भारतीय वन्यजीव संस्थान
Wildlife Institute of India

Telemetry in Wildlife Studies

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Tiger Re-introduction in Sariska 2008…

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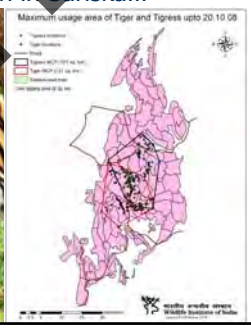


Wildlife tracking

- Wildlife tracking is a process whereby biologists, scientific researchers or conservation agencies can remotely observe relatively fine-scale movement or migratory patterns in a free-ranging wild animal using Positioning Systems and optional environmental sensors or automated data-retrieval.
- Animal tracking data helps to understand how individuals and populations move within local areas, migrate across oceans and continents and evolve across generations.

Structure of presentation …

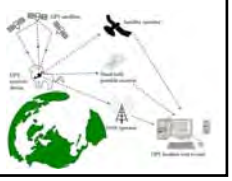
- History
- Types of positioning systems & their features
- Criteria for selection of positioning systems
- Case study 1: Olive ridely turtle
- Case study 2: Pied crested cuckoo

History of Telemetry

Word *telemetry* is derived from Greek word, meaning distance measuring

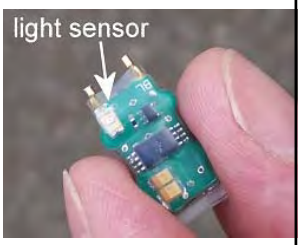
1900	Late 1950s	Late 1970s	Early 1990s
Marking / Tagging	Researchers began using radio transmitters to track wildlife.	The Argos satellite system provided a new method for tracking animals globally	the global positioning system (GPS) began to provide the potential to obtain high-resolution tracking data.

Since the twentieth century, improved communication systems, shrinking battery sizes and other technological developments have led to a range of methods for tracking animals.



Light Level Logger or Geolocators

Light-level loggers are tags that collect measurements of light levels. The light level information is used to estimate sunrise and sunset times, which are used to estimate the movement of the animal.



Features:

- Small, have low weight and drag, long lasting and cost effective. This method allows a much cheaper and much smaller device to be constructed which records for a far longer time (many years).
- Marine species that spend most of their time below the ocean surface where they cannot be tracked by satellites or radio receivers.

MK6 tags for Small terrestrial bird

MK3 Tags for Deep-diving and larger waterbirds

VHF (Very High Frequency) Transmitter

Also known as a pulse collar, VHF transmitters attached to a study animal emit a pulsed radio signal allowing a person to physically locate and observe the animal by homing into the signal using a receiver and directional antenna.

Features

1. VHF transmitters are easy to use, reliable, versatile and affordable providing exceptional value.
2. They can be used for a wide variety of animals, and the operating life of the battery can last up to three years. This type of collar can be available with an internal antenna as an option for use when there is a high chance of the antenna being chewed.

GPS Transmitter

A GPS tag calculates the location of an animal at specific time intervals using positions estimated by GPS satellites.

Features

- These tags can provide high-resolution and accurate (within meters) location estimations for animals.

Features

- The main advantage GPS collars have over VHF collars is that data can be collected at any time of the day or night remotely and regularly. Most GPS collars are also fitted with VHF capabilities so animals can still be tracked conventionally, allowing for observational research to be conducted.

Types of GPS collars:

- GPS collar with Argos uplink
- GPS collar with Iridium uplink
- GPS collar with ground download utility via VHF or UHF
- GPS collar with GSM download

Data retrieval

Locations are logged and can then be downloaded in various ways.

- The older GPS collars used to store the data until the collar was retrieved. Now, most GPS collars allow the data to be downloaded remotely.

Platform Transmitter Terminals (PTTs)

- Argos Doppler tags (known as platform transmitter terminals, or PTTs are electronic ultra high frequency (UHF) tags that send periodic signals to polar-orbiting satellites of the US national oceanic and atmospheric administration (NOAA).
- French aerospace affiliate service argos (Toulouse, France) estimates the PTT locations from the doppler shifts in their frequencies.

