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.

**Impacts of Climate Change in Nepal**
- Communities are vulnerable to flood and landslides.
- According to National Adaptation Programme (NCCSP) Nepal Climate Change Support Program (NCCSP)
  - Government led initiative funded by EU, DFID-UK and UNDP
  - Build adaptive capacity of vulnerable communities in 14 districts of Far and Mid Western Nepal.
- Nepal accounts for only 0.027% of global greenhouse gas (GHG) emissions
- According to Maplecourt 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).
- 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
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**Stories of Struggle and Survival**
- 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.
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**Community Resilience**
- Centre for Development Informatics proposed properties that strengthen community resilience.
- Robustness: ability to secure resources even in the face of shocks, e.g. access to rigid infrastructures such as dams, bridges, drought resistant crops.
- Scale: ability to access resources from extended networks, e.g. from nearby village, locally, nationally.
- Redundancy: ability to have access to surplus resources so there is minimal damages.
- Rapidity: ability to quickly gain access to resources e.g. social network, financial, food, shelter.
- Flexibility: ability to create opportunities from the challenges faced, e.g. shifting from traditional farming to new income generation activity.
- Self-organization: ability to coordinate for a collective action.
- Learning: ability to learn from its current crisis experiences (feedback) and improve for future crisis.

**PROBLEM**
- People faced with the crisis are often isolated and failed to access timely help like medicines, food, shelter, and communication.
- 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.

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

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.