

# RISK AWARD

RISK Award  
First-hand news  
Best project  
proposals 2017



## Contents

---

1	Introduction	12	A farmer app for upscaling weather index insurance and promoting climate justice Micro Insurance Academy Social Re Consultancy
2	Responding to flood resilience using innovation and technology in the Tana River, Kenya Church World Service (CWS)	14	PREPHubs (Communication Infrastructure for Disaster Preparedness) MIT Urban Risk Lab
4	Open data and web mapping platform to reduce disaster risk in Haiti Cooperazione Internazionale (COOPI)	16	Community based flood early warning system for Budalang'i Sub-County, Kenya Multiface Research & Development Centre
6	Training In A Tab Earth Aid	18	EpiNurse – Participatory Monitoring of Health Security and Disaster Risk by Local Nurses Nursing Association of Nepal Disaster Nursing Global Leader Degree Program
8	App-based Landslide and Flash Flood Early Warning in Aizawl, Mizoram, India GeoHazards International GeoHazards Society India Aizawl District Disaster Management Authority	20	From world's first case study to concrete action: bridging the last mile between analysis of mobile network data and Early Warning System policy Oregon State University Flowminder Foundation
10	Estimating human losses in unavoidable major earthquakes in the Himalayas International Centre for Earth Simulation Foundation (ICES) Indian Society of Earthquake Technology	22	Contacts
		24	Imprint

The projects appear in alphabetical order according to the names of the applying organisations.



## Information and Communication: Innovative Concepts and Technologies for DRR and DRM

Good disaster prevention is key! This is again underpinned by the UN Sendai Framework for Disaster Risk Reduction 2015–2030. Innovation has the potential to boost it. Innovative concepts and technologies for information and communication (ICT) are playing an increasingly important role in disaster risk management (DRM) and disaster risk reduction (DRR). The more efficiently these new tools are used, the more people at risk can be reached in time before, during or after an emergency. New scalable options for preparing communities to better cope with disasters or better deal with the consequences can be facilitated.

More than 85% of the world's population have a mobile phone or a smartphone. This opens up completely new channels of transmitting information. People can be reached individually, anytime and everywhere – as long as the mobile network plays along, of course. The challenge now is to capitalise on this and create tailor-made solutions for DRR and DRM. The aim is either to use new technologies or to develop innovative concepts for well-established media. More people can be prepared for risks and hopefully be saved in an emergency. ICT can be used for mobilising and coordinating people and to observe and influence behaviour before, during or after disasters, e.g. for reconstruction and relief.

The RISK Award First-Hand News provides insights into ten outstanding projects which have made it to the final evaluation round of the 2017 RISK Award. We briefly introduce innovative ideas on how to use ICT to make a difference. For safety, empowerment and resilience.

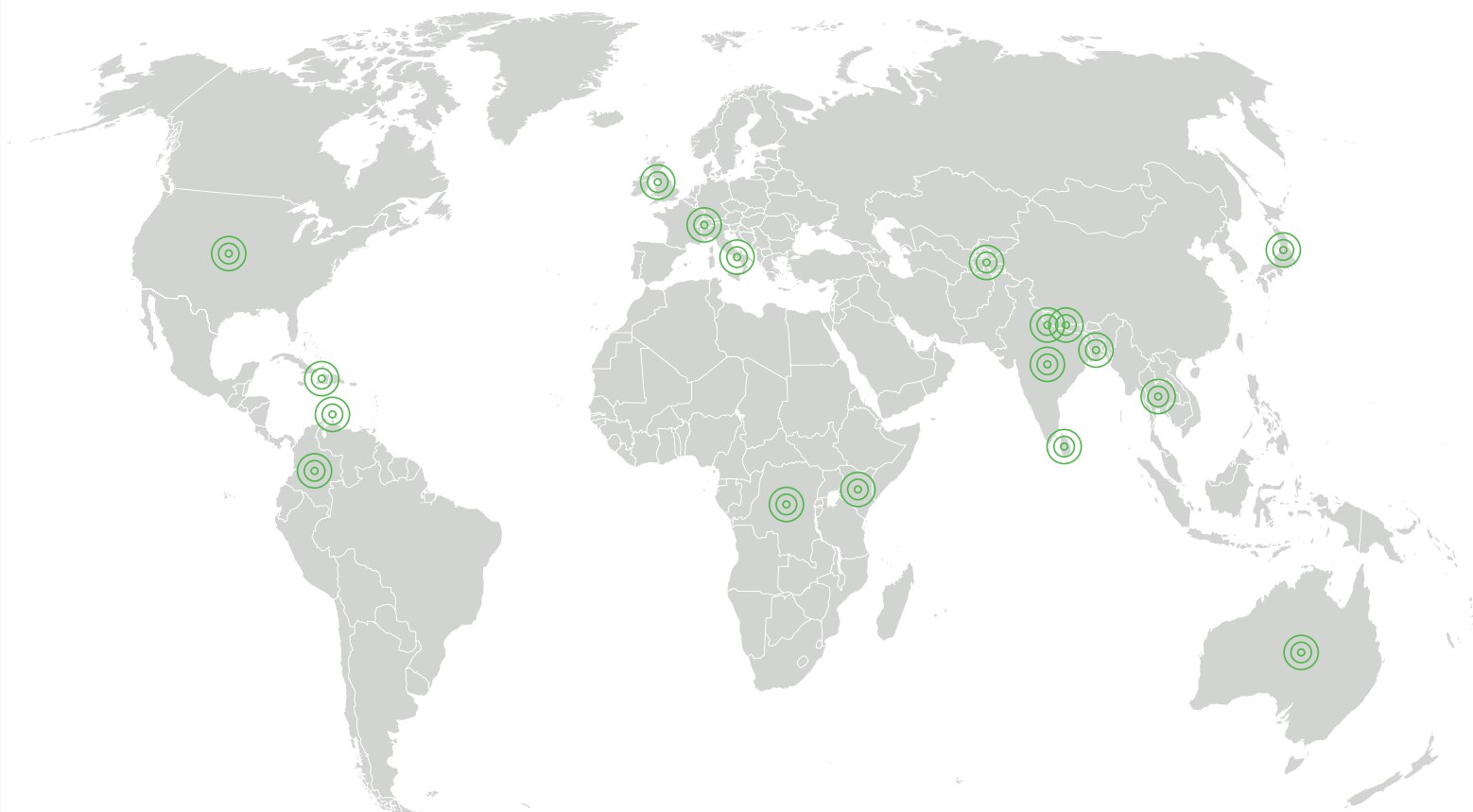
We wish you a pleasant read,  
Christian Barthelt  
Project Lead RISK Award

### The 2017 RISK Award applications

29 organisations from 18 countries registered to submit a proposal for the 2017 RISK Award. Ten proposals have made it to the final round. The ideas range from local activities to holistic and systematic approaches at national level. This publication summarises a jury selection of the ten best project proposals in 2017. They provide valuable information as to how effective disaster risk reduction projects can be implemented.

For this publication we received photographs and reports of varying quality and types. The presentations may therefore vary in style. Please also take into account that different languages are used in different cultures. The most sincere thanks of the RISK Award partners UNISDR, GRF Davos and Munich Re Foundation go to the project owners and contributors for their efforts and dedication.

