Participatory and Collaborative Digital Mapping to Enhance Disaster Resilience

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The Issue: Knowledge and Information Gaps -

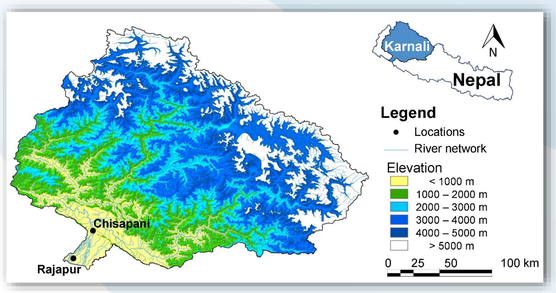
- **The Sendai Framework recommendation – "to develop, periodically update and disseminate, as appropriate, location-based disaster risk information, including risk maps, to decision makers, the general public and communities at risk of exposure to disaster in an appropriate format by using, as applicable, geospatial information technology".**
- **Critical information gaps, especially spatial risk information at local levels, seriously compromise efforts for building disaster resilience in disaster-prone least developing countries. The collection and generation of such information is generally hindered by lack of expertise, technological barriers and resources in developing regions, where the majority of information flows from the top down.**
- **Hundreds of thousands of community maps related to risk and resources are produced on paper by humanitarian and development organizations around the world through Vulnerability and Capacity Assessment and the value of these maps are far from being fully exploited.**

Approaches - An integrated participatory and collaborative mapping methodology approach for local disaster risk, resources and capacity information collection and management.

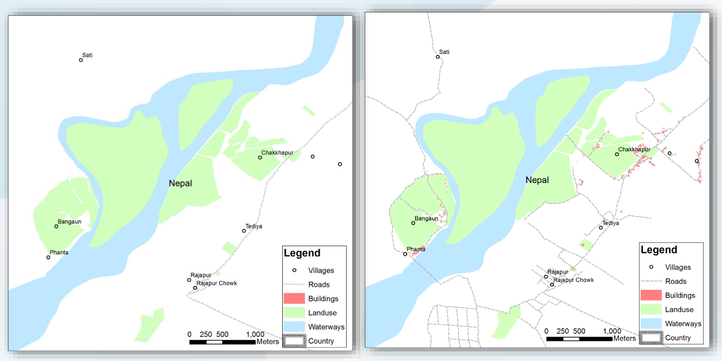
Tools: Participatory VCAs, OpenStreetMap (OSM) Remote Mapping, Field papers, OSMTracker, QGIS, etc. General Procedure –

1. **Collect and digitize existing analog community maps (PRA, VCA and others) and identify geographic locations of target communities;**
2. **Conduct remote OSM mapping using both satellite images and community maps and generate preliminary baseline community maps;**
3. **Develop, together with local stakeholders, field surveys to fill major data gaps in the preliminary maps;**
4. **Organize focus groups with local communities to discuss and further improve the baseline maps;**
5. **Maintain traditional community mapping activities using baseline maps as the basis and add information to capture new changes (e.g., land use changes, impacts from recent disaster events) and discuss risk reduction and preparedness options;**
6. **Store spatial information locally in a GIS (likely by government agencies and NGOs) and upload non-sensitive data to OSM;**
7. **Periodically update the maps and share and exchange them across communities and with regional stakeholders.**

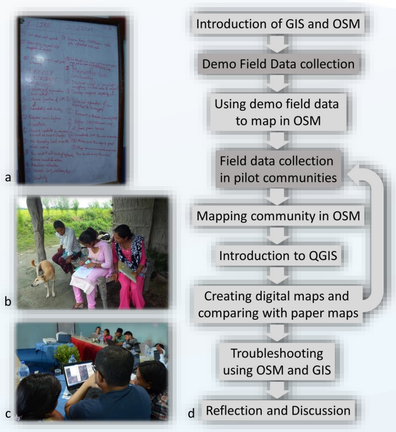
Demonstration Site in Karnali River Basin, Western Nepal



