



SOCIAL RESPONSIBILITY IN WILD LIFE HAZARD MANAGEMENT

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LOCATION

India - Delhi - Mumbai - Kerala - Kochi

- Southern most state of India
- 700 KM coastline
- On the western side of India
- Just 1.2% of India's land mass and 2.8% of India's population BUT Kerala caters to **16%** of India's International passenger traffic
- Kerala - The HR Capital



Kerala - God's own Country

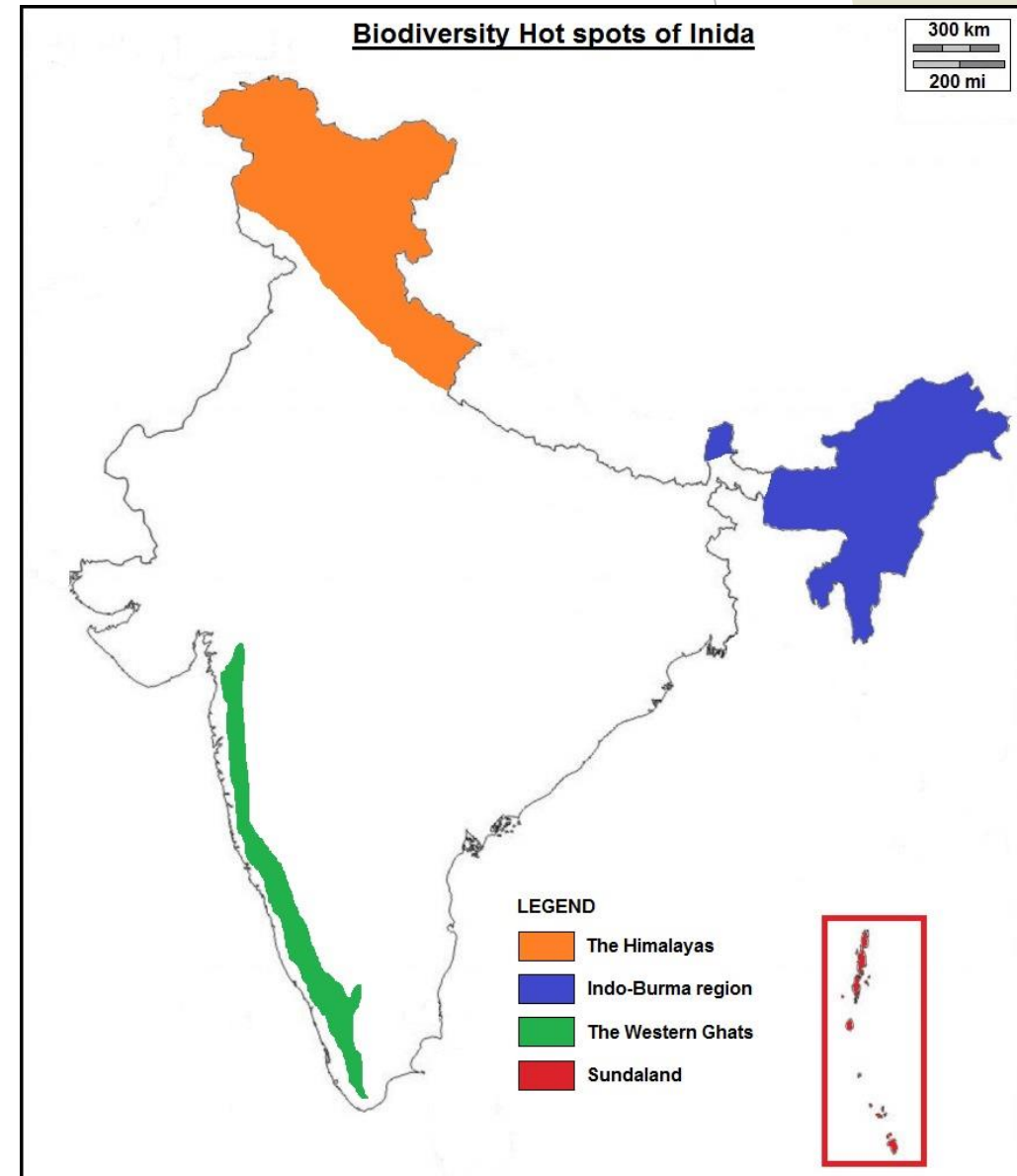
As per National Geographic Traveller

- Among 10 paradises in the world
- Among 50 Must See Destinations of a life Time
- Hills, valleys, rivers, lakes, beaches, rich flora & fauna
- Western Ghats - cradle of Bio Diversity
- Pristine Ayurveda



Biodiversity of India and Kerala

- Four biodiversity hot spots in India
- 1,366 bird species in India (12% of the total avi-fauna of the world); 81 are endemic to the country
- Kerala has more than 4,500 species of flowering plants of which above 1,500 taxa are endemic
- Kerala has three Ramsar sites in the state are **Vembanad, Ashtamudi & Sasthamkotta Lakes**
- State has 508 bird species





- **INDIA'S 1ST AIRPORT OUTSIDE AAI**
- **INDIA'S 1ST PUBLIC PRIVATE PARTNERSHIP MODEL AIRPORT**
- **A PATH BREAKER IN INDIA AVIATION**
- **ROLE MODEL IN AIRPORT MODERNIZATION & PRIVATIZATION**



