CIVIL AVIATION AUTHORITY OF NEPAL

Nepal Initiation

"Challenges in the Regulations of Wildlife Hazard Management "

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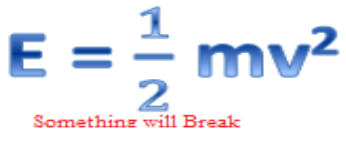
Overview

- ✓ Nepalese Aviation
- ✓ Compliance to ICAO SARPs
- ✓ Assessment of Wildlife Hazards
- ✓ Wildlife strike statistics and reporting
- ✓ Wildlife Management Plan
- ✓ Awareness and sharing lesson-learned
- ✓ Challenges
- ✓ Conclusion



$E_k = 1/2\ mv^2$

E_k = Kinetic energy (joules)

m = mass (kilograms)

v = velocity (meters/second)

A 6.6 lb. (3 kg) Black Kite is hit at take off by a aircraft traveling 150 mph (65 m/sec).

- joules) = $1/2\ MV^2 = (3[65^2])/2 = 6{,}338$ joules

  1 ft-lb. = 0.738 joules

- E (ft-lbs.) = 0.738*6338 = 4,677 ft-lbs

The energy released when a 6.6 lb (3 kg) Black Kite is hit by an aircraft traveling 150 mph equals the energy released by dropping:

4,677 pound object 1 foot, or
468 pound object 10 feet, or
47 pound object 100 feet

Something will break!

Nepalese Aviation

- Country of Mount Everest
- International Airport- 1, passenger movement 4.5m.
- International Airport under construction-3
- Domestic airport- 51 (233feet to 12348 feet AMSL)
- Heterogeneous traffic 80 knots to 480 knots
- Mammals- 208 species
- Avi/Aquatic fauna-
  over 887 bird species

Danfe (Lophophorus)
National Bird of Nepal

ICAO Standards and Recommended Practices (RP), Annex 14 Vol. 1. Chapter 9.4. -Wildlife strike hazard reduction

Section	Activity	ICAO Status
9.4.1	Assessment of Wildlife Hazards	Standard
9.4.2	wildlife Strike Reporting	Standard
9.4.3	wildlife Management Plan	Standard
9.4.4	Garbage disposal dumps and wildlife Attractant	Standard
9.4.5	Land-use guidelines for Wildlife	RPs
	a) ICAO Bird Strike Information System (IBIS) (Doc 9332). b) Airport Services Manual (Doc 9137), Part 3.	Guidelines

9.4.1 Assessment of Wildlife Hazards

a) Establishment of a national procedure

1.Rules, regulation, standard Procedure and manuals.

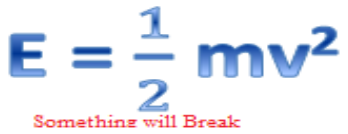
a. Local Self Governance Act 1999

Garbage transportation and dumping, Slaughter house, Strayed and dead animal management, if failed punishment up to approx US$ 150.

b. Civil Aviation Regulation 2002.

Slaughter house shall not be in 3 km of circle, nobody allowed to store garbage in side airport area, provision of punishment, in circle of 3km nobody allowed to store, throw, garbage.

c. CAR-14, SMS, Advisory Circular, Procedure and Management Manuals



a) Establishment of a national procedure

2.Committee :

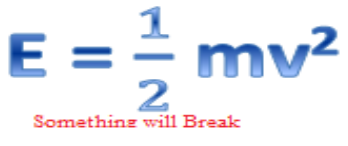
a) Airport Bird Control and Reduction Committee (ABCRC)

under the chairmanship of Secretary, Ministry of Culture, Tourism and Civil Aviation.

NATIONAL LEVEL

Composition of Airport Bird Control and Reduction Committee

1.Secretary, Ministry of C. T. and Civil Aviation-	**Chairman**
2. Joint Secretary, Ministry of Home -	Member
3. Joint Secretary, Ministry of Defense-	Member
4. Joint Secretary, Min of population and environment-	Member
5. Joint Secretary, Ministry of Local Development-	Member
6. Brigadier General , No. 11 Brigade, gaucher-	Member
7.Chairman, Kathmandu, Lalitpur and Bhaktapur District Development Committee-	Member
8. Mayor, Kathmandu Metropolitan-	Member
9.Chairman, Nepal Airlines Corporation-	Member
10. Director General CAAN-	**Member secretary**



Major functions of the ABCRC

1. Develop Rules and Regulations and requirements to make airport bird control program more effective

2. Issue directive to government organization, non-government organizations and individuals if required.

3. Inspection and monitoring of bird control program at airports.

4. Take necessary steps to solve the problem.

a) Establishment of a national procedure

2.Committee :

b) Tribhuvan International Airport Bird Control Coordination and Implementation (TIA-BCCIU):

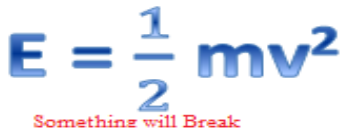
AIRPORT LEVEL

(Each airport has their own wildlife control coordination and implementation committee)

Composition of TIA- BCCIU Committee

1.General Manager, TIA Civil Aviation Office - Chairman
2.Representative Kathmandu District Development Committee Member
3.Representative, Kathmandu District Police Office Member
4.Representative, Kathmandu District Administration Office Member
5.Representative, Kathmandu District Forest Office Member
6.Representative, Kathmandu District Agriculture Office Member
7.Representative, Kathmandu District Vetenary Office Member
8.Representative,Ward No. 9, 34, 7 of Kathmandu Metropolitan City Member
9.Mulpani and Gothathar VDCs.Member
10.Specialists designated by Chairman Member
11.Representative Nepal Airlines Member
12.Representative Nepal Army Member
13.Representative Solid Waste Management and Resource
14.Mobilization Center, Ministry of Local Development Member
15.Chief, Bird Control Unit, TIA Member Secretary



Major functions of the committee

- ✓Collect Bird activities data and report to higher level committee i.e., Airports Bird Control and Reduction Committee (ABCRC).
- ✓Discuss on problem of wildlife hazard management.
- ✓Manage the wildlife hazard problem at airport.
- ✓Carryout the directives issued by ABCRC.

