developed.

Recommendation 2. Garbage and Food Waste Control.

2.1. Surveys done during my consultancy at TIA (and also Pokhara, the second busiest airport in Nepal) indicated control of garbage in the airport environment (on airport property and in the surrounding community) is the most critical action that must be taken to reduce activity of kites, egrets, vultures and other scavenging and predatory birds. On 6 separate occasions during my visits to TIA, I saw garbage, including food waste, piled on the ground next to garbage containers or in the open. Three of these sites were at airside sites (domestic parking bay, guard house on

northeast end of airport and security force quarters on east side of airport). Crows were feeding at 1 of these sites within 75 m of runway, and a monkey was seen at the domestic bay parking area. These wastes must be kept in covered containers and disposed of properly.

2.2. The encroachment of people and activities that generate garbage in the immediate approach area for runway 02 must be stopped. This encroachment is hazardous to the people (in the case of an overrun or short landing), and it provides a strong attractant for birds. Considerable garbage was observed in this area during my visit. CAAN must exert its authority to control the dumping of food waste and encroachment of people and livestock in these areas surrounding the approach lighting to Runway 02.

2.3. Much garbage and food waste (e.g., from slaughterhouses) was seen in and along the Bagmati River just north of the airport and in the surrounding community and market area. Manure piles in agricultural fields just north and east of airport were also a bird attractant. The Koteshor market area south of TIA also generates much uncovered food waste. The combination of food wastes, abundant water, and the nearby jungle areas (Pashupati, Gyuheshwori, Gokarna) creates an ideal environment (food, water, and shelter) near the airport for birds hazardous to aviation. CAAN must continue to work closely with other governmental entities to clean up the polluted rivers near the airport and to prohibit the dumping of food wastes within at least 3.2 km of the airport boundaries.

2.4. A major public awareness campaign is suggested to help people understand that improper garbage disposal in the area around TIA creates a hazard for aircraft, which puts human lives in danger and negatively impacts the Nepali business and tourist economy.

Recommendation 3. Development of Bird Control Unit.

A Bird Control Unit (BCU), consisting of personnel trained in bird dispersal and habitat management techniques, must be developed and equipped. A qualified biologist trained in bird identification and principles of wildlife management should be employed to advise the bird control unit, accurately identify the hazardous species, and oversee wildlife management programs on the airport.

As a minimum, the BCU should have assess to a vehicle at all times and be equipped with basic bird dispersal equipment such as pyrotechnics. A BCU person should be active on the airport each day during daylight hours. The BCU should have the means to shoot birds that will not disperse, either by having the authority and training to use shotguns or by having rapid access to Royal Nepalese Army personnel who can shoot the birds under BCU oversight.

Recommendation 4. Habitat Management on Airport.

4.1. Overall, the vegetation appeared to be well managed at TIA. Grass should continue to be maintained at 10-25 cm height. The only places that needed to be mowed were some low areas with tall grass along west side of runway on south part of airport.

4.2. All unnecessary structures or trees that can be used as perches for large birds should be removed. There was 1 tall tree at northwest end of airport that should be removed in particular. In addition, areas of brush and shrubs just outside the perimeter fence on the southwest part of airport should be cleared. The use of "anti-perching" spikes should be considered for runway signs (e.g., distance markers along runways).

4.3 A highly visible crow nest was discovered on top of the windsock pole on the east side of airport. Birds should not be allowed to nest on airport property, especially on airside areas. This nest should be removed and any new nests discovered removed immediately. Nest removal should be part of the BCU responsibility, but all airport employees should be instructed to report such activity.

4.4. The airport perimeter fence and gates should be inspected regularly for openings that would permit dogs and livestock to enter the airside area. Deficiencies should be corrected immediately. Some gates presently need to be adjusted or modified to prevent animals from crawling under or squeezing through openings.

4.5. Additional experiments should be conducted in autumn to minimize earthworms on the pavement surfaces after heavy rains. These experiments should include use of Benomyl and perhaps mechanical actions such as compacting soil next to runways. Consultation with an expert from Ministry of Agriculture is recommended.