The map shows the 18 countries which were represented in the 2017 RISK Award process.





## Responding to flood resilience using innovation and technology in the Tana River, Kenya



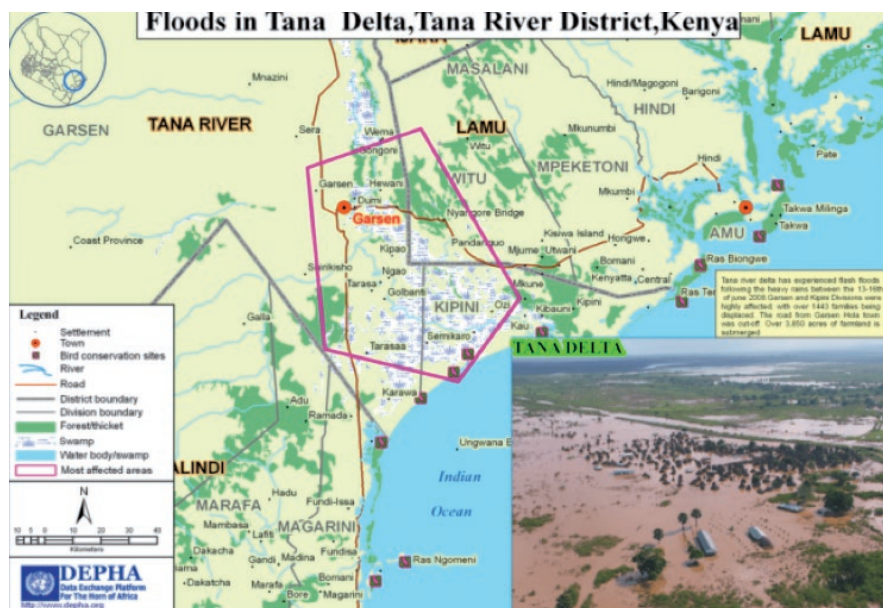
The Tana River is a hot spot for flooding. Church World Service (CWS) proposes to assist farming and pastoralist communities in using information and communication technology (ICT), and receiving accurate information that will help them cope with, prepare for, adapt to, and thrive in the face of ever-increasing flooding.



"Here I had my bananas, while there I had my maize and water melons, which were ready to be harvested."

Mzee Ahmed  
in reference to the loss of his crops to flooding

Map from the Data Exchange Platform for the Horn of Africa published on 24 June 2008.



CHURCH WORLD SERVICE

Church World Service  
(CWS)

[www.cwsglobal.org](http://www.cwsglobal.org)





Flooding in the Tana River is caused by heavy rainfall upstream. Every year, floods displace more than 5,000 families, destroy property and cut off access to markets and schools. It is possible to reduce losses of property by combining ICT and conventional methods, such as focus groups and help desks.

Once a month, government personnel will meet community members at help desks to expand on climate change information shared via e-platforms. This will improve public-private collaboration by supporting farmers to gain access to available vital government resources and services, thereby enhancing community resiliency. Every two months, the community will congregate for peer learning sessions and group discussions, and learn how to use smartphones to access flood information.

Left: With strong resilience measures, the Tana River has untapped potential for water melon farming.

Right: The ravaging impacts of flooding by the Tana River.

#### SMS alerts

4,000 SMS alerts will be sent once a week to community focal points and opinion leaders, ultimately reaching 12,000 people through networks. This is to be complemented by a toll-free line for information provision.

#### Interactive web portal

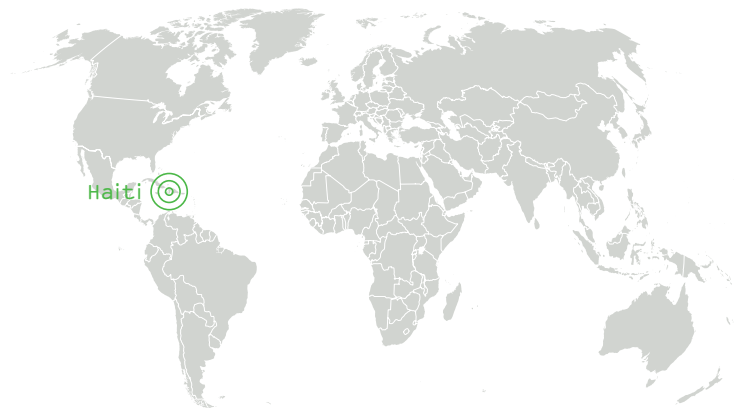
An interactive web portal will support 40 community focal points to find flood-related information via their smartphones. Interactive live chats, e-forums and online discussions will share updates on flood related advisories and responses.

#### Help desk

A weekly help desk at village centres will offer one-on-one support and provide technical information. Help desk dialogue will be held once a week for one year at a village centre.



## Open data and web mapping platform to reduce disaster risk in Haiti



Understanding the characteristics, resources and vulnerabilities of a territory prone to natural hazards is essential in adopting a proper strategy to reduce disasters risks. By using an open data and user friendly web mapping platform integrated with a mobile app, COOPI will allow local and departmental institutions to identify their essential resources for crises management and their vulnerabilities in the South-East Department of Haiti.



*"It is only when we know how we are exposed to natural threats and what our vulnerabilities are that we can prepare ourselves so that emergency management doesn't overcome our response capability, thereby giving rise to new victims and subverting development logistics"*

Morena Zucchelli ,  
COOPI Project Manager

Over the past 10 years, Haiti has been hit hard by disasters, leaving more than 220,000 dead and in excess of 165,000 homes destroyed. The 2010 earthquake and the high level of vulnerability of the country to seasonal hurricanes (as the most recent one, Hurricane Matthew, demonstrated), very often leave the inner regions of the country completely isolated, with contaminated water sources, health and civic services heavily damaged and livelihoods severely affected.

The project will use information and communication technologies as a tool to have better mapping and an improved understanding of the characteristics of a territory with reference to natural hazards, resources and vulnerabilities. It will also address the need to improve the level of training for all institutions and others involved locally in dealing with disaster management.

The goal of this proposal, in line with priority #1 of the Sendai Framework for Disaster Risk Reduction (2015–2030), is to replicate the open data and user friendly web mapping platform on the essential resources and vulnerabilities of the South-East Department of Haiti by supporting the efforts that COOPI is already implementing in this area. This innovative tool will allow local and departmental institutions to identify their essential resources for crises management and their vulnerabilities, and to put into place effective preventive, preparedness and response measures. Furthermore, a mobile app will be developed to download the different web mapping platforms and to allow free and accessible information from smartphones.



