



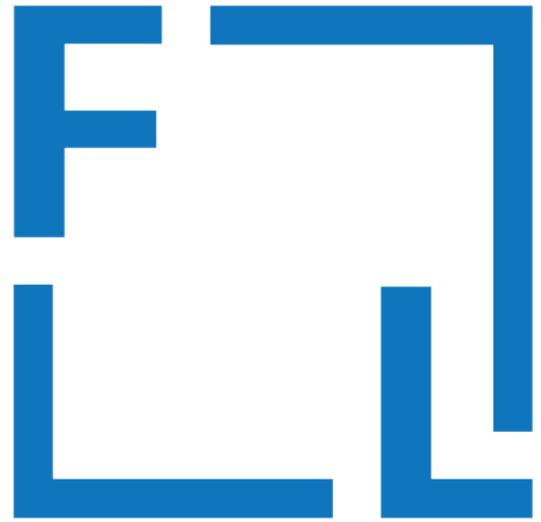
We  
Robotics  
Global

Uttam Pudasaini

Nepal Flying Labs

**Dispatches from the Flying Labs**

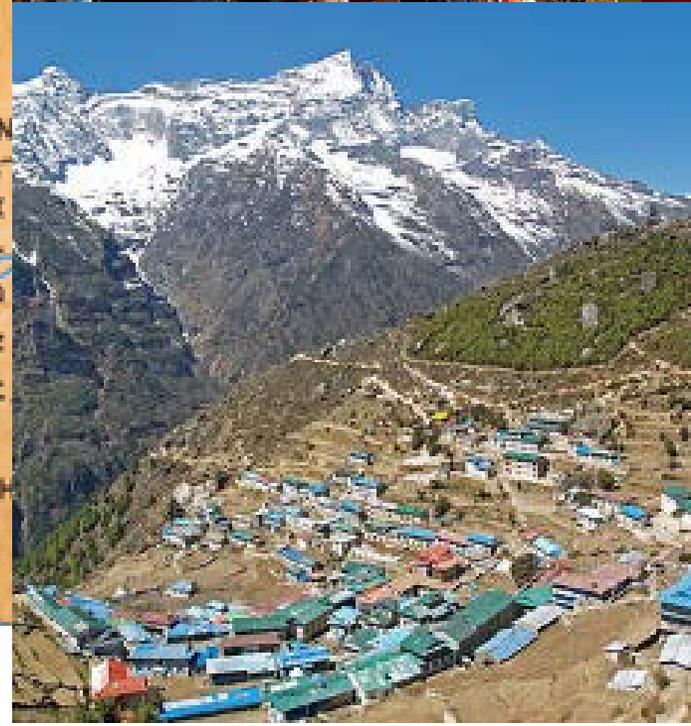
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Nepal  
Flying Labs

We  
Robotics

Uttam Puadasaini  
NFL Coordinator  
[uttam@werobotics.org](mailto:uttam@werobotics.org)



# Nepal: 2015 Earthquakes

Nepal experienced two major earthquakes on April 25 and May 12, 2015 at magnitudes of 7.8 and 7.3 respectively.

Number of people killed  
As of 26 May 2015

**8,673**

Number of people injured  
Source: UNRCO/Gov. of Nepal

**21,952**

INTERACTIVE MAP

EARTHQUAKES AND AFTERSHOCKS

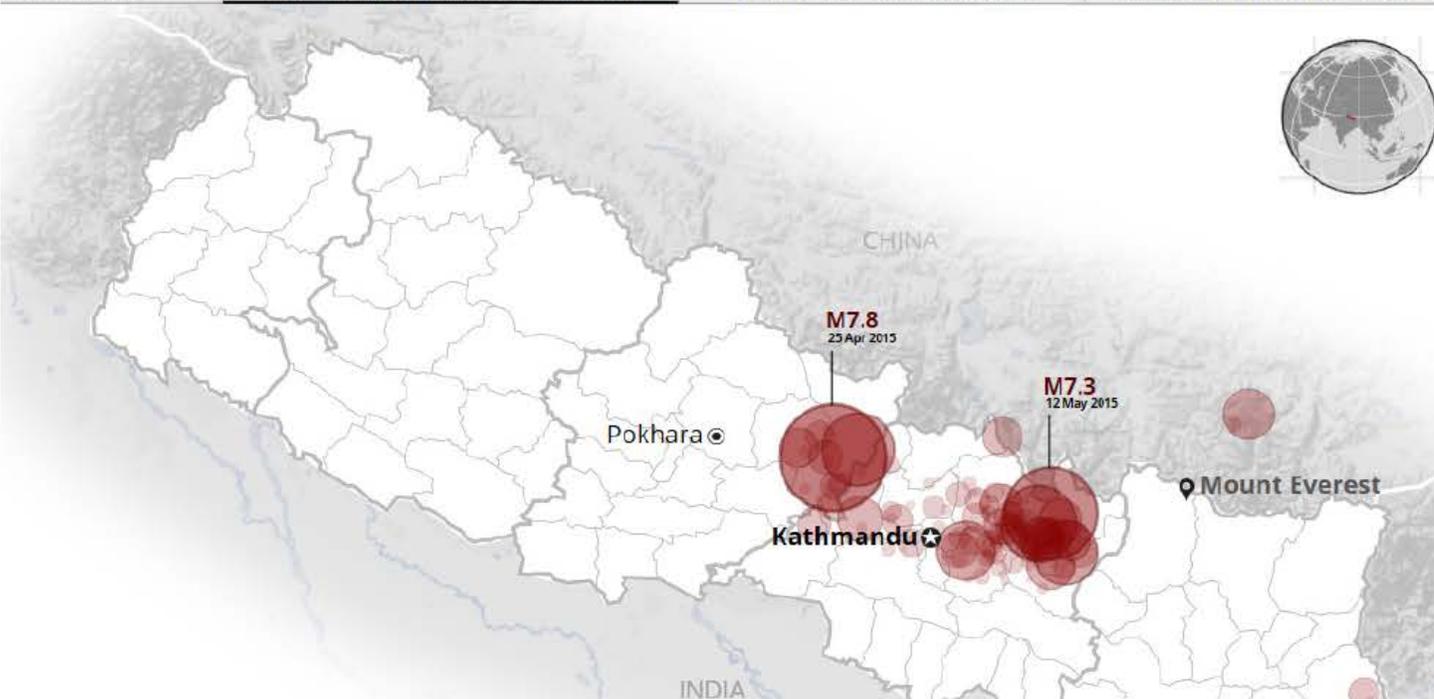
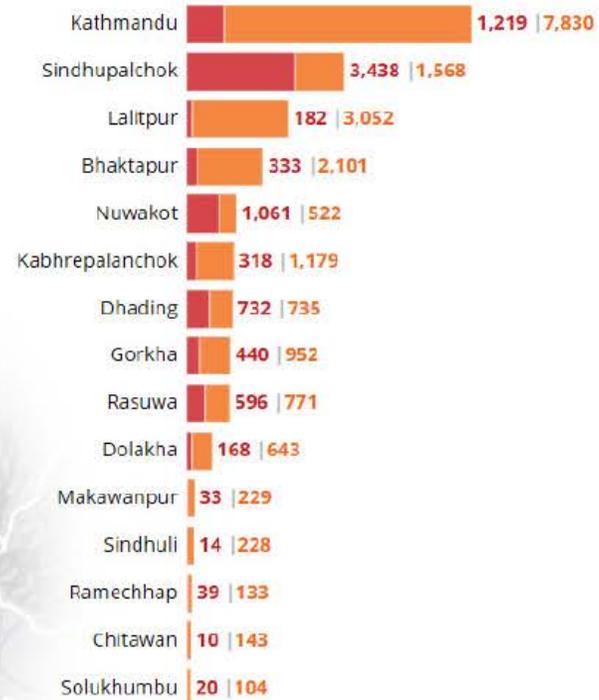
PEOPLE KILLED BY DISTRICT

