

AI for Predictive Protection and Dignified Adaptation

- **Predict. Protect. Prepare.**

: Empowering vulnerable communities with foresight and resilience through AI-driven climate intelligence.

- **AI-powered foresight for people &**

- **planet**

: ClimaShield leverages advanced predictive models to anticipate displacement and enable dignified climate adaptation.



The Problem



Climate change is displacing millions
Extreme weather and environmental
degradation are forcing over 20 million people
each year to flee their homes, often without
warning.



Protection is unequal

Support is disproportionately distributed — the
poorest are hit hardest and recover slowest,
widening global inequality.



Warning systems arrive too late
Current infrastructure fails to alert vulnerable
communities in time, leaving families
unprepared and exposed to danger.



Rising frequency of disasters

Floods, droughts, and heatwaves are
increasing in both intensity and frequency,
compounding systemic vulnerabilities.

Our Vision



Migration should be a choice — not a tragedy
We envision a world where families can choose
to adapt with dignity, supported by data and
early warnings, not fear and last-minute
escapes.



Building equitable adaptation pathways
The platform bridges humanitarian aid with
technological foresight, ensuring no one is left
behind during crises.



ClimaShield empowers timely action
Through predictive alerts and transparent data
systems, communities can prepare, protect,
and stay connected.



From vulnerability to agency
By returning time to communities, ClimaShield
restores agency to the displaced —
transforming disruption into resilience.

The Two-Part Solution



Predictive Protection

Advanced AI analyzes multi-source climate, migration, and vulnerability data to forecast displacement zones and deliver tailored insurance models.



Real-time intelligence for at-risk zones
ClimaShield uses adaptive dashboards to monitor risk and deploy early alerts to vulnerable populations.



Dignified Adaptation

A post-crisis support platform matches families to safe destinations, connects them with work opportunities, and integrates humanitarian assistance.



Equitable outcomes at the core
Designed with inclusive ethics, the platform prioritizes the needs of the most affected communities.

