10. Handling Project Management

Managing a UAV project requires attention to a number of concerns:

- *Lithium batteries.* Lithium polymer (LiPo) batteries used in UAVs are highly flammable and must be transported in LiPo safety bags when traveling. On commercial flights, passengers are allowed a maximum of two 100–160 Wh batteries, which must be kept in carry-on luggage.[1] Quantities of smaller batteries are not usually limited, but some airlines or airport security staff may take away what they perceive as excessive quantities of batteries. Before traveling with batteries related to a UAV mission, it is advisable to obtain the airline's transport policy in writing so there will be no question of permissibility.
- *Power supply.* When working in the field, power can be limited. A good power supply should be ensured both on site and at the facility where processing of the data will take place (e.g., solar charger or car inverter in the field; reliable electricity or on-site generator at the hotel or office).
- *Food, water, shade.* UAV missions should plan for food, water, and a source of shade in the field. In some locations, and particularly after a disaster has occurred, it may be difficult to purchase food and water on site. Because UAV operations require outdoor work during the hotter hours of the day, it is also important to have an umbrella or tent to protect people and equipment from overheating.
- _Daily planning._The hours available for UAV flights can be limited by weather and sunlight. It is advisable to plan all aspects of the day's work, including worst-case scenarios, on the preceding evening. This approach ensures that valuable daylight hours are used for flying rather than planning and coordination.
- *Mission reports.* During the mission, the operator should keep a daily log that records flights, any issues encountered, and recommendations for future missions. This gathering of small but key details of the day-to-day operations—such as turnaround time, number of failures, potential for schedule delays—can be helpful in estimating potential extra costs and improving budgeting, planning, and execution of future missions.
- *Collaborators and service providers*. In many situations, hiring local professional service providers can be an efficient way to implement a survey. Local professional firms are likely to have already met relevant regulatory requirements (i.e., are likely certified or registered), so this approach can save time. It can also simplify logistics because local service providers know the operational context, the terrain, and the population. Finally, it can save money, since it obviates shipping of equipment and hiring of international experts. Of course, any local service providers hired must have the adequate expertise and experience for the project. Table 6 offers some guidance on skills profiles and equipment that may be needed for various types of mapping.
- *Maintaining skills.* Flying UAVs during and after emergencies requires a high level of skill. To ensure readiness in these high-stress situations, training should be ongoing. More specifically, operators should regularly practice and train in the piloting skills that are needed during emergencies. All flights during emergency operations must be premeditated and based on training with the responsible emergency personnel and authorities; otherwise well-meaning operators risk seriously interfering with emergency response activities.

Table 12. Sample Sensor Types and Experts Needed for Various UAV Data Applications. Table created by the UAV4Resilience team.

Project type	Sensor type	Resolution	Accuracy	Experts
Crop monitoring	Red edge or multispectral	As low as 30 cm/pixel	5 m	Remote sensing specialist; agronomist
Urban mapping	Standard RGB camera	2–10 cm/pixel	< 10 cm; requires use of GCP or RTK/PPK	Urban planner; machine learning specialist

[1]For more information, see IATA (International Air Transport Association) guidance at http://www.iata.org/whatwedo/cargo/dgr/Pages/lithium-batteries.aspx.

Project type	Sensor type	Resolution	Accuracy	Experts
Disaster mapping	Standard RGB camera	10 cm/pixel[a]	1 m	Disaster recovery management specialist; machine learning specialist for damage assessment (if crowdsourcing is not used)

a. UNICEF Malawi uses 7 cm/pixel resolution for flood mapping.