PEOPLE INJURED BY DISTRICT

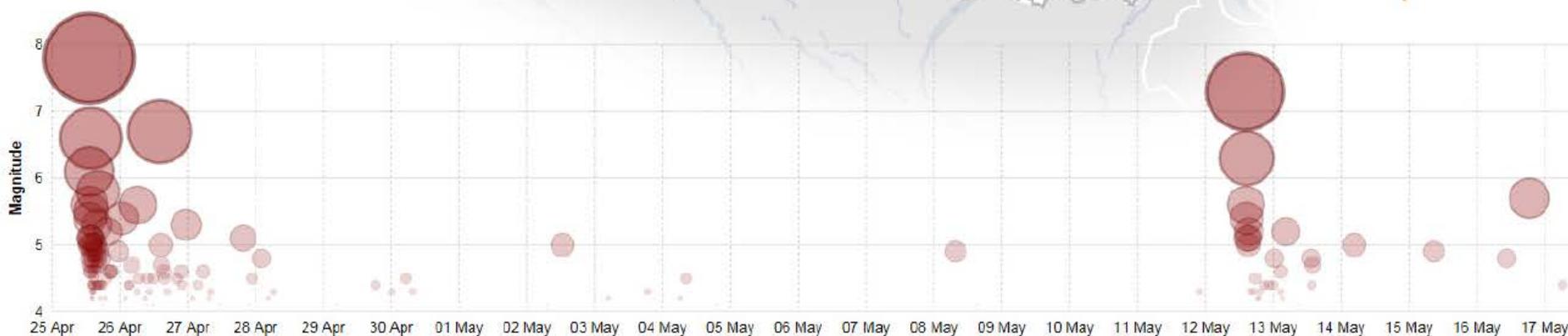
PEOPLE KILLED AND INJURED BY DISTRICT

Number of people killed | Number of people injured

limited to the top 15 districts

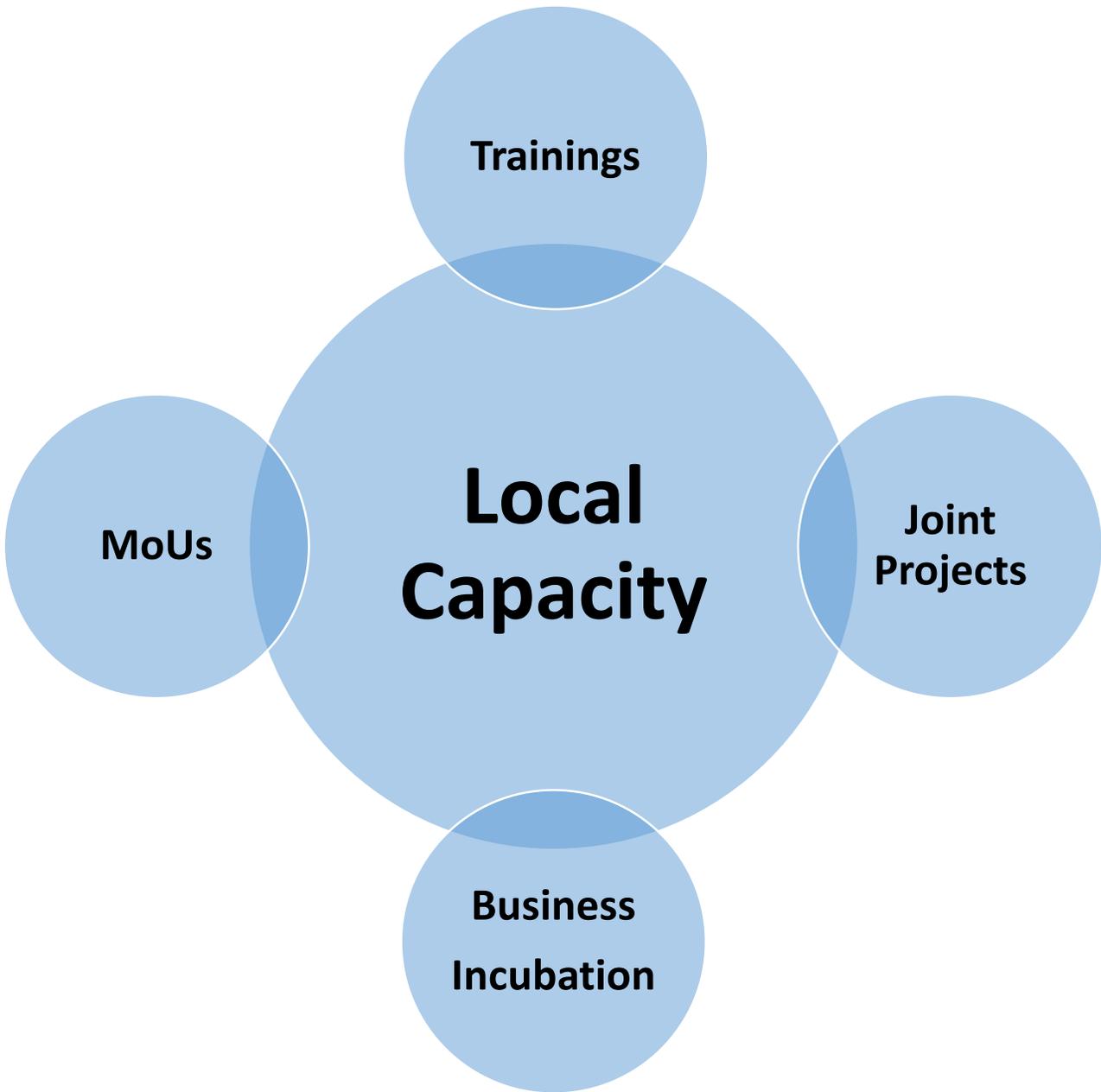


