



First report of the 2020 ISPRS Educational and Capacity Building Initiatives Project



UAV Photogrammetry for Developing Resilience and Educational Activities in Malawi



Abstract: UAV Photogrammetry for Developing Resilience and Educational Activities in Malawi is a cooperative project between the Polytechnic University of Turin (PI) and the United Nations Children Fund (UNICEF) Malawi (Co-Is), with the support of local Universities (Lilongwe University of Agriculture and Natural Resources, Mzuzu University) and Agisoft LLC (for the use of their photogrammetry and computer vision software suite).

Malawi is a flood-prone landlocked country constantly facing natural and health

challenges, which prevent from sustainable socio-economic development of the country. Frequent natural shocks leave vulnerable communities food-insecure. UNICEF Malawi, in partnership with the Government of Malawi, was the first UNICEF office in the world to establish a segregated air space, which would serve as a sandbox for drone manufacturers, service companies, academia and other entities to test their drones in a real-life humanitarian and development cooperation context.

The UP4DREAM project focuses on one of the key priorities of drone project in Malawi (Imagery), and has the ambitious aim of starting a capacity building initiative, in order to become one of the biggest mapping mission in developing countries, focusing on the realization and management of cartography at a big scale and high level of detail (using GIS - Geographic Information Systems) and on the generation of 3D products based on the UAV-acquired data. The principal aim of UP4DREAM is to ensure that local institutions, universities, researchers, and service companies and manufacturers operating in the drone corridor will have the right knowledge and understanding of the photogrammetry and spatial information best practices, in order to perform big-scale aerial data acquisition, processing, share and manage in the most efficient, cost-effective and scientifically-rigorous way.



Report: From the 23rd of February to the 5th of March a delegation from the Department of Architecture and Design (Filiberto Chiabrando and Alessio Calantropio) and the Department of Environment, Land and Infrastructure Engineering (Andrea Lingua and Paolo Maschio) have been to Malawi for the first phase of the UP4DREAM Project. The experience was shared with colleagues from the Amazon’s disaster relief and response team, with the purpose of identify areas of collaboration with Amazon and Politecnico in the framework of this project. Below is a

brief summary of the activities, the outcome and the next steps for the initiative.



Politecnico di Torino conducted a capacity building exercise to students of the ADDA (The African Drone and Data Academy). As part of the capacity building exercise, Politecnico di Torino conducted a training session on the use of AGISOFT METASHAPE software for drone imagery processing, setting up of ground control points to enhance

the accuracy levels of the acquired drone imagery, as well as support ADDA with the structural development of their academic curricula most especially around drone imagery acquisition/processing. Activities have been also carried outside the class, with the acquisition of GCPs, the flight plan design and execution, both with fixed wing and multirotor UAV.

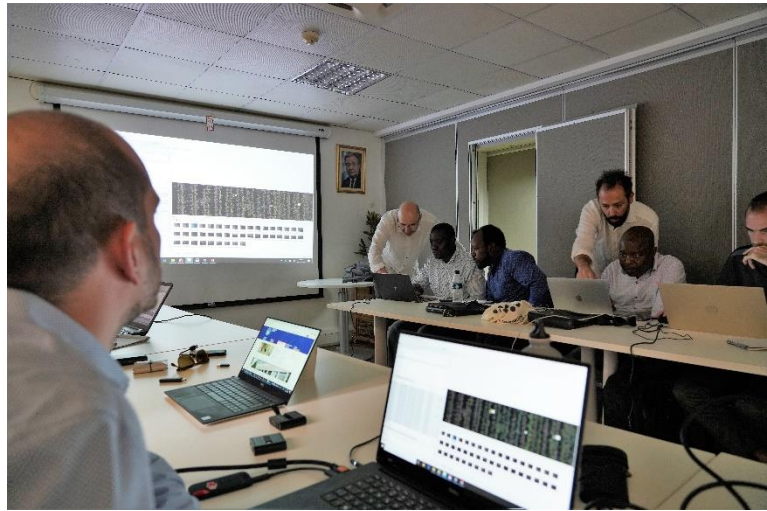
AMAZON colleagues hosted a session where they trained on how to use the Snowball edge computers to batch process drone imageries. The team is still in touch with the Amazon colleagues to provide technical support as we run along with the use of their equipment.



Another capacity building workshop has been organized with partners from the Academia (Malawi University of Science and Technology, Lilongwe University of Agriculture and Natural Resources, MZUZU University) as well as 4 colleagues from DODMA (Department of Disaster Management Affairs), COOPI (Cooperazione Internazionale) and with the UNICEF staff. The



outcome of the capacity building exercise was quite satisfactory as it was a good learning experience for all parties involved in the exercise. Colleagues from the academia, ADDA, DODMA and expressed satisfaction with the exercise and even requested for more of similar exercise's in the nearest future.



