

## About the Organization

SEEDS (Sustainable Environment and Ecological Development Society) is a not-for-profit organization dedicated to protecting lives and livelihoods through community-led, resilience-based solutions. Since 1994, SEEDS has empowered vulnerable communities across Asia to prepare for and recover from natural and climate-induced disasters. With operations in 23 Indian states and beyond, SEEDS has impacted over 12.3 million people through interventions in disaster risk reduction, climate adaptation, resilient infrastructure, and nature-based solutions.

**SEEDS MISSION:** Equipping the most vulnerable with appropriate tools and technologies, sharing knowledge and skills and promoting linkages among stakeholders to prevent loss of life and suffering.

## Problem Statement (use case specific)

India faces growing climate and disaster risks, from heatwaves and floods to cyclones and earthquakes, that threaten millions living in informal settlements. Traditional planning remains reactive and often overlooks communities at the highest risk due to a lack of granular, real-time data. SEEDS identified the need for an **evidence-based and inclusive risk model** that pinpoints vulnerability at the scale of individual buildings, enabling precise, early, and community-led action. **AI makes this possible** by analysing diverse datasets using satellite imagery, geospatial layers, and environmental indicators to detect risk patterns invisible through manual methods. It provides hyperlocal insights that guide targeted, life-saving interventions before disasters strike. Aligned with SEEDS' mission to equip vulnerable communities with the right tools and technologies, this AI-driven approach ensures that climate resilience is not just reactive but predictive, inclusive, and scalable across India's most at-risk regions.

## AI Solution Description

SEEDS' AI system integrates satellite imagery, meteorological data, land-use maps, building footprints, roof types, vegetation cover, population density, and household surveys to produce **hyperlocal multi-hazard vulnerability scores**. Using spatial analysis, supervised learning, and time-series forecasting, the model identifies hotspots for heat, floods, cyclones, and earthquakes, ranks households by risk, and generates impact forecasts. AI insights guide targeted, community-led interventions such as home insulation or disaster preparedness, ensuring protection for the most vulnerable.

## Tools and techniques Used

The model leverages **Python, TensorFlow, Scikit-learn, QGIS, and GeoJSON** standards for processing, visualisation, and data exchange. Currently deployed on high-resolution imagery, it is being adapted to be **imagery-agnostic**, using open platforms like **OpenStreetMap**. Open-source tools enable transparency, scalability, and integration with municipal and national disaster management systems, supporting data-driven climate resilience planning.

## Key Features of tech solution

- **Building-level risk mapping** and ward-level dashboards for decision-making.
- **Adaptive learning loop** using sensor data and community feedback.
- **Multi-hazard risk scoring** across heat, floods, cyclones, and earthquakes.
- **Interactive GIS interface** for planners and field teams.

## Impact (Qualitative and Quantitative)

**User Base:** SEEDS team, NDMA, SDMA, municipal bodies, field partners, and community groups across multiple states.

**Active Users:** ~1,00,000 families reached across 10 cities (Delhi, Nagpur, Chennai, Gaya, Bhubaneswar, Gangtok, Dehradun, Puri, Mumbai, Bhopal).

### **Impact:**

- 85–88% model accuracy across heat, flood, and cyclone risks.
- 1,650+ homes insulated; 8–12°C cooler indoor temperatures.
- 40% improvement in resource targeting efficiency.
- 72–75% rise in community awareness through AI-driven advisories.
- Institutional integration underway in Heat Action and Flood Preparedness Plans.

## Additional documents

- *Presentation provided earlier*
- *Solution Demo Videos:*
- *User Testimonials*
  
- [Google Drive Link](#)

## Plan for roll-out and sustainability

- **Scaling partnerships with NDMA, SDMA, DDMA** and municipal corporations to integrate AI risk mapping into Heat Action Plans and city disaster systems.
- Open-source and imagery-agnostic model enables **low-cost replication** using freely available datasets and open platforms.
- **Capacity-building programmes** for government officials and field partners to ensure long-term adoption and operational use.
- **Community feedback loops and real-time data updates** continuously refine the model and strengthen trust.
- **National scale-up goal:** Expansion across 225 climate-vulnerable districts by 2030 under SEEDS' resilience strategy.