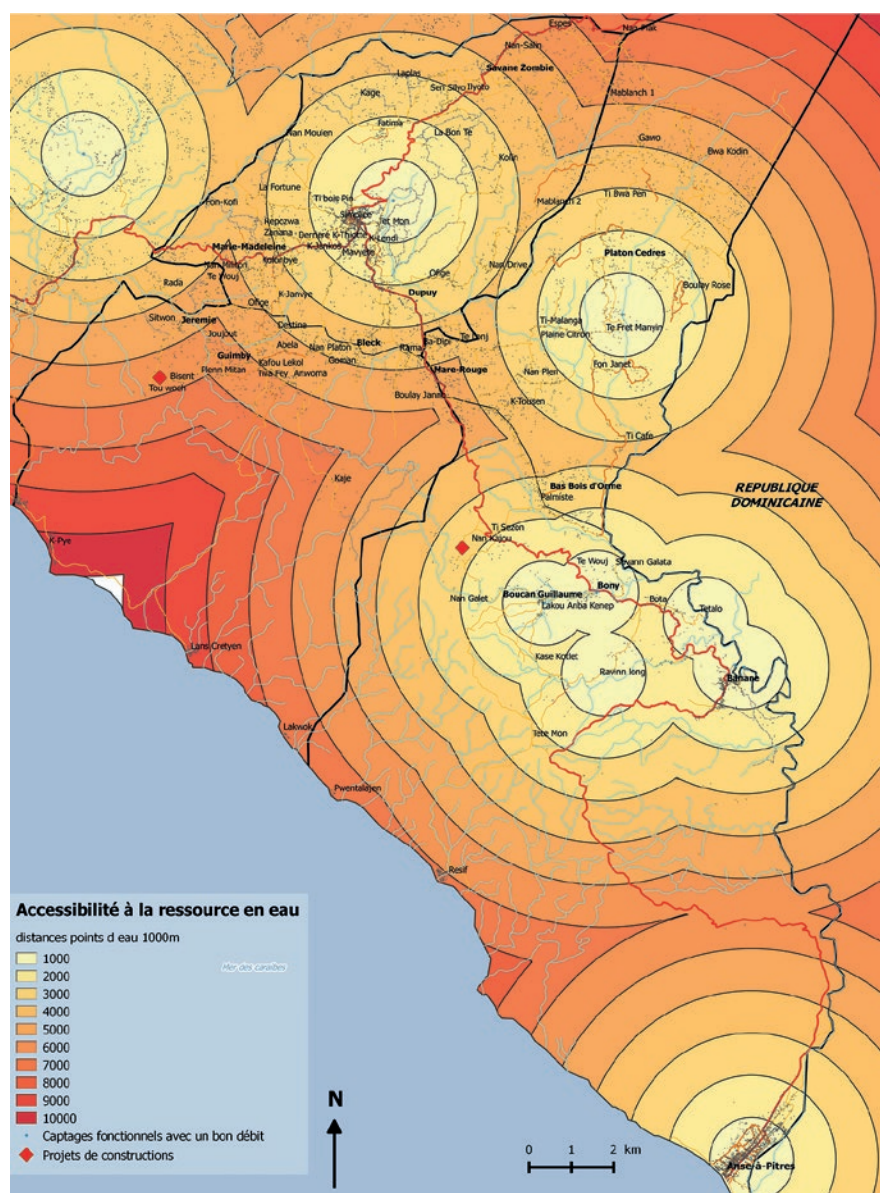
Cooperazione  
Internazionale (COOPI)  
[www.coopi.org](http://www.coopi.org)





Left: Mapping the territory includes pointing out escape routes and meeting points. Once resources and risk exposure have been identified, the community is trained in evacuating quickly and promptly.

Right: Emergency plans are tested through community simulations. Every member of the community and civil society has his/her own role for which he/she is well trained.

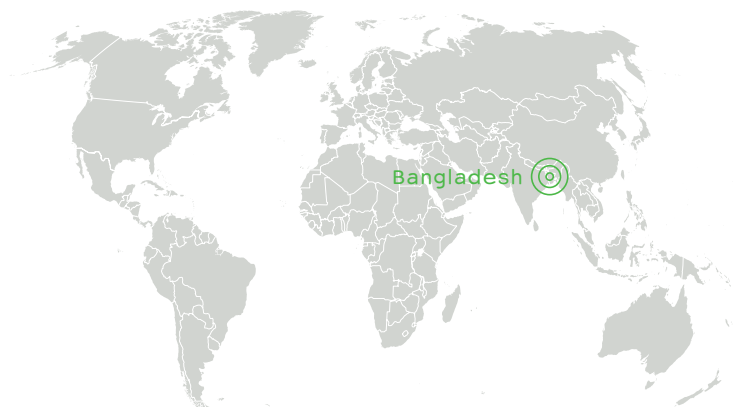


Map showing the distance to water access (one ring equals 1,000 metres) in the Municipality of Thiotte and of Anse à Pitre, in the South East Department (Haiti).





## Training In A Tab



“Training In A Tab” is the world’s first tablet-based disaster preparedness training programme for high numbers of people. This training is tailored to rural populations who are often deprived of formal education and never really manage to undergo institutional training on “Disaster Preparedness” of any sort. This programme is raising awareness and helping unaware people to be proactive and save lives in Bangladesh.

Expert trainer demonstrating basic first aid skills to a group of participants in Baintala, Bangladesh.



Earth Aid

[www.earthaid.org.uk](http://www.earthaid.org.uk)





"Let's make disaster preparedness a social priority! My aim is to make disaster preparedness training affordable, accessible and available to people irrespective of their gender, literacy and knowledge of current technologies."

Syed Ali Tarek,  
FRSA, FHEA, FRAS, Initiator of  
the "Training In A Tab" Project.

People living in Bangladesh are scarcely prepared for facing natural calamities, despite it being one of the most disaster-prone countries in the world. This is mostly due to unawareness and negligence resulted from the unawareness. "Training In A Tab" places "prevention" at the heart of disaster preparedness training. This training has a custom teaching pedagogy that enables participants to engage with minimal direct supervision irrespective of their personal attributes. With a bottom-up approach in the background, common man including- literate, semi-literate & illiterate, male & female, people with or without technical knowledge can participate in this customised training programme that respects local needs, values and cultures.

The interface of the programme used in the tablets is entirely in Bangla. The interface in the device acts as a facilitator, and participants get to use the device in small groups. At the end of the training, participants create an emergency plan, learn about their surrounding spatial arrangements (that can be hazardous), an emergency kit and acquire basic first aid skills. All this with minimal guidance from a professional trainer. Those with "Training In A Tab" training are able to assist local volunteers selected and trained by local NGOs and government offices. This capacity building is resulting in improved "Disaster Risk Reduction" and improved "Disaster Risk Management" – which corresponds to the "UN Sendai Framework" and "UN Sustainable Development Goals" (3, 10, 11, 13, 16 and 17 number goals in general).

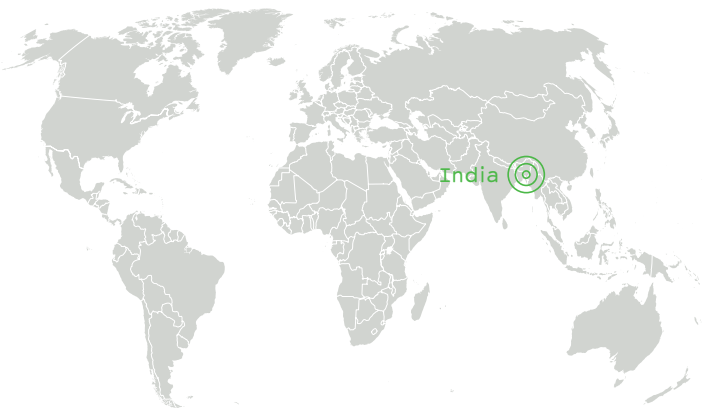
Left: One of the participants in Afrah taking pictures of disaster prone areas during a training session. Participants are required to take part in activities beyond the tablet interface.