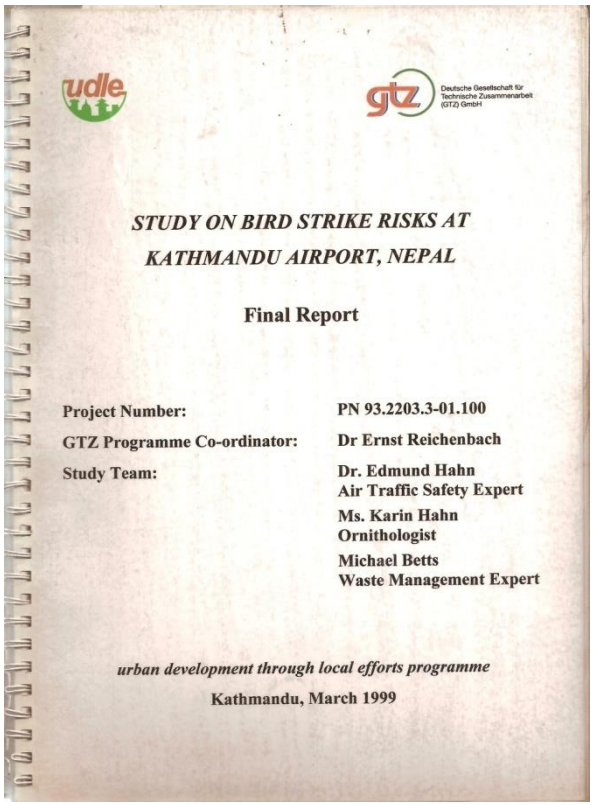
9.4.1 (b) Collection of information, presence of wildlife on or around the aerodrome constituting a potential hazard to aircraft operations;

Study on Bird Strike Risk at Kathmandu Airport

1999

Done by Deutch Gesellschaff for Techniche Zusammenrbeit (GTZ) under Urban Development Through Local Effort Prpgramme in Association with TIA.

- Expert :
- Dr.Ernst Reichenbach.
- Dr.Edmand Hahn
- Air Traffic Safety Expert.
- Dr.Karin Hahn
- Ornithologist.
- Mr.Michael Betts
- Waste Management Expert.



$E = \frac{1}{2} mv^2$

Something will Break

7- RECOMMENDATIONS

YEAR 2001

Expert :

Dr. Richard A. Dolbeer.

USA Bird Strike committee chairperson

1. Bird Strike Database

2. Garbage and Food Waste Control

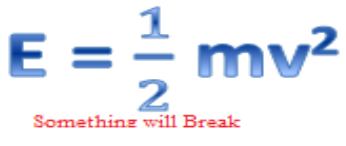
3. Development of Bird Control Unit

4. Habitat Management on Airport

5. Falconry Program and automated Bird Dispersal Acoustic Systems.

6. Bird control committee for TIA

7. One- Year study of Bird in Kathmandu area focused on Bird Activity at and in vicinity of TIA



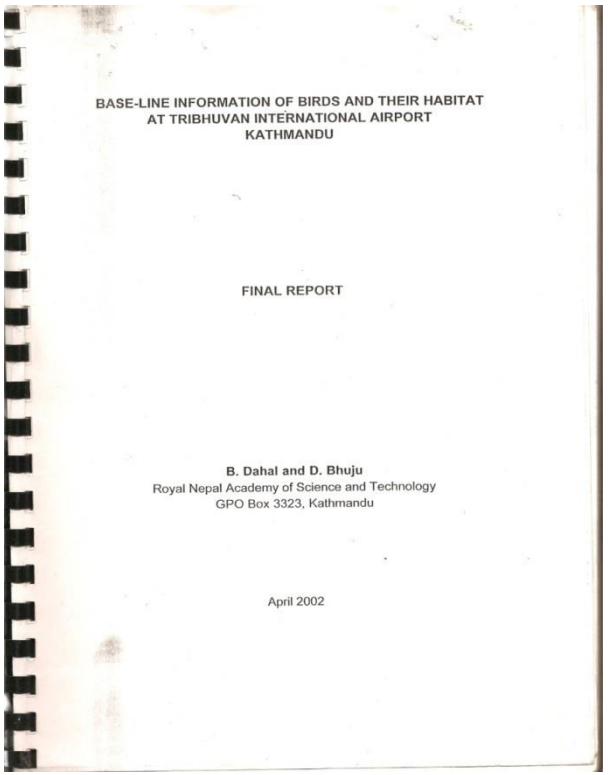
9.4.1 (b) Collection of information

Base-Line Information of Bird and their Habitat at Tribhuvan International Airport, Kathmandu 2002

Nepal Academy Science and Technology (NAST) in association with CAAN

Expert:

- Mr.B.Dahal
- Mr. D.Bhuju


BASE-LINE INFORMATION OF BIRDS AND THEIR HABITAT
AT TRIBHUVAN INTERNATIONAL AIRPORT
KATHMANDU

FINAL REPORT

B. Dahal and D. Bhuju
Royal Nepal Academy of Science and Technology
GPO Box 3323, Kathmandu

April 2002

Bird Species

Large type	-	5
Medium type	-	10
Small type	-	24
PM type	-	1
Winter Visitor type	-	4
Spring Visitor type	-	5
Residential type	-	29

Vegetation Type

Large part of airport is grassland

- ✓ Plant Species - 59
- ✓ Herb - 57.6%
- ✓ Trees - 27.1%,
- ✓ Shrub - 11.8%
- ✓ Others - 3.2%