EARTHQUAKES AND AFTERSHOCKS Source: USGS

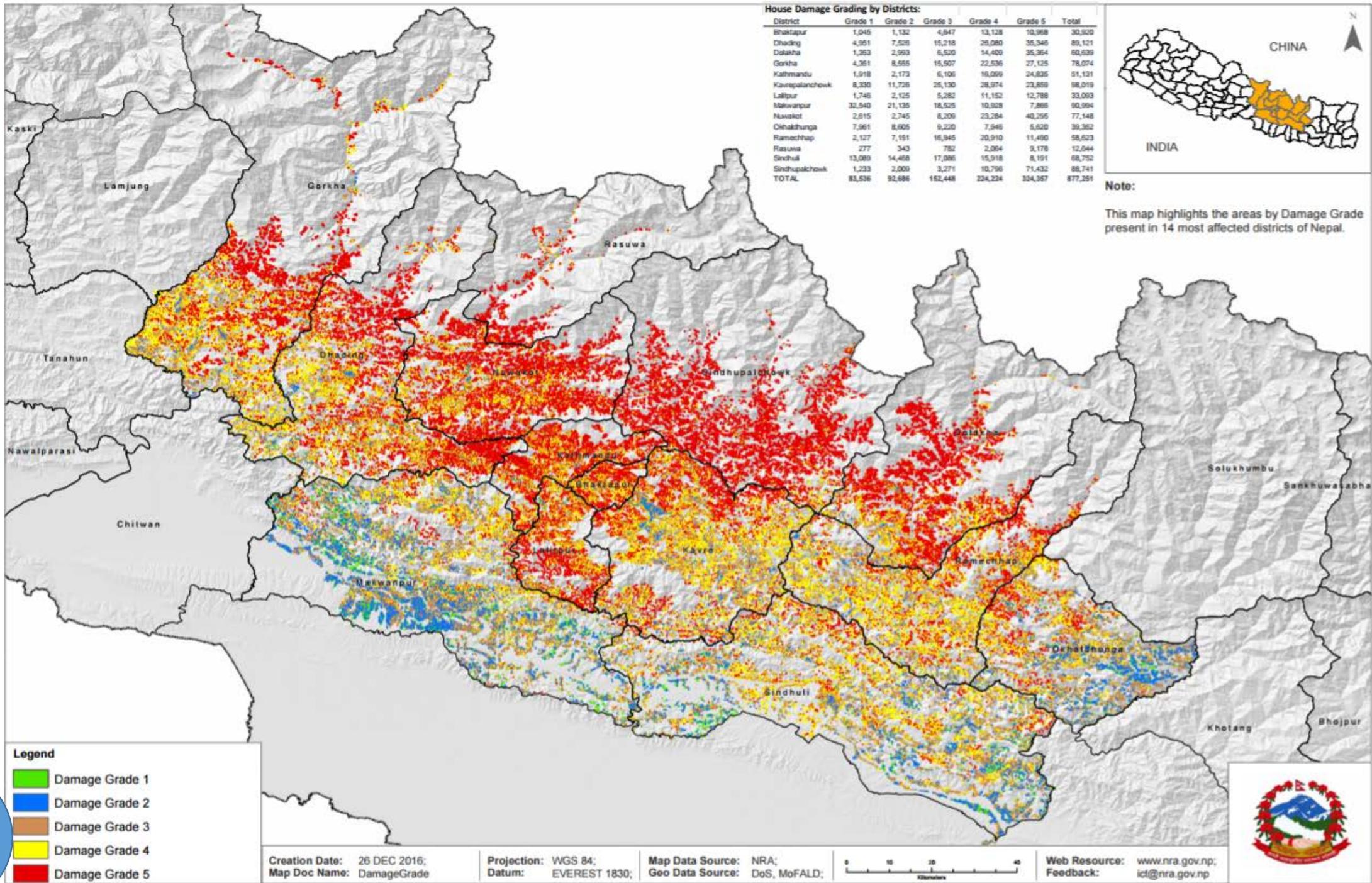








PROJECTS





In Partnership with **Medair**



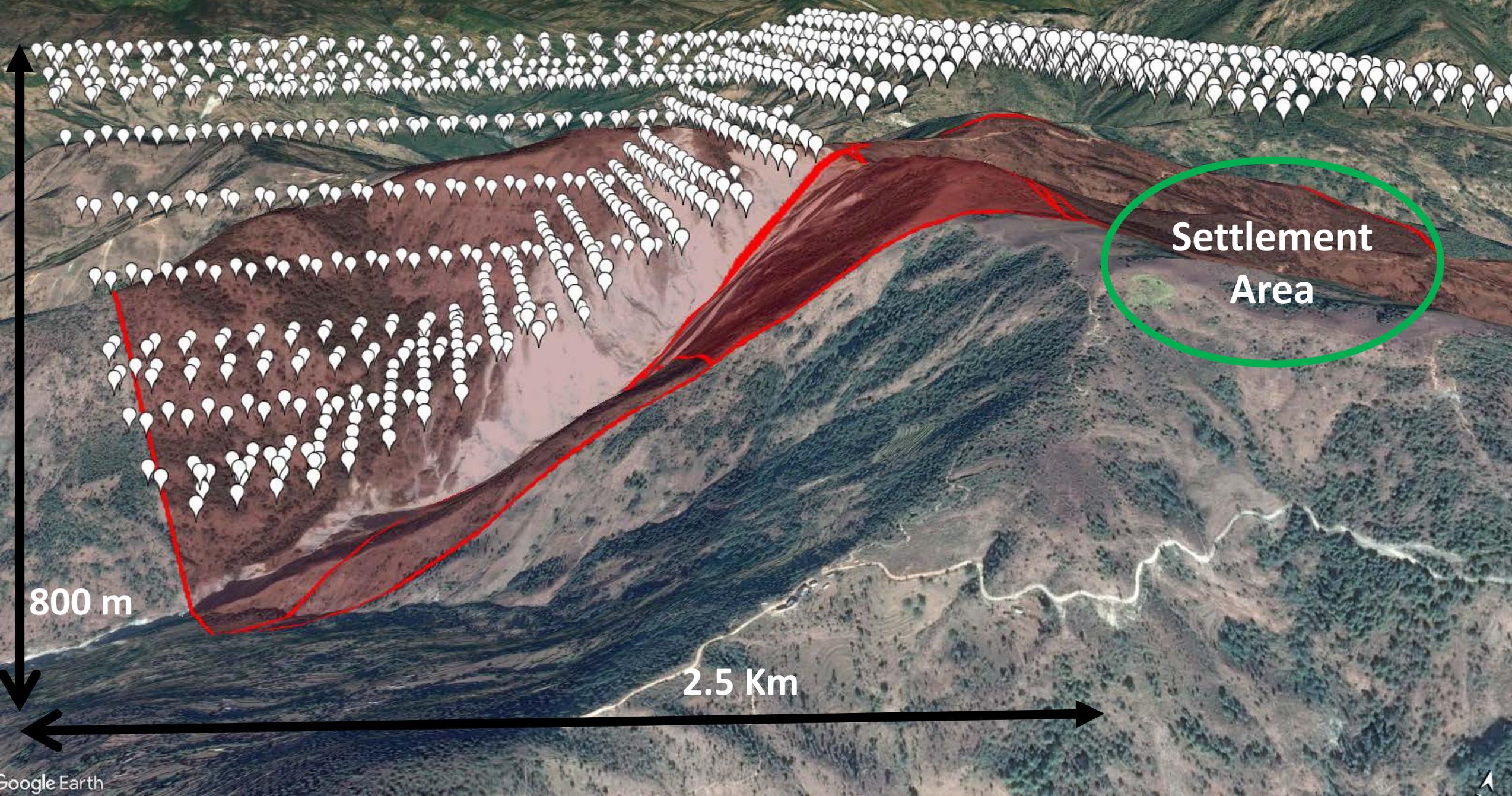
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In Partnership with **Medair**

