

Digital technologies in support of flood resilience

A case study from Nepal

Wei Liu^{1*}, Ian McCallum¹, Linda See¹, Sumit Dugar², and Juan-Carlos Laso-Bayas¹

1. International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria;

2. Practical Action Consulting South Asia, Kathmandu, Nepal

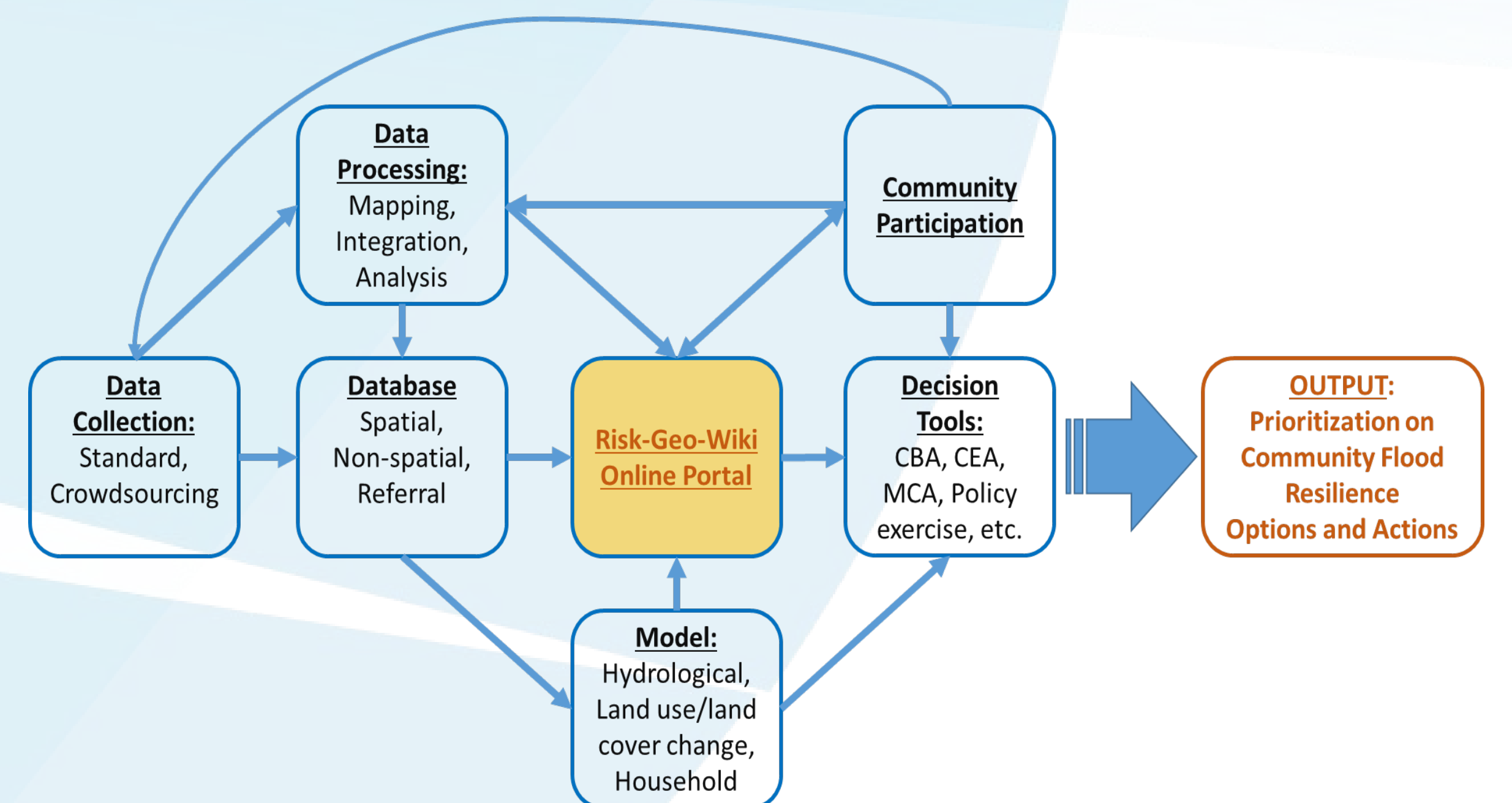
* liuw@iiasa.ac.at

Summary

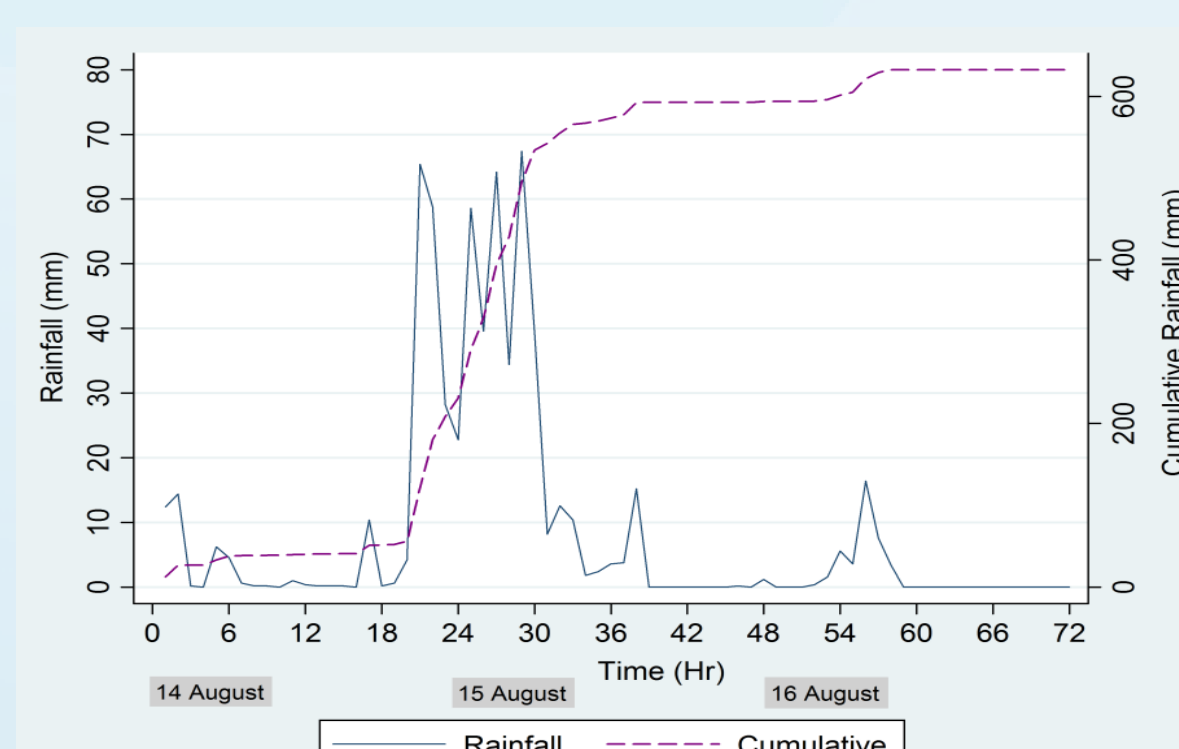