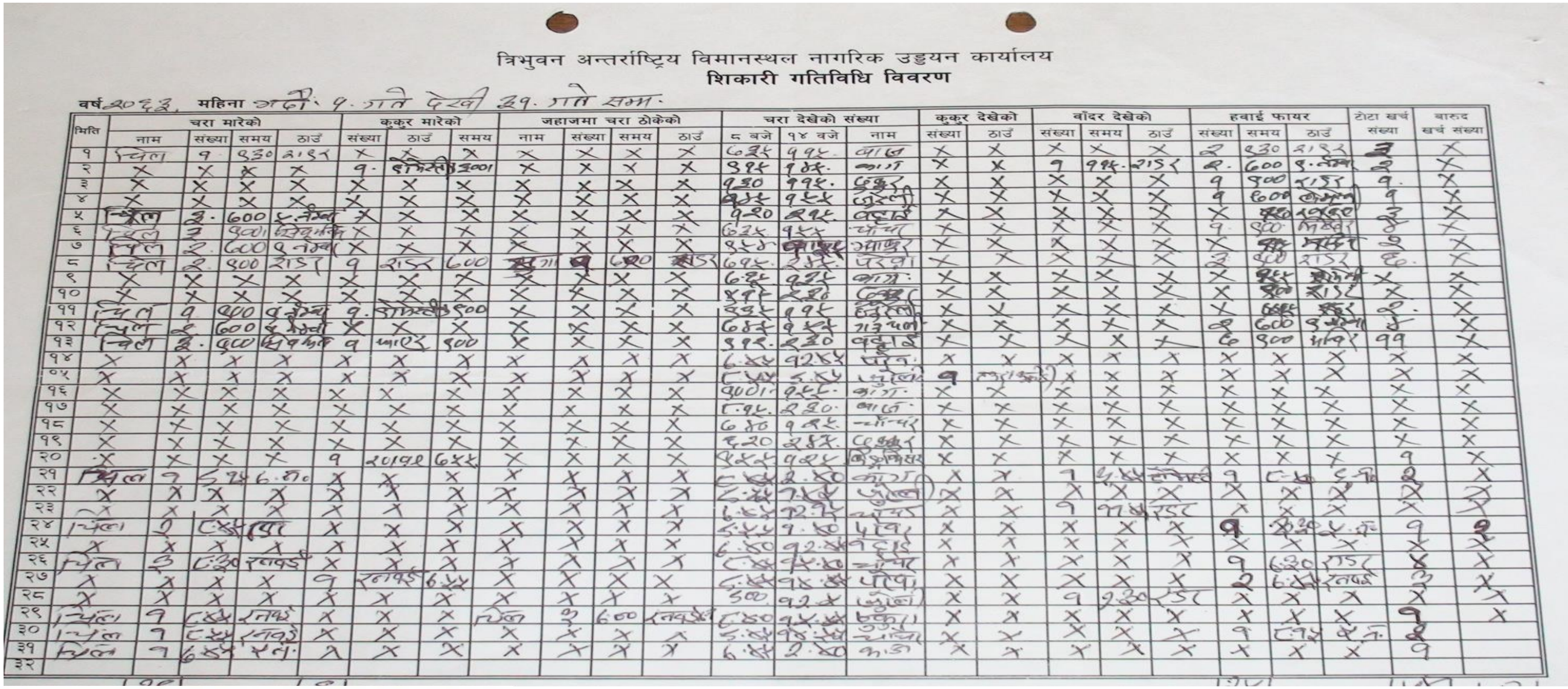
Major Problematic Wildlife

S.No.	English Name	Zoological Name	Family	Type	Size
1	Black Kite	Milvus migrans	Accipitridae	Residential	L
2	Blue Rock Pegion	Columba Livia	Columbidae	Residential	M
3	House Crow	Corvus splendens	Corvidae	Residential	M
4	Spotte Owlet	Athene brama	Caprimulgidae	Residential	M
5	Domestic Dog	*Canis lupus familiaris* or *C anis familiaris*	*canidae*	Residential	55-65 lbs
6	golden Jackal	*Canis aureus*	*canidae*	Residential	35-40 lbs
7	Blue Bull	*Boselaphus tragocamelus*	Bovidae	Residential	220- 470lbs
8	Wild Boar	*Sus scrofa*	Suidae	Residential	90 -115 lbs
9	Rhesus Monkey	Macaca Mulatta	Cercopithecidae	Residential	10-12 lb