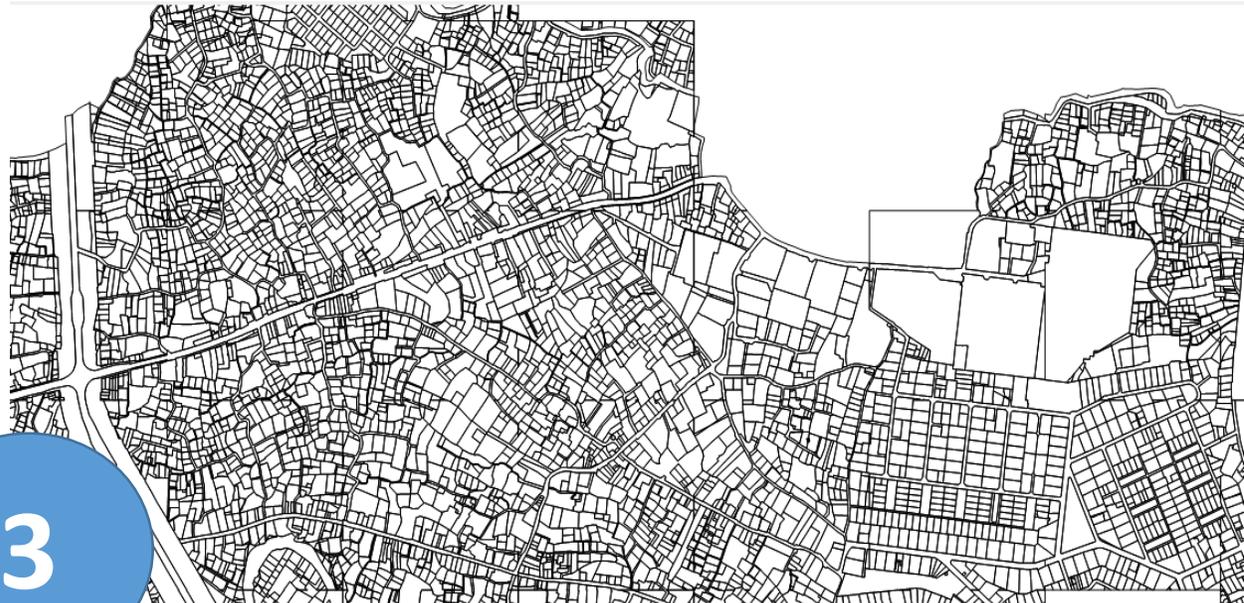
20 mi





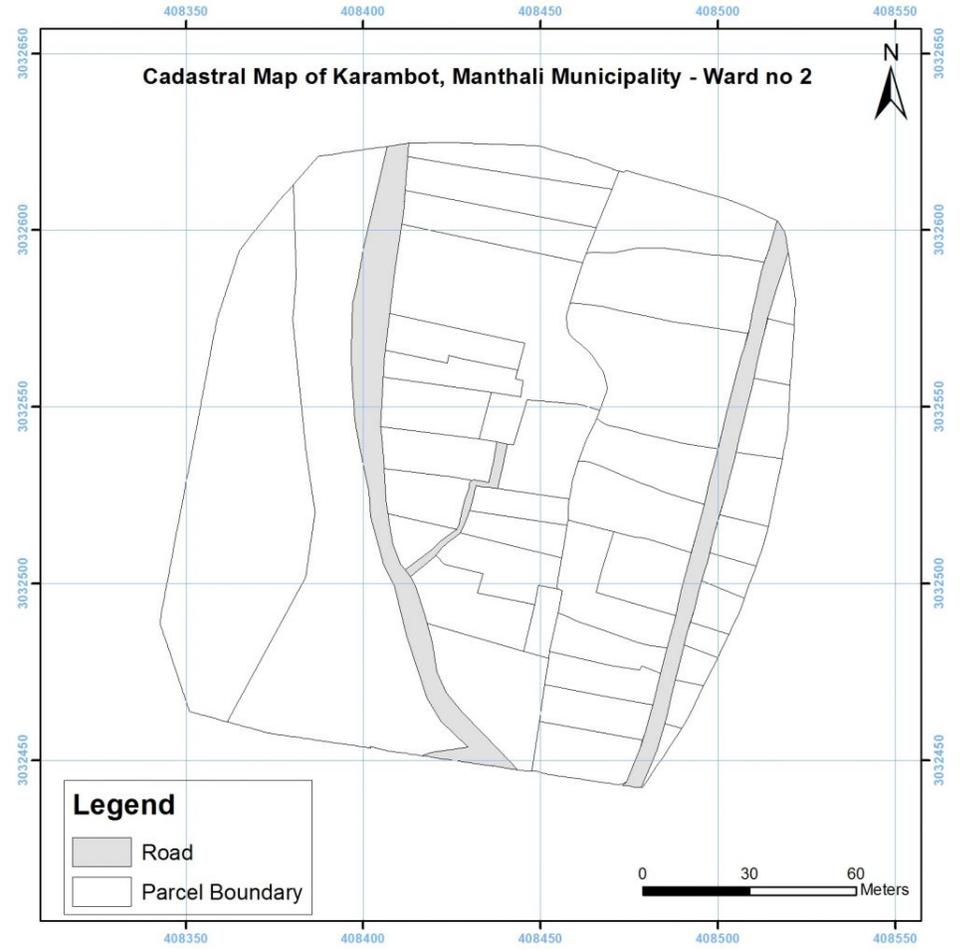


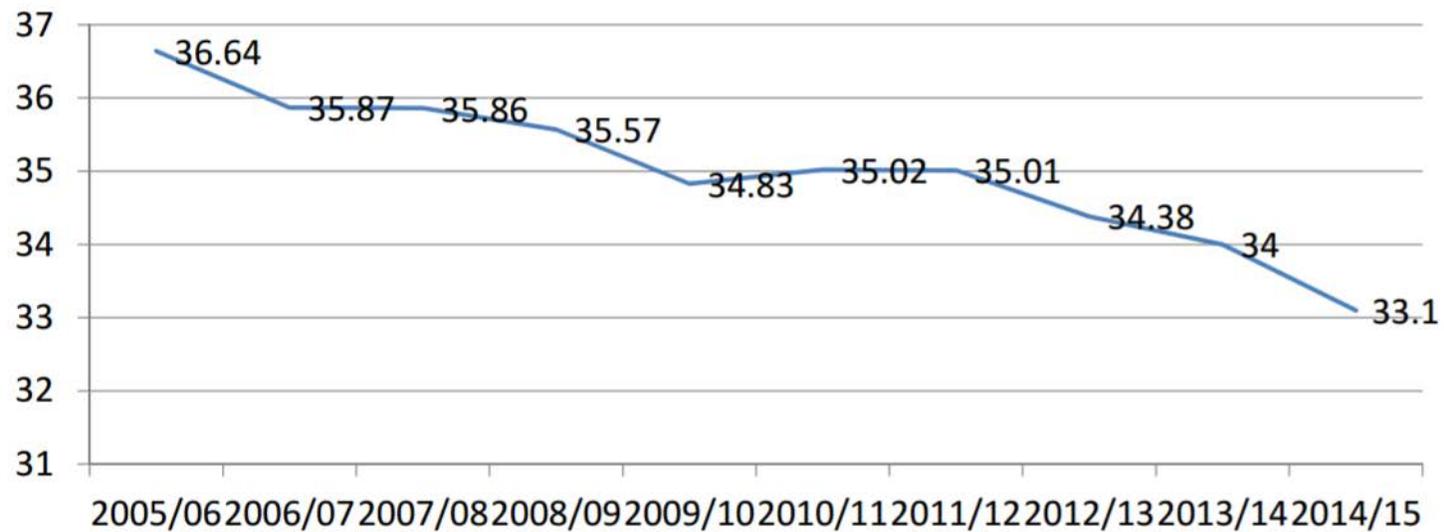
