In early April 2020, tropical cyclone Harold, a severe category 5 cyclone, hit countries within the Pacific region, causing major damage and widespread destruction (Figure 1). Following the cyclone, the National Emergency Management Office (NEMO) in Tonga, under the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC), and together with supporting ministries and humanitarian agencies, acted quickly to lead and coordinate the Initial Damage Assessment (IDA) at the household level across Tongatapu and ‘Eua and other affected areas (Figure 2). The IDA was undertaken by conducting household interviews, damage verification and observation and remote sensing surveying using unmanned aerial vehicles (UAVs.) Figure 2 demonstrates the areas where the IDA survey was carried out using KoboTool where overall maps were generated, reaching a total of 3,950 households (23 per cent of total households) across Tongatapu and ‘Eua. It was estimated that approximately 10 per cent of households in Tongatapu and ‘Eua were significantly impacted and needed urgent relief, with over 1,400 people being displaced. Patangata (Kolofo’ou District) experienced severe flooding during tropical cyclone Harold, as can be seen in Figure 1. The area of dryland that was used for living is now thinner and more exposed to flooding.

With assistance from the MORDI Tonga Trust, an International Fund for Agricultural Development, a UAV damage assessment survey was undertaken using small scale UAVs. These surveys, undertaken in high damage areas, showed major differences between the pre- and post-disaster scenarios in terms of severe land and building damage. Using space and geospatial applications, such as UAVs, post disaster assessments provide accurate, high resolution and quick imagery of the damage which would be difficult or expensive to gain elsewhere. Through the use of UAV surveying, areas of high concern can be quickly identified in order to alert authorities of where aid and support needs to be directed.

The cyclone caused widespread damage to not only people and property, but also to local infrastructure and agricultural areas, such as crops and trees. This impacted and strained the local communities who rely on these
services for their livelihoods. Many people living within these communities do not have other means of acquiring these services, such as food and water, and required urgent support. Upon completion of the surveys, it was found that many households had poor access to clean drinking water, electricity, reliable food sources and basic necessities, and 25 per cent of households had damaged kitchens or toilets. This information was then used for recovery efforts by providing recommendations to aid priority areas where immediate action was needed. This included priority to both communities and households, as well as mid- to long-term priorities in supporting and rebuilding households.

Figure 1. Drone images showing severe flooding during Tropical Cyclone Harold in the Patangata Village, Kolofo’ou District, Tonga


Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Figure 2. Areas where the IDA survey was carried out in Tongatapu

<table>
<thead>
<tr>
<th>TOTAL POPULATION OF TONGATAPU</th>
<th>TOTAL NUMBER OF HOUSEHOLDS IN TONGATAPU</th>
<th>TOTAL NUMBER OF HOUSEHOLDS SURVEYED</th>
<th>TOTAL POPULATION SURVEYED</th>
</tr>
</thead>
<tbody>
<tr>
<td>74,611</td>
<td>13,096</td>
<td>4,900</td>
<td>23,940</td>
</tr>
</tbody>
</table>


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Additional details and more practices like this can be found in *Geospatial Practices for Sustainable Development in Asia and the Pacific 2020: A Compendium*.