WELCOME TO
COCHIN INTERNATIONAL AIRPORT
COCHIN - QUEEN OF THE ARABIAN SEA
KERALA - GOD'S OWN COUNTRY

10.1518° N, 76.3930° E , 28 feet

**COCHIN INTERNATIONAL AIRPORT –
GATEWAY TO GOD'S OWN COUNTRY**

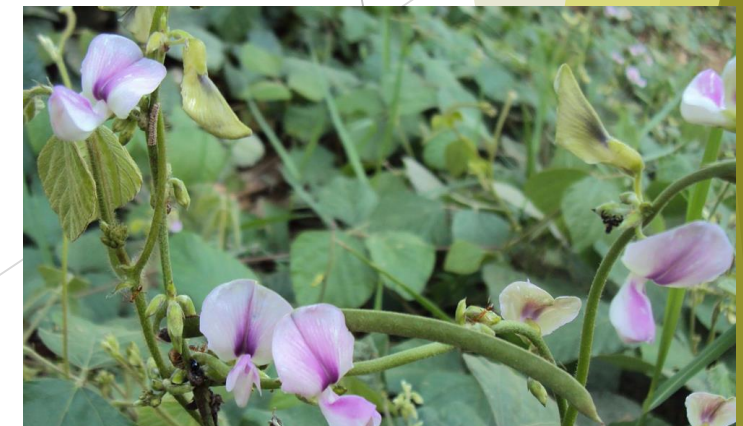
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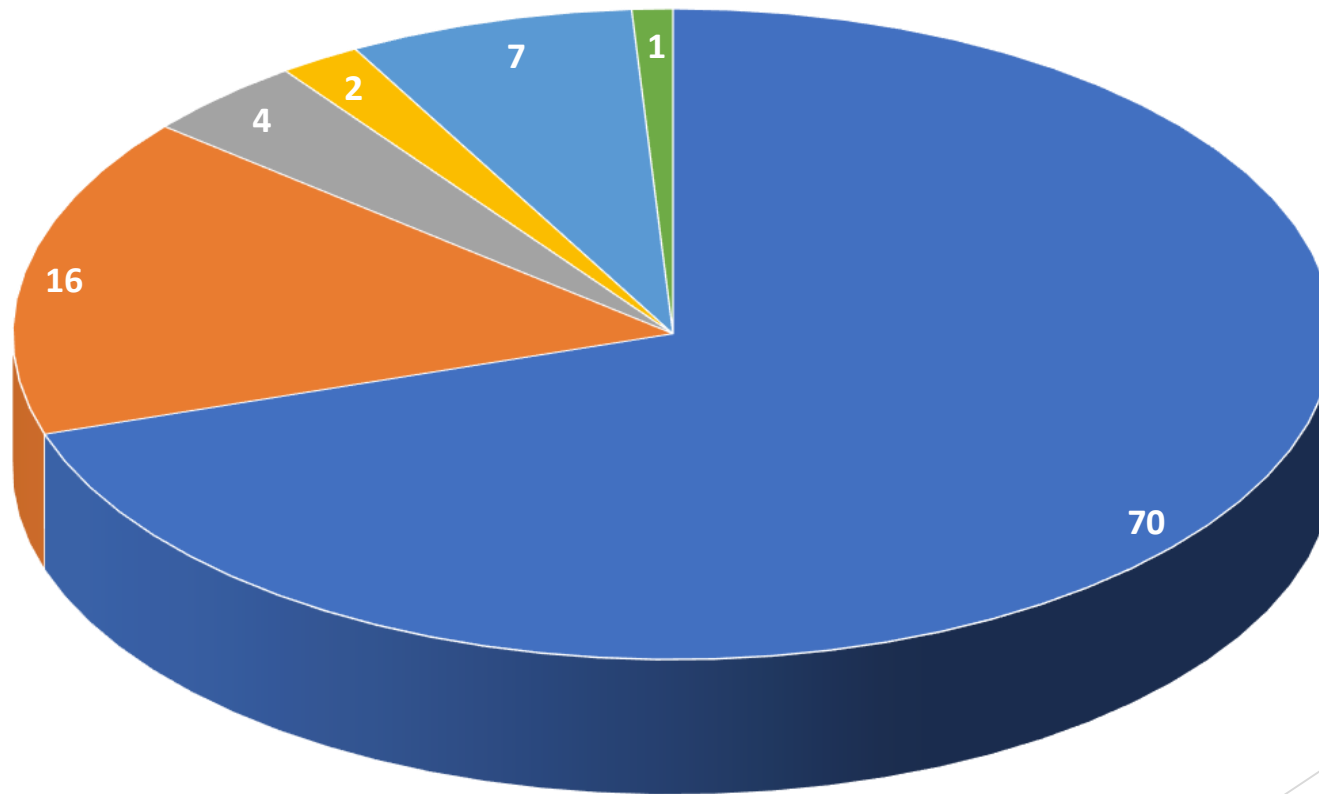


1A. FLORA AT COCHIN INTERNATIONAL AIRPORT

S. No.	Common name	Scientific name	Status
1	Crab or finger grass	<i>Digitaria sp</i>	Dominant
2.	Fountain grass	<i>Pennisetum sp.</i>	Dominant
3.	Tropical kudzu	<i>Pueraria phaseoloides</i>	Moderately dominant
4.	Asthma plant	<i>Euphorbia hirta</i>	Less dominant
5.	Morning glory	<i>Ipomea sp.</i>	Less dominant
6	Calico plant	<i>Alternanthera bettzickiana</i>	Less dominant
7.	Pygmy ground cherry	<i>Physalis minima</i>	Less dominant
8.	Wild-sage	<i>Lantana camara</i>	Less dominant
9.	Black creeper	<i>Ichinocarpus frutescens</i>	Less dominant
10	Quick stick	<i>Gyricidium sepium</i>	Less dominant
11.	True indigo	<i>Indigofera tinctoria</i>	Less dominant
12.	Goat weed	<i>Scoparia dulcis</i>	Less dominant
13	Mile-a-minute vine	<i>Mikarnia micrantha</i>	Moderately dominant