Drone based Hazard and Vulnerability Mapping





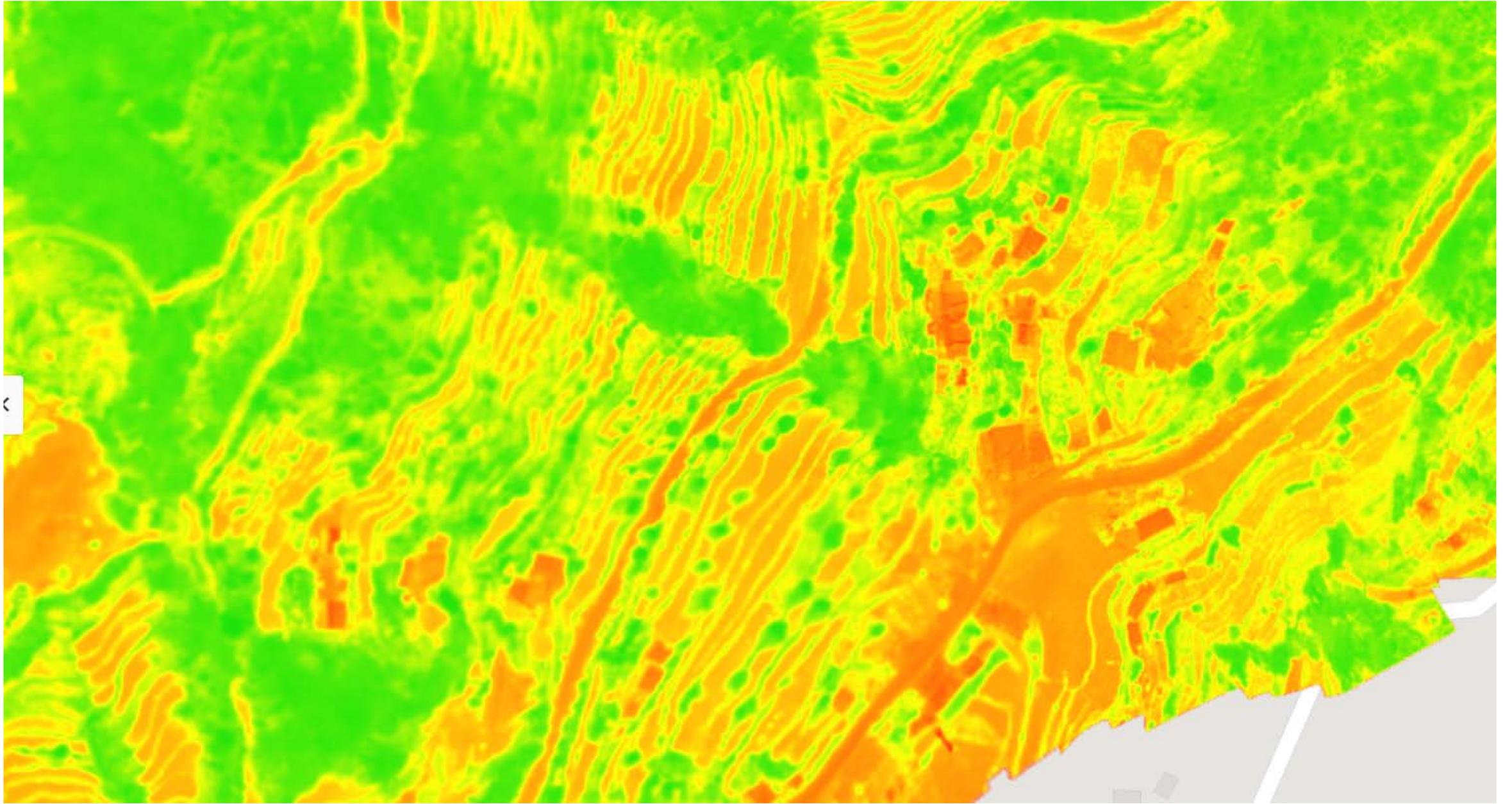
Traditional Manual Survey Based Boundary Mapping VS Aerial Survey