How It Works

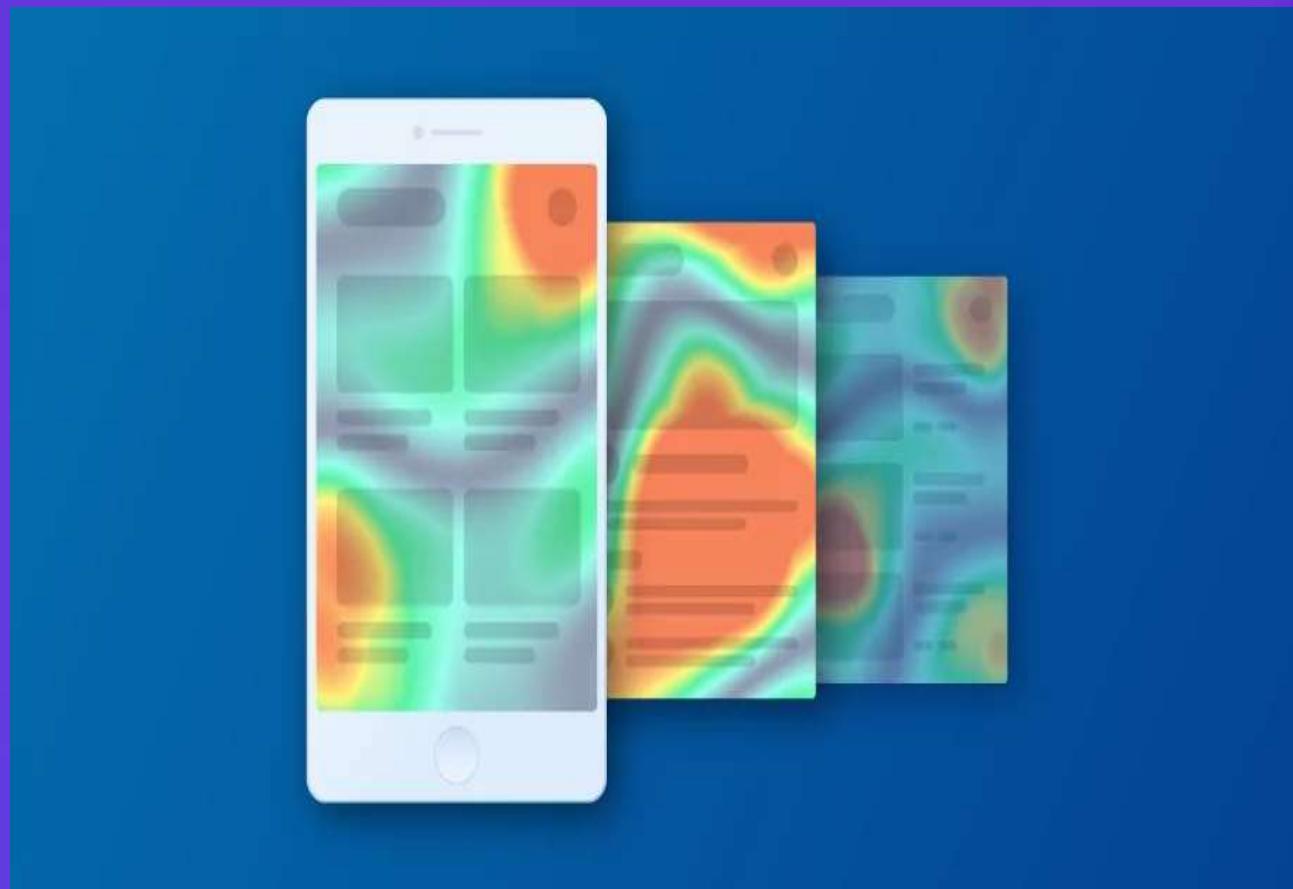
AI Architecture Overview

- **Data Sources:** Integrated climate and development data from ASDI, Copernicus, World Bank, and humanitarian inputs ensure contextual intelligence.
- **Risk Scoring Model:** Uses a composite index: $R = 0.4C + 0.3V + 0.3(1 - I)$ to quantify climate, vulnerability, and insurance gaps for targeted protection.
- **Adaptive Premium System:** Premiums follow: $P = P_0(1 + \alpha R)$, dynamically adjusting coverage affordability based on real-time risk.
- **Intelligent Dashboards & Alerts:** Outputs real-time heatmaps, mobile alerts, and AI-driven migration recommendations to policymakers and users.



