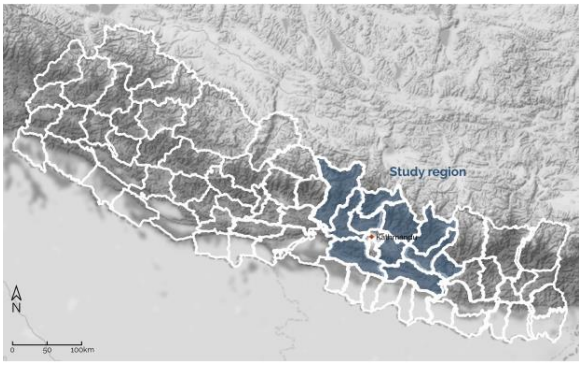
Supporting Equitable Disaster Recovery Through Mapping and Integration of Social-vulnerability into Post-disaster Impact Assessments



Summary:

Disasters continue to present tremendous obstacles to sustained development progress and the well-being of communities around the world. After the 2015 Gorkha earthquake in Nepal, the need for holistic post-disaster information systems became even clearer. This study focused on the information and the data that influences early decision-making processes after a disaster. It built frameworks for developing information systems that not only identify those who are impacted but also those who are least able to recover to inform more equitable long-term recovery processes.

What challenges and tradeoffs do households face as they 'build back better' after disasters? Often, recovery decisions are in the hands of national governments along with international and local NGOs. But how do these groups create plans and policies on how to recover?

One instance is the Post-Disaster Needs Assessment (PDNA), which is a multi-sectoral loss assessment meant to detail a holistic view of the damages and needs introduced and/or exacerbated by the disaster. The framework built by this project capitalizes on the PDNA and uses it and other data sources to rapidly estimate building damage.

At a Glance:

SDGs: 1- No Poverty, 10 - Reduced Inequalities, 11- Sustainable Cities & Communities

Project Objective: To develop tools and improve how stakeholders can map damage and integrate social vulnerability into post-disaster information systems.

Geography: Nepal

Technologies: Spatial statistics, machine learning models.

Data Innovation:

Disaster impact measurement can be improved to foster a more effective and equitable recovery. Two main aspects are:

1. Improving statistical accuracy of assessment using more and better data (e.g. remote-sensing, crowd-sourcing, rapid field surveys) and better statistical modeling using a 'geospatial data integration framework' (G-DIF);
2. Defining better metrics of disaster-induced vulnerability and need by creating a 'post-disaster persistent need' (PDPN) metric to predict recovery outcomes based on data from past disasters.

The project developed novel methods combining spatial statistics, social science, and machine learning models to develop rapid damage and need estimates to reflect the different ways that disaster impacts are felt and enable a meaningful recovery process. The tools and frameworks developed are openly available to potential users. It is flexible to diverse data inputs and other disaster scenarios (e.g. hurricanes) but context-specific to enable generalizability across regions and hazards,

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while also ensuring local validation by incorporating ground truth data inputs.

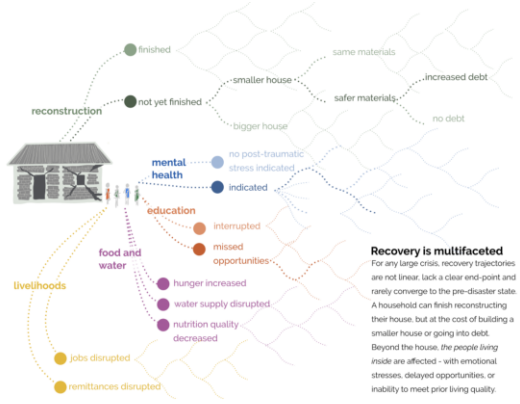

Figure: An illustration of the multifaceted nature of recovery for earthquake-affected households. Credit: Sabine Loos.

Lessons Learned:

Impact assessments are crucial for guiding recovery, that the next generation of researchers and practitioners must answer:

1. Whether the statistics and measurements of impact genuinely reflect the *needs* of the affected communities.
2. Whether supporting analysis makes efficient use of existing information and rapidly available data collected post-disaster.

Three key learnings from this project are:

1. Recovery is not a straightforward or a linear process; there are many different trajectories of recovery, with varying tradeoffs involved.
2. It is possible and valuable to improve the accuracy of post-disaster evidence, like building damage maps, by rapidly integrating multiple data sources.
3. Households will have different needs after a disaster; it's important that post-disaster evidence reflects those differences thoughtfully.

Results:

A framework was developed to produce high-resolution estimates and maps of damage that leverage and integrate numerous data sources, mobilizing advances in remote sensing and big data technologies. G-DIF locally calibrates and integrates the increasing number of damage proxies produced after a disaster into a single estimate and map. The survey of earthquake-affected households highlighted how common narratives around 'building back better' can conceal complex recovery trajectories fraught with trade-offs between rapidity of reconstruction, housing safety, taking on debt, etc.

The project also developed a new need metric to integrate a combination of recovery factors. Unlike the building damage mapping (conducted through G-DIF), which is an estimate of the immediate state of impact, the post-disaster persistent need metric is a prediction of a future outcome of recovery. It highlights the fact that even though two communities might have experienced similar physical impacts, one might recover more quickly and to different standards because it benefits from certain socioeconomic or geographic factors that put it at an advantage over the other.

References:

Five years later: equitable recovery research
Informatics for equitable recovery
Informatics for Equitable Recovery: Nepal – Disaster Analytics for Society Lab

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