Right: Project map of the "Training In A Tab" project.





## App-based Landslide and Flash Flood Early Warning in Aizawl, Mizoram, India



During monsoon season and major storms, heavy rainfall triggers localised landslides and flash flooding on the steep slopes of Aizawl, a hill city in North-east India. A new, app-based system will relay emergency alerts to city residents via mobile phones, warning them to evacuate before these sometimes fatal events, and residents can use the same system to report danger or request help themselves.

A mobile phone app will relay targeted alerts, based on rainfall levels, to warn residents when they are directly in harm's way of potential landslides or flash flooding. The early warning system will rely on data from a network of rain gauges to be installed in Aizawl's high-hazard and highly populated areas.

Residents will also use the app to report back. They can describe hazard situations in their neighbourhoods and pinpoint where help is needed. Because residents will receive as well as provide actionable information, the app will improve how the city protects people from natural disasters.

Aizawl's already extremely high landslide and flood risk is growing. In the capital of Mizoram, the population is set to more than double in 20 years, to 800,000. Residents are in danger because of the city's unstable geologic conditions and intense rainfall that triggers both landslides and floods. Climate change may bring even more rainfall. Urban growth adds dense hillside construction and excavations that further weaken fragile slopes. The app-based system, which will highlight dangerous situations, will also raise public awareness about how to build local resilience to landslides.

Mizoram, in North-east India near Myanmar, is home to the Mizo people, a primarily ethnic and linguistic minority. It has the second highest literacy rate and highest level of gender equality in India, plus high smartphone usage. App-based communication is likely to be widely used and inclusive.



"Since I was a kid, there have been so many deaths in Mizoram from flash floods and landslides. If there is a rainfall monitoring app to warn us instantly what may happen, I am sure it will save lives."

Lalrinpuii Tlau,  
GeoHazards International  
Mitigation Officer for Aizawl





After very heavy rainfall, 17 people died when this landslide crashed through their neighbourhood, a known high-risk area.



Steep drainage and dense construction lead to flash flooding in urban streams. Unaware of heavy rainfall upstream, four children playing downstream were swept away and killed in 2016.

In this densely populated region of Aizawl, areas with very high landslide hazard are marked red in the overlay.



GeoHAZARDS INTERNATIONAL

GeoHazards Society



GeoHazards International

GeoHazards Society India

Aizawl District Disaster  
Management Authority

[www.geohaz.org](http://www.geohaz.org)

[www.geohaz.in](http://www.geohaz.in)





# Estimating human losses in unavoidable major earthquakes in the Himalayas

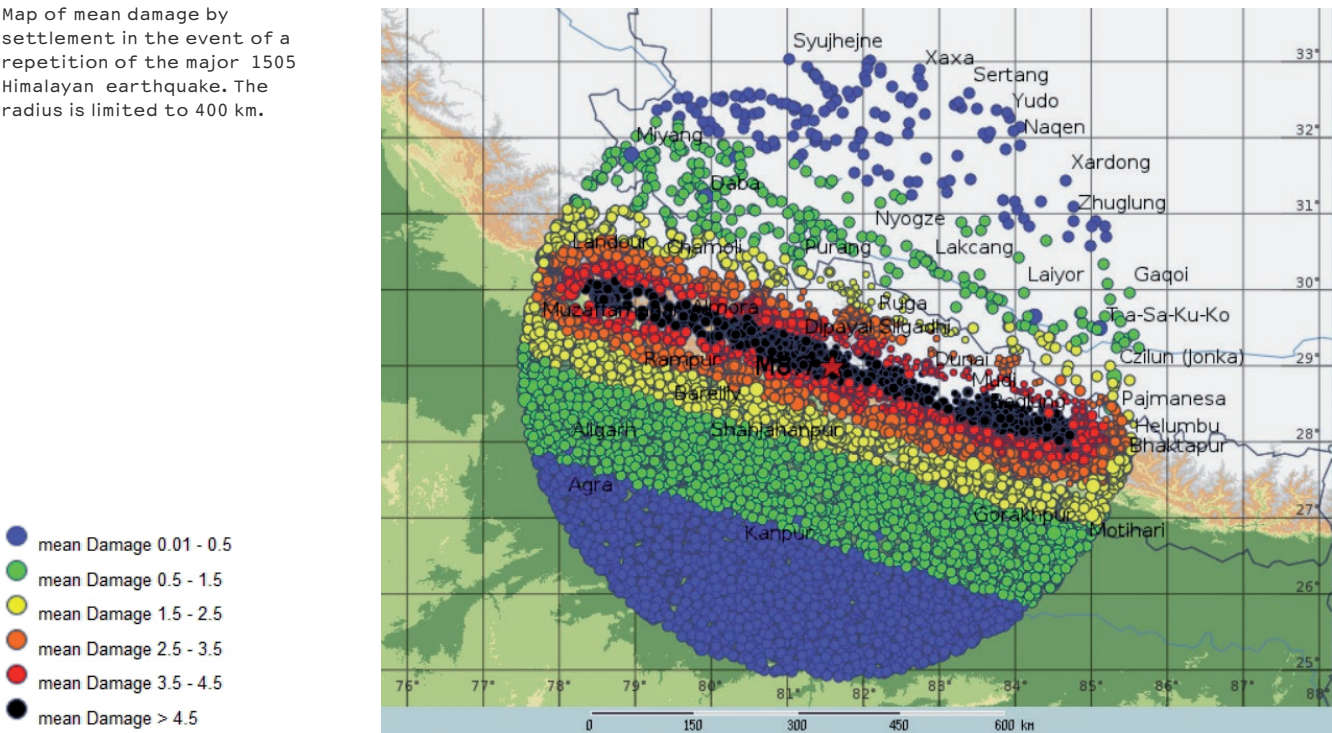


By our quantitative estimation, major earthquakes will kill up to 1 million and injure 2 million along the Himalayas. 7 months and 10 years before they occurred, we correctly published the numbers of fatalities for the earthquakes in Kashmir in 2005, (85,000 fatalities) and Katmandu in 2015 (10,000 fatalities). We propose to transmit our knowledge and computer program to Indian colleagues so they may calculate expected future losses for earthquake disaster mitigation and preparedness.



Destruction wrought by the M7.6 Kashmir earthquake of 8 October 2005 predicted scientifically in a publication of March 2005 (Wyss, 2005).

Map of mean damage by settlement in the event of a repetition of the major 1505 Himalayan earthquake. The radius is limited to 400 km.



The Himalayan plate boundary is loaded by compression due to India advancing toward Asia, producing major earthquakes. Because of the large population and vulnerable habitat, the figures for human losses in future Himalayan earthquakes will be very high.

