Mapping Vulnerabilities: Empowering Grassroots Disaster Management and Community Resilience through Geospatial in Tonga

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SUMMARY

The integration of geospatial tools into disaster risk management is crucial for enhancing community-level resilience, particularly in the Pacific Islands. Conducted as part of Spatial Vision's Pacific Geospatial Skills Development Program, this project aimed to strengthen the disaster risk management plans developed by Kau He Lau (a disaster resilience initiative under the Tonga National Council of Churches) for two disaster-prone communities in Tonga by creating risk profiles and mapping vulnerabilities. The Pacific Geospatial Skills Development Program provides opportunities for professionals from Pacific Island Countries and Territories to develop geospatial expertise with Spatial Vision. This year's awardee, Ofa Masiwawa, selected this project as her focus, aiming to integrate geospatial tools into community disaster management workflows. In collaboration with the Tonga National Council of Churches and other local stakeholders, the project integrated geospatial data into community disaster risk management plans. This involved a systematic process beginning with desktop collation of existing hazard, vulnerability, and risk data, followed by the design of in-field surveys. Using QField, household demographic and structural data were collected from 90 households across two villages. The data were then analysed to develop community-specific risk profiles that mapped vulnerabilities and identified priority households at greatest risk during climate and natural hazard events. Beyond data collection, the project had a significant capacity-building focus. Staff from Kau He Lau were trained in geospatial data collection methods, QField workflows, and basic QGIS skills. To sustain the impact of this initiative, a custom QGIS viewer was developed, allowing the organisation to independently query and visualise data on hazards and vulnerabilities. These tools and training have embedded geospatial capacity into an organisation that had never before used geospatial technologies in its disaster risk management workflows. The results of this pilot project are transformative. Vulnerabilities that were previously unseen are now mapped, enabling more effective, geo-smart decision-making at the grassroots level. This has empowered Kau He Lau and community

stakeholders to take data-driven action, improving disaster preparedness and response efforts. Importantly, the integration of geospatial tools at the community level bridges a critical gap in disaster management, ensuring that interventions are targeted, timely, and equitable. This project demonstrates the power of geospatial innovation in addressing the pressing challenges of climate resilience and disaster risk in Pacific Island nations. By focusing on capacity building and grassroots action, it highlights how the strategic integration of spatial data can strengthen local disaster management systems, support community-level decision-making, and pave the way for more resilient futures in vulnerable regions.