Landslide Risk Management in Remote Communities: Integrating Geoscience, Data Science, and Social Science in Local Context

Award Number 1831770

Robert Lempert, RAND

IRG 2018

Principal Research Investigators

Robert Lempert, RAND
Ryan Brown, RAND
Josh Roering, Univ of Oregon
& Annette Patton
Phebe Vayanos, USC

Community Partners

Lisa Busch, Sitka Sound Science Center
Jeff Feldpausch, Sitka Tribe of Alaska

Other partners

Project Overview

Use-Inspired Research

In 2015, landslides killed three people in Sitka, Alaska.

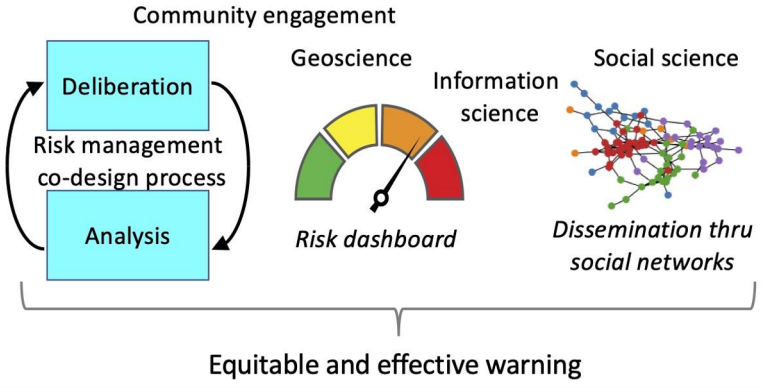
How can a small town have better landslide warning?

Project Vision

Provide Sitka effective and equitable landslide warning by:

- Deploying a large network of low-cost sensors to improve landslide prediction;
- Employing social network analysis to disseminate risk information to the entire community; and
- Co-designing warning system with community to best serve their needs

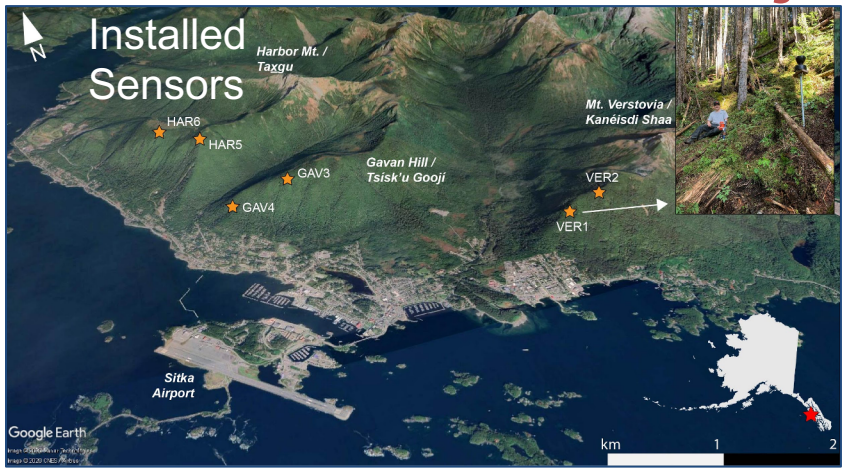
Visual Schematic



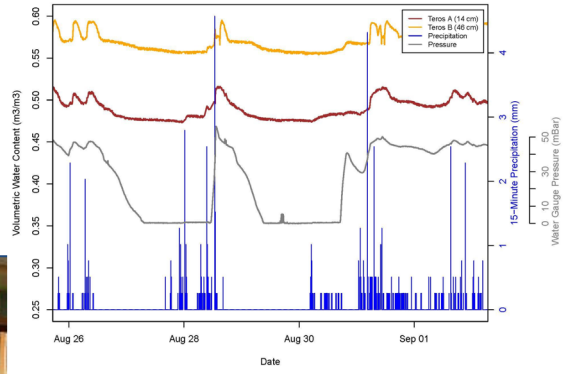
Fundamental Research Contributions

- Improve landslide prediction with data from networks of moisture sensors and rain gauges
- Enhance equitable and efficient access to risk information using social network analysis and influence maximization
- Extend participatory risk management processes to landslide warning systems and to small communities

