Building a resilient future in flood-prone areas of Bangladesh

A crowdsourcing initiative for community mapping and geospatial solutions for enhanced flood resilience

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Introduction

In flood-prone regions of Bangladesh, resilient disaster management is essential. This initiative, led by GroupMappers, harnesses the power of geospatial mapping and crowdsourced data to support proactive disaster response and resource allocation. By integrating satellite imagery, population data, and physical accessibility models, we are building comprehensive maps of built-up areas, shelters, health facilities, and transportation networks across four eastern districts.

Aim

To improve disaster preparedness and response for flood-prone areas through crowdsourcing and by leveraging geospatial data, population mapping, and physical accessibility models to ensure equitable access to shelter and health services.

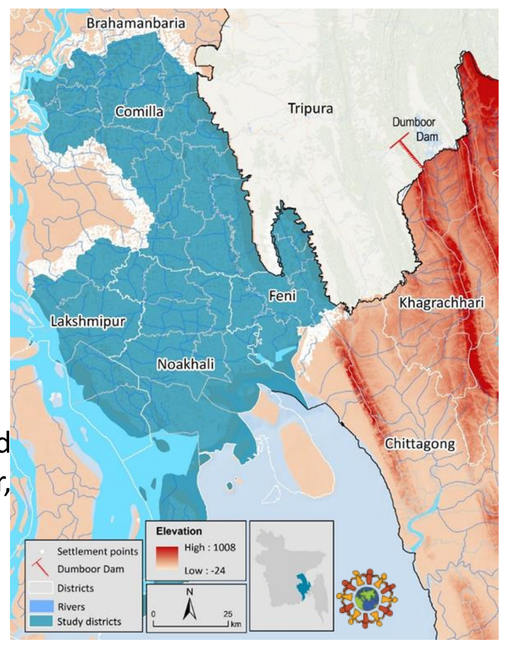
Objectives

- Use Google building footprints and satellite imagery to create comprehensive maps of built-up areas, adding missing structures as needed.
- Calculate building density per 1x1 km tile and estimate population distribution with 2022 census data.
- Gather geolocation data for flood shelters and health facilities from secondary sources for spatial analysis.
- Adjust and digitize OSM transportation and hydrographic networks, adding Digital Terrain Models (DTM) and land cover data to assess flood shelter and health service accessibility in dry and wet seasons.
- Conduct post-flood building assessments by comparing pre- and post-flood imagery to detect changes in building coverage and infrastructure damage.

Methodology

Study sites

This initiative focuses on Feni, Lakshmipur, Comilla, and Noakhali in eastern Bangladesh, impacted by the August 2024 floods.

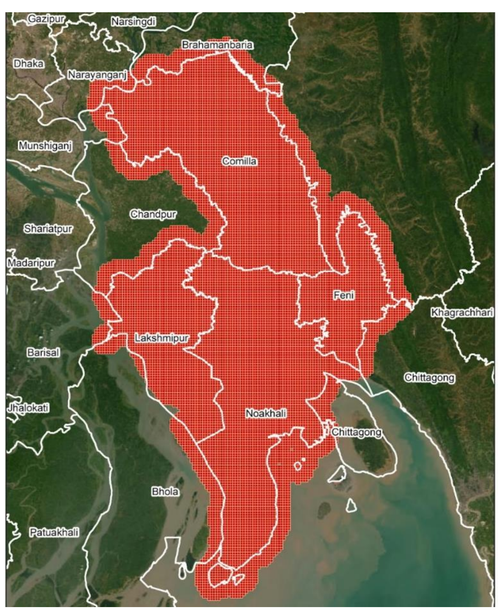


Data Collection

2594899 Google Building Footprints downloaded with a 5 km buffer, requiring adjustments across **16241** grids.

Work Process

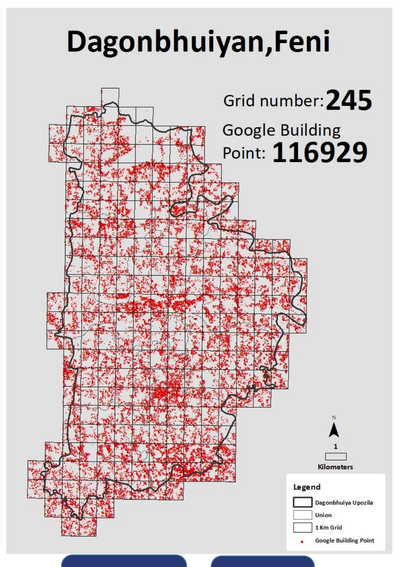
Volunteers were assigned 1x1 km grid sections, totalling 400 grids with building footprint data from Google and OpenStreetMap road and hydrographic network data. Using satellite imagery from Google, Esri, and Bing, they validated and updated this information, and submitted for review.



The quality control (QC) team reviewed submissions, providing feedback for revisions. After completing a set of five grids, volunteers received new assignments. All volunteers attended an online training session, followed by a QC session, with GroupMappers team members available for support.

