**INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS**

GRANTS PROGRAM (Special Call - IYBSSD2022)

**Improving earthquake preparedness through geoscience education in the Himalaya**

# Final Report submitted to IUGG Secretariat, October 2023

## Introduction

Since 2017, we have been running a successful educational seismology program in Nepal which stands on two main pillars: the installation of low-cost seismometers in schools to span an operational seismic network, and the training of local teachers to teach about earthquake preparation and related topics including hands-on activities with the seismic sensors.

In the proposal submitted to IUGG, we aimed to develop a new module namely the Earthquake Evacuation Procedure Guide, to continue educational activities in Nepal, and to extend the initiative to neighboring countries. Below we present major activities done with the support of IYBSSD funding.

### 1. Teachers' workshop

With the support of various institutions together with IUGG, we have organized a two-day workshop for Nepali school teachers on 1-3 May 2023 in a centrally located city in Nepal, Pokhara.

There were 49 teacher participants in total, of which most teachers were science, computer science, and social science teachers, as well as several school principals. The workshop topics covered a broad spectrum of topics such as seismic hazard in Nepal, demonstration of a teaching tool for teachers: Sismobox, an Earthquake evacuation procedure guide, earthquake location using school-seismometer recorded data, and an educational card game "Beat the Quake". The program was designed to offer a mixture of scientific talks, demonstrations, open question-and-answer sessions. All presentations were well received, and Nepali clarifications and translations have been ensured where necessary. What has clearly gone well beyond our expectations was the open Q&A session. All speakers sat in front of the audience, and we received literally any type of question about the Earth, Earth Sciences, earthquakes, and much more, leading great discussions. Five speakers: Prof. Dr. György Hetényi from the University of Lausanne, Switzerland, Ms. Sarah Houghton from the St Michael Steiner School, United Kingdom, Dr. Fabrice Jouffray from University Côte d'Azur, France, Dr. Lok Bijaya Adhikari, a senior seismologist from National Seismological Center, Kathmandu, and Dr. Shiba Subedi from Seismology at School in Nepal program shared the stage for presentations, practical demonstrations, and discussions.

### 2. Running educational activities in 2023

In 2023, we also conducted various educational activities in participating schools directly. We have visited most of the schools this year and conducted classroom activities such as special lectures on earthquake awareness, answering questions with demonstrations, monitoring the seismometer to keep it online 24/7, introducing an educational card game for students, etc. During our school visits, we took the opportunity to provide religious and scientific explanations for earthquakes in the Himalayas. This is crucial for local people, because most of them, especially in the countryside, believe that earthquakes are caused by God. This is also mentioned in various Hindu scripts, and it is difficult to convince older and poorly educated people of the scientific causes of the earthquake. We carefully explained the science of earthquakes to the public during our school visits.

### 3. Earthquake evacuation procedure guide: preparation and test

As part of our Seismology at School program in Nepal, we developed an earthquake preparedness module called the Earthquake Evacuation Procedure Guide (EEPG). Since there is no specific protocol to follow when an earthquake happens in Nepal, it would be very helpful to save lives in future earthquake occurrences. The main goal of this guide is to teach students in schools how to maximize their chances of saving their lives during earthquake shaking. The document includes information on what students can do to prepare for earthquakes, how to improve earthquake safety, the school's emergency plan, and a proposed earthquake education schedule. All action steps before, during, and after an earthquake are explained in

detail in the guide, with an additional section for teachers. Below are the main steps of the Earthquake Evacuation Protocol:

1. Secure space by identifying hazards and securing moveable items.
2. Plan to be safe by creating a school emergency plan and deciding how one will communicate.
3. Organize emergency supplies in convenient locations.
4. Prepare and organize important documents and strengthen the school building.
5. Good response during an earthquake: where are you? Outside or inside?
6. Improve safety after earthquakes by evacuating, helping the injured, and preventing further injuries or damage.
7. There will be a need to restore daily life by reuniting with others, repairing damage, and rebuilding the community.

**4. Other activities**

4.1. While teaching EEPG to teachers, we assessed the list of necessary items for emergency situations in each school. Then, we bought the necessary items to prepare so-called "Go Bags", or emergency-preparedness bags, that is useful in emergency situations for a quick evacuation. It contains nonperishable food, water, some extra clothes, and blankets for a family to last a few days. It also includes some tools like a flashlight, whistle, and multipurpose knife which are extremely useful in case of an earthquake emergency. We are about to distribute these Go Bags to each school in a few weeks after the festive season in Nepal.

4.2 To extend the idea of geoscience education in the neighboring region of the Himalayas, we sought possibilities in Bhutan and India to at least start the program by installing a few educational seismometers. This was more challenging than expected. Nevertheless, we succeeded in finding local partners who were interested in operating low-cost seismometers in their grounds, and using them for educational purposes. In Bumthang (Bhutan) and Aizawl (India), new low-cost educational seismometers have been installed and are operational.

