Introduction

- Birds and aircraft are increasingly competing for space in crowded skies
- Not only bird but other mammals on ground
Wildlife strike annually cost the civil aviation in the (USA) at least $500 million in direct damage and associated costs and over 500,000 hours of aircraft downtime and cost in human lives.
74% of wildlife strike occur at or below 500 feet above ground level (AGL).

18 of 19 civil and military large transport aircraft destroyed because of bird strike between 1960 – 2004 resulted from bird strikes that occur on the airport.
before a problem can be solved the problem must be first understood.
the first step on this is the collection and analysis of data from actual wildlife strike events

Reporting type:

a. Official

B. Voluntary

Report form

A . design your won form

b. use ICAO , ACI, standard form
What wildlife strike database contain?

- Number of reported bird and mammal strike /month (frequency).
- Reported time of occurrence (dawn–day–dusk–night)
- Type of wildlife involved (homeless dogs, cats, black kite..)
- Characteristic of strikes:
  % of bird strike with reference to phase of flight,[barked, taxi, take off run, climb, en-route, decent, approach, landing, roll]

- Which device should be used?
Experience at Sudan Airports

- Bird strike report 2017 (Khartoum airport)
- Bird strike report 2018 (Khartoum airport)
- Copy report form used
### Bird strike report 2017

<table>
<thead>
<tr>
<th>Date</th>
<th>Air ways</th>
<th>Reg.</th>
<th>Type of craft</th>
<th>Damage</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>23/08/2017</td>
<td>FLY NAS</td>
<td>A6-FDX</td>
<td>B737-800</td>
<td>No damage</td>
<td>During take-off ATC officer notice bird hit an air plane</td>
</tr>
<tr>
<td>07/09/2017</td>
<td>FLY NAS</td>
<td>YX-592</td>
<td>A33</td>
<td>No damage</td>
<td>During take-off ATC officer notice bird hit an air plane</td>
</tr>
<tr>
<td>15/09/2017</td>
<td>SUDAN AIR</td>
<td>ST-MKW</td>
<td>AB-320-214</td>
<td>Navigation light glazing panel and strobe light damage</td>
<td>At approach toward KTM airport, R/W 18 the pilot notice a flocks of Birds AROUND THE A/C</td>
</tr>
<tr>
<td>24/09/2017</td>
<td>BADR</td>
<td>C5-BDB</td>
<td>B737-500</td>
<td>Damage on Radome</td>
<td>During hold over lagra, A/C had bird strike at 4000 ft</td>
</tr>
<tr>
<td>29/09/2017</td>
<td>ETIHAD</td>
<td>A6-DCC</td>
<td>A33</td>
<td>Damage on LP compressor blade</td>
<td>During walk around found bird strike left out bones engine No (1) N(3) cowl</td>
</tr>
<tr>
<td>05/10/2017</td>
<td>SAUDIA</td>
<td>HZ-A020</td>
<td>A333</td>
<td>Traces of blood on right wing side slate No (2)</td>
<td>During A/C landing at R/W 18 got bird strike on right wing side</td>
</tr>
</tbody>
</table>
## Bird strike Reports 2018

<table>
<thead>
<tr>
<th>Date</th>
<th>Air ways</th>
<th>Reg</th>
<th>Type of aircraft</th>
<th>Damage</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>26/1/2018</td>
<td>Emirates Air ways</td>
<td>EPI</td>
<td>B777</td>
<td>No damage</td>
<td>Bird impacted the nose of airplane as we rotated during takeoff phase</td>
</tr>
<tr>
<td>13/02/2018</td>
<td>Jordan aviation</td>
<td>JY-JAL</td>
<td>B767</td>
<td>On engine No (2) Fan blades</td>
<td>During back tracking RWY 36 the pilot notice presence of bird between Twy C and D</td>
</tr>
<tr>
<td>22/4/2018</td>
<td>Blue bird</td>
<td>ST-ARH</td>
<td>F50</td>
<td>On top part of LHS windscreen</td>
<td>During rotation bird hit on part of LHS windscreen</td>
</tr>
<tr>
<td>16/5/2018</td>
<td>SAUDI ARABIA</td>
<td>HZAQ</td>
<td>A330</td>
<td>No damage</td>
<td>During landing at RWY 18 bird hit NOSE DOM</td>
</tr>
<tr>
<td>22/03/2016</td>
<td>Jordan aviation</td>
<td></td>
<td>B762</td>
<td>No damage</td>
<td>during take off ATC officer notice bird hit an airplane</td>
</tr>
</tbody>
</table>
One bird strike at Nyala Airport
Wildlife management is complex mixture of (science, experience and art).

Agencies: {mission, role, responsibility} federal agencies (ministry of transportation – CAA – office of airport safety and standards – environmental protection agencies)

state agencies: (state wildlife management agencies [mission, role, responsibility]).

Airports: (airport operator, air traffic control, pilots)

Bird strike committee
– role and responsibility:
  1– facilitate the exchange of information.
  2– promote the collection and analysis of accurate wildlife strike data.
  3– promote the development of new technologies for reducing wildlife hazard.
Experience at Sudan Airport

- Federal agencies:
- CAA – DASS:
- Airport:
- Bird strike committee:
REGULATION AND POLICIES

(SCAA)
Recognizing hazards wildlife attractants on or near airport:

- land use practices and habitat are the key factors determining the wildlife species and the size of wildlife population that are attracted to airport environments.
  
  - Recognition and control of these land uses practices and habitat on or near airport that attract hazardous wildlife are fundamental to affective wildlife hazards management plans.
Separation criteria for hazardous wildlife attractant on or near airport

- It is used for land use practices that attract hazardous wildlife to vicinity of the airport

Separation distance based on

1. Flight pattern (airport served – piston powered or turbine powered aircraft – protection of approach or departure airspace
2. The altitude at which most strike happen.