QLARM is our tool with which the numbers of fatalities in two major Himalayan earthquakes have been forecast. If authorities had taken these 2005 warnings seriously, numerous lives could have been saved. Suppose the 1505 Himalayan earthquake (M8.7) is repeated. In such a case, we calculate the numbers of injured and fatalities to be up to 2 million and 1 million respectively. We propose to give QLARM and the data for the Indian population and existing buildings to our Indian colleagues at ISET, and to show them the following:

- 1) How to use QLARM to calculate numerous likely scenario losses
- 2) How to gather data on building properties
- 3) How to enter data on buildings and population into QLARM
- 4) How to activate mapping groups for gathering building data by crowd sourcing using open street map
- 5) How to construct models for large cities, using data on soil conditions and defining neighbourhoods of similar buildings

We propose holding a news conference for the TV and newspapers, explaining quantitatively the scale of earthquake disasters looming for India. We will write articles for popular newspapers and magazines, ISET Journal and Newsletter to explain the danger and create mass awareness. This will serve to draw attention to the fact that earthquake disaster mitigation and preparedness are badly needed in the Himalayas. Further, we will attempt to gain the attention of leading politicians and disaster managers at national level in order to prioritize mitigation. Involved in this project are M. Wyss, P. Rosset, S. Tolis from the International Centre for Earth Simulation Foundation (ICES) and H.R. Wason, S. Gupta and M.L. Sharma from the Indian Society of Earthquake Technology (ISET).



"Quantitative estimates for numbers of fatalities in potential future earthquakes have become reliable enough, so politicians should no longer ignore them and should take mitigating action."

May Wyss, ICES Foundation



International Centre  
for Earth Simulation  
Foundation (ICES)

Indian Society of  
Earthquake Technology

[www.icesfoundation.org](http://www.icesfoundation.org)

[www.iset.org.in](http://www.iset.org.in)

ICES FOUNDATION QLARM									
Expected Deaths due to Hypothetical Earthquakes in the Himalaya (Wyss, March, 2005)									
	Location	Lat. (deg.)	Lon. (deg.)	Depth (km)	M	Expected Deaths (thousand)	Number Injured (thousand)	No Settle 1 ≥ 7	No Settle 1 ≥ 5
1	Assam	27.8	92.3	25	8.1	24 - 49	52 - 99	160	1900
2	Bhutan	27.3	89.5	25	8.1	76 - 151	163 - 274	270	2500
3	Kathmandu	28.1	84.2	25	8.1	27 - 42	43 - 66	330	2600
4	W. Nepal	28.7	81.8	25	8.1	11 - 22	24 - 53	370	2800
5	Garhwal	29.7	79.6	25	8.1	58 - 115	125 - 230	380	3000
6	Dehra Dun	30.7	77.7	25	8.1	96 - 199	210 - 433	450	3300
7	Kashmir	33.0	75.0	25	8.1	67 - 137	146 - 293	550	4000

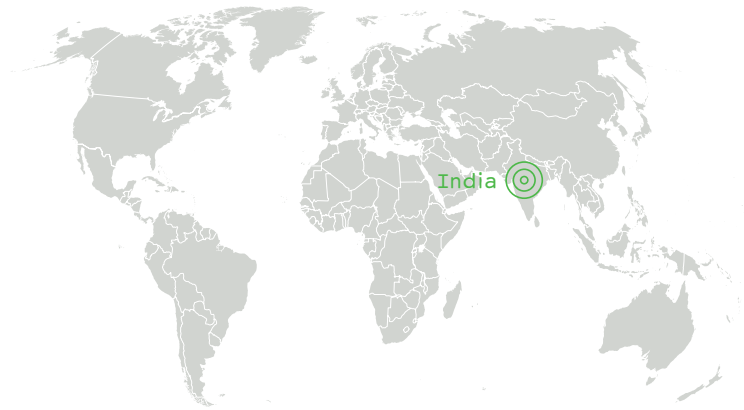
Reported Fatalities due to M7.6 Kashmir Earthquake of October 2005: 85,000  
Reported Fatalities due to M7.8 Gorkha Earthquake of April 2015: 10,000

Our estimates of 7 scenarios for Himalayan earthquakes (Wyss, 2005). The two scenarios that have since come true are highlighted in pink and yellow. Fatalities in Kashmir numbered approximately 85,000 and in Kathmandu about 10,000. This is a copy of the original table published in 2005, no changes have been made.





## A farmer app for upscaling weather index insurance and promoting climate justice



This project proposes to develop a participatory crop insurance app which involves farmers in the design of their insurance package, and allows splitting of the premium into a normal risk and an increment due to climate change. The app will bridge the gap between farmers and underwriters, and facilitate implementation of the “polluter-pays” principle.

“I was disappointed by my crop losses. But the crop coverage offered by MIA gave me hope. When we farmers discussed it, we realised insurance will at least give us some respite.”  
Rakesh Kumar beneficiary in Vaishali, Bihar, India.





Farming risks are expected to intensify due to climate change. It is therefore imperative to establish adequate adaptation measures for people at the base of the pyramid who depend on climate sensitive sectors for their livelihood. An important step in this regard is the development of innovative risk transfer mechanisms, such as insurance solutions to protect against climate related risks.

In India, most farmers (75%) have not been keen to buy insurance even if heavily subsidised. One challenge is that farmers are not adequately involved in the design of insurance that makes sense in their context. Furthermore, index based crop insurance (despite certain benefits for insurers) has introduced a new demand-side problem, that of basis risk – the risk of mismatch between insurance payouts and actual losses.

The proposed project aims at increasing farmer participation through a user-friendly app which involves farmers in the design of their insurance packages. Another important component of the project is to integrate a concept called "Climate Cost of Cultivation (CCC)" into the app. The CCC index reduces basis risk and quantifies the cost of climate change, a cost which cannot be legitimately attributed to the farmers. Using the CCC index to determine and detrend premiums would promote climate justice, as farmers would not be required to pay for the costs of climate change.

The project is part of Climate Resilience through Risk Transfer (RES-RISK) funded by the Swiss Agency for Development (SDC).



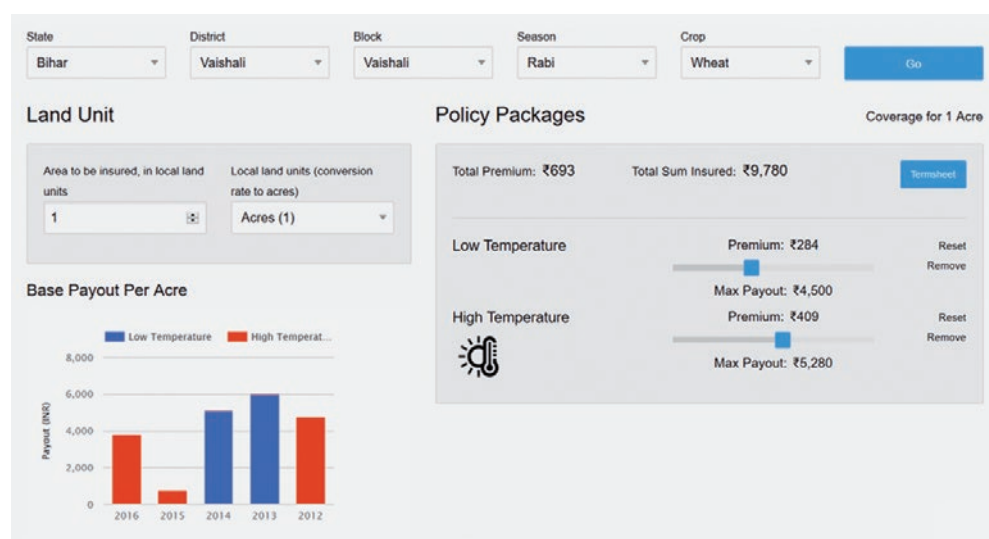
"Very few people observe, analyse and quantify problems from the farmer's point of view. For MIA, the true test is that farmers accept those solutions."

