MANGROVE MAPPING

Proposal submitted to the Forest department of Govt. of Goa by Aerodynamics Club, BITS Pilani K K Birla Goa Campus

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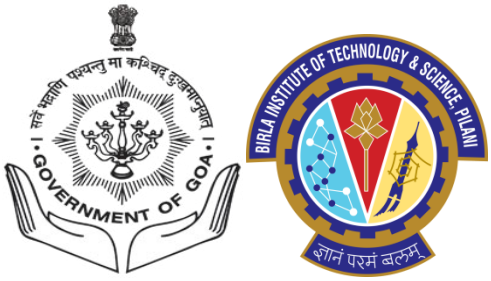


INTRODUCTION

The importance of mangroves as a coastal resource is well established. To study mangrove areas effectively, and to monitor changes over time, accurate, rapid, and cost-effective mapping techniques are required. The use of remotely sensed data offers many advantages in this respect and has been used to monitor deforestation and aquaculture activity, in environmental sensitivity analyses and for resource inventory and mapping purposes. However, the accuracy of the final map is affected by the ability of the classification procedure to discriminate between various vegetation types and this is completely dependent on the resolution of the image captured. This is the major limitation of traditional satellite remote sensing data.

AIM

To develop a high resolution digital image stitched map of the state's mangroves with the following features:

- Ability to identify various species and calculate their area distribution
- Very high resolution images (2cm per pixel)
- Elevation map for better understanding of the topography

METHODOLOGY

- Lightweight Unmanned Aircraft with autopilot and digital camera (Specialized for aerial photography) flies automatically over a pre-defined area of interest taking high resolution (2cm per pixel) photographs
- The captured data is stitched together using sophisticated algorithm and software
- Several Mangrove species and they area they occupy can be identified based on the difference in leaf patterns using various image processing algorithms
- The processed data is ported onto to GIS viewer (Like Google Earth) and deployed at the forest department office computer(s)

EQUIPMENT USED

QUADCOPTER

- Range – 15 Kms
- Flight Time – 45 Mins
- Wind Resistance – Up to winds of 45 Km/h
- Payload capacity – 0.5Kg
- Weight – 2 Kgs
- Power Source – External Switchable Li-Po batteries

FIXED WING PLANE

- Range – 25 Kms
- Flight Time – 2 hours
- Wind Resistance – Up to winds of 45 Km/h
- Payload capacity – 3 Kg
- Power Source – External Switchable Li-Po batteries

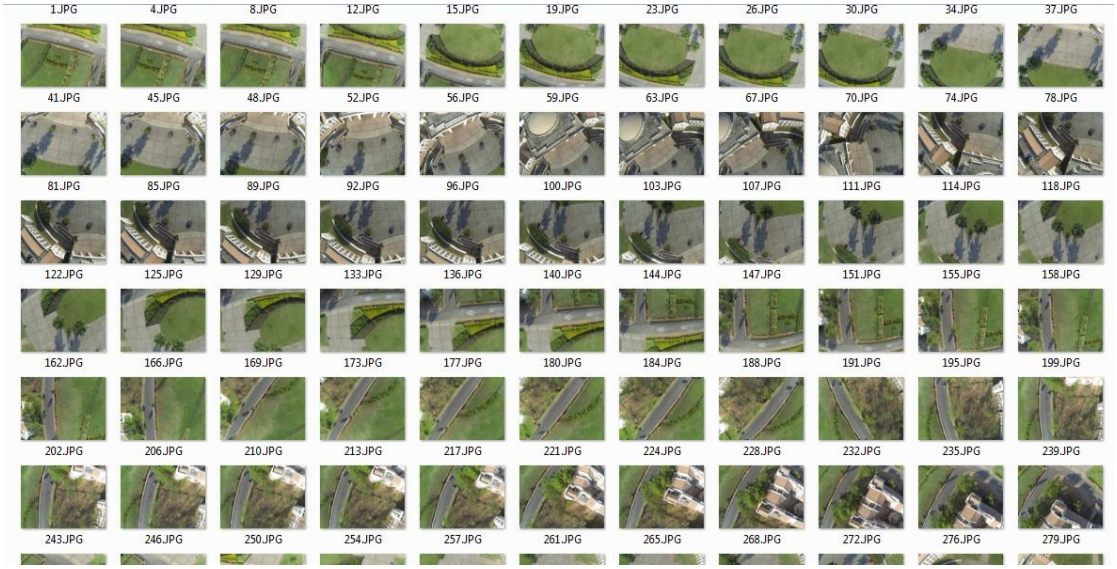
CAMERA

- Sensor Pixels - 12,000,000
- Maximum Image Resolution - 4,000x3,000
- Optimal Sensor Type - CMOS
- Memory Slot – Micro SD
- Size - 40x55x28mm
- Weight – 76gms