- Under 1000 feet 81%
- Under 3000 feet 92%
Experience at Sudan Airports:

Agreement between Khartoum Airport and Green Yard manager (collecting waste before sun rise, reduce the time of irrigation, cut the grass)
AIRPORT WILDLIFE HAZARD MANAGEMENT PROGRAM

AIRPORT WILDLIFE HAZARD MANAGEMENT PLAN

- It contains steps
  - wildlife hazard assessment (is the first step).
  - it is conducted by a wildlife damage management biologist.
  - HE/SHE provides the scientific basis for the development, implementation and refinement of wildlife hazard management plan.
  - it is a separate document (or may be part of W.H.M plan).
REQUIREMENT FOR WILDLIFE HAZARD ASSESSMENT

- For certified airport it conducted when any of the following event occur on or near the airport:
  1- An air carrier aircraft experiences wildlife strikes.
  2- An air carrier aircraft experiences substantial damage from striking wildlife.
  3- An air carrier aircraft experiences an engine ingestion of wildlife.
  4- A wildlife of a size or in number capable of causing an event described in 1–3 above.
1. The identification of the wildlife species observed.
2. Their numbers.
3. Location.
4. Local movement.
5. Daily and seasonal occurrence.

In general, a 12-month assessment in the airport and surrounding areas.
Experience at Sudan airports
Perform W.H.A (2007)(Khartoum Airport)
Need to updated
when complete W.H.A it send to authorized agents (CAA).

 Necessary elements of wildlife hazard management plan.

  - The goal of an airports wildlife hazard management plan is to minimize the risk to aviation safety, airport structure or equipment or human health posed by population of hazardous wildlife on or around the airport.
Land -use practices that attract wildlife to the airport

1–waste disposal operations
   Municipal solid waste landfills should be outside operation area.

2–trash transfer station.

3–water management facilities (drink water, storm water facilities).

4–existing storm water management facilities (quick removal of surface water so as to reduce standing water).

5–livestock production
   Synergistic effects of surrounding land uses (hay field–lake).
Glyphosate Used to treat grass at Damazine Airport
WILDLIFE CONTROL TECHNIQUES

✓ Firearms
  a) need well-trained personnel.
  b) need authorization.
  c) use alone or to reinforce repellent techniques.

✓ Pyrotechnics
  a) Need training.
  b) use correct pyrotechnics for each situation and wildlife species and to minimize habituation.
Record keeping and strike reporting:

W.H.M.P have developed a system to:

1) Document the daily activities of W.C.P
2) Long information about wildlife number and behaviour on the airport.
3) Record all wildlife strikes with aircraft
This information is essential to document the effort being made by the airport in reducing wildlife hazard.

It is extremely useful during evaluation of wildlife hazard management plan.
Experience at Sudan Airports

Wildlife Hazard Management Plan (part of airport certification manual) (Khartoum, Portsudan, Obied) Airports
The first step in solving any wildlife damage problem is to answer the following 9 questions for each species:

1) What are the wildlife doing that make the control at their number or damage necessary? (The type of the activity that need to be control wildlife determine:
   A. severity of the problem.
   B. The type of control method used.
2) Which species of wildlife that causing the problem? (different species required different management techniques.)

3) Why are the wildlife in the airport?
   - are they attracted to the airport for:
     a) Food.
     b) Water.
     c) Shelter.
     d) Flying over the airport from night time roosting sites to day-time feeding site.

(Answer determine the most appropriate control method to use.)
4) What are the daily and seasonal movement patterns' of the wildlife among feeding, roosting, nesting areas (time, seasons, location, critical to aviation safety).

5) What are the legal status of the problem species? (species have no equal legal protection).
6) What effective and legal management method are available?

7) How selective are the control method? (control target wildlife).

8) How much will it cost to apply the selected control methods?

9) What are public attitudes to word the problem (hazard) that wildlife species (poss.) (influence the tap of management used).
Wildlife control strategies

1) Aircraft flight schedule modification.
2) Habitat modification of exclusion.
3) Repellent and harassment techniques.
4) Wildlife removal.
Aircraft flight schedule modification:

(not to depart during 20 minute period at sun rise or sun set)

Habitat modification:

means changing the environment (at airport and surrounding area) to make it less attractive or inaccessible to the problem wildlife (reduce, food, cover and water)
Food: for airport landscaping avoid plants that produce fruits and seeds desired by birds.

Cover: avoid dense vegetation..

Water: water act as magnet for birds – eliminate all standing water at airport to the greatest extent possible.
Experience at Sudan Airports
Habitat modification
Repellent techniques

Are designed to make the area or the resources desired by wildlife unattractive or make the wildlife uncomfortable or fearful

Repellents work by affecting the animal sense by chemical, auditory or visual means

Habituation or acclimation of bird and mammals to most repellent devices or techniques is the major problem.
Critical factors to be recognised in deploying repellents are:

- There are no "silver bullets" that will solve all problems.
- Likewise, there is no standard protocol or set of procedures that is best for all situations.
- Repelling is an art as much as science.
- The most important factor is having motivated, trained, appropriately equipped personnel who understand the wildlife situation in their airport.
Each wildlife species is unique and will often respond differently to various repellent techniques even in a group of closely related species.

Habituation to repellent techniques can be minimized by:

- Using each technique sparing and appropriately when the target wildlife is present
Using a verity of repellent techniques is an integrated fashion

Reinforcing repellents with occasional lethal control (with necessary permits in place) directed at abundant problem species
Thank You