A part of the project activities has been focused on testing data acquisition on a limited area of the corridor with the partner Swop

Aero. A two days exercise has been performed in the Nsanje district, an area in the south of the country that is flood-prone and has been heavily affected by flooding in the 2019. Big flooding events in that area are recurrent (every 5 years), and the activities performed on the field aims also to provide support for the emergency preparedness and response before the next disaster is expected. The company, who won a commercial tender and is currently working in the corridor



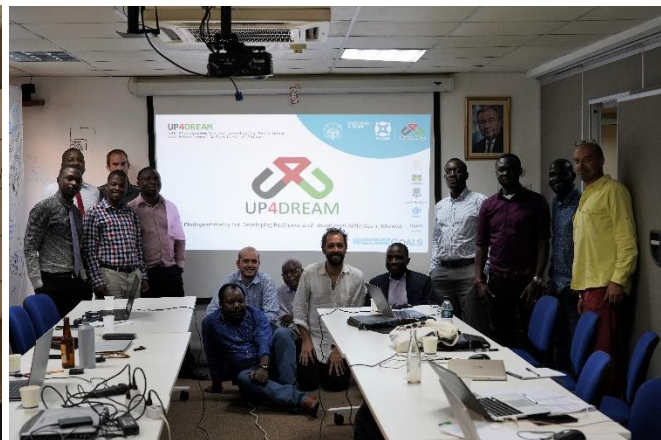
on behalf of UNICEF Malawi, is expected to run organized and automated drone mapping missions in order to acquire large amounts of aerial data, suitable for post-processing with a photogrammetry software which will then be used for further analysis for various multiple applications that, apart from flood modelling, will include mosquito breeding site identification, watershed monitoring, and similar.

Thanks to the ISPRS support, Politecnico di Torino donated 2 units of GNSS survey equipment's to UNICEF Malawi. Agisoft Metashape issued one-year software licenses for continuing with the activities of the project. Amazon, on the other hand, donated 3 units of their world class ruggedized supercomputer (Amazon Snowball edge) to UNICEF Malawi. The device will be used by for processing of large sized drone imagery, storage of the imagery as well as sharing the processed file(s) to hosted cloud server. This in turn, will support UNICEF's programmatic efforts, most especially around the flood modelling project and the planned mosquito breeding sites mapping.



Future steps: Moving forward, a few areas of future collaboration were outlined: Researchers exchange are expected and colleagues from the Academia indicated interest in possible exchange programmes with Politecnico di Torino. Therefore, MoU with interested partner will be signed in order to explore the possibility of staff exchange as well as publishing joint academic papers in international journals.

Future plans include the organization of one-week training activities; we explored the option of having another capacity building exercise maybe online or a future visit. Politecnico is also willing to continue to support ADDA on the development of their academic curricula with regards to drone imagery acquisition, processing & use. Possibilities of collaborations will be also investigated with Virginia Tech (the academic UNICEF partner in the ADDA project). Politecnico will provide also scientific support to the selected entity for the flood modelling project.





Press and social media dissemination:

- https://poliflash.polito.it/in_ateneo/up4dream_il_politecnico_in_africa_con_unicef_per_aiutar_e_le_operazioni_umanitarie
- [http://www.diati.polito.it/news/\(idnews\)/14531](http://www.diati.polito.it/news/(idnews)/14531)
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- [https://www.facebook.com/labG4CH/posts/832856440563733?_xts__\[0\]=68.ARBv8a4lUNvaYIo5JPqzs17OewBgLnM-bSGPjqmDXjq5cahaO1pW5ArTp_FbOZGcXRhV_MI83G5mHrgqM-TgdOOGl4A04frk2dMBnskdR7HLsvpI9V6QCs47R0wueRH4UGmLTmWTXaPDKg1xm6qUfSKFdUeQ667nwlI0hdQRveij50Circi4AmYD1MEW1Loj2NJW4x7dVvk11u3E5M7o64CwYtA0xN-pgNxLjX-0MhHAzs1HyvtRL5QoDzIqbyG23YUSboCF-Dajp6L0Q6-0HBjDpqmIAKZNoCUgzovzauCyluWjazWFP3kZ0nM7Ms4Re97N8Ui1Xeqd6b0GpB0JM&_tn=-R](https://www.facebook.com/labG4CH/posts/832856440563733?_xts__[0]=68.ARBv8a4lUNvaYIo5JPqzs17OewBgLnM-bSGPjqmDXjq5cahaO1pW5ArTp_FbOZGcXRhV_MI83G5mHrgqM-TgdOOGl4A04frk2dMBnskdR7HLsvpI9V6QCs47R0wueRH4UGmLTmWTXaPDKg1xm6qUfSKFdUeQ667nwlI0hdQRveij50Circi4AmYD1MEW1Loj2NJW4x7dVvk11u3E5M7o64CwYtA0xN-pgNxLjX-0MhHAzs1HyvtRL5QoDzIqbyG23YUSboCF-Dajp6L0Q6-0HBjDpqmIAKZNoCUgzovzauCyluWjazWFP3kZ0nM7Ms4Re97N8Ui1Xeqd6b0GpB0JM&_tn=-R)
- https://www.instagram.com/p/B8_oNSBggXX/



