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Unmanned Aircraft Systems (UAS) Training

Report on the Regional Drone Training for Central
America

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Introduction

World Food Programme (WFP), as lead of the Emergency Telecommunications Cluster (ETC) conducted the very first regional drone workshop /Unmanned Aircraft Systems (UAS) training in El Salvador in June 2019.

To fully reap the benefit of the regional actors coming together from six countries—Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, and Panama, WFP combined its UAS training package (including three components Let's FLY, Let's MAP and Let's COORDINATE) and a regional workshop. Thanks to this approach, the participants got a full overview of drone flight and mapping operations and capacities, but also worked together to develop ideas and projects for the region.

This report outlines key figures and achievements as well as a way forward.

This regional workshop was organized and supported by:



Belgium

partner in development



World Food Programme





WFP DRONES

Taller Regional
de Pilotos Aéreos
Tripulados
11-20 Junio (Drones)



Training Overview

From 11 to 20 June, WFP, supported by the Government of Belgium and local organizations, conducted the full UAS training package, combined with a regional workshop for Central America. Academic, government and humanitarian organizations from six countries attended this two-week learning event.

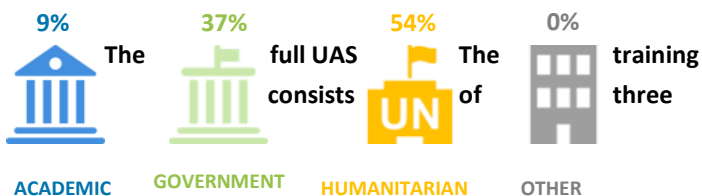


16 ORGANISATIONS
54 PARTICIPANTS
80% MEN VS. 20% WOMEN

Participating organizations:

- AAC—El Salvador's Civil Aviation Authority;
- CENTA— National Center for Agricultural and Forestry Technology "Enrique Álvarez Córdova";
- CONRED—Guatemala's National Disaster Management Office;
- El Salvador's Civil Protection;
- FAO—Food and Agriculture Organization;
- IOM—International Organization for Migration;
- MAG— El Salvador's Ministry of Agriculture and Livestock;
- MAGA—Guatemala's Ministry of Agriculture Livestock and Food;
- MARN— El Salvador's Ministry of Environment and Natural Resources;
- SETEPLAN—El Salvador's Technical and Planning Secretariat;
- UNDP—United Nations Development Programme;
- UNFPA— United Nations Population Fund;
- UNICEF—United Nations Children's Fund;
- University of El Salvador;
- WFP (El Salvador, Guatemala, Honduras, Nicaragua, and Regional Bureau Panama [RBP]);
- World Vision.

Breakdown of organizations:



modules:

LET'S COORDINATE



LET'S FLY



LET'S MAP



Let's COORDINATE

The facilitators delivered theoretical sessions on:

- Overview of UAS coordination;
- Case studies and lessons-learned, especially in the Latin American region and the recent emergency response to Cyclones Idai and Kenneth in Mozambique;
- Safety procedures; as well as
- Data privacy and protection.

Let's FLY

Technology used for practical sessions:



SPARK
MAVIC PRO

During Let's FLY the participants received a hands-on training on the drone technology, including detailed introduction to mobile applications that enable handling of drones. Participants were able to get extra flight time during the Let's MAP module and the regional workshop, gaining in total approximately 20 hours of flight time.

Let's MAP

During this two-day course, the participants gained a solid understanding of the processing of drone imagery into detailed 2D maps and 3D models. The instructors introduced a variety of software that can be used to process the images including Pix4D, Pix4D Cloud, Agisoft and OpenDroneMapper. The course provides a comparison of these options in terms of their pricing, pros and cons as well as different outputs they produce. At the end of two days, the students were able to process the drone data in all four applications.

Survey results (general)

- 100 per cent of the participants found that the training met their expectations and that it offered a good variety of content delivery methods.
- 93 per cent found that the amount of content was appropriate for the time available. Some participants suggested to reduce the content to be able to go more in-depth.
- Participants named the following components as the most beneficial to their organizations: flight security and planning, drone technical features, applications of the technology for emergency preparedness and response as well as agriculture, practical drone exercises; post-processing of data into different types of maps; collaboration with various agencies and countries; data protection; balance between theory and practice.
- The participants particularly enjoyed the knowledge of the instructors and organizations of the training.
- Suggestions for improvements included: more exercises in country-specific context e.g. volcanic eruptions, more practice time, use of multi-spectral camera, as well as online course prior to the training with pre-reading materials ahead of the in-person training.