SAMPLE OF FINAL DELIVERABLE

1. THE UAV FLYING ALONG THE PRE-SEPATH, CAPTURING IMAGES

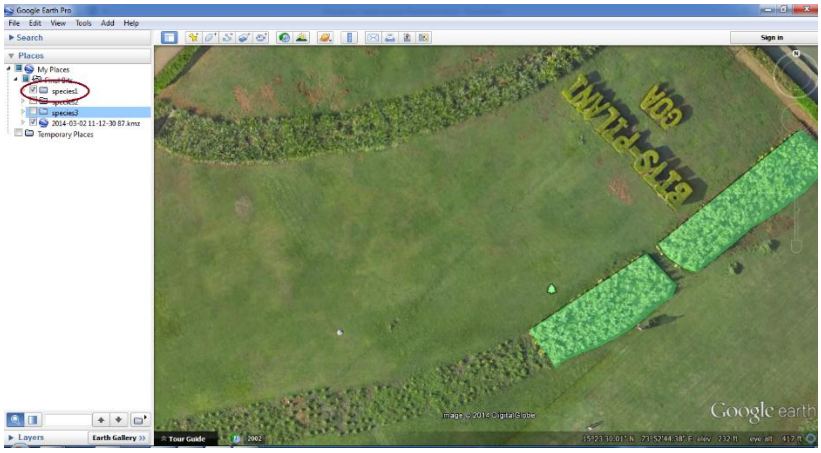
2. HUNDREDS OF IMAGES CAPTURED

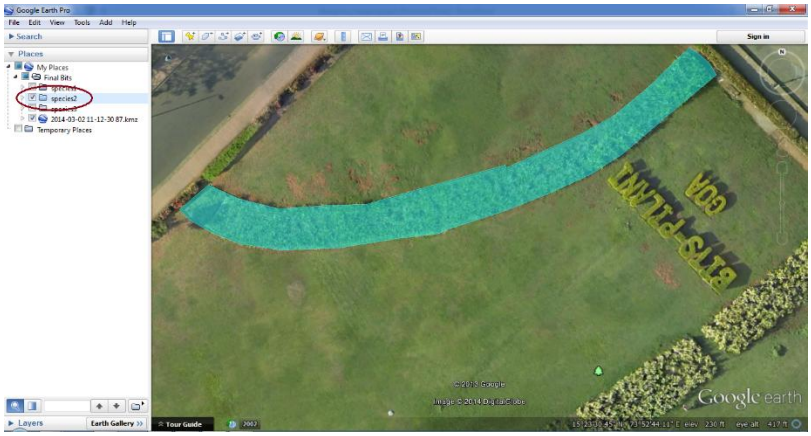


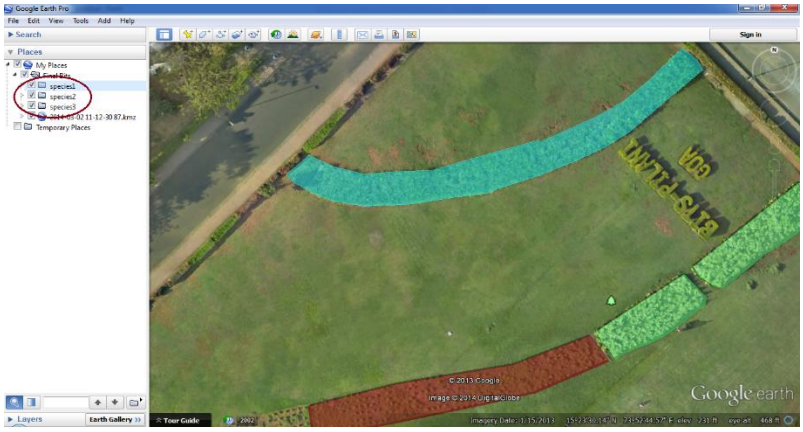
3. THE CAPTURED IMAGES ARE STITCHED TOGETHER TO FORM A SINGLE LARGE HIGH RESOLUTION IMAGE OF THE ENTIRE AREA