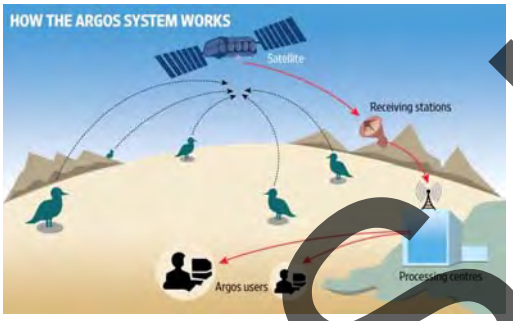
- Locations subsequently relayed to the ground stations in USA and France.
- Users can download the data from Argos service website or via email from Argos.

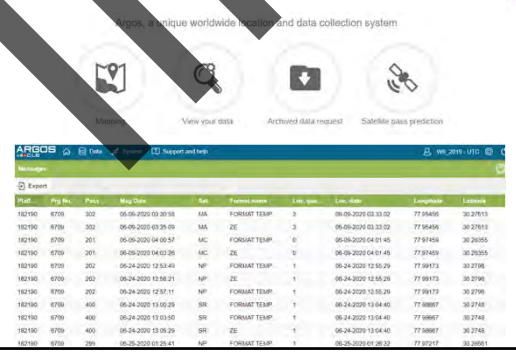
Quality Index:

Argos assigns a quality index, termed as location class or LC to each location. Viz. LC G, 3, 2, 1, 0, A, B and Z.

Features

- Can be cheaper and lighter than GPS units
- Can also be used to remotely transmit GPS locations if the tag is properly equipped, and allow for location measurements from anywhere on the globe.





Selection of transmitters

5%
body weight

1. Size: The size and mass of transmitters can pose a challenge for small animals. As a rule, a transmitter's mass should not exceed 5% of the animal's body mass. This is important, as carrying heavy transmitters increases energy expenditure during migration, delaying arrival time and thus possibly reducing reproductive success, and potentially even resulting in fatality.

Selection of transmitters

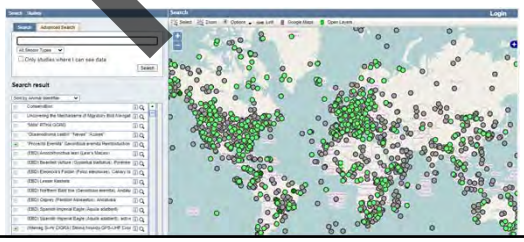
- **Price:** Transmitters should be cheap enough to put on many individuals
- **Remote transfer of data:** able to transmit high-resolution data remotely so that the animal need not to be captured again.

A scientist must choose the best available method based on the size and movement patterns of the study animal, the study budget and the research questions they want to address.

Movebank

Movebank is coordinated by the Max Planck Institute of Animal Behavior, the North Carolina Museum of Natural Sciences, and the University of Konstanz.

2.2 billion locations
3.2 billion non-location events
7,320 studies
971 taxa
over 5,000 data owners



Lotek

https://www.lotek.com/

https://www.microwavetelemetry.com/

TELONICS

https://www.telonics.com/

ATS
ADVANCED TELEMETRY SYSTEMS

https://atstrack.com/

Oil Exploration and Marine Turtle Conservation…

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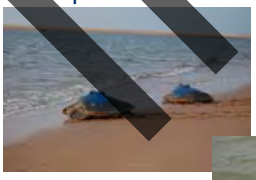
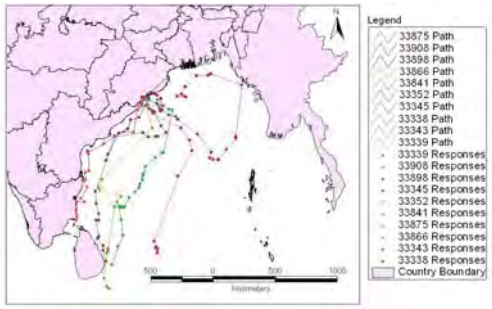