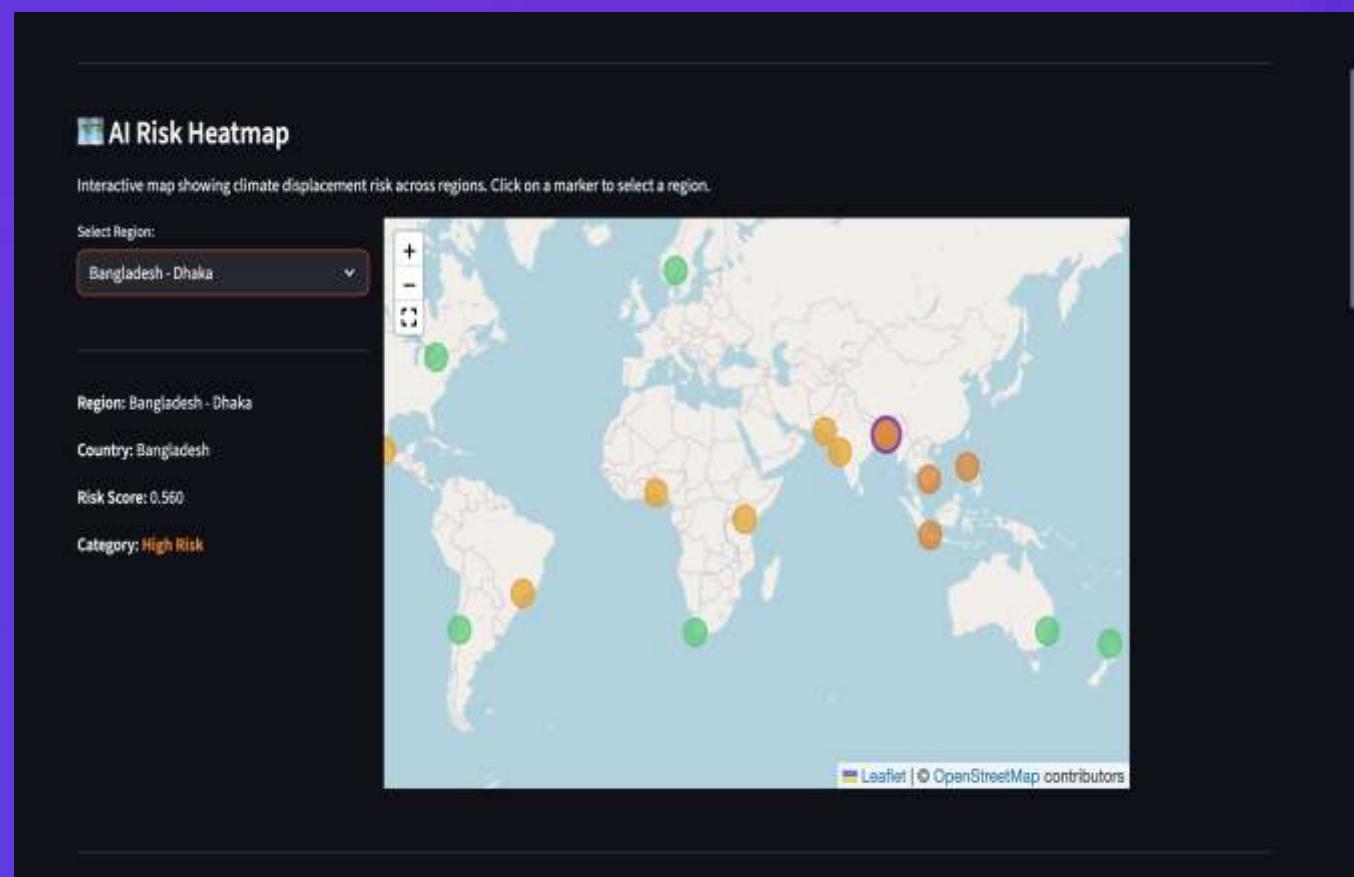
User Journey

- **Step 1: Early-Warning Alert:** Users receive AI-powered climate alerts via voice or text, tailored by location and device accessibility.
- **Step 2: Risk Forecast & Insurance Options**
 - : Mobile dashboard presents local risk analysis and micro-insurance choices based on user profile.
- **Step 3: Access to Relocation & Jobs:** The platform connects families to verified NGO-led relocation programs, including housing and employment.
- **Step 4: Supported Migration:** Displaced families are guided safely to new homes with logistical and legal support networks.



Demo Preview

- **AI Risk Heatmap:** Interactive global map powered by live climate feeds to show displacement hotspots and risk zones.
- **Insurance Simulation:** Users test micro-insurance scenarios based on real-time risk profiles using accessible UI tools.
- **Migration Support Dashboard:** NGOs and governments coordinate safe relocation options for families, visible via ClimaShield interface.
- **Voice Alerts:** Multilingual, AI-generated voice messages notify users with clear instructions in high-risk scenarios.



Technology Stack

- **AI Modeling:** ClimaShield utilizes scikit-learn with Random Forest models for interpretable climate risk scoring and displacement forecasting.
- **Frontend Interface:** Streamlit and Folium provide an interactive web app experience for both end users and agencies.
- **Explainability with SHAP:** Model transparency is maintained using SHAP values, clarifying AI decision-making for ethical assurance.
- **Voice Integration:** ElevenLabs API delivers natural-sounding, multilingual alerts, crucial for low-literacy or offline communities.
- **Data Backbone:** Primary datasets include ASDI, Copernicus satellite imagery, World Bank climate indices, and NGO field data.