Floral composition of CIAL

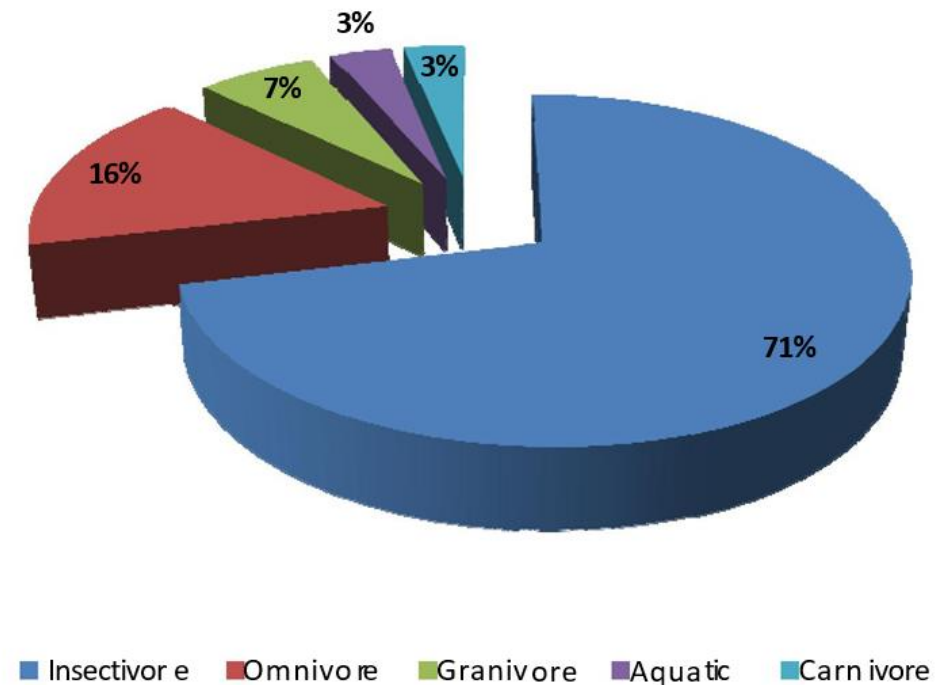


■ Grass ■ Herbaceous ■ Creeper ■ Sedges ■ Bush ■ Woody



1B. BIRD FAUNA AT COCHIN INTERNATIONAL AIRPORT

- ▶ Airport habitat used by 71 % of insectivorous birds followed by omnivorous, granivorous, piscivorous and carnivorous birds
- ▶ Species richness
 - Feb. - 42 species
 - Jul. - 24 species
 - Oct. - 21 species
- ▶ Dominant species- Common myna (RA 13.27%) followed by house crow (RA 9.91%), black drongo (RA 9.73%), red-rumped swallow (RA 9.38%), red wattled lapwing (RA 5.13%)



1c. INSECT AND OTHER WILDLIFE AT COCHIN INTERNATIONAL AIRPORT

► Insects and arthropods

- **Grass hopper and crickets**
- Ants and termites
- Beetles
- Dragonfly and Damselfly
- Mosquito
- Butterfly and moths (**larva**)
- Dipteran flies
- Honey bees and pollen bees
- Cockroach
- Plant bugs
- Centipedes and millipeds
- Arachnids
- **Crab**

► Animals

- Mongoose
- Rabbit
- Jackal
- Monkey
- Jungle cat
- Asian palm civet (മരച്ചുട്ടി)
- Indian giant squirrel
- Fruit bat
- Lesser bandicoot rat
- Field mouse
- House mouse
- Larger bandicoot rat

► Reptiles, worms and molluscs

- Russell's viper
- Cobra
- Common krait
- Kukri snake
- Checkered keelback
- Indian rock python
- Garden lizard
- Skink
- House lizard
- **Earth worm**



2.IMPORTANCE OF FLORA & FAUNA TO THE HUMAN AND ECO - SYSTEM

- ▶ Render numerous ecosystem services
- ▶ Grasses like crab grass and fountain grass - used as cattle feed, ground cover and in few cases as grain crop
- ▶ Many flora recorded in the airport vicinity - used in traditional medicine
- ▶ Earth worm - enriching the soil and improves soil fertility
- ▶ Soil arthropods and rodents - aerate the soil and improves the soil physical conditions
- ▶ Bird fauna - are insectivorous and rodentivorous - helps in bio control of vermin
- ▶ Cats and mongoose - natural predators on rodent vermin
- ▶ Insects - herbivores, feed on unwanted plants; excellent pollinators; insects are being consumed by humans



THE FIRST EVER REPORTED BIRD HIT



Depiction of Bird hit on Aircraft in the Epic Ramayana (5300 BCE)-



Jatayu Nature Park -world's largest bird sculpture, which is of Jatayu. measures (200 feet (61 m) long, 150 feet (46 m) wide, 70 feet (21 m) in height and occupies 15,000 square feet (1,400 m²) of floor area).



3.WILD LIFE HAZARD PREVENTION - PROACTIVE AND REACTIVE MEASURES

- ▶ **Pyrotechnics (combining sounds and visual effects)**
- ▶ **Propane Cannons**
- ▶ **Visual Effects**
- ▶ **Standing Lasers**
- ▶ **Bio-acoustic distress calls**
- ▶ **Ultrasonic bird deterrents**
- ▶ **Natural Predators (i.e. Falconry), Border Collies - Trained Dogs**
- ▶ **Bird Chasers**
- ▶ **Controlled height of the grass at the airfield**
- ▶ **Selective Culling**
- ▶ **Food Chain Breaking**
- ▶ **Insecticide Application**
- ▶ **Weedicide Application**
- ▶ **Trapping and Rehabilitation**
- ▶ **Diverting the Migratory Route**



4.PROACTIVE & REACTIVE MEASURES: IMPACT ON ENVIRONMENT

- ▶ **Noise Pollution**
- ▶ **Air Pollution**
- ▶ **Water and Soil Pollution**
- ▶ **Affecting the Propagation of Plants**
- ▶ **Endangering of Protected Species**
- ▶ **Cruelty Towards Animals**
- ▶ **Human Injuries**
- ▶ **Adaptability**
- ▶ **Grass Fires**
- ▶ **Costs involved**
- ▶ **Benefits Earned : Safety & Operational Efficiency**
- ▶ **Others**



4.A. Impacts on Environment - Pyro Technics

▶ Benefits

- ▶ The shock of pyrotechnics can cause wildlife to flee.
- ▶ Effective Method (if used judicially)
- ▶ Flexible- Manually or Through Devices

▶ Drawbacks

- ▶ Toxic release, (sulphur dioxide [SO₂], nitrogen oxides [NO_x], Carbon dioxide [CO₂], carbon monoxide [CO])
- ▶ Fire.
- ▶ Explosion injury.
- ▶ Noise pollution (125 Db) (Above 85 Db is harmful).
- ▶ The oxidisers - perchlorates can dissolve in water, contaminating rivers, lakes and drinking water.
- ▶ A fine cloud of smoke and particulate matter, affecting local air quality.