$E = \frac{1}{2} mv^2$

Something will Break

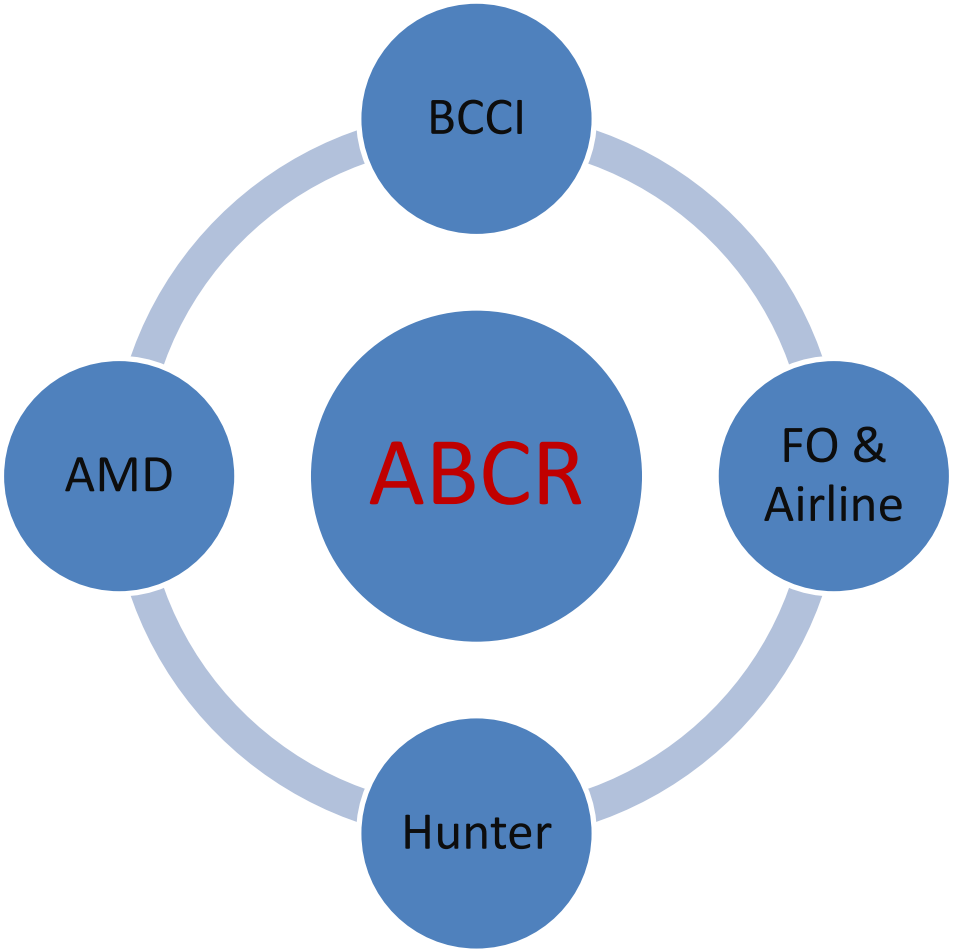
Data collection



$$E = \frac{1}{2} mv^2$$

Something will Break

c) An ongoing evaluation of the wildlife hazard by competent personnel.



$E = \frac{1}{2} mv^2$

Something will Break

9.4.2 Wildlife strike reports shall be collected and forwarded to ICAO for inclusion in the ICAO Bird Strike Information System (IBIS) database.

ICAO WILDLIFE STRIKE REPORTING FORM

BIRD STRIKE REPORTING FORM

Send to:

Operator . . . . . .
Aircraft Registration . . . . . .
Aircraft Make/Model . . . . . .
Engine Make/Model . . . . . .
Date *day* . . . . *month* . . . . . *year* . . . . . .
Local time . . . . . .
dawn GA day GB dusk GC night GD . . . . . .
Aerodrome Name . . . . . .
Runway Used . . . . . .
Location if En Route . . . . . .
Height AGL . . . . . *ft*
Speed (IAS) . . . . . *kt*

Phase of Flight

parked	GA	*en route*	GE
taxi	GB	*descent*	GF
take-off run	GC	*approach*	GG
climb	GD	*landing roll*	GH

Part(s) of Aircraft

	Struck	*Damaged*
radome	G	G
windshield	G	G
nose (excluding above)	G	G
engine no. 1	G	G
2	G	G
3	G	G
4	G	G
propeller	G	G
wing/rotor	G	G
fuselage	G	G
landing gear	G	G
tail	G	G
lights	G	G
antenna	G	G
pitot/static	G	G
tail rotor (helicopter)	G	G
other (specify)	G	G

Effect on Flight

none	G
aborted take-off	G
precautionary landing	G
forced landing	G
vision obscured	G
engines shut down	G
fire	G
other (specify)	G

Sky Condition

no cloud	GA
some cloud	GB
overcast	GC

Precipitation

fog	G
rain	G
snow	G

Bird Species* . . . . . .

Number of Birds

	Seen	*Struck*
1	GA	GA
2-10	GB	GB
11-100	GC	GC
more	GD	GD

Size of Bird

small	GS
medium	GM
large	GL

Pilot Warned of Birds
yes GY *no*

Remarks *(describe damage, injuries and other pertinent information)* 46/47

. . . . . .
. . . . . .
. . . . . .
. . . . . .

Reported by . . . . . .
**Send all bird remains including feather fragments to:*
(Optional)

THIS INFORMATION IS REQUIRED FOR AVIATION SAFETY

SUPPLEMENTARY BIRD STRIKE REPORTING FORM
OPERATOR COSTS AND ENGINE DAMAGE INFORMATION

A. BASIC DATA

Operator . . . . . .
Aircraft Registration . . . . . .
Aircraft Make/Model . . . . . .
Engine Make/Model . . . . . .

Date of strike *day* . . . . . *month* . . . . . *year* . . . . . .
Aerodrome/Location if known 11/12/14

B. COST INFORMATION

Aircraft time out of service . . . . . *hours*
Estimated cost of repairs or replacement *U.S.$ (in thousands)*. . . . . .
Estimated other costs
(e.g. loss of revenue, fuel, hotels) *U.S.$ (in thousands)*. . . . . .

C. SPECIAL INFORMATION ON ENGINE DAMAGE STRIKES

Engine position number	1	2	3	4
Reason for failure/shutdown				
uncontained failure	GA	GA	GA	GA
fire	GB	GB	GB	GB
shutdown — vibration	GC	GC	GC	GC
shutdown — temperature	GD	GD	GD	GD
shutdown — fire warning	GE	GE	GE	GE
shutdown — other (specify)	GY	GY	GY	GY
shutdown — unknown	GZ	GZ	GZ	GZ
Estimated percentage of thrust loss*	___	___	___	___
Estimated number of birds ingested	___	___	___	___

Bird species. . . . . .

* These may be difficult to determine but even estimates are useful.