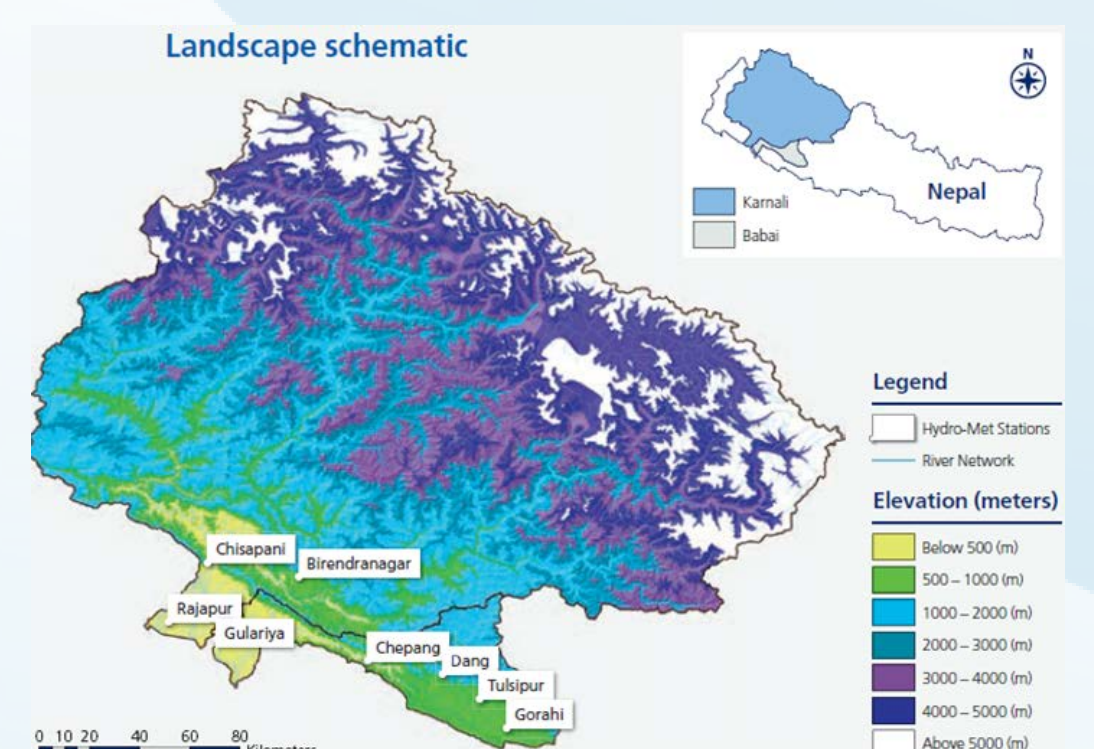
- Disaster resilience of communities is the ability of communities to pursue their social, ecological and economic development objectives while managing its disaster risk over time in a mutually reinforcing way. It cannot be understood without sufficient data about the risks (hazard, exposure and vulnerability) faced by the communities.
- Different forms of digital technology can support to build flood resilience. We introduce three main tools we use here – Flood Risk Geo-Wiki, Community-based risk mapping integrated with OpenStreetMap, Geographical Open Data Kit (GeoODK). These types of digital technologies are simple to implement yet together can help support flood prone communities. We demonstrate a pilot effort on how we work with different stakeholders in the Karnali basin in Nepal.