▶ Our Commitment

- ▶ Safety Gears , Earplugs and Gloves are provided to the staff and is ensured real time.
- ▶ Limiting- the usage
- ▶ Alternatives- Smokeless hand-held sound blasters using water and carbide



4.B.Impacts on Environment - Propane Canon / Gas canon

▶ Benefits

- ▶ LPG/Propane scare cannons are one of the most common types of bird scaring devices.
- ▶ If thoughtfully used- very effective and convenient.

▶ Drawbacks

- ▶ In excess of 150 dB causing a flight reaction in birds.
- ▶ One Molecule of C_3H_8 combustion (+O₂) - produces 3 molecules of CO₂ - and water

▶ Our Commitment

- ▶ Restricting canon usage to only hours when birds are active and during day time
- ▶ Alternate Methods



4.C.Impacts on Environment - Laser Beams

▶ Benefits

- ▶ Effective particularly during Poor Visibility Conditions.
- ▶ Lasers can be used for the control of most species of birds.

▶ Drawbacks

- ▶ Some species will habituate to the product quickly
- ▶ The highly-concentrated light from lasers— can be dangerous
- ▶ Confuse the pilots-
- ▶ Latest Regulations- Annex 14 - Laser Beam Free Flight Zone/ Laser-beam critical flight zone (LCFZ)/ Laser Beam Sensitive Fight Zone.

▶ Our Commitment

- ▶ Almost nil usage and justified usage - (aircraft non- operating hours)
- ▶ Less intensity beams
- ▶ Promote - usage of - Flash Lights (Controlled usage) , Scare Crow , Reflectors, Mimicking predator species, Mock predator eyes, Decoys.



4.D.Impacts on Environment -Selective Culling

▶ Benefits

- ▶ Very Effective
- ▶ Immediate result

▶ Drawbacks

- ▶ Not permitted under law
- ▶ Cruelty towards animals.

▶ Our Commitments

- ▶ Trapping and Relocation
- ▶ Exclusion Techniques
- ▶ Manipulating the habitat unattractive for the birds and animals
- ▶ Floaters on water bodies inside the airport deter the water and shore birds.
- ▶ Trimming roosting branches of birds.
- ▶ Scientific disposal of airport bio-wastes.
- ▶ Use of metalized reflective ribbon to scare-off birds.



4.E. Impacts on Environment - Insecticide Application

▶ Benefits

- ▶ Very Effective
- ▶ Immediate result

▶ Drawbacks

- ▶ Organophosphorus, synthetic pyrethroids - pollution in the environment.
- ▶ Soil adhesion of chemicals and disruption in the food chain
- ▶ Contaminating downstream water bodies.

▶ Commitments

- ▶ Monitoring insect population by light traps, pheromone traps, sweep net and vehicle mounted aspirator. Rodent population can be monitored through bait traps, live burrow counts.
- ▶ Remedial measures - use of insect growth regulators (IGR compounds like buperofezin) and botanical pesticides like neem. Green chemicals like ryanodine receptor inhibitors for the management of lepidopteran insect pest.
- ▶ Resorting to less attractive cover crops.
- ▶ Resorting to Soil Stabilization Using Lime / Sulphate.
- ▶ Use of Natural Predators - Humans /Border Collies/ Falconry.



4.F.Impacts on Environment - Weedicide Application

▶ Benefits

- ▶ Very Effective
- ▶ Immediate result

▶ Drawbacks

- ▶ Glyphosate is the common weedicide applied to minimize vegetative growth in vast stretches of airfield leads to pollution in the environment
- ▶ Not effective during rainy period
- ▶ Air pollution
- ▶ Ground water contamination
- ▶ Adverse effect on pollinators, food resource denial to grassland dependent insectivorous birds.

▶ Our Commitments

- ▶ Resorting to Cover Crops
- ▶ Resorting to Soil Stabilsation
- ▶ Use of Natural Predators - Humans /Border Collies/ Falconry