4.6. We set a total of 71 rodent traps (snap traps) in 5 locations for 3 nights (12-14 Jan 2001) and had only 1 rodent (*Mus musculus*) captured (in area of tall [30 cm high] grass at southwest end of airport). This low rate of capture indicated minimal rodent activity on the airport in winter. Trapping should be repeated in May and October to determine the annual cycle of rodent activity. Rodents are a strong food attractant for raptors such as kestrels, eagles, and kites. Kestrels were seen hovering over grassy areas near the runway on 3 occasions during my visits to TIA.

Recommendation 5. Falconry Program and Automated Bird Dispersal Acoustic Systems.

Falconry should not be deployed at the airport at this time as part of the Bird Hazard Management Program. As discussed in my lecture on bird strike control at JFK International Airport, falconry programs have often generated much positive publicity for airports. However, there is no scientific evidence that falconry programs have reduced strikes at airports. In addition, I also would not recommend purchase of any expensive, automated bird dispersal acoustic system at this time.

The key programs needed at TIA at this time are 1) garbage control and a habitat management program to make the airport environment unattractive or inaccessible to birds and other wildlife and 2) a trained and equipped BCU that can disperse or remove birds.

Recommendation 6. Bird Control Committee for TIA.

6.1. It is encouraging that a local Bird Control Committee for TIA has been formed. The committee should meet on a regular basis (at least twice a year) with a structured agenda. Each meeting should discuss a) strikes that have occurred since the last meeting and how the strike rate compares with previous years, b) actions that continue to be taken and new actions taken since the last meeting to reduce the strike risk, 3) continuing (unsolved) and developing new problems and d) actions planned for the coming year. The results (minutes) of each meeting should be summarized and distributed to interested parties (e.g., major airlines at TIA) so that there is good communication and opportunity for feedback.

6.2. CAAN should consider sending someone from the TIA Bird Control Committee to an upcoming meeting of Bird Strike Committee-USA/Canada (next meeting is 27-30 August 2001 in Calgary, Canada--see www.birdstrike.org for details) and the International Bird Strike Committee (2002, European location and date unannounced). These meetings provide much practical information on wildlife management programs for airports.

Recommendation 7. One-year Study of Birds in Kathmandu Area Focused on Bird Activity at and in Vicinity of TIA.

The actions outlined in Recommendations 1-6 should be undertaken as soon as possible. These actions provide the foundation for a solution to the wildlife strike problem at TIA. However, to further refine the wildlife control program at TIA and develop a more effective long-term solution that is ecologically based, a 1-year study of bird activity at and in the vicinity of TIA should be undertaken by local experts from qualified organizations such as RONAST or Resources Himalaya. The study should document on a seasonal basis the species, numbers, feeding activities, habitat use, attractants and daily movement patterns of birds at and in the vicinity of TIA. A final report from this study should provide recommendations to refine the existing wildlife control program at TIA.

SUMMARY OF RECOMMENDATIONS

Recommendation 1. Bird Strike Database.

All bird and other wildlife strike incidences occurring at TIA and other Nepali airports should be accurately documented and a national database developed. It is especially important to accurately identify the species struck.

Recommendation 2. Garbage and Food Waste Control.

2.1. Airport garbage must be kept in covered containers and disposed of properly.

2.2. CAAN must exert its authority to control the dumping of food waste and encroachment of people in areas surrounding the approach lighting to Runway 02.

2.3. CAAN must work closely with other governmental entities to clean up the polluted rivers near TIA and to prohibit the dumping of food wastes within at least 3.2 km of TIA boundaries.

2.4. A major public awareness campaign is needed to help people understand that improper garbage disposal in the area around TIA creates a hazard for aircraft, which puts human lives in danger and negatively impacts the Nepali business and tourist economy.

Recommendation 3. Development of Bird Control Unit.

A Bird Control Unit (BCU) consisting of personnel trained in bird dispersal and habitat management techniques must be developed and equipped. A qualified biologist trained in bird identification and principles of wildlife management should be employed to advise the bird control unit, accurately identify the hazardous species, and oversee wildlife management programs on the airport.

Recommendation 4. Habitat Management on Airport.