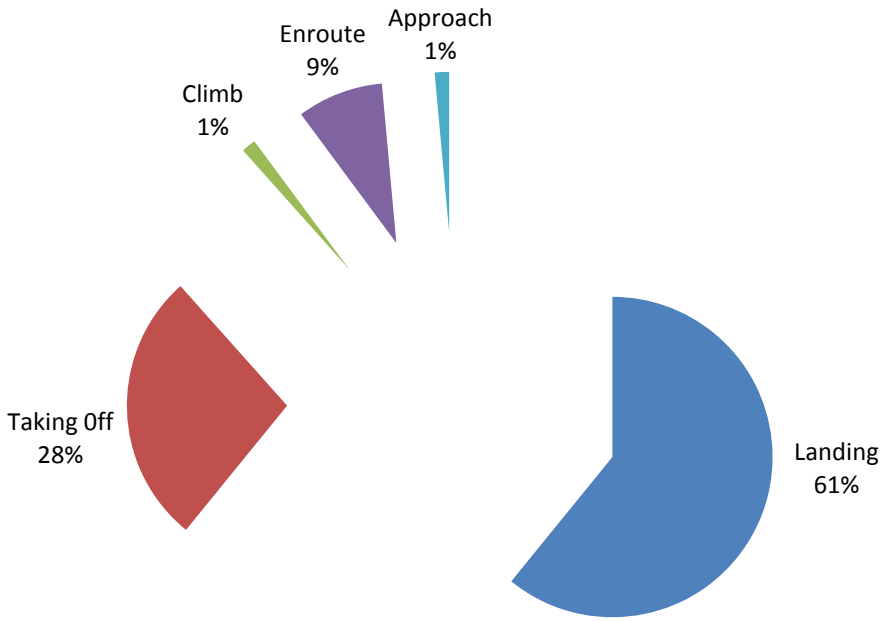
Send all bird remains including feather fragments to:

Reported by . . . . . .

ICAO WSHRS2017
ICAO / ACI Wildlife Strike Hazard Reduction Symposium
ICAO Headquarters, Montréal, 16–18 May 2017

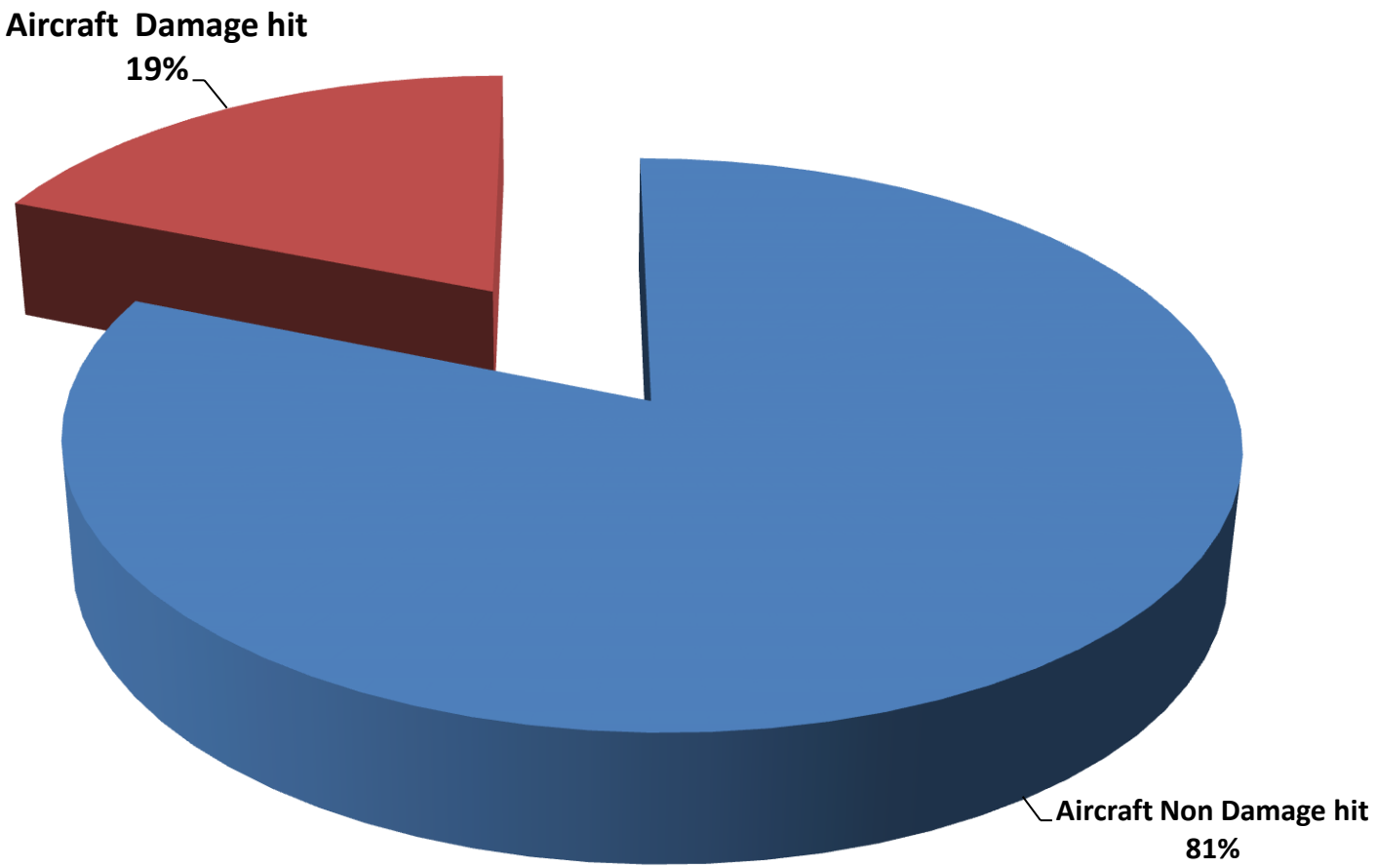
$E = \frac{1}{2} mv^2$
Something will Break

