

# 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 disaster strikes, it is important to estimate the impact from the disaster quickly to prepare for recovery. Spatial Impact Assessment (SIA) can be undertaken to obtain rapid assessments of the impact prior to, or in parallel to a Post Disaster Needs Assessment (PDNA). Apart from generating a first-order impact estimate, the results from the SIA can also be used to validate the outputs from the PDNA.

### Global partnerships

Over the years, the SIA team has established relationships with worldwide organizations 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 continue advancing and adjusting the methodology to align with new technologies.

### Choosing the optimal partners and methodologies

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

- ▶ Pre-event data availability
- ▶ The country's existing capacity to handle geospatial data
- ▶ The country context,
- ▶ 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 these spatial datasets.

### Leveraging work by the Open Data for Resilience Initiative

The work of the 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 an estimate of damage. SIA uses the information generated from community mapping exercises undertaken prior to the disaster event, to determine, for instance, the number of schools and hospitals affected or the total length of roads destroyed.

Open data platform, a data storage and sharing platform supported by OpenDRI, and the stored data allow the SIA team to quickly access pre-disaster geospatial information about a community.

### Establishing post-event baseline for reconstruction planning

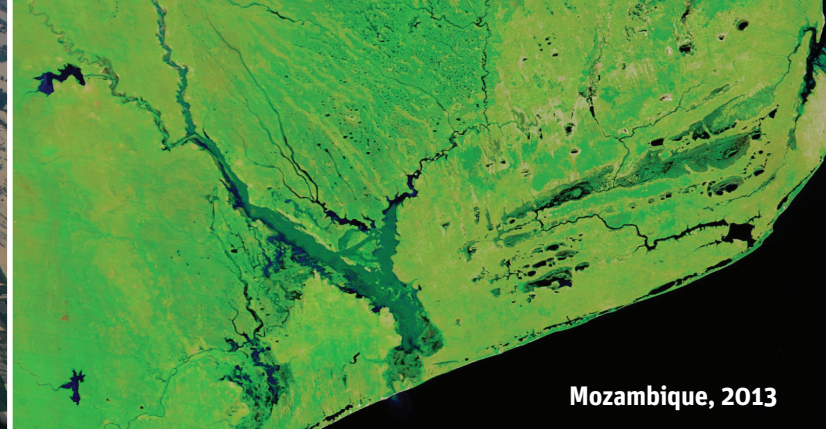
Replacement costs of housing and key infrastructure can be obtained from national statistics or specialists with local knowledge. Combined with the direct physical impact estimates, a first-order estimate of the direct damage in economic terms can be obtained.

### 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 forward disaster response and recovery.



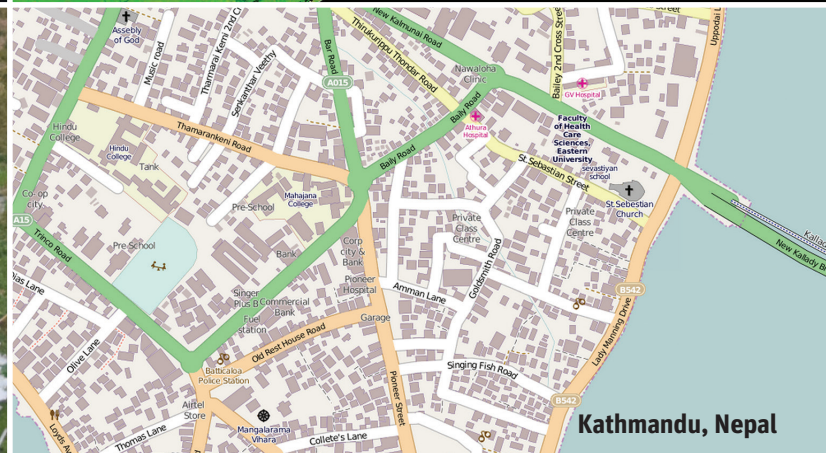
Bosnia and Herzegovina, 2014



Mozambique, 2013



Vanuatu, 2015



Kathmandu, Nepal

## Case studies

### ► 2010 Pakistan Flood

During three months in the summer of 2010, the entire country of Pakistan was affected by heavy rainfall, resulting in prolonged flooding along the entire Indus River. An SIA was deployed and carried out by the Pakistan Space Agency (SUPARCO). Within two weeks, SIA and its partners, delivered a rapid, first-order estimate of the direct physical impact to the housing, agriculture, and transportation sectors for the five provinces highlighted by the PDNA.

### ► 2013 North India Floods in Uttarakhand

In summer 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.

### ► 2015 Malawi Floods

In January 2015, Malawi was affected by major floods and landslides. Pre-disaster community mapping activities, supported by the Open Data for Resilience Initiative (OpenDRI), had generated comprehensive spatial baseline maps in two of the affected districts. The flood extents generated from satellite data by the SIA global partners were overlaid on the OpenStreetMap data to establish total extent of affected areas by the floods.

**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.



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