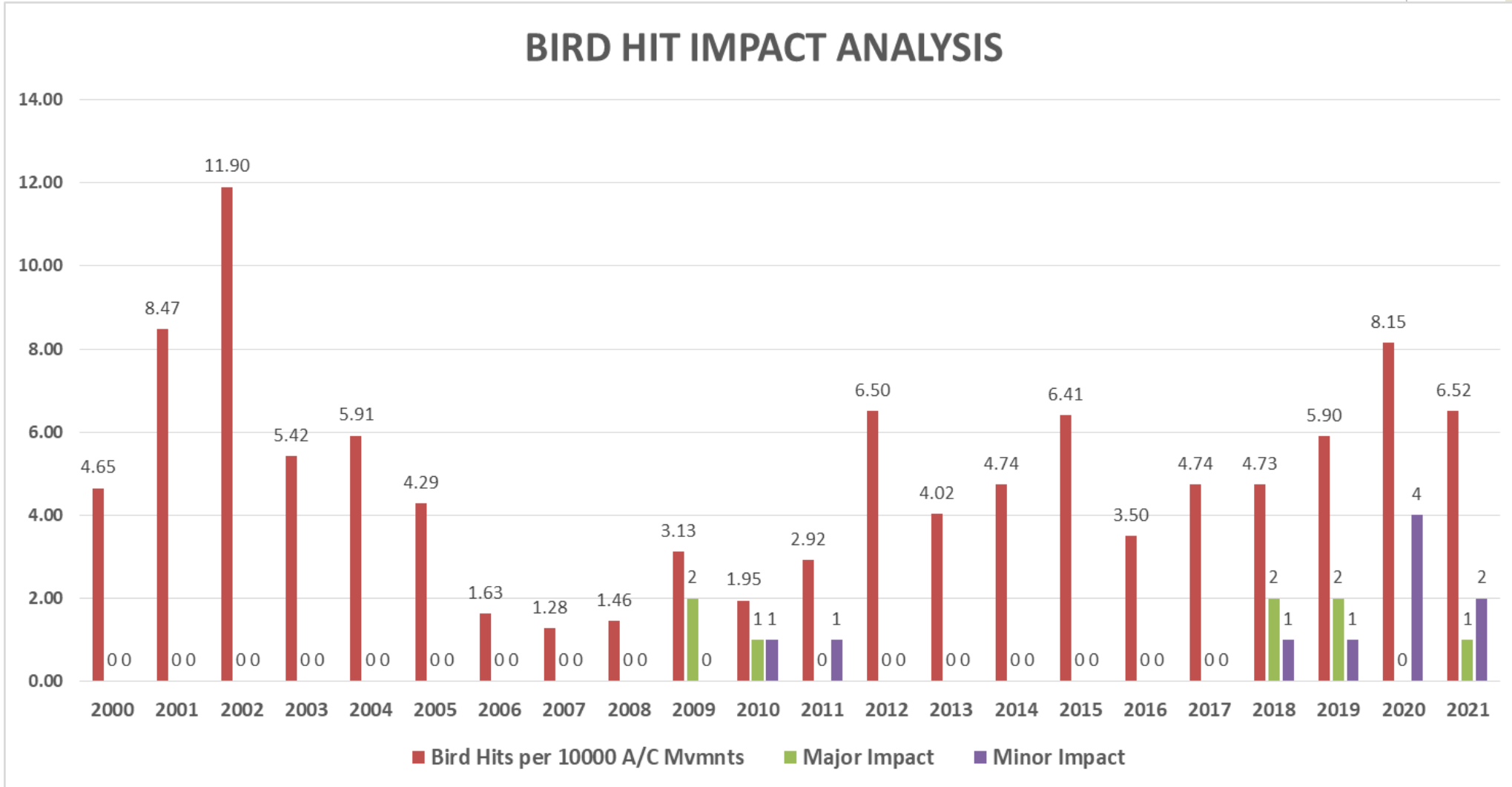


5.SINGLE BENCHMARKING OF ENVIRONMENT IMPACT MEASUREMENT

SI No	Type of Mechanism	Rating
1	Insecticide Application	8
2	Weedicide Application	8
3	Selective Culling	7
4	Standing Lasers	6
5	Propane Cannons	5
6	Pyrotechnics (combining sounds and visual effects)	4
7	Visual Effects(reflectors, scare crow etc)	3
8	Ultra-Sonic Devises	3
9	Bio Acoustics	2
10	Natural Predators -Trained Dogs Birds/Bird Chasers	2
11	Adjusting the height of the grass at the airfield.	2
12	Trapping and Rehabilitation,	2
13	Diverting the path (Migratory Birds	2
14	Exclusion	1
15	Covering Crops (vegetation cover)	1
16	Soil Manipulation	1