Bird Strike By Phase of Flight



$E = \frac{1}{2} mv^2$
Something will Break

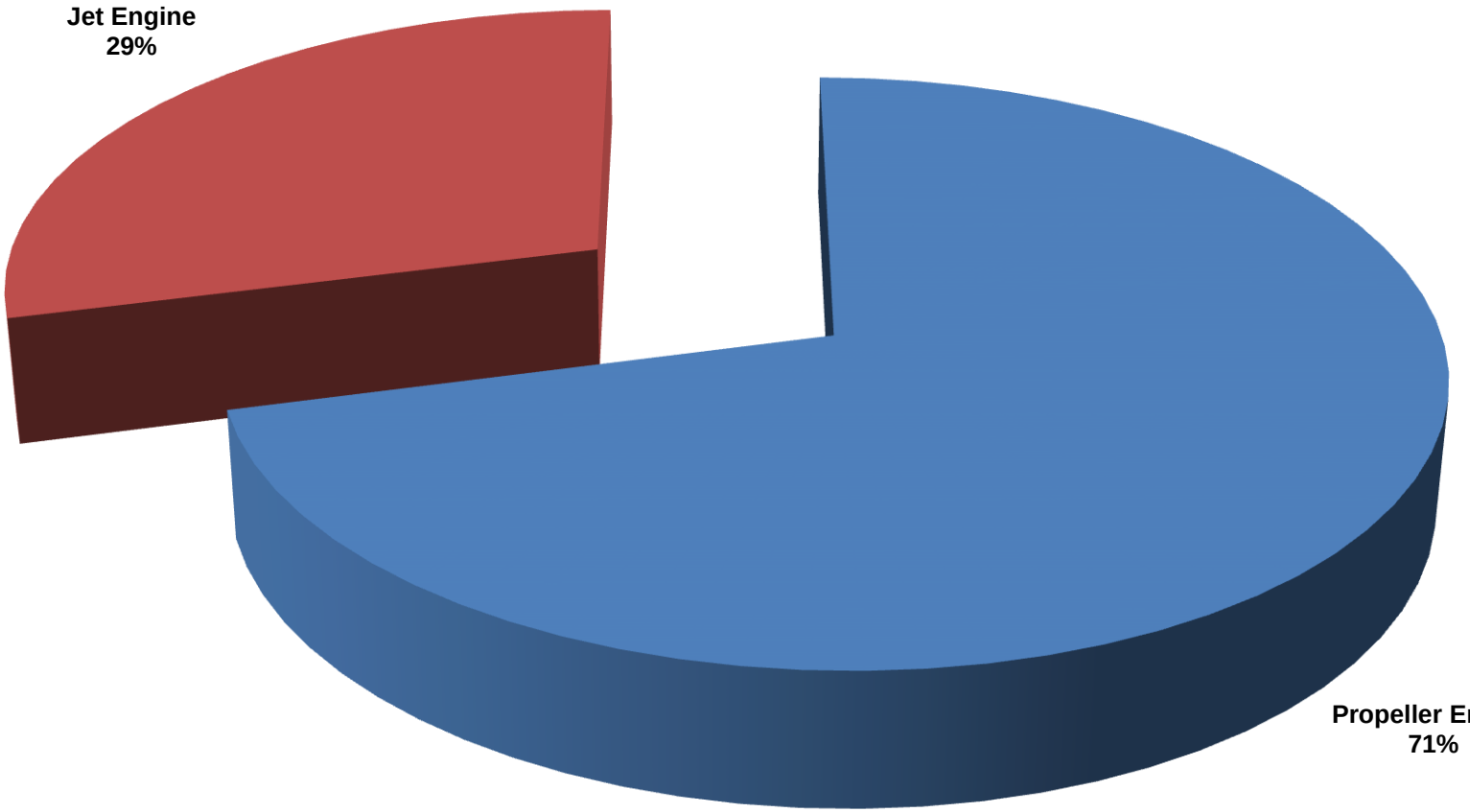
Damage



$E = \frac{1}{2} mv^2$

Something will Break

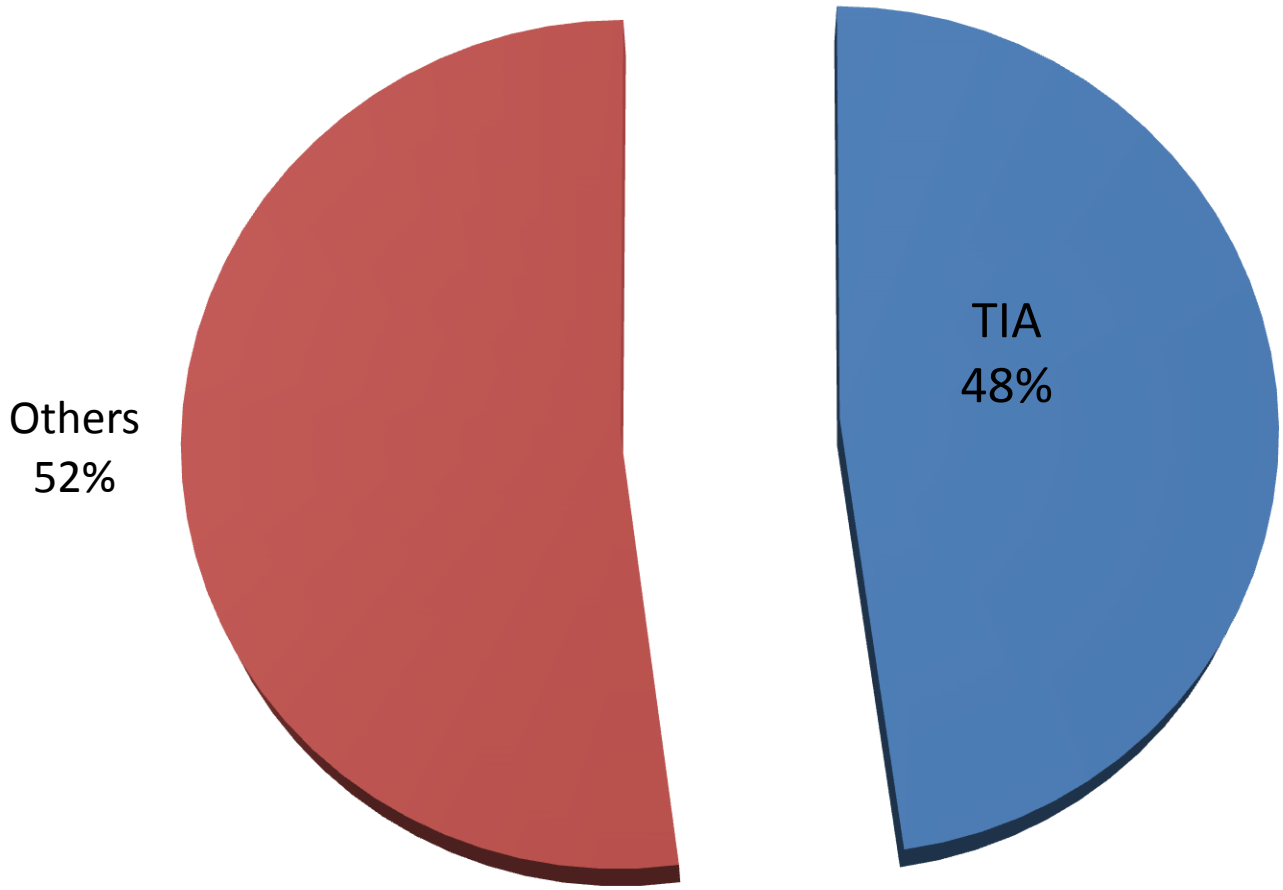
Propeller Engine V/S Jet Engine



$E = \frac{1}{2} mv^2$

Something will Break

Tribhuvan International Airport V/S Others



Strike Statistics

- ✓ 89% occurred on or near the aerodrome.
- ✓ 28% occurred during the take-off run or climb
- ✓ 61% occurred during the approach or landing roll
- ✓ 87% occurred during the day 13% occurred at night.

$$E = \frac{1}{2}mv^2$$

Something will Break

Major Losses Due to Bird Strikes

- ✓ 1996, Thai Airways (Thailand) Airbus A300 repair cost was US$ 850000.
- ✓ 2000, Nepal Airlines B757 lost one engine.
- ✓ 2012, Sita Air(Nepalese Domestic carrier) Dornier- 228 Aircraft crashed during take off at Kathmandu killing all 19 people on board was suffered bird strike.
- ✓ 2014, Jet Airway (India) B737 lost one engine.

9.4.3 wildlife Management Plan

1.Habitat Management

a. Unnecessary structure , trees, bushes and shrubs has been removed from Airport Area.