Feedback on Let's COORDINATE

- Among the biggest learning the participants named the coordination between various agencies as well as countries.
- Participative and comprehensive approach of the training was highly praised.

Feedback on Let's FLY

- Practical flight exercises were very appreciated by the participants who after two weeks felt confident in the basic operation of

drones.

- The participants enjoyed using different aircrafts and felt they were adequately used for the learning experience.

Feedback on Let's MAP

- The participants considered this component as one of the biggest learning for their organizations. The various ways of processing the data obtained by drones into detailed and high-resolution maps that can complement satellite imagery or be used as stand-alone product were highly praised.
- The main suggestion for improvement, as the explanations were quite fast was to provide manuals on each of the applications used during the course.

Feedback on regional workshop and emergency simulation

- Overall, 100 per cent of the participants were satisfied with the regional collaboration part of the workshop.
- The most enjoyable part was how realistic the scenario and the injects were, as well as the collaboration between all participants to achieve the objectives.
- The participants considered the biggest challenge of the emergency simulation to be dealing with high stress levels, big number of service requests and trouble-shooting technical problems.

"Right now, CONRED has a mobile app that invites citizens to send info if they have witnessed a landslide or car accident with hazardous materials. We [need drones because we] coordinate with all the emergency agencies, like firefighters, local army and NGOs for tactical response. We gather all the information and send it over for strategic coordination. We're the ones who go to the field."

Emilio Lara Heussler Guatemala's Disaster Management Agency (CONRED)



Training Details



“This workshop came along at the right time (...) In our ministry, we have been looking forward to these technologies. We have a budget for drones and software, but no one knew how to operate them. We will use the technology to monitor the growth of corn, beans and basic grains during the drought. We can use sensors [attached to the drones] to analyze the soil, to avoid planting crops that won’t thrive. We might have to diversify the crops [for a better yield].”

Mey Riveiro, Ministry of Agriculture, Honduras

UAS coordination

WFP has been developing the use of UAS in humanitarian sphere since 2017, including the coordination model, capacity building and support to WFP programmes and operations. This work with current examples from several countries was presented during Let’s COORDINATE. Since WFP is looking at various aspects related to UAS—from air safety to data protection, the participants received a comprehensive overview of drones’ capacity, challenges and practical applications.

Case study: drones in emergency response

One of the real-life scenarios presented to the group was the use of drones in the emergency response to Cyclones Idai and Kenneth in Mozambique. The UAS services were deployed for the first time as a common service, which included deconfliction of airspace, coordination with the government and humanitarian agencies as well as provision of services in

the area of assessment (search & rescue and mapping). Drone pilots who responded in Mozambique talked about their experience and lessons-learnt, giving the participants practical tips.

Data Protection and Privacy

The participants of this training had a varying levels of familiarity with drones but also the topic of data protection and privacy. All participants showed high level of engagement when WFP presented on its policies as well as guidelines on handling drone data.

Guest presentations

El Salvador’s Civil Aviation Authority (AAC) presented on their

“We have extreme drought in our country right now. The drones will be used for soil analysis. We need to give information to the farmers on what to plant and what not to plant in that area. Secondly, we had floods. Our office is going to buy four drones, and I will go back and show other staff how to use them.”

José Guzman, WFP Dominican Republic



regulations regarding unmanned aircraft systems, which specify aspects such as allowed weight or purpose (personal vs. professional) as well as allowed altitudes. Importantly, after this WFP training, AAC agreed to adjust its certification programme—drone pilots will be able to register the hours flown during the Let’s MAP and they will count toward the official certification.

El Salvador’s Civil Protection agency presented on their programmes in the area of mitigation and prevention of disasters.

Practical flight sessions

During two weeks of the UAS training, the participants received around ten hours of flight time during Let’s FLY, but also extra practice during Let’s COORDINATE, Let’s MAP and the regional workshop. They learnt to operate multi-rotor systems—starting with a small Spark for practice and then progressing to Mavic Pro, suitable for mapping operations. The objective of the course was to gain confidence on operating the drones for photo/videography and mapping operations, troubleshooting basic problems as well as learning all the associated mobile applications which allow for automation of the process. The instructors also explained mapping missions with using software available for download online: Pix4D Capture.

Next steps

- WFP Drones team will continue engaging with the Country Office on their needs and support in case of follow-on programme activities.
- The participants were particularly interested in an advanced flight training (such training was conducted in September 2018 for Madagascar and Mozambique allowing South-South collaboration).
- All training materials will be shared with the participants.

Regional Collaboration

54 participants from five countries in the Central America region plus Dominican Republic took part in this regional training.