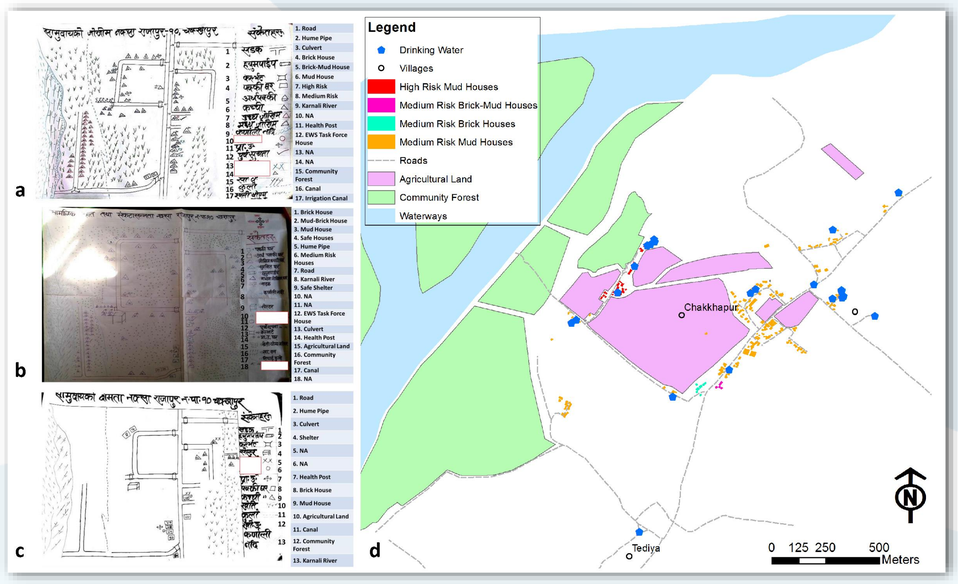
Karnali river basin in Nepal is one of the most remote and economically poor regions in the world, and suffers from serious flood risk, with three major flood in the past decade



Pilot communities shown in OSM in 2014 & 2016



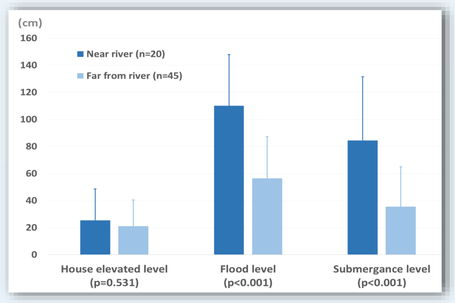
General workflow of a stakeholder mapping workshop procedure



Chakhapur community - a) risk map, b) capacity map, c) social map & d) digital OSM/VCA map.

a) Flood hazard map of Chakhapur, sizes of circles correspond to self-reported flood levels in Aug. 2014 at house locations (n=65);

b) Physical vulnerability map of Chakhapur, sizes of circles correspond to measured level of elevated houses (n=65). The background of maps is from OSM.



Comparison of Chakhapur households near river and far from river in terms of a) flood hazard, b) physical vulnerability, and c) potential impacts.

Ongoing Activities to Scale-up from the Demonstration Communities and Replicate in Other Regions

- **>25000 houses and constructed units & ~1000 km of roads mapped throughout ~100 communities in Lower Karnali River basin;**
- **Ground validation on important facilities (e.g., shelters, health posts, open grounds, etc.) to be completed before monsoon 2017;**
- **Remote mapping of 5000+ houses and 200+ km of roads in disaster-prone communities in Jonuta, Mexico and Chosica, Peru**

Discussion and Conclusions

This approach, as an inclusive form of risk knowledge co-production, takes advantage of the strengths of the diversity of the tools from both participatory & collaborative mapping approaches. We involved a wider range of stakeholders and citizens to co-generate geographic information on resources, capacities and flood risks of communities based on local needs more effectively & efficiently. These information can compliment other scientific knowledge and make important contribution to evidence-based understanding of disaster risk, inform better assessment, management and allocation of resources for risk reduction, and enhance disaster resilience at local level and beyond.