4. THE IMAGE QUALITY IS SIGINIFICANTLY BETTER THAN PUBLIC SATELITE DATA

5. WHEN A PARTICULAR SPECIES IS SELECTED, ITS HIGHLIGHTED AND THE AREA IS CALCULATED IN THE MAP







SALIENT FEATURES

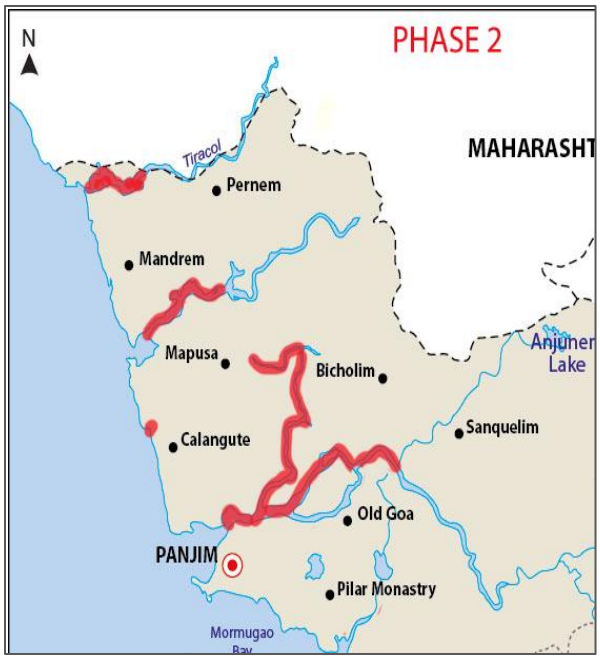
- Fully digital processed data accessible anytime
- Precise species wise area calculations
- Easy to use interface, all the data needed can be obtained in just few clicks
- At least 100 times cheaper compared to traditional GIS mapping services which uses helicopters

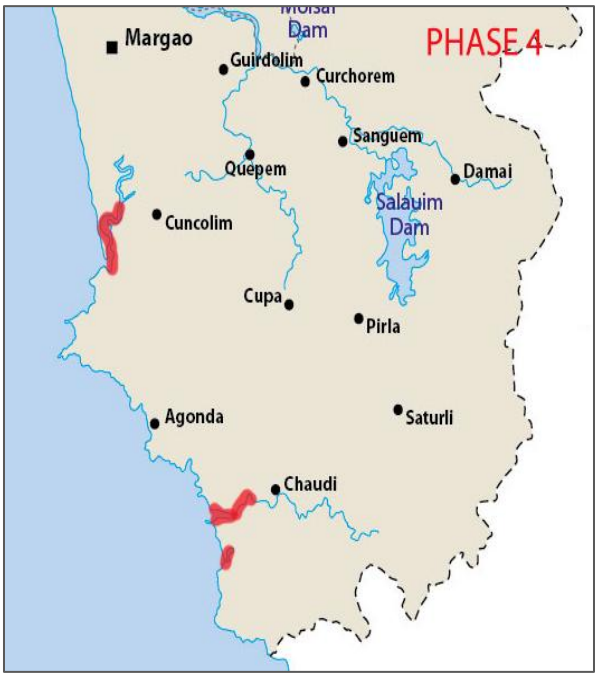
TIMELINE

Phase No.	Duration	Description of work done
1	15 days	• Manual inspection of the mangrove areas to identify the regional topography • The equipment to be used(Plane or Copter, Camera and software) for particular regions to be decided after the primary examination • To identify the landing and take-off positions for the aerial vehicles
2	30 days	• Aerial imaging starts. Planes fly over the required area and capture high quality aerial images • In this phase, mangrove basins in the North Goa are covered
3	30 days	• The mangrove basins lying between Mormugao Bay and Sanquelim are covered in this phase
4	30 days	• In This phase, mangrove basins in the South Goa are covered
5	30 days	• Final processing of the captured data and setup of species wise mangrove database in the forest department servers and offices.
Total duration : 4.5 months		

PRIMARY INSPECTION IN PHASE 1

AREA COVERED IN PHASES





LOGISTICS

- Starting from phase 2, planes and copters will be used accordingly for aerial imaging
- Processing of the captured data will happen on our high performance servers
- Our UAVs can fly in winds up to 45kmph and only in light drizzle. PRICE ESTIMATEA rough estimate of the effective days of work has been made after accounting for this
- We shall require a van type vehicle for the whole duration of the project for equipment transport

PRICE ESTIMATE

S No	Particulars	Estimated Cost (INR)	Remarks
1	On Completion of Phase 1	50,000	Manual inspection of the mangrove areas to identify the regional topography
2	On Completion of Phase 2	1,00,000	In This phase, the aerial imaging of mangrove basins in the North Goa is done
3	On Completion of Phase 3	1,00,000	The aerial imaging of mangrove basins lying between Mormugao Bay and Sanquelim are covered in this phase
4	On Completion of Phase 4	1,00,000	In This phase, aerial imaging of mangrove basins in the South Goa are covered
5	Final Completed Processed Data	1,50,000	Final Data Overlay on GIS software
	Total	**5,00,000**	

REMARKS

The final processed data with the software interface to use it along with the final report that has the findings would be handed over to the department; this would mark the completion of the project.