Prof. David Dror,  
CMD, MIA



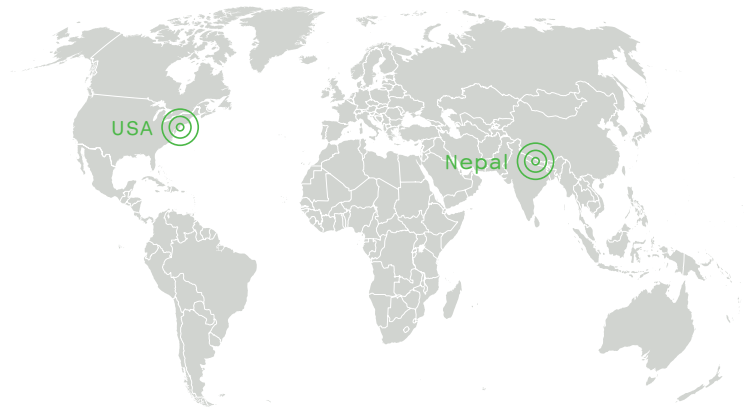
Micro Insurance Academy  
Social Re Consultancy  
www.microinsurance  
academy.org

Screenshot of the farmer app:  
The app bridges the gap between farmers who are in need of a good risk management solution and insurers who have the capacity to underwrite risks.





## PREPHubs (Communication Infra- structure for Disaster Preparedness)



Paati community space in Thecho, Kathmandu Valley. PREPHubs in Nepal are building off these gathering places as a way to embed new PREPHub emergency communication and water infrastructure into existing social patterns.

PREPHubs (Communication Infrastructure for Disaster Preparedness) are a new kind of public space infrastructure designed to increase disaster preparedness. Integrated into outdoor public spaces across a city, PREPHubs become part of everyday community life. In the case of a natural disaster, they transform into focal points for neighbourhood resilience by providing much needed information, energy, water and supplies. They are being prototyped for Nepal and the US.



Massachusetts Institute  
of Technology

[www.urbanrisklab.org](http://www.urbanrisklab.org)

PREPHubs are part of an ongoing project exploring ways to integrate disaster preparedness and response technologies into public infrastructure to facilitate community resilience. Able to operate entirely off-grid during a disaster, the hubs are built around the short-term and immediate needs for communication, power and supplies. PREPHubs are strategically placed to activate public spaces, while encouraging neighbourhoods to build preparedness into their lives. Should a disaster occur, they become gathering places to access information, resources and connect with loved ones.

The Urban Risk Lab has been researching the effects of earthquakes on cities since the 1995 earthquake in Kobe. A key lesson, evidenced through multiple research projects, shows that public open space and the infrastructure that supports it are critical for evacuation and recovery. Large parts of the population end up evacuating to open spaces to be safe from aftershocks, to find relatives and to gather important information. The PREPHub project makes the connection between open space and resources before an earthquake so that the public knows where to go and how to establish a plan with family and friends. By using the embedded technology on a regular basis, they become familiar with how to use it should an emergency occur.

We are developing PREPHub projects independently for San Francisco (USA) and Kathmandu (Nepal). Motivated by the beautiful specificity of each context and culture that we work in, each version of the PREPHub is being developed in conjunction with community partners in both locations to meet the specific needs of its local population, both before and after a disaster occurs.



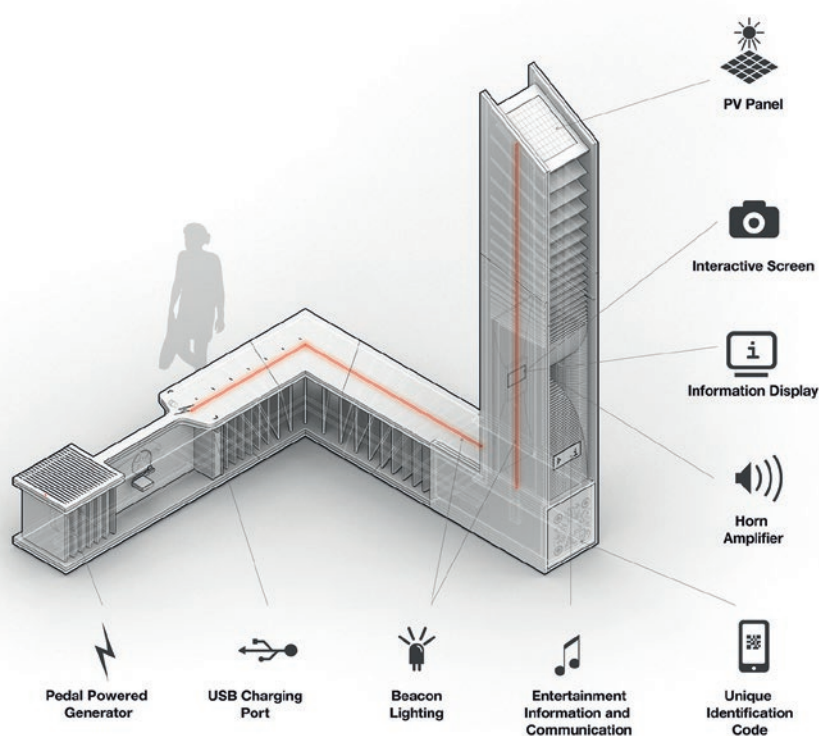
"More and more, cities around the world are facing an uncertain future. In all our projects, we work to prepare for it by enhancing the everyday, helping communities be ready for the worst."

Miho Mazereeuw,  
Director of the  
Urban Risk Lab

Version 2.0 prototype components. Each function serves the community in everyday situations, but then provides critical needs in the case of an emergency.



Version 2.0 prototype of the San Francisco PREPHub tested on MIT Campus. People can charge their phones, send an "I'm okay" message and listen to the radio. When an emergency occurs, the blue beacon lights would turn red.







## Community based flood early warning system for Budalang'i Sub-County, Kenya



This is a community flood early warning system for Budalang'i Sub-County. This will be a mobile phone based early warning system that will integrate indigenous traditional knowledge and climate science data. It developed using a community participatory approach for capacity building to enhance livelihood activities.

Periodic floods occur in the River Nzoia basin in Budalang'i where vulnerable households and communities experience negative impacts on their mainly small-scale agriculture, livestock keeping, fishing and informal enterprise activities. In order to improve the livelihoods of residents, the Busia County government has responsibility for local level planning and development – which presents an opportunity to use locally available resources and capacities to address sustainably the challenges of periodic floods.