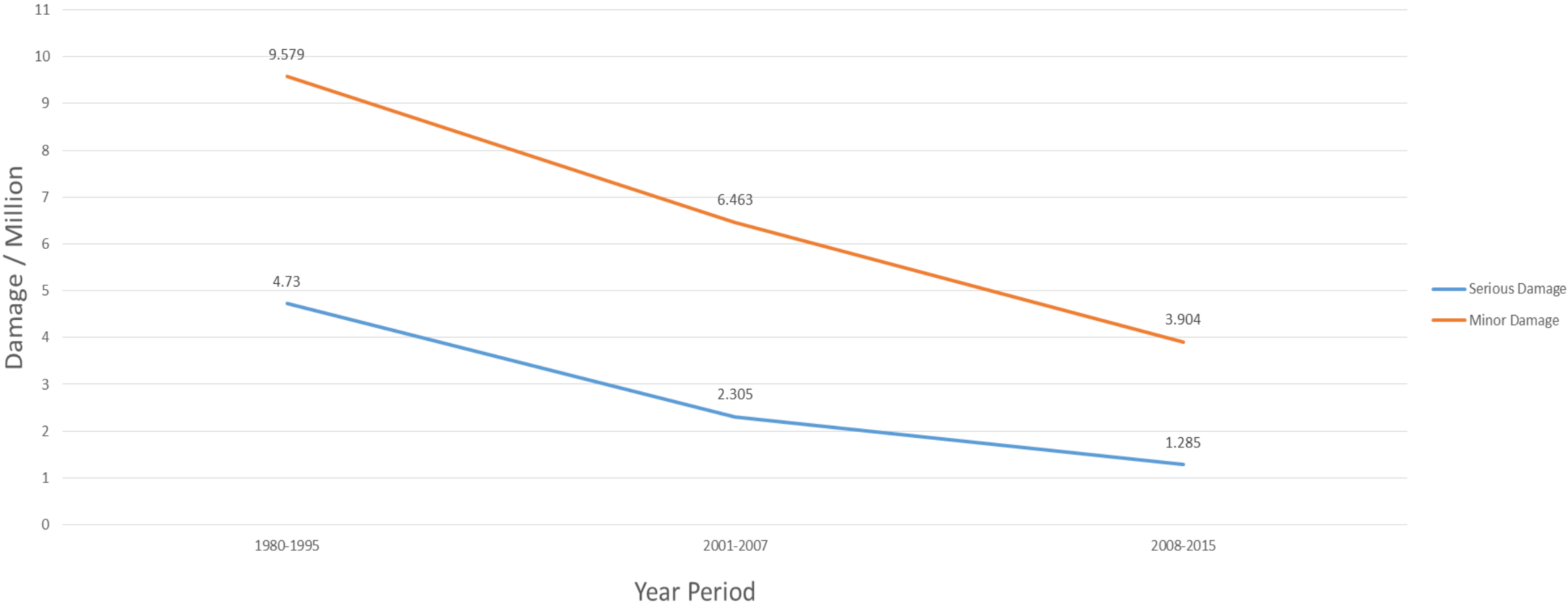


6.IMPACT OF BIRD HITS VIZ-A-VIZ NUMBER OF BIRD HITS COCHIN AIRPORT



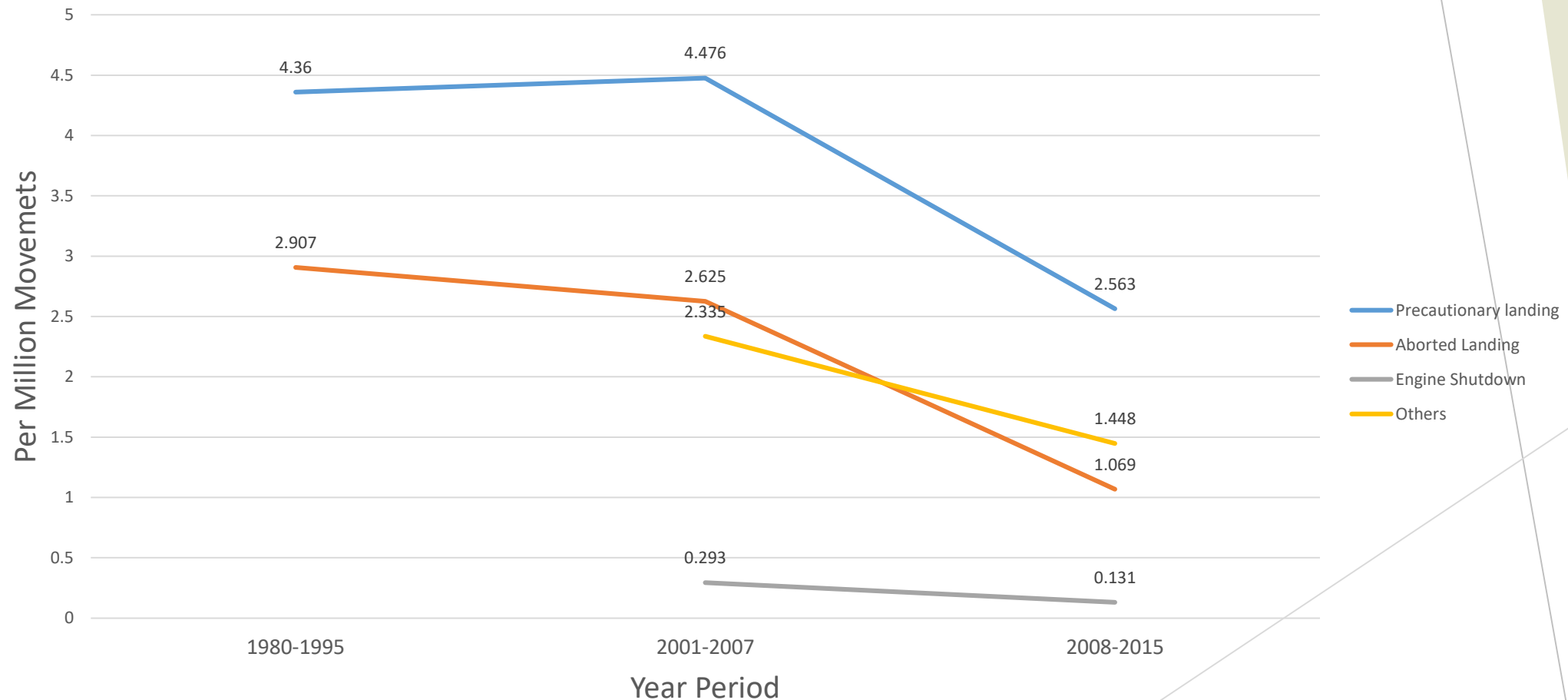
6.IMPACT OF BIRD HITS VIZ-A-VIZ NUMBER OF BIRD HITS WORLD AT A GLANCE

Damage to Aircraft due Birdstrike per Million Aircraft Movements



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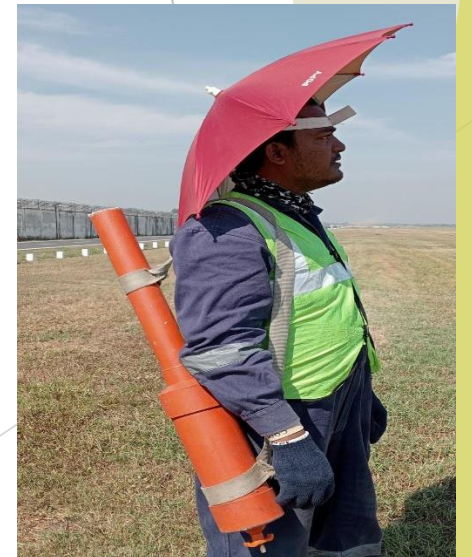
Effect on Aircraft due Birdstrike per Million Aircraft Movemets



7. CIAL'S ENVIRONMENT COMMITMENT ENSHRINED IN ITS WHM PRACTICES

A. Smokeless blasters -water and cartridge

- ▶ Smokeless hand-held sound blasters using water and carbide which are handy and user friendly and economical.
- ▶ Fireworks cause extensive air pollution in a short amount of time
- ▶ The double replacement reaction of calcium carbide with water produces acetylene gas and calcium hydroxide.