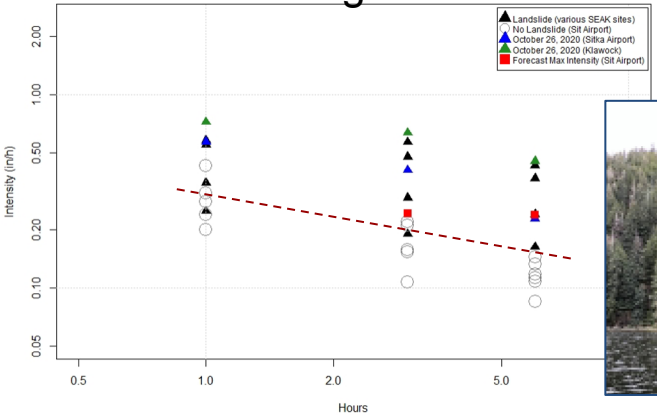
Project Update

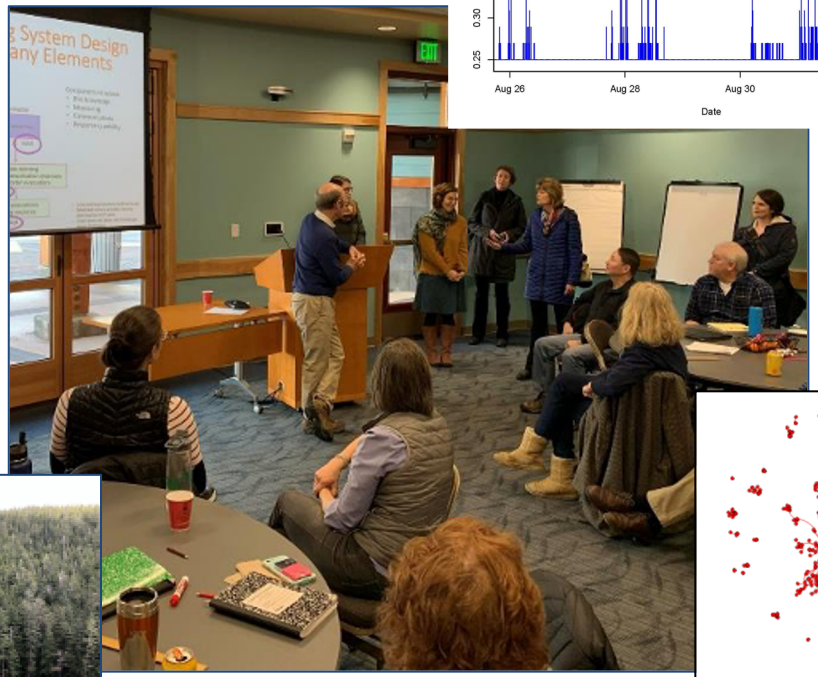


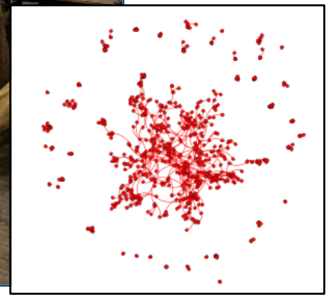
Soil Moisture Analysis



Preliminary rainfall thresholds identified landslide-initiating storms in Oct & Nov, 2020







Conducted community co-design workshops and analyzed Sitka's social networks

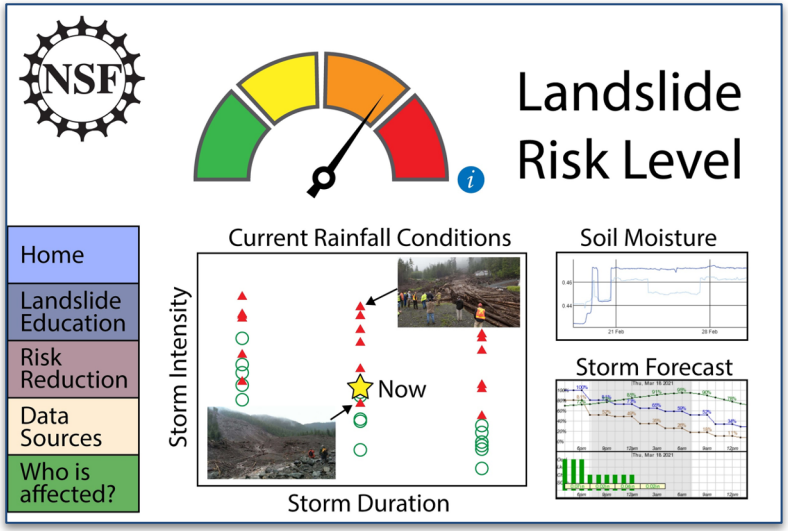
Project Evolution

Significant change in project

- Switched from siren to risk dashboard
- Developed new sensor designs that prioritize reliability
- Installed a network of citizen science rain gauges
- Added focus on landslide insurance, including landslide runout model comparison workshop

New sensors in hills

Risk dashboard



Rain gauges in people's backyards

Warning siren

Evaluating Project Impact on Communities

To date, project has:

- Fostered community interest in and understanding of landslide science
- Provided warning during last fall's intense rain storms
- Created community/researcher relationships that have blossomed into:
  - a regional COVID survey (NSF Rapid grant) and
  - a ten-year resident partnership on food security with Pardee RAND graduate school
- Provided input into Federal legislation on landslide research

Scientist in residence fellowship

Community meeting

Anticipated outcomes & success measures for next year

- In the coming year, we plan to:
  - Develop and deploy landslide risk dashboard, which includes:
    - Deploying third generation moisture sensors
    - Developing predictive model of landslide
  - Educate community on use of dashboard
  - Make recommendations for addressing landslide insurance challenges

- In the longer-term, we plan to
  - Transfer sustainable landslide warning system to Sitka
  - Transfer approaches to USGS for widespread dissemination