

# USING UAVs TO ASSESS DISASTER RISK IN FIJI & TONGA

## Developing the capacity and readiness of Pacific island countries

### AT A GLANCE

**Countries** Fiji & Tonga

**Risks** Tropical cyclones

**Area of Engagement** Promoting open access to risk information

By developing local capacity to generate data on disaster risk, countries can carry out more analysis and make decisions based on evidence.

### LIFE-SAVING DATA SCATTERED ACROSS HUNDREDS OF ISLANDS

Collectively home to more than 1 million people, the Pacific island nations of Fiji and Tonga are frequently threatened by the impacts of climate change and natural hazards. In the aftermath of a disaster, these islands work hard to assess, identify and quantify risks and begin the recovery process.

Fiji and Tonga have taken many efforts to gather information about and prepare for shocks. However, consisting of many small and often remote islands, they face unique geographical challenges that impede data collection. This, in turn, hampers effective disaster prevention and response.

### USING UAVs TO PUT IT ALL TOGETHER

To help fill this risk information gap, Fiji and Tonga have taken to the skies with Unmanned Aerial Vehicles (UAVs), which provide a flexible means to collect very high-resolution images and terrain information that complement traditional sources such as satellites.

Image comparison of the same building in Tonga



Through the UAV4Resilience project, which received support from the African, Caribbean, Pacific - European Union Natural Disaster Risk Reduction (ACP-EU NDRR) Program\*, the two countries built their capacity and readiness to deploy UAVs for disaster and climate risk assessments, and for rapid identification of damage to the environment in post-disaster situations.

Through this project, Fiji and Tonga used high resolution aerial images from UAVs to generate cost-effective baseline mapping data and digital elevation models. These rich data can be used for many disaster

risk management applications such as flood modeling or coastal erosion risk evaluation. The datasets can also be updated frequently to monitor changes in the physical environment, parcel mapping, and crop monitoring.

Data generated through the UAV4Resilience project fed into the *Tonga Rapid Damage Assessment and Recovery Framework for Tropical Cyclone Gita*, which was also supported by the ACP-EU NDRR Program. Over the course of six days following Tropical Cyclone Gita, the World Bank, the National Emergency Management Office of Tonga, and Tonga's Ministry of Lands, Survey and Natural Resources and the Environment deployed UAVs to cover the main island of Tongatapu and were able to compare the data against images captured by UAVs in October 2017.

These data helped Tonga identify which buildings, infrastructure, and vegetation were damaged by the cyclone. Comparing the images before and after the disaster also enabled officials to create a post-disaster baseline map that could be incrementally updated through the recovery and reconstruction phases. Furthermore, the images proved useful in validating the claims of damage to housing by the house owners.

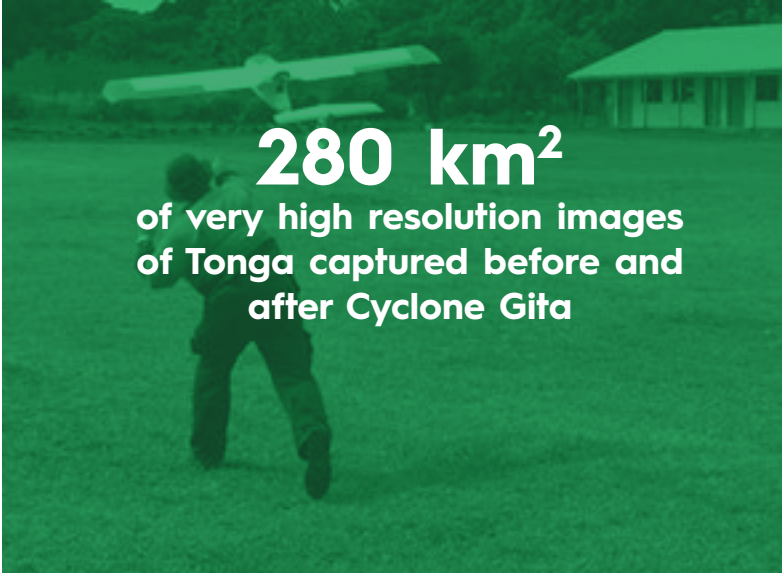
## LESSONS LEARNED

### Better data leads to better decisions

The very high resolution images UAVs produce can be the basis for analytical work on the physical environment and how it interacts with the society at the local level. Tonga's Ministry of Education is using the high-resolution aerial images to plan for the reconstruction of schools following Tropical Cyclone Gita. Better data led to a better representation of the issues, resulting in better decisions.

### Projects implemented before a disaster can be crucial for post-disaster activities

Before Tropical Cyclone Gita struck, the World Bank and counterparts from the Government of Tonga (GoT) developed best practices on the use of UAVs for small island states, and these practices proved key for the data collection following the disaster. The various datasets created through this activity will form a robust database that can be used for subsequent recovery and reconstruction planning, as well as monitoring and evaluation.



# 280 km<sup>2</sup>

of very high resolution images  
of Tonga captured before and  
after Cyclone Gita

### LOCAL CAPACITY ENHANCED

GoT trained 5 people and developed training for the Department of Land of Tonga and Fiji, which created local capacity and bottom-up data generation, leading to better ownership of the data from local communities and interest in its use. The South Pacific Community will function as the regional knowledge hub to scale-up the use of UAVs to other Pacific Island nations.

### DEVELOPED A RECOVERY FRAMEWORK

The UAV images of the island of Tongatapu that were captured before and after Tropical Cyclone Gita informed the development of a Disaster Recovery Framework for Tonga, outlining the next steps for recovery and reconstruction efforts.

### REPURPOSED DATA ASSETS

The 44 UAV images covering the main island of Tonga were made available on OpenAerialMap.org. They are now being used by Tonga's Ministry of Education to plan for the reconstruction of schools following Cyclone Gita, and by the Ministry of Lands, Survey and Natural Resources to validate damage claims. To inspire the use of UAVs well beyond the Pacific, the World Bank showcased the results of the projects during the 2018 G7 Ministerial Meeting.

*"UAVs unlock the potential for interested parties to capture information that was previously only possible by hiring manned aircraft and specialists which were expensive. Availability of good quality high-resolution data will further accelerate the ability to make informed decisions based on evidence."*

-- Leveni Aho, Director, National Emergency Management Office, Tonga