Social

Empowers communities with early insights and access to adaptation tools, reducing trauma and increasing preparedness.



Economic

Prevents displacement from becoming a poverty trap through dynamic micro-insurance and job connectivity.



Environmental

Uses forecasts to minimize ecosystem disruption, encouraging proactive planning and resource resilience.



Ethical

Builds transparent, explainable AI to ensure climate risk tech supports the most vulnerable without bias.

Challenges & Learnings



Data Ethics & Integration

Bridging sensitive migration and insurance data required ethical frameworks to ensure privacy, transparency, and agency.



Explainable AI

Balancing accuracy and transparency with SHAP values was essential to gain trust from NGOs and local leaders.



Empathy in Design

Human-centered UX helped balance technical precision with emotional clarity for users under stress.



Designing for Dignity

We learned that data can protect dignity – if it's built for people first, not just systems.

Future Vision

- **Global Migration Mapping:** Scale AI-driven migration pathways to include climate-vulnerable zones across the Global South and Pacific regions.
- **Insurance via Open Finance:** Integrate with decentralized finance platforms to deliver transparent, low-cost adaptive insurance.
- **NGO & Policy Integration:** Build deeper partnerships across local governments, NGOs, and aid groups to increase resilience delivery.
- **Toward Resilience Ecosystems:** Advance from response to resilience — ClimaShield will help communities not only survive, but thrive.

The screenshot shows a user interface for the ClimaShield platform. At the top, a yellow warning bar displays a high flood risk alert for Bangladesh - Dhaka, with a message to consider securing insurance coverage and monitoring weather updates. Below this are two buttons: "View Insurance Options" and "Simulate SMS Alert".

The main content area features a section titled "★ Relocation Opportunities & Assistance" with a sub-section for "Climate Resilient Housing Program". This section includes a "Relocation Grant" button, a "Description" field containing text about government-backed loans and grants for relocating to elevated areas in Chittagong Hill Tracts or Sylhet, and fields for "Eligibility" (families in flood-prone zones with income <\$5000/year) and "Deadline" (rolling applications). A "Learn More & Apply" button is also present. Below this are links to other programs: "Rural Livelihood Transition Fund" and "Safe Haven Relocation Assistance".

Closing

- **Predict. Protect. Prepare.**: With ClimaShield, technology becomes a force for empathy — enabling proactive adaptation that honors human dignity.

- **AI for Dignified Climate Adaptation**: We stand at a crossroads: use AI to control nature, or to care for one another. ClimaShield chooses care.

- **Where Technology Meets Empathy**: Every alert, every match, every insight is built to support lives, not just systems. Climate tech should be humane.



ClimaShield by Andri Peti & Dea Peka

The screenshot shows the ClimaShield application interface. On the left, there's a sidebar with a globe icon and the text "ClimaShield". Below it are sections for "About" (explaining AI and open climate data), "Data Source" (AI for Water and Planet), and a footer with the date "November 2025" and a note about the hackathon.

The main content area has a dark background with white text. It features a "Additional Resources" section with three columns: "Global Support" (UNHCR Climate Displacement Hub, IOM Migration Resource Center, Red Cross Emergency Aid), "Employment Services" (Climate Jobs Network, Green Skills Training Portal, Migrant Worker Support Line), and "Housing Assistance" (UN-Habitat Safe Shelter, Local Housing Authorities, Community Relocation Groups). Below this is an "Alert Log" section showing 1 alert.

The central part of the screen is the "AI-Powered Premium Calculator". It asks for "Monthly Income (USD)" (set to 1000) and "Selected Region: Bangladesh - Dhaka". A "Calculate Premium" button is visible. Below this is an "Explain AI Predictions" section with the text "Understand how the AI model makes risk predictions based on climate features." At the bottom, there's a "Top Risk Factors" section.