Regional representation

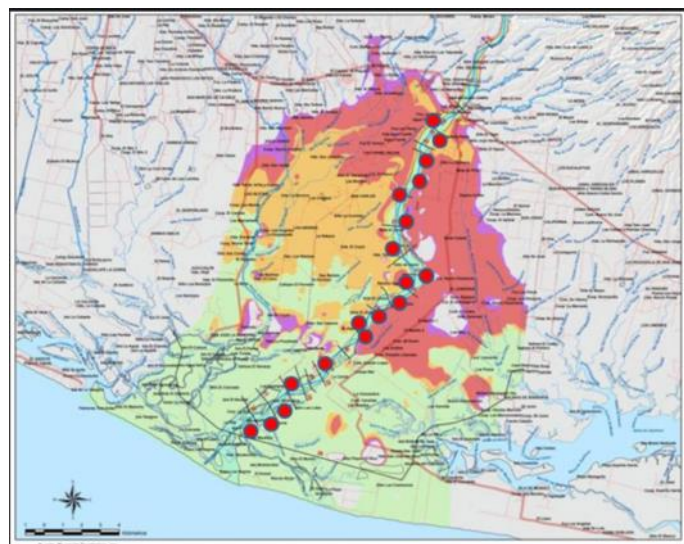


Group work—developing CONOPS

To further the regional collaboration and encourage the participants to think about regional applications of drones, the participants were divided into groups that had to come up with a Concept of Operations (CONOPS). One of the groups focused on the intervention in the Dry Corridor where smallholder farmers have been affected by the drought, losing livestock and crops. Drones could be used for an assessment of the situation of where the intervention is needed most.

Another group suggested to use drones for emergency preparedness in the Bajo Lempa area, in the Republic of El Salvador, which is prone to flooding caused by overflowing from the Lempa River. This is repeated year after year causing damage to agricultural production and the road structure.

During the preparedness phase, drones can be used for flood modelling and infrastructure planning, while in the emergency



response phase they can be used for search and rescue and situation monitoring.

All groups considered important aspects of project management and operations planning, accounting for needed time, resources as well as funding. All CONOPS planned for different response phases, personnel, equipment, legislation as well as flight limitations, risk and challenges.

Emergency Simulation

On Wednesday, 19 June 2019, a full-day emergency simulation was conducted. The participants entered the scenario of an emergency response...

The participants were divided into four groups who were rotating through different tasks throughout the day, as the emergency progressed from relief operations to recovery and reconstruction phase.

Each team had several profiles assigned to them (different at each rotation). The roles included:

- UAS Coordinator;
- Information Management Officer;
- Flight Safety Officer;
- Logistics Manager;
- Communications;
- Data Controller;
- Data Processor;
- Remote Pilot in Command.

The tasks mirrored a real emergency response and were based on real requests, for example from the emergency response in Mozambique carried out earlier in 2019. The tasks included:

- Mapping of standing water for assessing risk of cholera
- Mapping of a helicopter landing zone
- Assessing road damage and accessibility;
- Assessment of telecommunications towers;
- Teaching local stakeholders how to operate drones;
- Search and rescue in flood waters;
- Collecting communication materials.

Throughout the day, participants had to bear in mind the principles learnt in the three modules—Let's COORDINATE, Let's FLY and Let's MAP. While dealing with service requests



“We are thinking about how our unit can use drones scientifically for research. We can map critical points where landslides will occur. We [want to] work with other institutions to make plans with the municipality, to help the local government make evacuation plans and identify triggers, which all the municipal plans are [currently] missing. [We need] time to prepare plans correctly, and to prepare people. Drones can help.”

Angel Espinosa, Program Assistant, WFP Nicaragua

which tested flight and mapping skills, the knowledge on regulatory issues and collaboration were tested through additional scenarios. For example all flights had to be cleared with local authorities. On top of that the participants were given a challenge of dealing with media presence as well as issues of accountability to affected populations and data privacy and protection.

The emergency simulation tested the participants ability to work in a high stress environment and dealing with multiple requests at the time. They had to remain calm-headed as well as critical of various requests and scenarios and sift through misleading requests e.g. such that would infringe personal freedom and rights of affected populations. The emergency simulation also further encouraged regional collaboration as the participants were mixed in four groups.

“The government is looking forward to benefiting from this, which is why the country director was excited to send me here. The training is very useful, everything we have learned here. The regional perspective allows us to share information and do things together.”

Amanda Martínez, WFP Nicaragua



Conclusion

El Salvador, while geographically small in comparison to some countries requiring UAS technology, presents a series of logistics and terrain obstacles to which drones can uniquely address. The government and Civil Aviation Authority are receptive to the technology and actively drafting regulations to support civilian and commercial drone operations. As this progresses drone technology will become an important tool for humanitarian assistance and development activities due to its ability to assist in increasing efficiency and precision of existing operations.