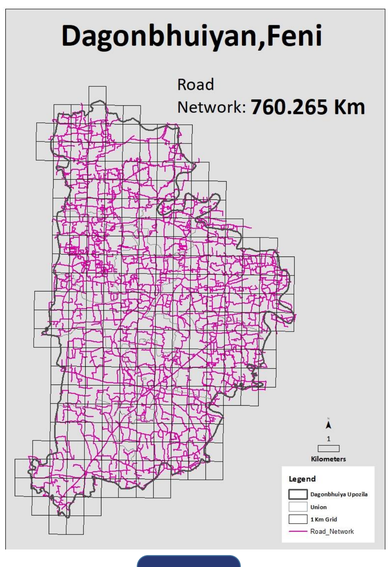
Assign → Adjust → Submit → Evaluate → Feedback → Improve → Finalize

Result

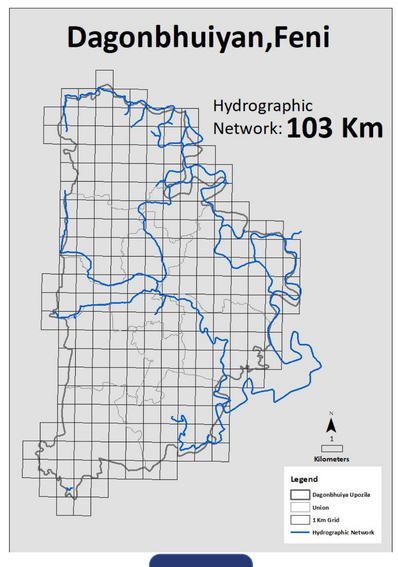


116929 Buildings

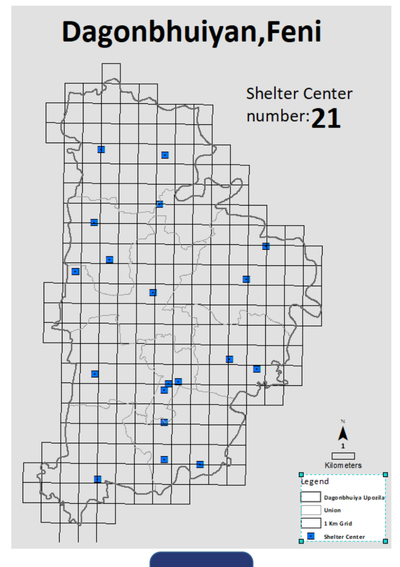
245 Grids adjusted



760 Km road network adjusted



103 Km river network adjusted

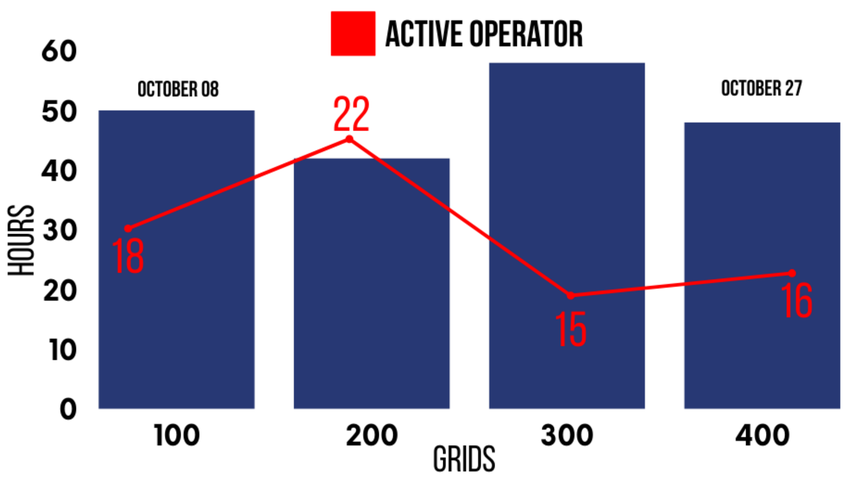


21 Shelter center identified

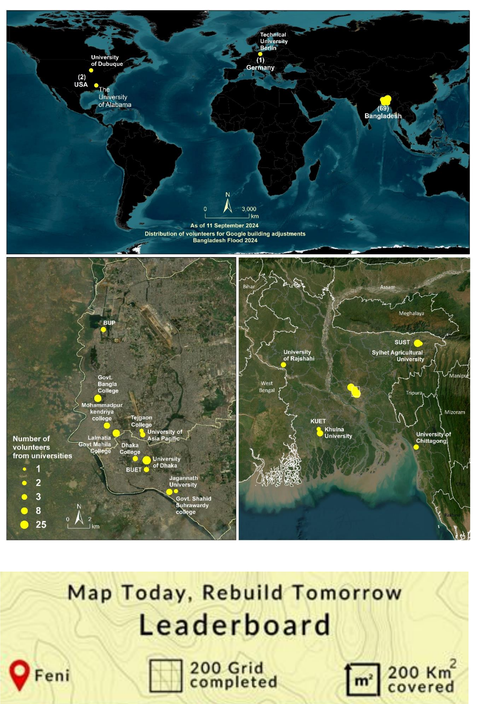
Timeline & Workflow

Planning (Mid of August) → **Promotion** (Throughout August) → **Recruit** (End of August)