7. CIAL'S ENVIRONMENT COMMITMENT ENSHRINED IN ITS WHM PRACTICES

B. Soil Stabilization Using Ammonium Sulphate / Lime

▶ General

- ▶ Application of ammonium sulfate (equivalent to 180 kg N/Ha) reduced the earthworm population to nearly 80 per cent.
- ▶ Problem - Secondary poisoning could be seen on scavenging birds on earthworm; ammonium sulfate is a nitrogenous fertilizer, which promote weed growth and managing the vegetation will become herculean task
- ▶ Mitigation - Tea seed pellet (very high concentration cause fish toxicity) application substantially reduce the earthworm population. Even the bird consumes the earthworm, no side effect could be noticed on the birds.

▶ Benefits

- ▶ Earthworms / Inspects attract birds into airfield which is a potential hazard. Manipulating soil can prevent earthworm to proliferate.
- ▶ Remedy - application of materials which lowers the soil pH. Earthworms do not survive in acidic pH (well below below pH 5.0).

▶ Drawbacks



▶ Commitments



7.B.Soil Stabilization - Lime Application

- Widespread outbreak of earthworms in certain season happens in CIAL
- Emergence of earthworm is hazardous as it attracts birds
- To minimize earthworm near the main runway, lime application suggested
- Hydrated lime or quick lime to spontaneously increase the pH to alkaline range which is unfavorable to earthworm to survive; as it affects the plant roots also, necessary organic matter may not be available for the earthworms

Drawback

- Caustic and has to be handled with care
- During heavy rains, leaching out may happen

Our commitment

- Non toxic to higher animals
- Less Frequent Application



7.CIAL'S ENVIRONMENT COMMITMENT ENSHRINED IN ITS WHM PRACTICES

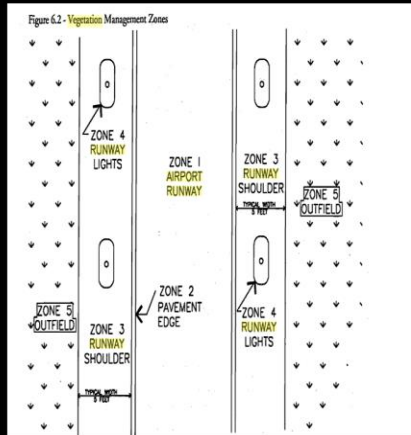
C.Cover Crops (Impacts vs Benefits)

- ▶ Identification of alternate methods
- ▶ Interaction with Subject/ industry experts
 - ▶ Pueraria (valapayar) / Wedelia (Singapore Daisy) - Bermuda Grass
- ▶ How the plant matches the aviation related requirements and best practices
 - ▶ Vegetative cover
 - ▶ little maintenance,
 - ▶ attract less/no invertebrates,
 - ▶ provide minimal harborage for rodents,
 - ▶ minimal seed production,
 - ▶ grow to a desired height,
 - ▶ drought resistant,
 - ▶ exclude other plants,
 - ▶ pose no fire hazard,
 - ▶ withstand vehicular traffic.



7C.Area & Location - Lime Stabilization and Cover crops

Ground cover



7.CIAL'S ENVIRONMENT COMMITMENT ENSHRINED IN ITS WHM PRACTICES

D.Promote Use of- “Bird” Rated Equipment

- ▶ Promote use of Bird / Green rated Equipment
- ▶ Which have been developed considering the social responsibility “too”
- ▶ Certification standards - by third party



7.CIAL'S ENVIRONMENT COMMITMENT ENshrINED IN ITS WHM PRACTICES

E..Afforestation /AEMC/Funding NGOS - Working for Welfare of animals



My Appeal

- ▶ Need to have a uniform rating for the bird deterrence methods
- ▶ Provision / Regulation for the Airport Operator to get credit points - for promoting highly rated devices
- ▶ Provision for Compensating the environment damage - by funding NGO/Afforestation
- ▶ Provision for Buying and selling the credit points earned



8. MANAGEMENT COMMITMENT FOR SUSTAINABLE GROWTH



Solar Plant 14 MWp proving energy for the Airport operations

Vegetables grown iunder PV Panels of Solar Plant 14 MWp



8. MANAGEMENT COMMITMENT FOR SUSTAINABLE GROWTH



**Run of the River Mini
Hydel Power at
Arrippara in Kozhikode
District**

**Nearly 180 KMs away
from the project**

**No major obstruction to
the Run of the river -
Iruvanjipuzha**



8. MANAGEMENT COMMITMENT FOR SUSTAINABLE GROWTH



**12 MWp Solar Plant
by CIAL outside the
Airport.**

**At Payyannur in
Kannur District
around 250 kms
away from the
Airport**





**UNITED NATIONS'S
CHAMPION OF THE EARTH AWARD 2018**

WORLD'S 1ST FULLY SOLAR POWERED AIRPORT



- **WINNER OF ACI'S AIRPORT SERVICE QUALITY AWARDS**
- **WINNER OF ACI DG'S ROLL OF EXCELLENCE**
- **WINNER OF ACI'S VOICE OF THE CUSTOMER RECOGNITION**
- **WINNER OF GoI'S SWATCH BHARATH AWARD**

9.ANCIENT INDIAN TRADITION & SCRIPTURE: A GUIDING LIGHT FOR SOCIAL RESPONSIBILITY IN WHM.

Yaneeha Bhootaani Vasanti Tani
Bali Gruheetwa Vidhivat Prayuktam
Anyatra Vasam Parikalpayintu
Kshamantu Thaanyadya Namostu Thebhye
(Verse 58-11 from Brihatsamhita 500CE)

The verse is from ancient Indian scripture Brihat-Samhita (500 CE), which emphasises on the importance of seeking permission from the trees before cutting them for construction or furniture purposes. Forgiveness is sought from the tree and all creatures inhabiting the tree, including insects, birds and reptiles, and are requested to rehabilitate themselves in a safe alternate location.

