Enhancing River Defense Design with UAV LiDAR Data in Peruvian Valley

Prepping the equipment for the mission

Our team of pilots and flight technicians ready to start the mission

OVERVIEW	
Flying Labs	Peru Flying Labs
Geographic area	Huaura River, Lima, Perú
Date range	08th March 2022
Sector program	EcoRobotics
Main SDGs	GOAL 11: Sustainable Cities and Communities
	GOAL 17: Partnerships to achieve the Goal

SCOPE	
Project stakeholders	- Ohla Perú - Peruvian Government - UAV LATAM Peru
People impacted	People from the valley of the Huaura River
Number of people impacted	Over 10, 000 people
Problem	People from the valley suffer from floods due to intense rain in the summer months which affect their crops, transport and their main economic activities, for example, tourism.
Project objectives	Collect elevation data from LiDAR sensor in order to provide reliable topographic information that will be used in the design of river defense
Scope	- LiDAR drone data collection. - Cloudpoint processing and geographic alignment to geodesic networks. - Topographic and planimetric generation.
Outcome	- The products generated were used as an input to the designing team and provided them with reliable topographic information. - Construction companies decide to use LiDAR Data that were captured using drones over conventional topographic surveys.
Impact	Conventional surveying methods were not able to provide reliable information which resulted in poor river defense designs. The use of LiDAR data allows engineers to design realistic river defense and even run simulations over it. All these will result in a community that is better prepared for the floods.
Challenges	Work in the Peruvian mountains (Andes) using drones was not easy. The Peruvian team developed a two-time workflow which consisted of scoping the area with a DJI Phantom 4 Pro and then collecting the data with a DJI Matrice 600 Pro.

Next steps	Ohla Peru is in charge of building the river defenses in most of the central coast of Peru. The client has decided to use LiDAR data in their workflows.

COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT

Consent for data acquisition	As it is a Peruvian government project, there is an agreement between the communities involved and the development of the project. These works and the river defense improvement project will benefit the entire population involved.
Community engagement activities	The communities involved have agreements for participatory work and job promotion in coordination with the executors of the works.
Community groups engaged with	This project directly involves the department of Lima as well as the provinces that make up the Huaura river basin: Oyón, Huaura and Huaral.
Community attendance	There were no meetings, community training, or instruction or awareness workshops.
Community feedback	The community supports these jobs. They give us access to the area to be mapped and important information to improve the studies carried out.
Stakeholder support	These data will serve directly to the executors of the project. There was no transfer of knowledge to the population in terms of the information collected.

DATA ACQUISITION

Size of area	650 ha / 6.5 km2
Drone	DJI Phantom 4 Pro DJI Matrice 600 Pro
Sensor(s)	Geocue TrueView 515
Flight plan software	Litchi for DJI Drones
Flight height	75 m
GSD (Accuracy)	2 cm/pix

Number of images acquired	Over 20000
Number of flights	Over 100
Time invested in data acquisition	10 days
Georeferencing	Clients geodesic network

DATA PROCESSING & ANALYSIS	
Processing software	- LP 360 - Terrasolid - AgiSoft
Processing time	Over 24 hours
Data products	- Cloud Point - DTM digital terrain model - DSM digital elevation model - Orthomosaic
Analysis tools	- ArcGIS Pro - Civil 3D
Analysis outputs	- Terrain surface - Planimetry
Final outputs shared with stakeholders	- Raw data - Processing products - Terrain surface - Planimetry - Point Cloud
Data sharing	Dropbox