Oil Exploration and Marine Turtle Conservation…



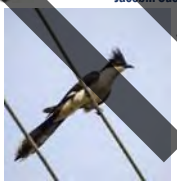
Case Study

Tagging of Jacobin Cuckoo with satellite transmitter

Jacobin Cuckoo, Pied Cuckoo or Pied Crested Cuckoo

Clamator jacobinus

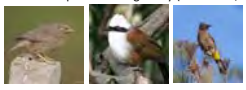
- *"Clamare" Meaning Shout*
- *"Jacobinus"- Jacobin Club*



4 species in the Genus

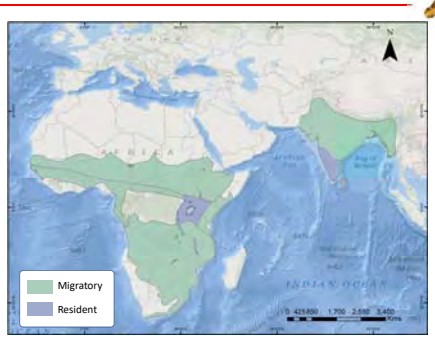
2 found in India

47 Reported hosts globally (Friedmann, 1964)



Friedmann, H., 1964. Evolutionary trends in the avian genus *Clamator*. Smithsonian Miscellaneous Collections.

Species range include African continent and Indian subcontinent

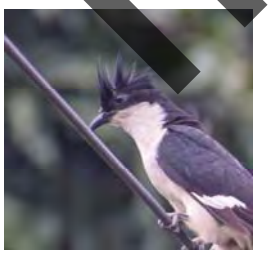


It arrives in India just before monsoon

Illustrations: Green Humor

Chataka (चातक)-**The Harbinger of Monsoon**

"A bird with a beak on its head"



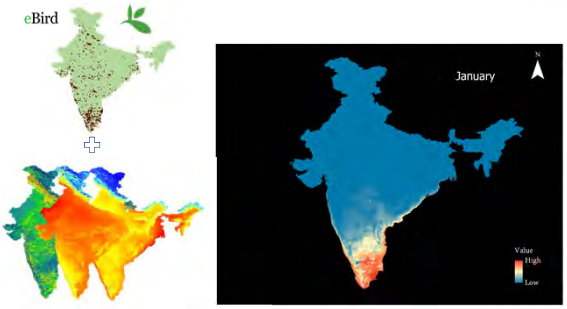
'…Shall mark the *Chataka's,*
who, in thy train,
Expect impatiently the
dropping rain'

-The
Mégha Dúta, Or, Cloud Messenger:
Horace Hayman Wilson, 1814

Divaukas, Present in only certain period in of time on Earth

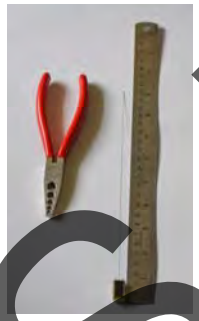
-Shakuntala, Kalidasa

Modeling the distribution of Pied Cuckoo

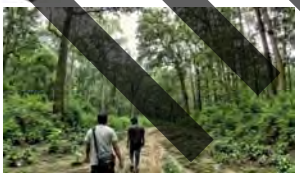


Standard rule of tag weight is 3% of the body weight of the bird

The birds weight ranges from 60-90gm.
Thus 2gm Solar PTT were chosen. Smallest solar PTT available



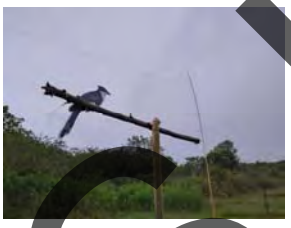
ARGOS Solar PTT Transmitter: 2gm



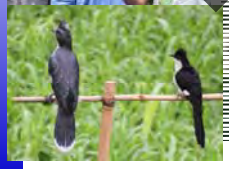
Intensive field survey to identify suitable mist-netting location

Mist nets deployed in different areas

Dummy along with call playback was used to lure the bird to the net



Two individuals were captured on 12th July and 14th July



Megh

Chatak

Various body measurements were taken prior to deploying the transmitter

Birds were released at the capture location

Thank – Q

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