b. Metal net and metal spike used.
c. Landscaping
d. Modification of drainage system
a. Replacing grasses.
b. Public awareness.
TV, FM aid, public meeting and announcement.

2.Interventions

a. Devices

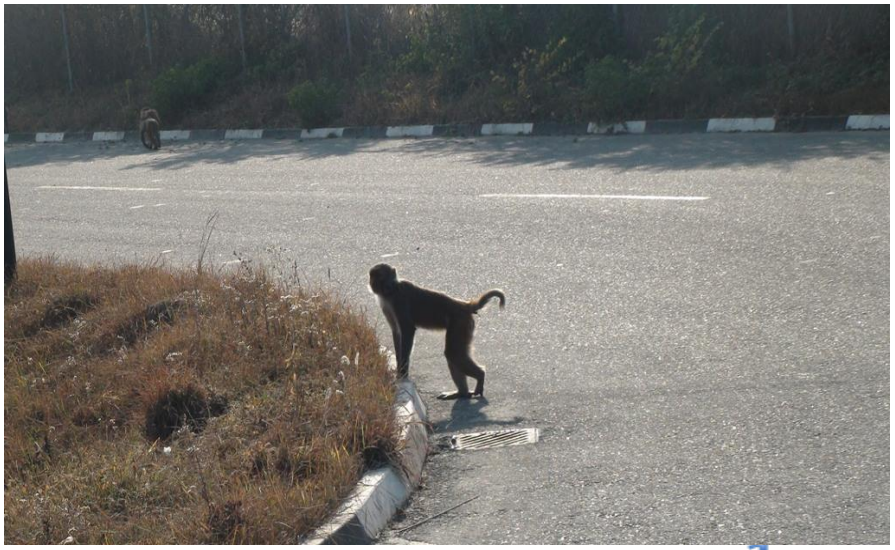
i. Airport Wailer –ultrasonic sound device
ii. LP Gas cannons
iii. Scare crow
iv. Bird guard: Distress Call.
v. Bird light: one-million candle power light flashes
vi. Quad Blaster -Ultra sonic bird repeller device
vii. Low Voltage electric fence.

b. Hunter

Hunters are using following techniques :

a. Producing loud voice
b. Showing primitive Guns
c. Dead bird tech
d. Misfiring
e. Slingshot
f. Fire cracker
g. Shooting (only in absolute danger condition)
h. Capturing animals
i. Laser light

Weapons



$E = \frac{1}{2} mv^2$

Something will Break

c.Chemicals

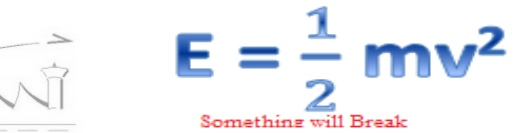
1. Benomyle (Methyl 1-Butylcarbamoy-2 Benzimidazolecarbamate)
2. Nimol (Neem, *Azadirachta indica) extract.*
3. Red pepper (oleoresin capsicum)
4. Strychnine sulphate ($C_{42}H_{46}N_4O_8S$)
5. Bleaching Powder (CaOCl2)
6. Dart Tranquilizer

