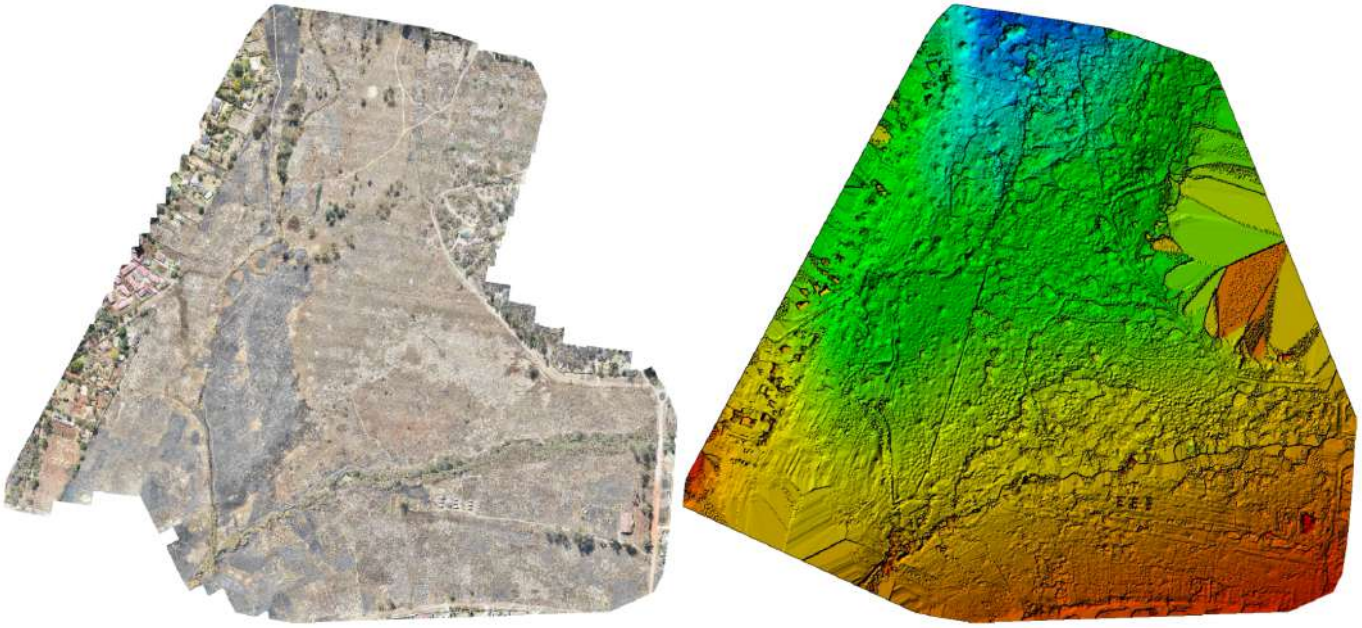
Protecting Harare's wetlands using drone data



Orthomosaic(left) and digital surface model (right) of the mapped area at Monavale Wetland in Harare

Zimbabwe Flying Labs team during fieldwork

OVERVIEW	
Flying Labs	Zimbabwe Flying Labs
Geographic area	Zimbabwe, Harare
Date range	May - July 2021
Sector program	EcoRobotics
Main SDGs	GOAL 6: Clean Water and Sanitation GOAL 11: Sustainable Cities and Communities

SCOPE	
Project stakeholders	Harare Wetlands Trust
People impacted	Citizens of Harare who rely on water from wetland sources
Number of people impacted	Over 15,000 people relying on this water source
Challenge	The last mapping exercise in Harare's wetland area was done between 1999 - 2000 using an aeroplane and handheld camera. Thus the existing map data including topography structure and change of land use over time was largely outdated. Lack of access to recent data makes it hard for wetland conservationists to protect the wetland areas from degradation through cultivation and encroachment from residential property development.
Scope	The scope of this project included aerial mapping of Monavale Wetland, namely 1 out of 7 identified wetland sites in Harare and producing data outputs including topographical map orthomosaic and digital terrain model. The mapped area covers 45 hectares. This project was a proof of concept to motivate further use of drones and data as a monitoring tool.
Outcome	The data gathered was well received by the client. Data and maps were used to measure the extent of wetland degradation caused by cultivation and property development. The data was also used to confirm topographical structure of the area, particularly high and low lying areas.
Impact	The outcome of the mapping exercise in the medium term and particularly the data captured will be used by the client to lobby the local government authorities to prevent further encroachment into the wetland by residential developers. The client has resolved to develop a report on the state of monavale wetland using the data gathered.
Next steps	Zimbabwe Flying Labs will issue a proposal for more regular aerial mapping done on a seasonal basis and provide the requirements for this kind of mapping. The clients will discuss with the board of trustees and donor partners for funding.

COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT	
Consent for data acquisition	We had face-to-face and online meetings with the Harare Wetlands Trust team.
Activities to engage with the community	We did a trial mapping exercise with the Harare Wetlands Trust team to show them how the process would work. This was held one week before the actual data capture.
Community groups engaged with	Locals who live close to the wetland also joined in as spectators on the day of the mapping trial. Students and the lecturer involved with environmental science at the local university of Zimbabwe were invited to the aerial mapping trial as well.
Community attendance	8 people
Community feedback	The community, particularly the students, said that training on data acquisition with drones should be taught in universities. Other community members said that drones should also be used for security patrols in the neighborhood.
Stakeholder support	N/A

DATA ACQUISITION	
Size of area	45 ha (0.45 sq km)
Drone	DJI Phantom 4 Pro
Sensor(s)	RGB sensor
Flight plan software	PIX4Dcapture
Flight height	70 meters above ground
GSD (Accuracy)	2 cm/pix
Number of images acquired	1388
Number of flights	5
Time invested in data acquisition	3 days
Georeferencing	Onboard GPS

DATA PROCESSING & ANALYSIS	
Processing software	PIX4Dmapper
Processing time	1hr 35mins
Data products	Orthomosaic, DTM, DSM
Analysis tools	ArcGIS Pro
Analysis outputs	Maps
Final outputs shared with stakeholders	Map data, orthomosaic, DSM, DTM
Data sharing	Email and Powerpoint presentation