InnovationLab Further your understanding of disaster risk



GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY GFDRR

Spatial Impact Assessment

Innovating with spatial data

When a major natural disaster strikes, it is important to estimate its impact quickly to prepare for recovery. A Spatial Impact Assessment (SIA) can be undertaken to do so prior to, or in parallel with a post-disaster needs assessment (PDNA). In addition to generating a first-order impact estimate, the results from the SIA can also be used to validate the PDNA outputs.

Global partnerships

Over the years, the SIA team has established relationships with organizations worldwide that can produce post-disaster spatial data that range from:

- Satellite (optical, radar) data;
- Aerial photography;
- Digital Elevation Models (DEM);
- Unmanned Aerial Vehicle (UAV) imagery.

The SIA team also works with scientists that have developed methodologies to assess the hazard impacts, as well as volunteer organizations that can facilitate *crowdsourced damage assessments* and *social media analysis*. These partnerships allow the SIA team to continuing advancing and adjusting the methodology to align with new technologies.

Choosing the optimal partners and methodologies

A few conditions affect how the SIA team undertakes an assessment:

- Pre-event country data availability;
- The country's existing capacity to handle geospatial data;
- ▶ The country context; and
- ► The nature of the event.

Working with different data producers and value-adding organizations, the SIA team facilitates the assessment of direct physical damage to cash crops, transportation assets (roads, bridges), forestry, and the housing sector using spatial datasets.

Leveraging work by the Open Data for Resilience Initiative

The work of the GFDRR-supported Open Data for Resilience Initiative (OpenDRI) is essential to SIA. The geospatial datasets developed through OpenDRI and other activities allow the SIA team to see the before and after impact to obtain a damage estimate. SIA uses the information generated from community mapping exercises undertaken prior to the disaster event to determine the number of schools and hospitals affected, total length of roads destroyed, or other relevant data.

The OpenDRI-supported open data platform allow the SIA team to quickly access pre-disaster geospatial information about a community.

Establishing post-event baseline for reconstruction planning

Based on national statistics or specialists with local knowledge, replacement costs for housing and key infrastructure can be obtained. Additionally, a first-order estimate of the direct damage, in economic terms, can be obtained.

SIA for post-disaster recovery planning

Information generated through the SIA, combined with baseline maps from pre-disaster activities, enables better reconstruction planning. The SIA team works hand in hand with OpenDRI, both pre- and post-disaster, to generate relevant, accurate data to further disaster response and recovery.



Case studies

Photos: The variety of resources used in SIA (top left clockwise): aerial imagery, satellite imagery, OpenStreetMap exposure data, and unmanned aerial vehicle (UAV) imagery. Photo credits: European Forces in Bosnia and Herzegovina (EUFOR), NASA, OpenStreetMap, Micromappers.

▶ 2016 Fiji Tropical Cyclone

SIA supported the Government of Fiji with a PDNA following Tropical Cyclone Winston, the strongest cyclone to make landfall in the island country. Advanced risk modeling techniques were used to quickly quantify the damage to the housing sector and further disaggregate the damage information collected by the government. Imagery taken by drones in sampled areas were used to characterize and verify the intensity of the cyclone.

2015 Malawi Floods

In January 2015, Malawi was affected by the worst floods and landslides in a century. Pre-disaster community mapping activities, supported by OpenDRI, had generated comprehensive spatial baseline maps in two of the affected districts. The flooding extent generated from satellite data by SIA global partners were overlaid on the OpenStreetMap data to establish the totality of affected areas by the floods.

2013 North India Floods in Uttarakhand

In June 2013, severe flash floods and mudslides in the northern Indian state of Uttarakhand resulted in the death of over 6,000 people and affected over 500,000. An SIA was developed in collaboration with the Uttarakhand Space Application Center in parallel to the PDNA, where a first-order estimate of the extent and severity of damage over the entire affected region was derived.