4.1. Grass should be maintained at 10-25 cm height.

4.2. All unnecessary structures, trees or shrubs that can be used as perches for large birds should be removed. The use of "anti-perching" spikes should be considered for runway signs (e.g., distance markers along runways).

4.3. Birds should not be allowed to nest on airport property, especially on airside areas.

4.4. The airport perimeter fence and gates should be inspected regularly for openings that permit dogs and livestock to enter the airside area. Deficiencies should be corrected immediately.

4.5. Additional experiments should be conducted in autumn to minimize earthworms on pavement surfaces after heavy rains.

4.6. Rodents trapping should be undertaken in May and October to determine annual cycle of activity.

Recommendation 5. Falconry Program and Automated Bird Dispersal Acoustic Systems.

Falconry or expensive, automated bird dispersal acoustic systems should not be deployed at the airport at this time as part of the Bird Hazard Management Program. The key programs needed at TIA at this time are 1) garbage control and a habitat management program to make the airport environment unattractive or inaccessible to birds and other wildlife and 2) a trained and equipped BCU that can disperse or remove birds.

Recommendation 6. Bird Control Committee for TIA.

6.1. The Bird Control Committee should meet on a regular basis (at least twice a year) with a structured agenda.

6.2. CAAN should consider sending someone to an upcoming meeting of Bird Strike Committee-USA/Canada and the International Bird Strike Committee.

Recommendation 7. One-year Study of Birds in Kathmandu Area Focused on Bird Activity at and in Vicinity of TIA.

A 1-year study of bird activity at and in the vicinity of TIA should be undertaken by local experts from qualified organizations such as RONAST or Resources Himalaya.

CONCLUSIONS

In conclusion, I will repeat the comments that I made on 8 January 2001 in the Inaugural Ceremony for the workshop on "Wildlife Hazard Management at Airports". As an overview to the workshop, I emphasized 4 points:

1. The hazard of bird-aircraft collisions (bird strikes) is not a problem unique to Nepal. Bird strikes are an increasingly serious economic and human safety problem at airports worldwide. Thus, CAAN should not be embarrassed by the fact that there has been a bird strike problem at Tribhuvan International Airport (TIA) in the past year. The only embarrassment would come if CAAN refused to acknowledge the problem and refused to take steps to correct the problem. Bird strike hazard management is simply part of the cost of doing business for modern international airports. I find it highly commendable that CAAN is quickly taking steps at this time, with the assistance of ICAO and internationally recognized bird control experts, to manage the problem. This workshop is tangible evidence of that commitment.

2. A problem must be understood before it can be solved. Therefore, it is absolutely essential that all bird and other wildlife strikes occurring at TIA and other Nepali airports be accurately documented. It is especially important to accurately identify the species that are struck. This information provides the scientific foundation for developing and evaluating the wildlife hazard management plan for the airport.

3. The key component for reducing wildlife hazards at TIA and other airports is habitat management to make the airport as unattractive as possible to birds. The control of garbage throughout the airport environment and the control of other food sources such as earthworms and rodents in the runway environment are critical.

4. No matter how successful habitat management programs are, some birds will always be attracted to the airport. Therefore, in addition to habitat management, the airport must employ trained and qualified personnel in a Bird Control Unit (BCU) to frighten and disperse birds that enter the runway areas. For frightening programs to be successful long term, a certain level of lethal control (shooting birds with shotgun) must be done to reinforce the scare tactics. This killing must be directed selectively at common species that pose a direct threat to aviation, and

must be properly managed and monitored to insure no long-term harm is done to bird populations at the regional level.

ACKNOWLEDGMENTS

This consultancy to Nepal was organized and funded by CAAN, the International Civil Aviation Authority (ICAO), Royal Nepal Airlines, the Nepali Tourist Association, Transport Canada and the U.S. Department of Agriculture. I gratefully acknowledge the helpfulness, friendliness, guidance and support of all persons listed in Appendix B, plus many other Nepali people who extended courtesies to me during my stay. I especially note the attentiveness and advice provided to me by CAAN employee B. K. Upadhyaya, Chief Manager, Ground Flight Safety Division, and ICAO employees P. K. Chattopadhyay, Captain L. J. Cormier, and Captain F. A. Shah. I also acknowledge the support and interest of B. MacKinnon, Transport Canada, who helped make this trip possible.