Source: Economic Survey





# TRAININGS and WORKSHOPS

# Use of UAV for Agriculture and Building Damage Assessment

6-9 September 2016

Venue: Kathmandu University

Partners:



Kathmandu University

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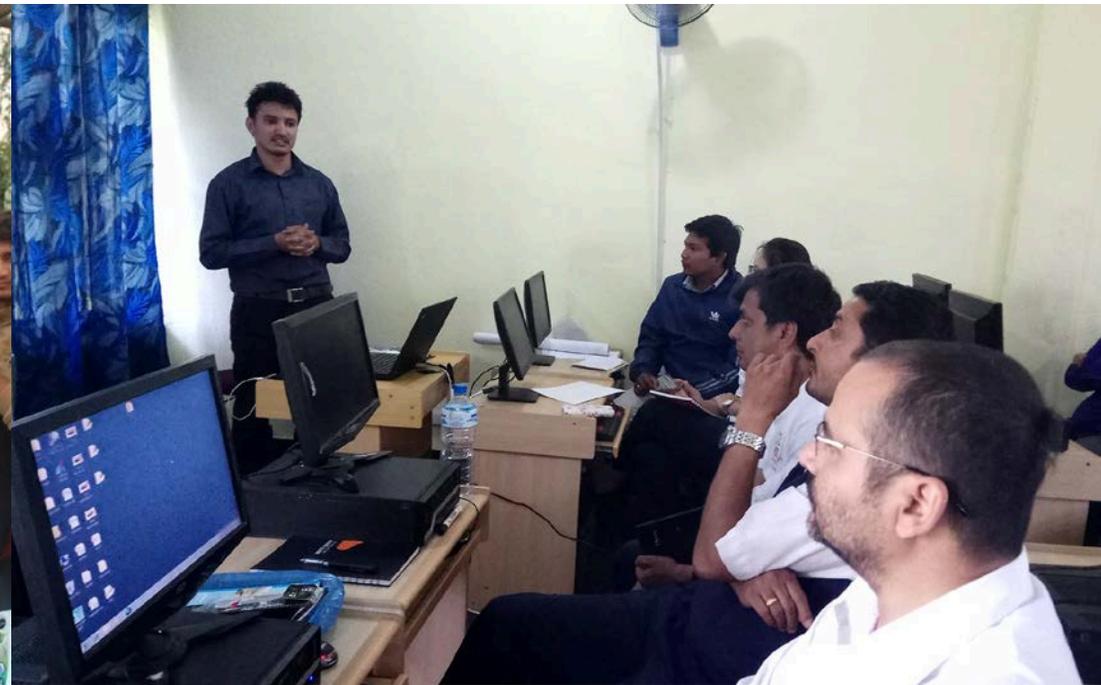
- *Kathmandu University*
- *Department of Urban Development and Building Construction*

- *Nepal Geomatics Engineering Society*
- *Robotics Association of Nepal*

- *ICIMOD , Medair*
- *Rural Development Initiative*



**Agriculture Mapping over a Paddy Field  
Building Damage Assessment : KU Library**





Application Deadline  
**March 15, 2017**

# HAVE A DRONE BASED BUSINESS IDEA ?

Take part in our  
**Drones As a Service:  
Business Accelerator program**

Ideation Workshop: **March 18, 2017**  
Venue: **Nepal Engineer's Association Office**  
**Pulchowk, Lalitpur**

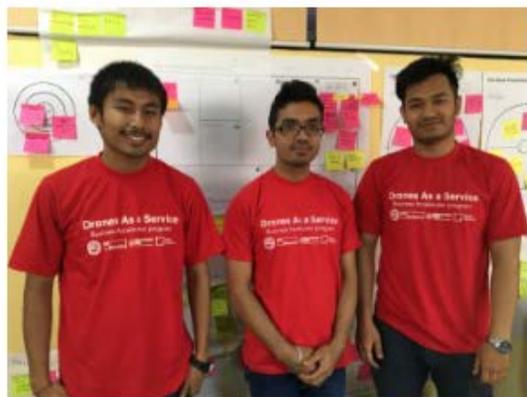
For further Information:  
**9851216126 (NFL), 9851166982 (NEA), 9860308879 (RAN)**  
**[www.nepal.werobotics.org/business](http://www.nepal.werobotics.org/business)**  
**[Uttam@werobotics.org](mailto:Uttam@werobotics.org)**

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Win upto  
**\$8000**  
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Airlift



