

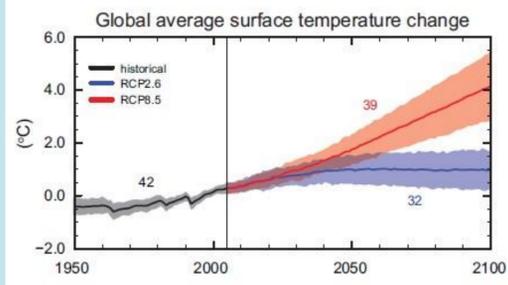
# Assessing the Potential for Using Crowdsensing to Improve Community Resilience to Climate Change

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## Background

The world is already witnessing serious impacts of climate change. Extreme weather conditions causing events such as drought, flashflood, landslides, and heatwaves are constantly making headlines in the news.

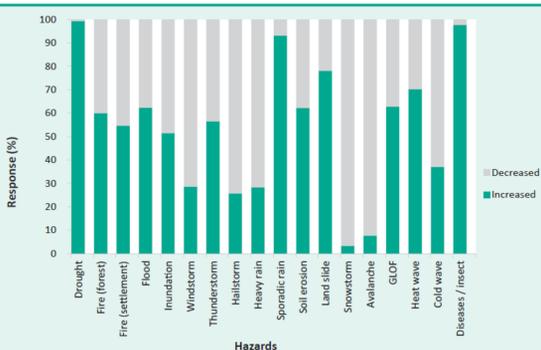


IPCC (International Panel on Climate Change) in its Fifth Assessment Report states that during 21st century global surface temperature is likely to rise from 0.3 to 1.7 degrees (lowest emission scenario), and from 2.6 to 4.8 degrees (highest emission scenario).

Every section of a society (urban or rural, rich or poor) is impacted by climate change. But those sections who live in the mercy of favorable climatic conditions for their livelihood are most vulnerable.

## Climate Change in Nepal

- Nepal accounts for only 0.027% of global greenhouse gas (GHG) emissions
- According to Maplecroft Nepal is the fourth most climate vulnerable country in the world, because of its challenging topography and socio-economic conditions (ranks 145 on the Human Development Index, nearly one-fourth of its population live below poverty line).



A survey conducted by the Government of Nepal in 2016 states that

- (99%) of respondents have reported increasing incidences of droughts in the last 25 years, followed by disease/insects (97.69%), landslides (78.12%) and inundation (51.47%).

According to National Adaptation Programme of Action (NAPA) 2010 report, out of 75 districts,

- 29 districts are highly vulnerable to landslides, 22 districts to droughts, 12 districts to GLOFs (glacial lake outburst flood) and 9 districts to flooding.

## Impacts of Climate Change in Nepal

- Communities are vulnerable to flood and landslides.



Landslide triggered by incessant rainfall halts in Dolakha district, Central Region Nepal, June 28, 2017



200 homes Inundated after Flood water entered settlements in Kailali district, Far Western Nepal, August 05, 2017

## Stories of Struggle and Survival



Local communities constructing a dam for an irrigation canal in Bardiya district of Nepal with assistance of NCCSP.

But amidst all these crisis there are also stories of struggle and survival.

These are critical times when we witness a soft side of humanity, how we come close together and help each other to solve a problem at hand in the best possible ways we can.



Shifting from agriculture to bamboo business after receiving three months training provided by NCCSP

<http://nccsp.gov.np>

## Community Resilience

- Centre for Development Informatics proposed properties that strengthen community resilience.

Properties
<b>Robustness:</b> ability to secure resources even in the face of shocks, e.g. access to rigid infrastructures such as dams, bridges, drought resistant crops.
<b>Scale:</b> ability to access resources from extended networks. e.g. from nearby village, locally, nationally.
<b>Redundancy:</b> ability to have access to surplus resources so there is minimal damages.
<b>Rapidity:</b> ability to quickly gain access to resources e.g. social network, financial, food, shelter.
<b>Flexibility:</b> ability to create opportunities from the challenges faced, e.g. shifting from traditional farming to new income generation activity.
<b>Self-organization:</b> ability to coordinate for a collective action.
<b>Learning:</b> ability to learn from its current crisis experiences (feedback) and improve for future crisis

ROBUSTNESS
SCALE
REDUNDANCY
RAPIDITY
FLEXIBILITY
SELF-ORGANIZATION
LEARNING



Community Resilience is proportional to the ability to secure each properties

## ICT for Community Resilience (e-Resilience)

Information and Communication Technologies (ICT) has a huge potential in strengthening these properties of community resilience. Mobile phones in particular have become sensational in developing countries to share information via social media like twitter, facebook.