$$E = \frac{1}{2}mv^2$$

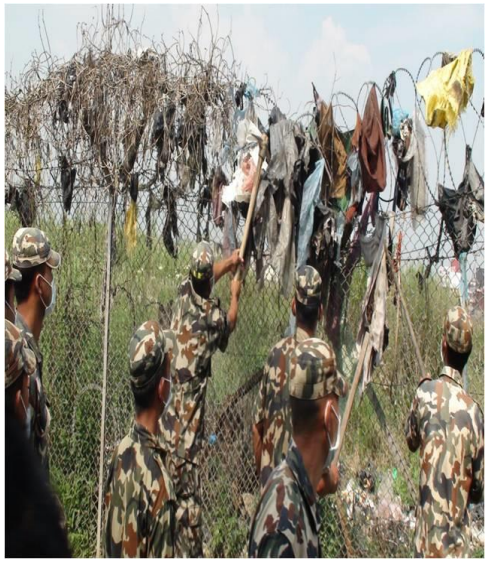
Something will Break

d. Rodent Check

e. Earthworm and other insect Control



f. Cleaning

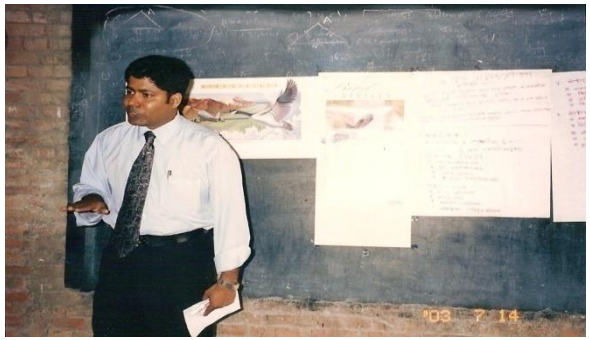


g. Issuance of NOTAM

Issuance of NOTAM (Notice to Airmen) about wildlife activities and closure of airport.

h. Awareness and sharing lesson-learned

- ✓Conducting Public awareness program,
- ✓Fixing of Hording board,
- ✓Essay competition among the Secondary level students,
- ✓ Media TV,FM radio and broadsheet,
- ✓ Lecture and direct interaction with stake holder with help of local NGO on the spot.

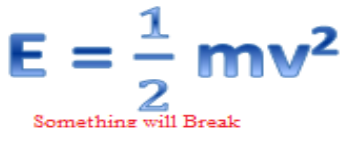


$E = \frac{1}{2} mv^2$

Something will Break

➢Information paper presented in Regional Seminar on Wildlife Hazard Management held at Bangkok, 9-12 January 2006, and 1-3 Dec 2010 Penang, Malaysia Jointly Conducted by the ICAO Asia Pacific Regional Office, COSCAP-SA and DCA Malaysia.

➢Research paper presented in 5th National science and Technology Conference held at Kathmandu in November 2008 conducted by National academy for science and technology.



- ✓Airport Wildlife Hazard Management held at Kathmandu, 16-17 August 2013, organized by Civil Aviation Authority of Nepal.
- ✓ India, Bangladesh , and lots NGO/INGO, Embassies and stake holders were participated

9.4.4 Garbage disposal dumps and wildlife Attractant

- ✓ Land field site is more than 20 km away from Tribhuvan International Airport, although its not a sanitary land field.

- ✓ Upcoming international airport in Pokhara has Sanitary land field but its location is within the 5 km vicinity, assessment has completed and recommendations are already made to municipality.

- ✓ Provision has made in regulation to not establish any dumping site or land field site in the vicinity of Airport.

9.4.5 Land-use guidelines for Wildlife

Yet to be developed

Challenges

- ✓ Habitat Management
- ✓ Adaptation of Auditory, Visual and electronic devices,
- ✓ Bird scaring Techniques,
- ✓ Implementation of Rules and regulations,
- ✓ Waste management
- ✓ Study and Research
- ✓ New technology
- ✓ International co-operation

$$E = \frac{1}{2}mv^2$$

Something will Break

Challenges cont...

- ✓ International Treaties and Conventions

  (Convention on Migratory Species of Wild Animals)
- ✓ Public sentiments
- ✓ Religious belief
- ✓ Animal Right Activists
- ✓ Knowledge and trained manpower.

$$E = \frac{1}{2}mv^2$$

Something will Break

Wildlife strike: An increasing problem for aviation

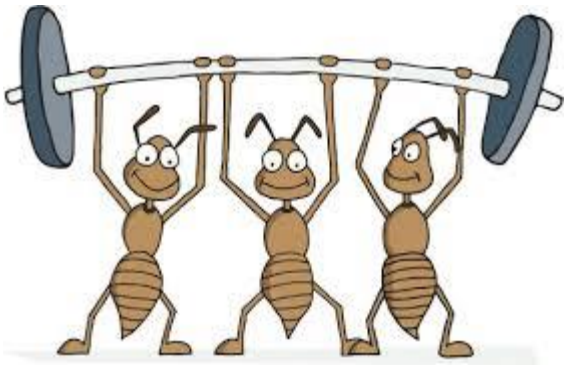
- ✓ Increasing wildlife populations
- ✓ Adaptation to urban environments
- ✓ Increasing number of aircraft and quieter engines
- ✓ Increasing number of aircraft movements.
- ✓ Liability issues with wildlife strikes

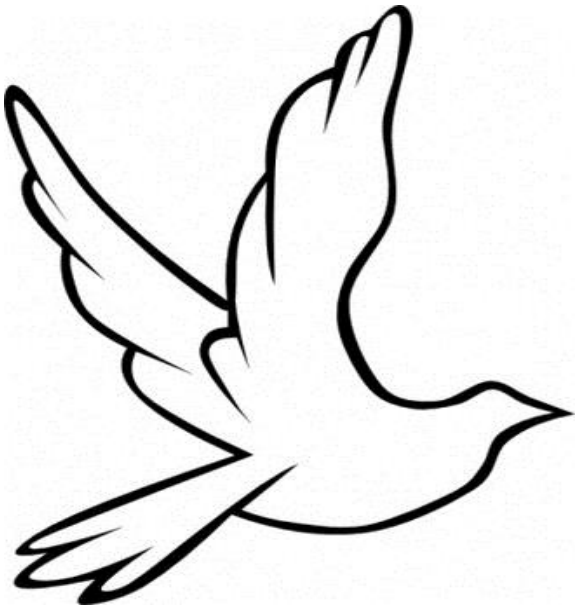
$E = \frac{1}{2} mv^2$

Something will Break

Conclusion

Wildlife strike problem cannot be managed by a single organization. Good co-operation and effective coordination is required from all concerned. By any means it cannot be wiped out but it can be minimized if better measures can be taken.





Thank you for your patience

$E = \frac{1}{2} mv^2$

Something will Break