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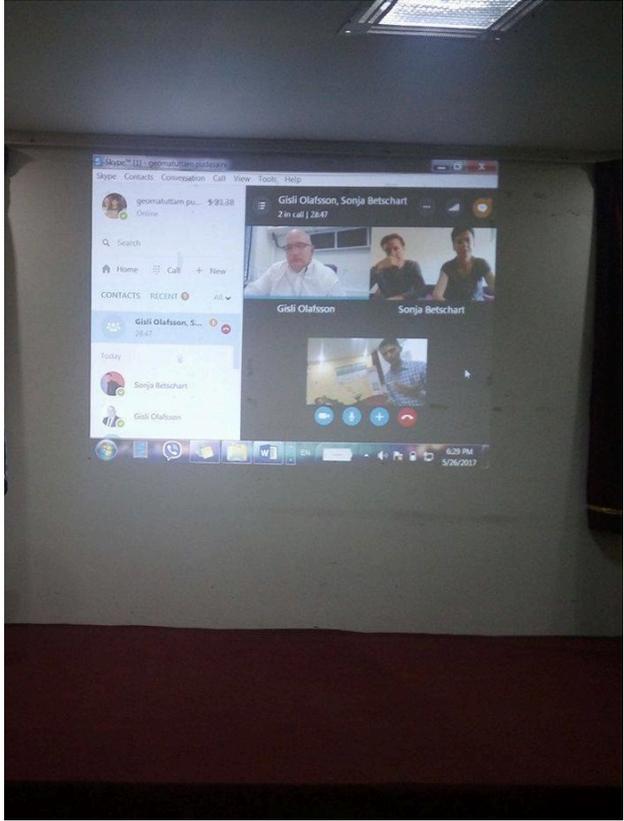


KalpaBrikshya



Maphub

# 4. Final Pitching





Nepal Engineers  
Association



NAXA Pvt. Ltd



Himalayan College of  
Agricultural Sciences and Technology

"Agricultural revolution through quality education"



# FUTURE PLANS

# 1. Use of Aerial and Marine Robotics to Assess Climate Change Impact on Glaciers



## 2. Aerial Robotics for Medicine and Humanitarian Cargo Delivery

Consider this: The government, which has been in a state of flux since the erstwhile Maoist-led coalition demitted office in early May, mobilised the Nepali Army and NGOs with medicine and health personnel a good two and half months after the outbreak gripped the far-flung villages. Locals claimed that it was too little, too late to contain the epidemic. They blamed the government for empty promises. High-level officials, alleged the villagers, made a reconnaissance of the affected areas by chopper, getting absolutely no feel of the situation on Ground Zero. While, medicine was sent from the district headquarters via mules.

“It takes at least three days for the drugs to reach the affected areas,” said Ramesh Bista, a resident of Sunwanauli.

**Krishna Hari Subedi, chief, District Public Health Office:**  
Remoteness makes it difficult to transport the medicine on time,” he said.



### 3. Hazard and Vulnerability Mapping



## 4. Use in Infrastructure Development





**LOCAL  
IMPACT**





# We Robotics

Nepal.werobotics.org



Uttam Puadasaini  
uttam@werobotics.org



# Media Outreach and Advocacy



- Press meet with our Local Partner, Nepal Engineers' Association
- Main Goal : To spread message about Social good Aspects of this technology



# Drone Assisted Diagnostic and Precision Agriculture (DA-DAPA): Case Studies on Kiwi Farm and Paddy Field in Central Nepal

Aastha Pudasainee<sup>1</sup>, Uttam Pudasaini<sup>2</sup>, Bidur P. Chaulagain<sup>1</sup>

<sup>1</sup> Himalayan College of Agricultural Sciences and Technology (HICAST), POB#25535, Kalanki, Kathmandu, Nepal, e-mail: bpchaula@gmail.com

<sup>2</sup> Nepal Flying Labs, Naagokhari road, Naxal and WeRobotics, USA

## ABSTRACT

UAVs commonly known as drones generally refers to the uninhabited flying vehicle that can be remotely controlled, either semi-autonomous, autonomous or have a combination of these capabilities. They are evolving as a promising tool for the acquisition of high-resolution images and being used rapidly as an alternative to satellite observation and in-situ measurements as opposed to in-vitro analysis as they offer cost-effective, high-resolution and multi-temporal data fitted with the (semi) automatic system allowing observation over ground areas.

The goal of this study is to demonstrate the applications of a multispectral camera mounted on UAV that allows to capturing high-resolution information of the field. We project our theme on drone (unmanned aerial vehicle, UAV) assisted diagnostics and precision agriculture (DA-DAPA) with case studies from kiwi farm, Bhotechaur, Sindhupokhawa and paddy field, Danchehi, Kathmandu.

## INTRODUCTION

**UAV Photogrammetry:** An emerging field that can provide very high-resolution datasets for small areas by the use of remotely or (semi) autonomously controlled aircraft, drones without the human pilot.

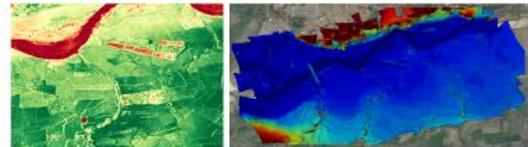
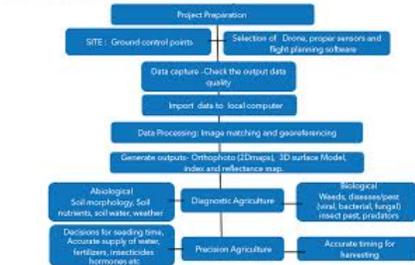
**Digital Surface Model:** Digital representation of the earth's surface elevation including natural and artificial objects like trees or building above it.

**NDVI (in agriculture):** An indicator/ index that can be used to assess whether the target being observed contains live green vegetation or not.

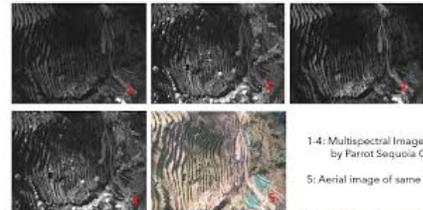
**Diagnostics Agriculture:** A combination of aerial (satellite or drone) and ground-based data collection, analysis tools to monitor plant growth and developmental stages, soil chemistry, soil-water, weed/disease/pest/preducers observation and identification, topography and climate/weather conditions.

**Precision Agriculture:** A combination of aerial (satellite or drone) and ground-based data collection, analysis tools to create seeding, disease pest control, soil fertilization and harvesting time prescriptions based on this data, and variable-rate technology (VRT) for accurately dispensing these prescriptions.