Orientation (September 22) → **Training** (September 27) → **1st Grid Assigned** (September 27)



Volunteers Footprint



96 Response received from

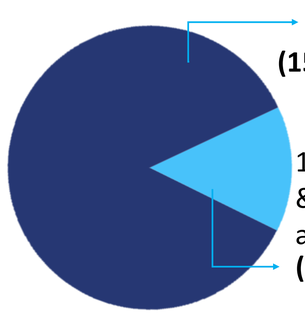
25 Universities & Colleges in

03 Countries (Bangladesh, USA, Germany)

We publish weekly leaderboard of the top five contributors, highlighting their work

- **Grid completion**
- **Quality of work**
- **Time management.**

Time Estimation



5 Upazilla left **(150 Days approx)**

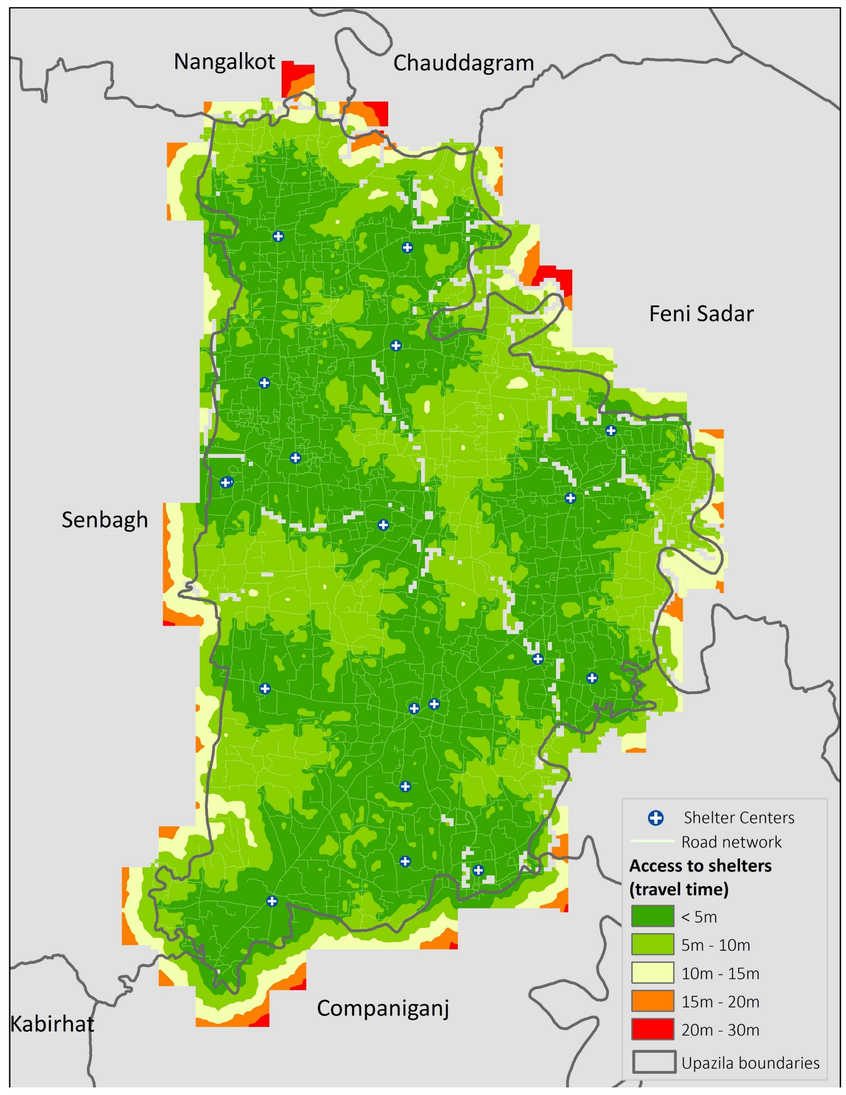
1 Upazilla building, road & hydrographic network adjustment completed **(30 Days)**

20 Different volunteer contributed

With more volunteers

We can quickly adjust remaining locations

Physical accessibility to flood related shelters analysis, Daganbhuiyan, Feni



The map displays shelter accessibility across a region, with color gradients indicating travel times from less than 5 minutes (dark green) to 20–30 minutes (red). This upazila has generally good accessibility to shelter centers, with most areas reachable within 5–10 minutes, although some peripheral areas require up to 20–30 minutes.

Limitations

While the result from accessibility analysis presented here are dependent on the quality of the data and the validity of the travel scenarios that were considered, the findings to date allow for the identification of potential areas for which there might require more in-depth analyses.

Prospect

This initiative improves disaster preparedness, strengthens community resilience, supports data-driven decisions, aids policy planning, and can be scaled for various regions and scenarios.

Conclusion

Our initiative empowers communities in Bangladesh to better prepare for and respond to floods through real-time geospatial data and volunteer-driven mapping. Despite challenges, its impact on flood resilience and relief distribution is promising. With continued improvements and expansion, this initiative aims to build a safer, more informed, and disaster-ready Bangladesh.