

## 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	
<b>Flying Labs</b>	Peru Flying Labs
<b>Geographic area</b>	Huaura River, Lima, Perú
<b>Date range</b>	08th March 2022
<b>Sector program</b>	<a href="#">EcoRobotics</a>
<b>Main SDGs</b>	<a href="#">GOAL 11: Sustainable Cities and Communities</a> <a href="#">GOAL 17: Partnerships to achieve the Goal</a>

SCOPE	
<b>Project stakeholders</b>	<ul style="list-style-type: none"> <li>● Ohla Perú</li> <li>● Peruvian Government</li> <li>● UAV LATAM Peru</li> </ul>
<b>People impacted</b>	People from the valley of the Huaura River
<b>Number of people impacted</b>	Over 10, 000 people
<b>Problem</b>	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.
<b>Project objectives</b>	Collect elevation data from LiDAR sensor in order to provide reliable topographic information that will be used in the design of river defense
<b>Scope</b>	<ul style="list-style-type: none"> <li>● LiDAR drone data collection.</li> <li>● Cloudpoint processing and geographic alignment to geodesic networks.</li> <li>● Topographic and planimetric generation.</li> </ul>
<b>Outcome</b>	<ul style="list-style-type: none"> <li>● The products generated were used as an input to the designing team and provided them with reliable topographic information.</li> <li>● Construction companies decide to use LiDAR Data that were captured using drones over conventional topographic surveys.</li> </ul>
<b>Impact</b>	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.
<b>Challenges</b>	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.

<b>Next steps</b>	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.
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### COMMUNITY ENGAGEMENT AND STAKEHOLDER SUPPORT

<b>Consent for data acquisition</b>	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.
<b>Community engagement activities</b>	The communities involved have agreements for participatory work and job promotion in coordination with the executors of the works.
<b>Community groups engaged with</b>	This project directly involves the department of Lima as well as the provinces that make up the Huaura river basin: Oyón, Huaura and Huaral.
<b>Community attendance</b>	There were no meetings, community training, or instruction or awareness workshops.
<b>Community feedback</b>	The community supports these jobs. They give us access to the area to be mapped and important information to improve the studies carried out.
<b>Stakeholder support</b>	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

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

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

### DATA PROCESSING & ANALYSIS

<b>Processing software</b>	<ul style="list-style-type: none"> <li>● LP 360</li> <li>● Terrasolid</li> <li>● AgiSoft</li> </ul>
<b>Processing time</b>	Over 24 hours
<b>Data products</b>	<ul style="list-style-type: none"> <li>● Cloud Point</li> <li>● DTM digital terrain model</li> <li>● DSM digital elevation model</li> <li>● Orthomosaic</li> </ul>
<b>Analysis tools</b>	<ul style="list-style-type: none"> <li>● ArcGIS Pro</li> <li>● Civil 3D</li> </ul>
<b>Analysis outputs</b>	<ul style="list-style-type: none"> <li>● Terrain surface</li> <li>● Planimetry</li> </ul>
<b>Final outputs shared with stakeholders</b>	<ul style="list-style-type: none"> <li>● Raw data</li> <li>● Processing products</li> <li>● Terrain surface</li> <li>● Planimetry</li> <li>● Point Cloud</li> </ul>
<b>Data sharing</b>	<ul style="list-style-type: none"> <li>● Dropbox</li> </ul>