

Tracking near-shore Olive Ridley turtles using UAVs



Nesting beach orthomosaic



Launching an UAV flight from the boat to observe olive ridley turtles in the sea

OVERVIEW	
Flying Labs	India Flying Labs Tfw Foundation
Geographic area	Rushikulya in Odisha, India
Date range	09th March - 15th March, 2023

Sector program	EcoRobotics
Main SDGs	GOAL 14: Life Below Water GOAL 15: Life on Land

SCOPE	
Project stakeholders	<ul style="list-style-type: none"> ● Technology for Wildlife Foundation (TfW), co-lead of India Flying Labs ● WWF-India ● Dakshin Foundation ● Odisha Forest Department
People impacted	Not Applicable; project focused on turtle population.
Number of people impacted	Not Applicable; project focused on turtle population.
Problem	<p>Classified as endangered by the IUCN, Olive Ridley Turtles spend a majority of their time in the open ocean. This means it is quite complicated to get a realistic estimate of their population. This is important both to understand the effect of threats they are facing and also to monitor any interventions for their conservation. The best possible estimates happen when these turtles come to shore once a year to nest- that is why these nesting events are critical to monitor and estimate the populations arriving at nesting sites.</p> <p>The coast of Orissa, India is one of the most significant nesting sites for this species globally, making this documentation very valuable.</p> <p>For monitoring near-shore populations, boat-based surveys are used. These can be challenging due to the vast coastline and numerous nesting sites. Rough seas, high consumption of fuel are some factors that make boat-based surveys expensive and time-consuming. The use of drones here seeks to compare with existing methods to see if this technology can improve our understanding of the species and aid conservation efforts.</p>
Project objectives	(a) Assess the feasibility of using drones for studying near-shore turtle aggregations,

	<p>(b) Determine the type of drone that is most suitable for the task, and</p> <p>(c) Provide recommendations based on the findings of the study.</p>
Scope	<p>(a) Conducting turtle transects using a drone along the same paths as boat transects.</p> <p>(b) Generating orthomosaics of nesting beaches.</p>
Outcome	<p>Video footage of off-shore turtles allowing for comparative population estimates to compare with boat-based surveys. High resolution maps of a nesting beach.</p> <p>Analysis comparing findings from boat-based and aerial surveys compiled in a poster.</p>
Impact	<p>This project has aided in-</p> <ol style="list-style-type: none"> 1. Providing a monitoring option that does not disturb the endangered species 2. Enhance documentation of the species. 3. Allows us to better design future surveys for capturing essential information on the species 4. Create resource-efficient options allowing for potential reallocation of resources saved into more conservation efforts.
Challenges	<p>Obtaining permits for field operations, and setting up the multi-stakeholder collaboration, were the primary challenges for this project. Once these were resolved through intense networking and negotiation, the actual implementation of the project itself was straightforward.</p>
Next steps	<p>We will be working towards transferring skills to local conservation organisations and the Odisha Forest Department, who will then be able to use UAVs appropriately.</p> <p>We will also be working towards deploying fixed-wing drones for future operations of this nature, with the goal of ultimately reducing the total manpower required for the effective study and conservation of turtles in Odisha.</p>

COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT

Consent for data acquisition	Odisha Forest Department
Community engagement activities	Interaction with volunteers and local Odisha Forest Department representatives while conducting field operations.
Community groups engaged with	Local turtle conservation volunteers and employees working with WWF-India, Dakshin Foundation and the Odisha Forest Department.
Community attendance	8
Community feedback	None.
Stakeholder support	The Odisha Forest Department provided us with permission to operate. WWF-India covered all the logistical costs of the operation. Dakshin Foundation conducted simultaneous boat surveys. Together the three NGOs are working on scientific outputs.

DATA ACQUISITION

Size of area	Video: ~800 ha (8km ²) Orthomosaic: 50 ha (0.5km ²)
Drones	<ul style="list-style-type: none"> ● DJI Mini 2 ● DJI Mavic 2 Pro ● DJI Air 2S
Sensor(s)	1/2.3" CMOS sensor (DJI Mini 2), 1-inch CMOS sensor (DJI Mavic 2 Pro & DJI Air 2S)
Flight plan software	Pix4D Mission Planner and FlyLitchi
Flight height	20-100M ASL
GSD (Accuracy)	2 cm/pix
Number of images acquired	483 (for ortho-mosaicing)

Number of flights	12
Time invested in data acquisition	02:40:05 hrs
Georeferencing	Yes, with on-board GPS

DATA PROCESSING & ANALYSIS

Processing software	WebODM, DaVinci Resolve, Dashware
Processing time	Not available; multiple products processed on different devices.
Data products	Aerial video-transects of near-shore turtles and turtle aggregations, orthomosaic map of the nesting beach
Analysis tools	ArcGIS Pro, ArcMap, QGIS
Analysis outputs	In progress; computer-vision based turtle counts.
Final outputs shared with stakeholders	Aerial video-transects of near-shore turtles and turtle aggregations, orthomosaic map of the nesting beach
Data sharing	Pendrive, Leaflet Webmap, YouTube, and Google Drive