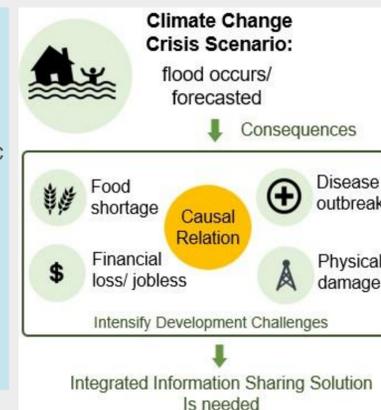
- In Nepal according to CBS there were 64 per 100 population cellular subscribers as of 2011. As of 2015 internet penetration rate is 44% and increasing.

The advantage of mobile phone is it strengthens properties needed to become a resilient community.

- It gives quick access to information resources, easy connection with networks, so that community is able to self-organize, quickly mobilize resources, make decisions, explore alternatives to support their livelihood so on.

## Issue 1: Research Gap in ICT4D from Climate Change Perspective

Most ICT for Development (ICT4D) research address specific developmental challenges without including climate change in the overall picture.



m-Krishi, a mobile application that provide advisory services to farmers on crop production, diseases on the backdrop of agriculture. Tele-medicine to connect specialists with the health workers in rural areas via video conferencing.

- Such solutions are specific and operate in isolation, not sufficient to build resilience to climate change.

## Issue 2: Assuring Information Quality in Crisis Situation

There were mixed reactions with respect to the usage of social media, after Nepal earthquake crisis in 2015.



Emergency rescue workers carry a victim on a stretcher in Kathmandu, Nepal in the aftermath of magnitude 7.5 earthquake.

- Local newspaper widely applauded social media initiative by Nepal Police in providing relief operations.
- One problem they faced were rumors posted in social media. How can we assure some level of reliability in the critical information being shared?

## Crowdsensing potential for e-Resilience

Mobile phones are packed with many sensors.

- Camera, can take photos, videos, microphone can capture sound, accelerometer for motion detection, gyroscope for orientation, GPS to send location.



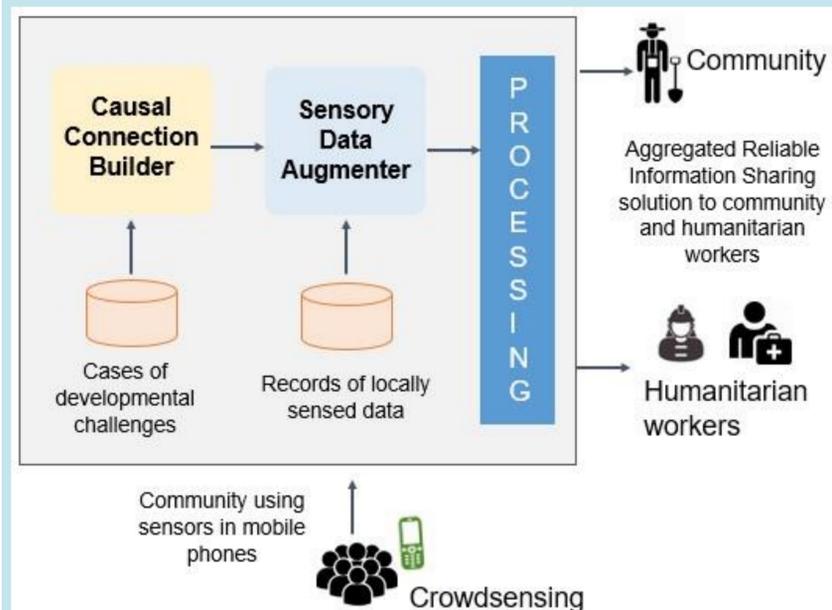
Crowdsensing is using the power of locally sensed data provided by the community.

- Combine GPS with the audio to capture honking, this will give data about noise pollution.
- Combine GPS with accelerometer this will give data about bumpy roads and so on.

## Practical significance

- During crisis such as flooding, physical sensors are damaged hence locally sensed data becomes a source.
- Locally sensed data from bottom up adds credibility to information being shared with humanitarian workers and expedites their relief operations.

## Proposal : Crowdsensing for Improving Resilience to Climate Change



- Design Framework to capture Holistic view of Climate Change crisis and Development challenges when using ICT and

- Integrate Crowd-sensed Technical Data to increase Information Quality for improving Community Resilience.