This project will intervene to establish a mobile phone based community flood early warning system – integrating indigenous traditional knowledge and modern climate science. Specifically, the project seeks to document existing indigenous traditional knowledge used for flood prediction in Budalang'i Sub-County, develop a mobile phone based flood early warning system that integrates flood indigenous traditional knowledge with climate science, and build the capacity of households, community organisations and selected Busia County government officials on the management of the mobile phone based flood early warning system. In order to achieve the project goals, various activities such as primary and secondary data collection, stakeholder capacity building through training, community mobilisation and participation will be undertaken. The potential beneficiaries are local households, women and youth groups, and staff at the department of Disaster Management in Busia County.



“... we observe the colour of water, the wind speed and direction, and animal behaviour to predict the onset of rain seasons and floods. However, it is difficult to warn people when floods occur at night.”

Benson Maina,  
(ITK) Expert

Left: Displaced locals on northern dyke of River Nzoia in Bukani sub-location. Annual floods curtail farming activities, which is the predominant socio-economic activity.

Right: Homestead destroyed by floods and abandoned in Busagwa Village, Magombe East sub-location.



Homestead abandoned due to December 2011 floods when River Nzoia burst its banks in Makunda village in Magombe West sub-location. Displaced people camped at Makunda primary school.





## EpiNurse – Participatory Monitoring of Health Security and Disaster Risk by Local Nurses



Temporary shelters for disaster survivors often become long-term residential units. Daily monitoring of shelter environment and direct data transmission on health risk ensure the health and safety of evacuees and communities. EpiNurses use the information and communication technology (ICT) toolkit to assess living conditions and provide crucial yet hard-to-collect evidence of communicable diseases, thereby preventing an eruption of health threats.



Left: The living arrangements in temporary housing leave evacuees vulnerable to communicable diseases. An EpiNurse carrying her toolkit inspects the shelters in Boudha.

Right: Mangsirmaya Tamang (mother) and Ruthmaya (baby) live in a shelter where EpiNurses conduct daily monitoring and follow up with care and consultation.



### EpiNurse

Nursing Association  
of Nepal

Disaster Nursing Global  
Leader Degree Program

[www.nursingassoc.org.np](http://www.nursingassoc.org.np)

[www.epinurse.org](http://www.epinurse.org)



The project aims to develop a disaster risk reduction method to ensure health security in disaster prone communities. Collaborating with local Nepali nurses, called EpiNurses (Epidemiology+Nurses), who conduct participatory monitoring using an ICT toolkit, the project aspires to protect and promote health and safety in shelters and communities.

The main informants of monitoring are women who remain in shelters and become health security keepers as well as unpaid care workers. Local nurses have the ability to mitigate risks. This requires greater cultural knowledge on how people interpret and live with risks, and how human behaviours contribute towards putting them in vulnerable situations. Nurses can restore public health in a disaster setting by ensuring a healthy level of people and living environment, and by identifying high risks and vulnerability among the population, including the unique needs of survivors.

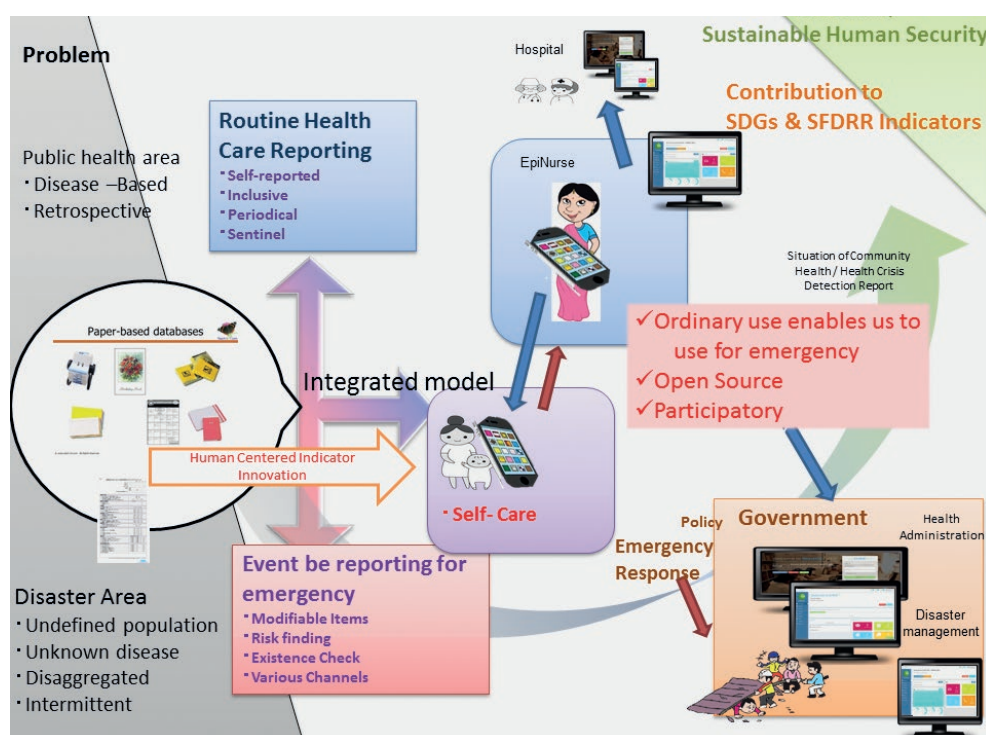
The proposed project seeks to provide an open framework using an application programming interface for integration with other information technologies. Experimental trials will use a prototype for data collection, simulations, and simulated response training. In order to put this into practice, nurses and community people need to be IT literate through formal education and training. Once trained, local nurses can arrange the community resources that would allow smooth cooperation among the stakeholders of health security.



“Survivors need to take care of their lives themselves rather than through medication.”

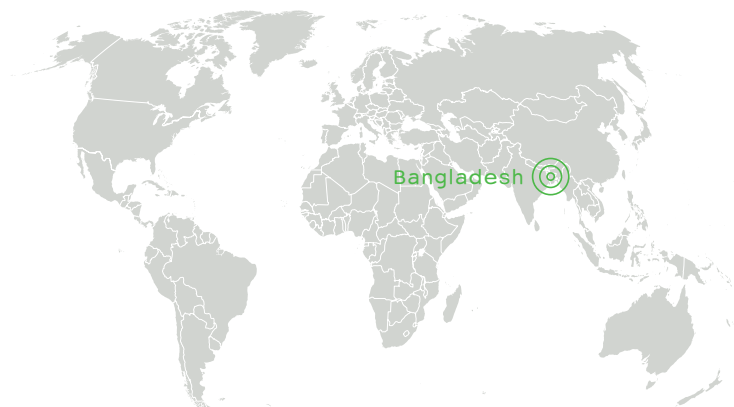
Thakchi Sherpa, Founding member of the EpiNurse project in Nepal

This conceptual map illustrates the efficacy of developing everyday technology to be applied in disaster response, which requires speedy and accurate assessment of health conditions around shelters.





## From world's first case study to concrete action: bridging the last mile between analysis of mobile network data and Early Warning System policy



Our previous work identifies a pathway to obtaining step-change improvements in the two cornerstones of Disaster Risk Management (DRM): early warning and post-disaster assessment. Mobile network data provides accurate information on who evacuates, where they go and how long they stay evacuated – and, even more significantly, information on who does not evacuate during warnings. But a gap exists between the data science and the DRM policy in Bangladesh. To plug this gap, we propose using mobile network data to 1) identify the most vulnerable and least responsive communities to early warning systems (EWS), and 2) target them for face-to-face intervention.