Appendix A. Trip itinerary for Richard A. Dolbeer during consultancy on Bird Hazards to Aviation in Nepal, 6-18 January 2001.

Dates	Location	Activity
4-6 Jan	USA-Nepal	Travel from Sandusky, Ohio USA to Kathmandu, Nepal via Detroit, London, Frankfurt and Dubai
7 Jan	Kathmandu	Aerial survey of Kathmandu area; initial meeting and briefing with Director General and staff, CAAN
8 Jan	Kathmandu	Workshop "Management of Wildlife Hazards at Airport"
9 Jan	Kathmandu	Workshop "Management of Wildlife Hazards at Airport"
10 Jan	Kathmandu, Pokhora	Inspection of TIA; Fly to Pokhara; Briefing by airport manager, ATC, and sanitary engineers regarding bird hazards and issues with garbage disposal, especially siting of new landfill 5 km from airport on right base to Runway 04.
11 Jan	Pokhora, Kathmandu	Inspection of potential wildlife hazards at Pokhara Airport and surrounding area; discussions with airport manager regarding bird hazards and issues with garbage disposal.
12 Jan	Kathmandu	Additional inspection of TIA and survey of bird attractants in area surrounding TIA; set total of 71 rodent traps in 5 grass areas on airport; meeting with TIA staff and biologists from Royal Nepal Academy of Science and Technology (RONAST) regarding bird study in Kathmandu.
13 Jan	Kathmandu	Checked rodent traps; surveyed bird attractants immediately N of airport along Bagmati River; surveyed landfill site along Bagmati River at Teku.
14 Jan	Kathmandu	Report writing; surveyed crow & egret roost at Royal Palace. Counted at least 20,000 crows, 1,000 cattle egrets flying to Palace at 1700 hrs.
15 Jan	Kathmandu, Patan	Surveyed garbage dump at Teku; collected rodent traps at TIA; presentation to Nepal National Bird Strike Committee with recommendations for reducing bird strikes.
16 Jan	Kathmandu; Bhaktapur	Surveyed garbage dumping areas and other bird attractants in area; presentation to TIA Bird Control Committee regarding recommendations for reducing bird strikes; report revisions.
17-18 Jan	Nepal-USA	Travel from Kathmandu, Nepal to Sandusky, Ohio USA via Dubai, Frankfurt and Detroit.

Appendix B. Principle contacts during consultancy on Bird Hazards to Aviation in Nepal, 6-17 January 2001.

Ministry of Culture, Tourism and Civil Aviation

T. D. Chataut, Minister
V. P. Shrestha, Secretary

Civil Aviation Authority of Nepal (CAAN)

Mr. M. P. Sharma, Director General
Mr. R. M. Joshi, Deputy Director General
Mr. R. R. Dali, General Manager, Tribhuvan International Airport (TIA)
Mr. B. K. Upadhyaya, Chief Manager, Ground Flight Safety Division, TIA
Mr. M. R. Upadhyaya, Deputy Director, Domestic Airport Department
Mr. B. K. Gautam, Deputy Director, Air Worthiness Division
Mr. T. R. Manandhar, Manager, Pokhara Airport
Mr. U. P. Dhitat, Chief, Civil Engineer

International Civil Aviation Organization

Mr. L. B. Shah, Regional Director, Asia and Pacific Region
Captain L. J. Cormier, COSCAP-South Asia, Chief Technical Advisor
Captain F. A. Shah, COSCAP-South Asia, Regional Flight Operations Inspector
Mr. P. K. Chattopadhyay, COSCAP-South Asia, Regional Air Worthiness Inspector

Royal Nepalese Army

G. M. Lama, Brigadier General

U.S. Embassy

J. C. Robertson, Vice Consul/Third Secretary

Royal Nepal Academy of Science and Technology (RONAST)

D. R. Bhuju, Ph.D. (Ecology), Senior Officer

Resources Himalaya

P. Yonzon, Ph.D., Team Leader

World Wildlife Fund Nepal Program

K. Basnet, Ph.D., Ecoregion Coordinator, Asia/Pacific Program