A Hindu prayer before cutting a tree for
a *Murti*

Oh Tree! you have been selected for the
worship of a deity,

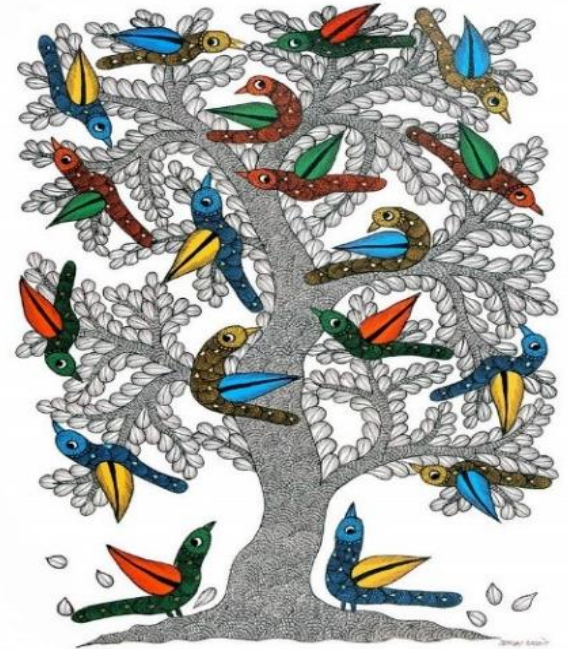
Salutations to you!

I worship you per rules, kindly accept it.

May all who live in this tree, find residence
elsewhere,

May they forgive us now, we bow to them.

—Brihat Samhita 59.10 - 59.11^{[25][26]}

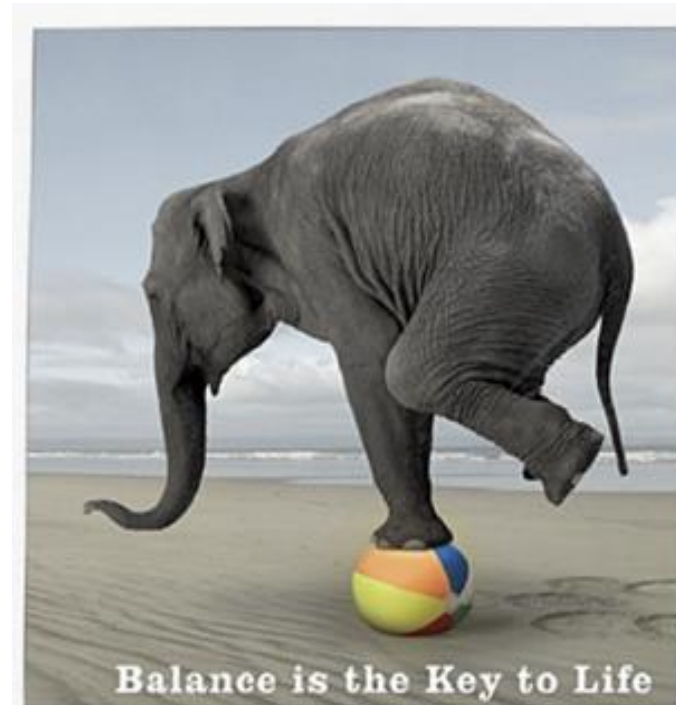
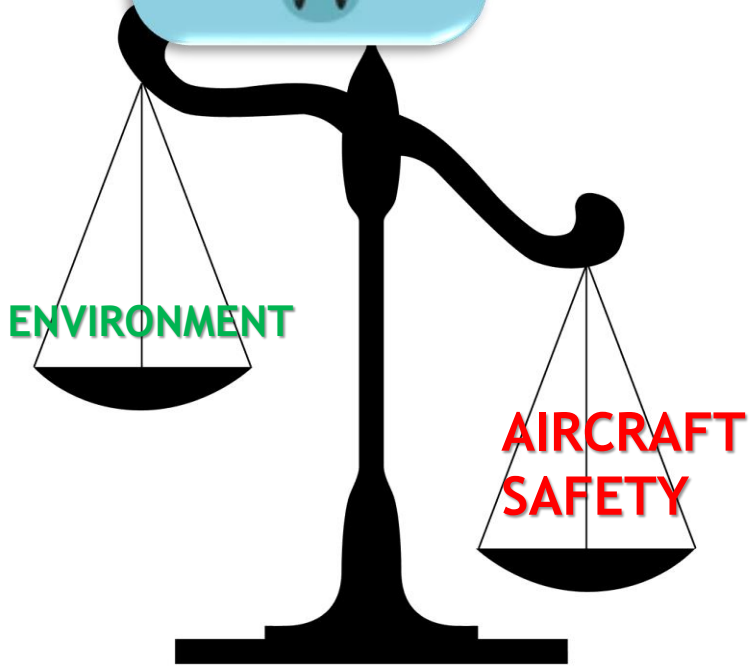
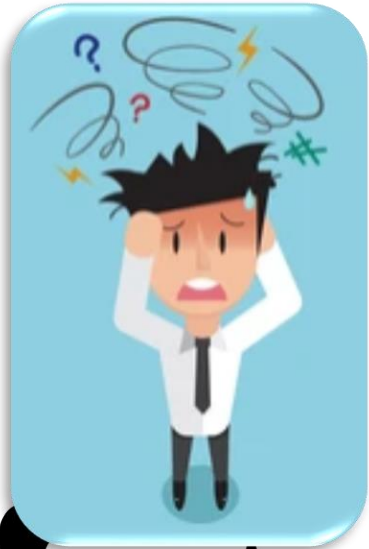


10. AIRCRAFT SAFETY VS ENVIRONMENT:

A BALANCED APPROACH

We in Aviation are called upon to protect the Aircraft
We, as human being must protect the Environment.

This calls for a **BALANCED APPROACH**
TO AIRCRAFT SAFETY & ENVIRONMENT



Thank You
Questions Please