We have demonstrated that very large sets of mobile network data provide rare and valuable insight into vulnerable people's behaviour before, during and after a disaster. Our analysis identifies a pathway to obtaining step-change improvements in the two cornerstones of DRM: early warning and post-disaster assessment. Specifically, as we have shown, mobile network data provides accurate information on who evacuates, where they go and how long they stay evacuated – and, even more significantly, information on who does not evacuate during warnings (Fig. 1a) and instead delays evacuation until it is too late (Fig. 1b).

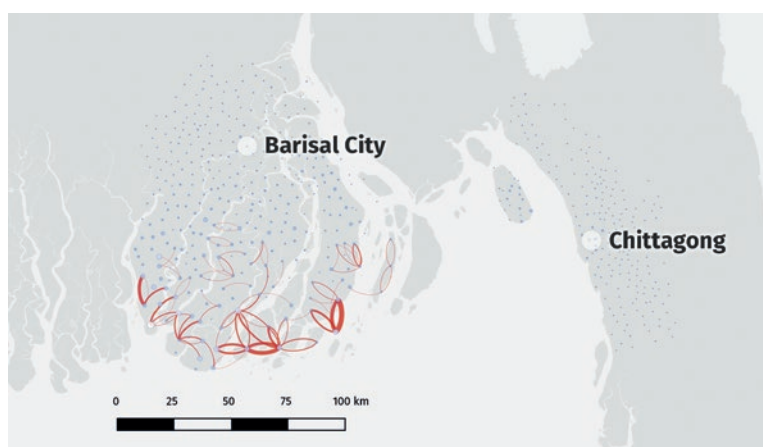
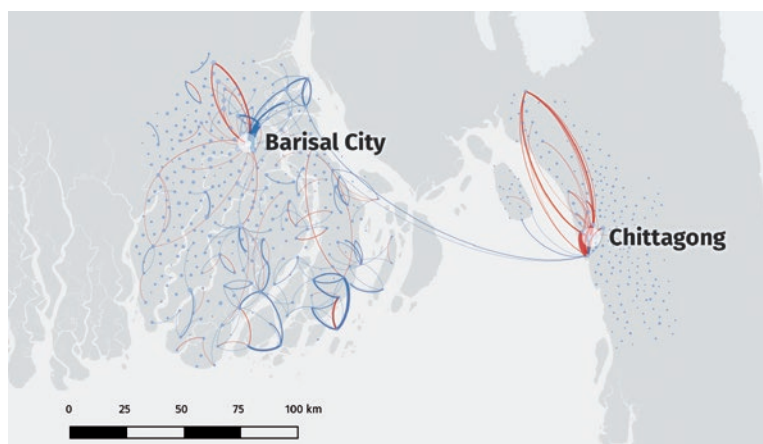
This rare and valuable information can reveal precise strengths and weaknesses in EWS without relying on the standard metric for EWS – death tolls, a very costly measure indeed. However, a very clearly observed gap exists between the data science (which has now been tested and proven) and the DRM policy in Bangladesh, a country which is exceptionally vulnerable to extreme flooding and cyclone impacts, and where hundreds of thousands of people have died in floods over the past century.

Our project is designed to carry "big data" analysis to the last mile – the people living in vulnerable areas who are not evacuating when EWS is deployed. We propose to use mobile network data to 1) identify the most vulnerable and least responsive communities to EWS, and 2) target them for face-to-face intervention. This proposed action will strengthen local responses to EWS – potentially saving lives in future storms. It is expected that by demonstrating the potential and effectiveness of mobile network data in community-targeted intervention, we can leverage our existing policy relationships in the Bangladesh government, donor agencies and civil society to identify an uptake pathway for mobile network data in official EWS.



“By analyzing data at such a large scale and in such high resolution, we gain new insights about how vulnerable people adapt to cyclones, which we can reflect to policy makers to help improve risk reduction strategies like early warning systems.”

Dr. David Wrathall,  
Oregon State University



Three girls stand in front of a cyclone shelter which protects villagers during emergency cases. However, not all people seek shelter, a lot start moving according to the mobile phone data.



Blue and red links indicate flows of mobile telephones passing between towers (upper figure) before and (lower figure) during Cyclone Mahasen (15 and 16 May 2013). Red links indicate greater flows than normal for the same period of time, and blue links indicate smaller flows than normal. Thickness indicates volume. The upper figure indicates flows on 15 May, as early warnings were issued for the southern coast of Bangladesh. The lower figure indicates flows between 00:00 AM and 6:00 AM local time, as Mahasen was passing overhead. These figures indicate clearly where people evacuated to in advance of the storm (Chittagong City) and where people moved too late (on the southern coast of Barisal).



## Contacts

## Church World Service

Beth Oppenheim  
boppenheim@cwsglobal.org  
www.cwsglobal.org

COOPI – Cooperazione  
Internazionale

Stefano Oltolini  
oltolini@coopi.org  
www.coopi.org

## Earth Aid

Syed Ali Tarek  
syedalitarek@gmail.com  
www.earthaid.org.uk

## GeoHazards International

Janise Rodgers  
rodgers@geohaz.org  
www.geohaz.org

International Centre for  
Earth Simulation Foundation

Max Wyss  
max@maxwyss.ch  
www.icesfoundation.org

Massachusetts Institute  
of Technology

Miho Mazereeuw  
mmaz@mit.edu  
urbanrisklab.org

Micro Insurance Academy,  
Social Re Consultancy (pvt) Ltd.

David Dror  
daviddror@socialre.org  
www.microinsuranceacademy.org

Multiface Research And  
Development Centre

Denis Opondo  
opiyod@yahoo.co.uk

## Nursing Association of Nepal

Apsara Pandey  
pkapsara@gmail.com  
www.nursingassoc.org.np

## Oregon State University

David Wrathall  
david.wrathall@oregonstate.edu  
www.ceoas.oregonstate.edu

## Imprint

## Picture credits

ph. Andrea Ruffini,  
COOPI/ECHO  
Cover

Church World Service (CWS)  
Page 2

Caroline Njogu,  
Church World Service  
Page 3

ph. Andrea Ruffini,  
COOPI/ECHO  
Page 4, 5

Earth Aid  
Page 6, 7

Gina Marie Belair,  
GeoHazards International  
Page 8

Lalrinpuii Tlau,  
GeoHazards International  
Page 9

Janise Rodgers,  
GeoHazards International  
Page 9

Lettis Consultants  
International, Inc.  
Page 9

Hilmi Hacaloğlu,  
Wikimedia Commons  
Page 10

International Centre for  
Earth Simulation Foundation  
Page 10, 11

Micro Insurance Academy  
Page 12, 13

MIT Urban Risk Lab  
Page 14, 15

Multiface Research and  
Development Centre  
Page 16, 17

Nursing Association of Nepal  
Page 18, 19

Archive Munich Re Foundation  
Page 21

Oregon State University  
Page 21

## Editors

Christian Barthelt,  
Munich Re Foundation

Renate Kramer,  
Munich Re Foundation

Thomas Loster,  
Munich Re Foundation

Carolin-Anna Trieb,  
Munich Re Foundation

## Design

Keller Maurer Design, Munich