The Regional Workshop and ideas presented from national and regional participants identified projects within the El Salvador governments existing intervention portfolio where UAS can be leveraged to assist ongoing activities. For example, drones can support the collection of water samples from the calderas of active volcanos serving as a mechanism to increase safety around sample collection through reducing the exposure to dangerous chemicals while also reducing the personnel involved in the collections process allowing for an increase in sample collection which directly feeds into the countries early warning mechanisms.

The regional workshop also identified the need for the support of a potential larger asset to support programmatic interventions across several geographically connected countries

addressing similar programme challenges. This includes the Dry Corridor where smallholder farmers across several borders are adversely affected by climate change. Increased surveillance of these areas can allow for more accurate modeling and forecasting leading to better outcomes for farmers and more efficient crop yields. A larger UAS asset can be positioned allowing for multi-agency use for monitoring while being on standby for emergencies that may arise within the region.



Annex

Training Agenda

SESSION	TIME	FACILITATOR(S)
Tuesday, 10 June 2019 (Let's COORDINATE)		
Opening & Introductions	1h	WFP
UAS Coordination	1h	WFP UAS
Concept of Operations (CONOPS) – Overview	2h	WFP UAS, Help.NGO
Case Study: Disaster Response in Mozambique	1h	Help.NGO
Overview on Data Protection and Privacy	1h	WFP UAS
Wednesday, 12 June 2019 (Let's COORDINATE)		
Planning Field Operations	1.5 h	WFP UAS, Help.NGO
Case Study: Climate Change and Adaptation	1.5 h	WFP UAS, Help.NGO
Group work: CONOPS	3 h	WFP UAS, Help.NGO
Thursday, 13 June 2019 (Let's FLY)		
Introduction to flight operations and applications	1 h	WFP UAS Team, Help.NGO
Practical Applications and Hands on Flight (Multi-rotor systems)	6h	WFP UAS Team, Help.NGO
Friday, 14 June 2019 (Let's FLY)		
Practical Applications and Hands on Flight (Multi-rotor systems)	6h	WFP UAS Team, Help.NGO
Monday, 17 June 2019 (Let's MAP)		
Introduction to Drone Imagery and Mapping	1 h	WFP UAS Team
Introduction to the Mapping Software	1 h	Help.NGO
Practical Mapping Exercises: Data Processing and Verification	5 h	Help.NGO
Tuesday, 18 June 2019 (Let's MAP)		
Standards for Data Processing	1h	Help.NGO
Practical Mapping Exercises: Data Processing and Verification	6 h	Help.NGO
Wednesday, 19 June 2019 (Regional Workshop)		
Emergency simulation	8h	WFP UAS, Help.NGO
Thursday, 20 June 2019 (Regional Workshop)		
Evaluation	2 h	Help.NGO, WFP UAS
Lessons-learnt	2h	WFP UAS, Help.NGO
Closing Ceremony	1h	WFP UAS, Help.NGO

Acronyms

AAC	El Salvador's Civil Aviation Authority (<i>Autoridad de Aviación Civil</i>)
CAA	Civil Aviation Authority
CENTA	National Center for Agricultural and Forestry Technology "Enrique Álvarez Córdova" (<i>Centro Nacional de Tecnología Agropecuaria y Forestal "Enrique Álvarez Córdova"</i>)
CONRED	Guatemala's National Disaster Management Office (<i>Coordinadora Nacional Para La Reduccion de Desastres</i>)
CONOPS	concept of operations
ETC	Emergency Telecommunications Cluster
FAO	Food and Agriculture Organization
IOM	International Organization for Migration
IM	Information Management
NGO	non-governmental organization
MAG	El Salvador's Ministry of Agriculture and Livestock (<i>Ministerio de Agricultura y Ganadería de El Salvador</i>)
MAGA	Guatemala's Ministry of Agriculture Livestock and Food (<i>Ministerio de Agricultura Ganadería y Alimentación</i>)
MARN	El Salvador's Ministry of Environment and Natural Resources (<i>Ministerio de Medio Ambiente y Recursos Naturales</i>)
RBP	Regional Bureau Panama
SDG	Sustainable Development Goals
SETEPLAN	El Salvador's Technical and Planning Secretariat (<i>Secretaría Técnica y de Planificación</i>)
UAS	unmanned aircraft systems
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WHO	World Health Organization

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El salvador
VEHICULOS NO TRIPULADOS
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