## METHODOLOGY



Preliminary plant health analysis of the paddy fields. An elevation model that can help identify which areas along the river may be most prone to flooding (blues-lowest elevation, reds - high) and thus calculate flood risk:



14: Multispectral Images captured by Parrot Sequoia Camera  
5: Aerial image of same location with optical camera



eBee drone flying over Paddy Field. Aerial survey over Kiwi Farm

## USAGES OF DIFFERENT SENSORS IN AGRICULTURE

RGB (Red/Green/Blue): Visual inspection, elevation modeling, plant counting

NIR (near-infrared): soil property & moisture analysis, crop health/stress analysis, water management, erosion analysis, plant counting

RE (red-edge): crop health analysis, plant counting, water management

multiSPEC 4C (multispectral): both NIR & RE applications, except plant counting  
thermoMAP (thermal infrared) - plant physiology analysis, irrigation scheduling, maturity evaluation, yield forecasting

## HARDWARE USED



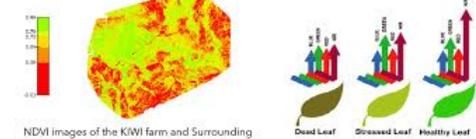
Sensely eBee+ Fixed Wing Drone



Parrot Sequoia Multispectral camera

## USAGES OF RESULTS

- 3D Maps:** Gives us the terrain information that can later be used for proper irrigation planning in the field, information regarding plants/ tree heights.
- NDVI:** Gives us plant growth/developmental stages and health information and best harvesting time.
- 2D orthophoto:** Helps in accurate measurement of ground area of the objects on fields.



## WHAT'S NEXT FOR NEXT GEN DRONES IN NEPAL?

- Further investigation needs to be carried out on following projects.
- Find out soil health from soil sample, NPK and micronutrient and organic: contains from the soil. ....
  - Application feasibility of drones in fragmented kind of farming technology.
  - Identifying plant disease on the basis of their spectral response to other kind of sensors mounted on a drone.
  - Management of farming system of remote topography from farm house.

## DISCUSSIONS

DA-DAPA can be blissful boon to the country like Nepal, where complex geographical patterns, range of different climates, micro climatic differences hinders uniform crop production. Now, the nation's priority is to increase production and productivity of agricultural crops in a diversified and commercialized way to become competent in regional and world market, while adapting smart technology to the unique constraints of the Nepalese agro-ecosystem. We hope combination of low-cost unmanned aerial vehicle based aerial imagery with manual agricultural practices would have significant effect on the efficiency of farming in Nepal.







Drones for Humanitarian Work and NFL featured on a National Daily

Free Guides ▾ Courses ▾ Drone Jobs Forum Advertise ▾ News by 50,000+ drone enthusiasts

### An Interview with Uttam Puadasaini, Lab Coordinator for Nepal Flying Labs

by Zacc Dukowitz on March 7, 2017

A little while back we had the pleasure of meeting Uttam Puadasaini, lab coordinator for Nepal Flying Labs, the Nepal representative for WeRobotics, and a geomatics engineering graduate from Kathmandu University.

Through his work with Nepal Flying Labs, Uttam has been flying and coordinating UAV missions in Nepal, and he has also been a general booster in the area for commercial drone use. We've been fascinated to learn more about Uttam's work with the Nepalese aviation authority in [getting drones accepted](#) for commercial use, and we wanted to ask him more questions about his background and experience with drones. These conversations are what led to the interview below.

**[Want to learn more about international drone laws? Check out our in-depth guide to drone laws by country, and our recent in-depth article on BVLOS around the world.]**

#### About Nepal Flying Labs

Nepal Flying Labs (NFL) is a Nepalese-based NGO that is part of the global [WeRobotics](#) network. It was created in the wake of the Gorkha Earthquake in the fall of 2015, which devastated the country of Nepal, destroying ancient monuments and killing over 8,000 people. Among other things, Nepal Flying Labs provides training for how to use UAVs to support disaster risk reduction and assist with early recovery efforts following disasters. Nepal Flying Labs is based in Kathmandu, the capital city of Nepal, and the work they do involves both community engagement and training

## Application of Drones IN Nepal :

“  **उत्तम पुडासैनी**  
संयोजक, नेपाल फ्लाई ल्याब्स

**के हो ड्रोन ?**  
ड्रोन यस्तो अत्याधुनिक मेसिन हो, जसमा उड्ने प्रणाली, फोटो खिच्ने प्रणाली र कहल 'रहेको छ भनेर पत्ता लगाउने अवस्थिति प्रणाली रहेको हुन्छ । सामान्यतया ड्रोन भन्नाले अमेरिकालगायत शक्तिशाली देशले युद्धमा विप्लोटक कार्यमा प्रयोग गर्ने मेसिनका रूपमा बुझे गरिएको छ । पश्चिमा देशहरूले युद्धमा बढी प्रयोग गर्ने भएकाले यसलाई धेरैले नकारात्मक अर्थमा पनि बुझे गरेका छन् । यसकारण पछिल्लो समय यसलाई 'अनम्यान्ड एरियल भेहिकल' पनि भन्ने गरिएको छ । यसको प्रयोग नेपालजस्तो भौगोलिक अवस्थिति भएको देशका लागि उपयोगी हुने र विकास निर्माणका क्षेत्रमा प्रयोग गर्न सकिने अनुभवीहरूको भनाइ छ । विशेषगरी ठूला पूर्वाधारको नक्सानु गर्ने यथार्थ सीमा निर्धारण गर्न, कृषि क्षेत्रमा, वन र सार्वजनिक स्वास्थ्यमा प्रभावकारी हुने यस क्षेत्रमा काम गरिरहेकाको भनाइ छ । यसवाहेक सडक, रेल, जलविद्युत्जस्ता पूर्वाधार आयोजनाको सर्भे गर्न उपयोगी हुनुको साथै कम समय र थोरै खर्चमा गर्न सकिने हुन्छ । मारीको जस्तै आवाज निकाल्ने भएकाले ड्रोन (भाले मारी) शब्द प्रचलनमा आएको मानिन्छ ।

Thank you #RadioKantipur .



**Radio Kantipur** ✓  
4 hrs · 📍

ड्रोन प्रविधि र डिजिटल म्यापिङ भनेको के हो ? यसलाई कसरी मानव उपयोगी बनाउन सकिन्छ ? भौगोलिक विकटता भएको नेपालजस्तो मुलुकमा यसको बहुआयामिक प्रयोग कसरी गर्न सकिन्छ ?

National Radio: Interview