Tools

- Flood Risk Geo-Wiki** is an online visualization and crowdsourcing tool, which has been adapted to display flood risk maps at the global scale as well as information of relevance to planners and the community at the local level.
- Combining community-based risk mapping (via **Vulnerability and Capacity Assessment, VCA**) and **OpenStreetMap** to provide better access to this collective knowledge base.
- Mobile phones, using the **GeoODK (Geographical Open Data Kit)** questionnaire builder, are being deployed to collect georeferenced information on flood risks and vulnerability, which can be used to validate flood models and design action plans and strategies for coping with future flood events.



Pilot Study in Karnali River Basin, Western Nepal

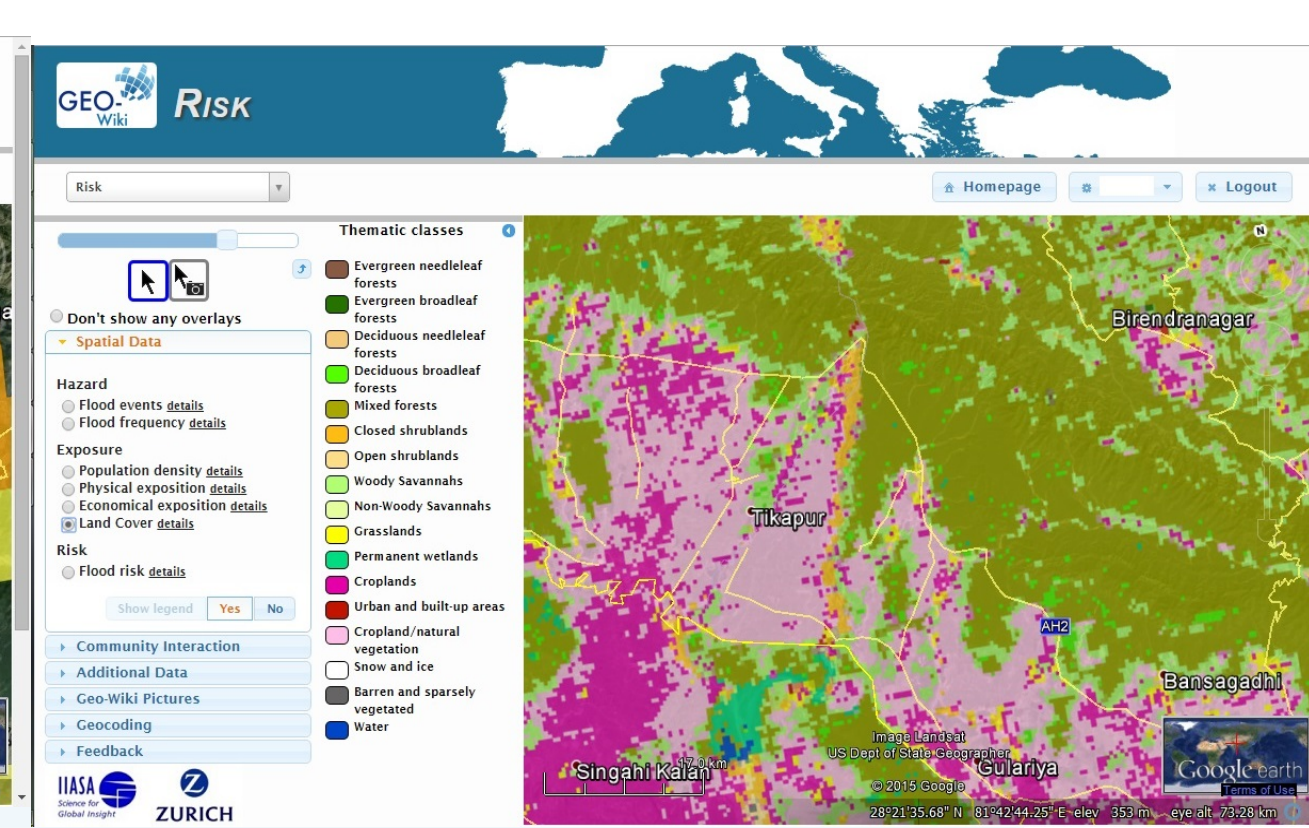
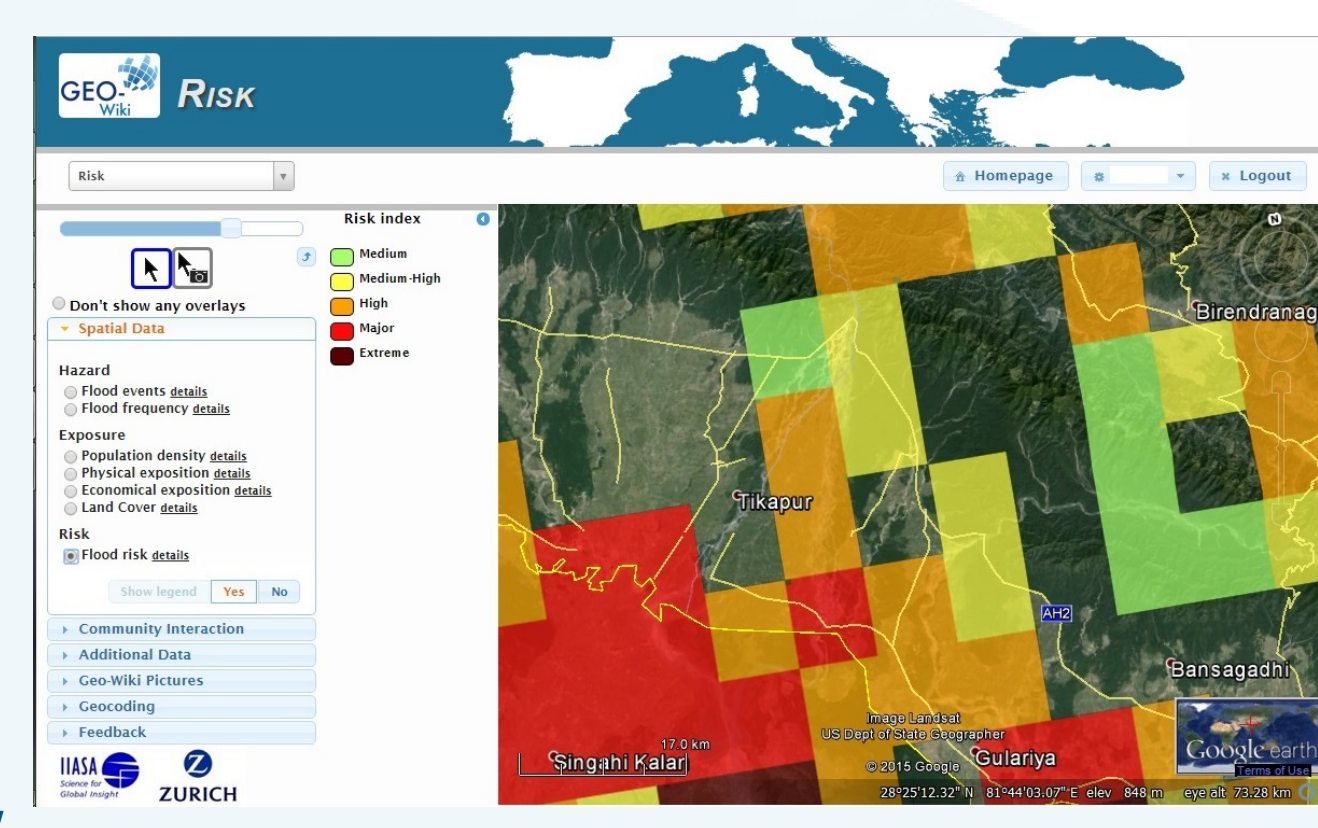
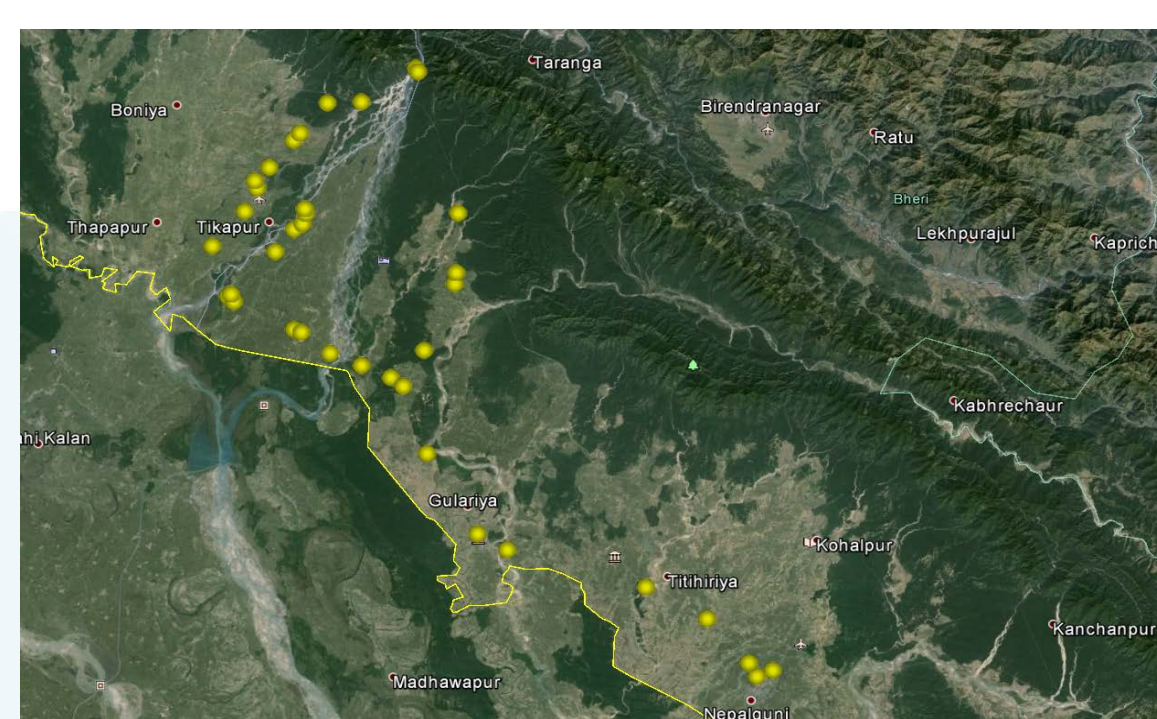
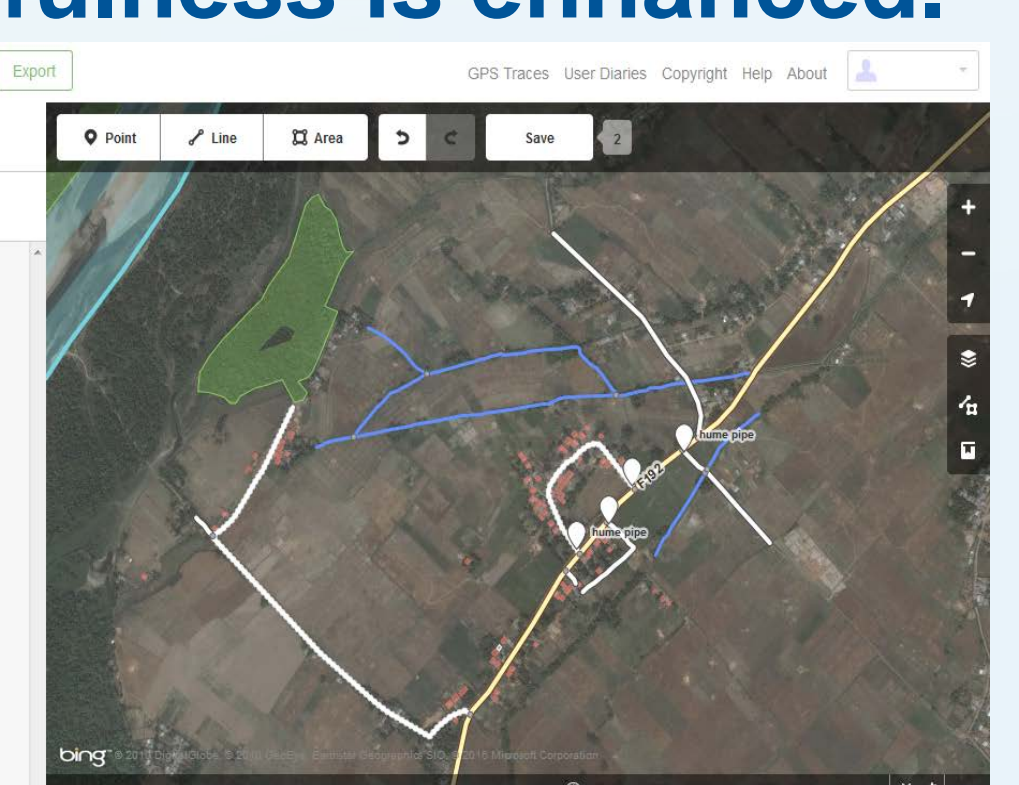
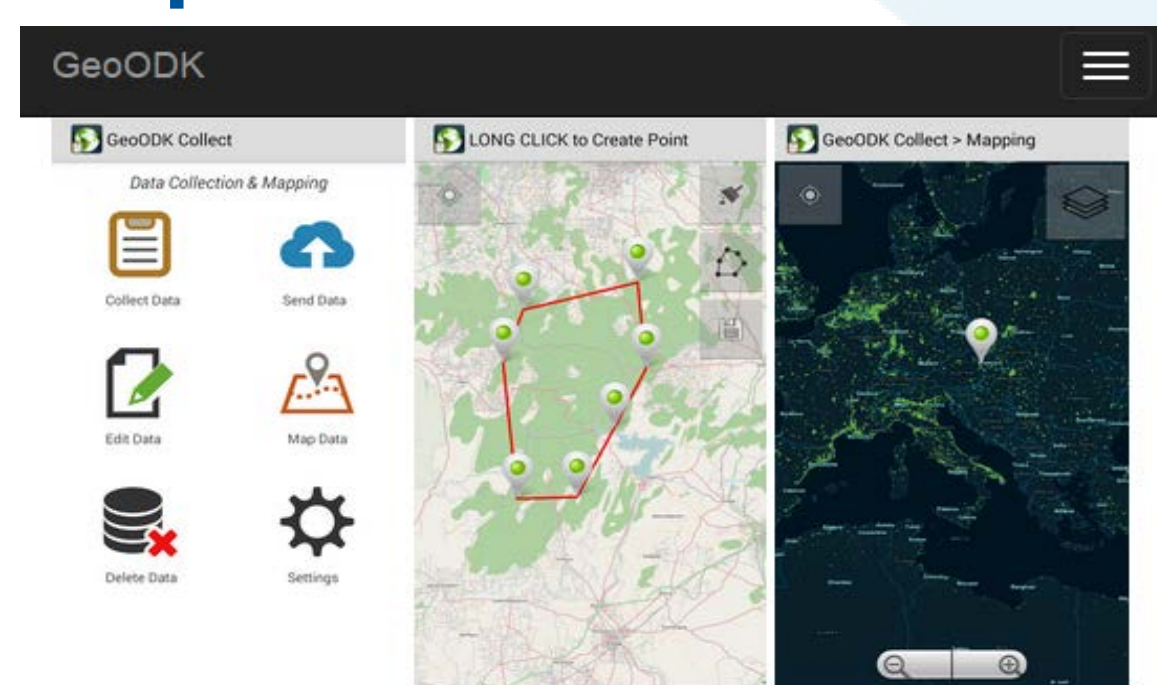


Karnali river basin in Nepal is one of the most remote and economically poor regions in the world.

A one-hundred year flood hit the lowland area of the basin in 08/2014 and led to extensive losses and damages.

GeoODK is used by local stakeholder to map key features, such as houses, shelters, of the communities and physical vulnerabilities and exposure information can be recorded as well.

Hand-drawn **VCA (Vulnerability and Capacity Assessment)** maps are critical information used by local stakeholders in designing flood risk management options. By working with community members to digitize these maps into **OSM**, its accuracy and usefulness is enhanced.



These crowd-sourced information are fed into the **Flood Risk Geo-Wiki** platform -

<http://www.geo-wiki.org/branches/risk/>

Large scale flood risk model output

land cover

A user-friendly online platform to allow users, including stakeholders, to integrate, visualize, and analyse related data and information

Next steps

- Further integrate global and regional biophysical (e.g., hazard and vulnerability to flooding) and socioeconomic (e.g., population and economic) data and information into Risk Geo-Wiki and link it with existing global flood modeling platforms.
- Carry out on-the-ground campaigns, together with regional and local stakeholders and experts to crowd-source more flood vulnerability data to enrich the local database. Working with local stockholders to use the platform and database for flood risk management planning and decision making in Karnali river basin.