4.3. We are successfully running our program in Central Nepal, however, earthquakes are not limited by political boundaries. In Nepal, an earthquake of M>4 per month is normally felt and most recently, an earthquake of ML 6.3 (Mw 5.7) happened in Far western Nepal in Bajhang District, killing a person, injuring hundreds, and damaging about 12,000 houses. Within a few days, we have reached the epicentral area and visited badly impacted communities. Additionally, we installed new, temporary seismic stations which help to evaluate the local seismicity and the aftershock sequence. We encouraged local governments to include earthquake education in the official curriculum, as this is the only solution to help save people from future earthquakes, especially in remote sites where the majority of buildings are made only by stones.

**Budget Summary**

| | |
|---|---|
| Workshop for teachers | 1'000 USD |
| Earthquake evacuation procedure guide preparation | 2'300 USD |
| First Aid Kit and Go Bag for 30 schools | 3'377 USD |
| Educational activities in schools | 3'773 USD |
| Bajhang earthquake deployment and visits | 1'550 USD |
| **TOTAL** | **12'000 USD** |

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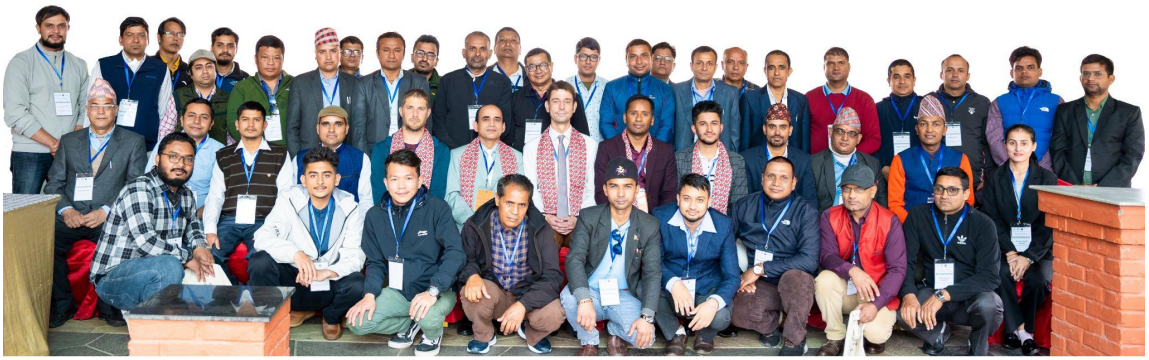
***Annex: selected pictures see on page 3.***

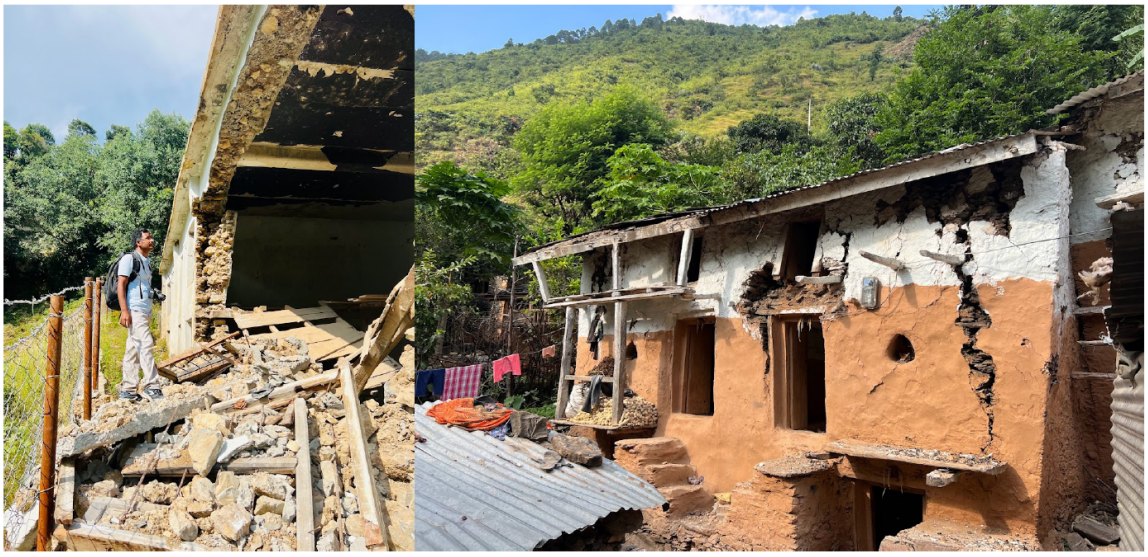
# 3rd International Workshop on Educational Seismology

## EGU Pokhara Workshop 2023

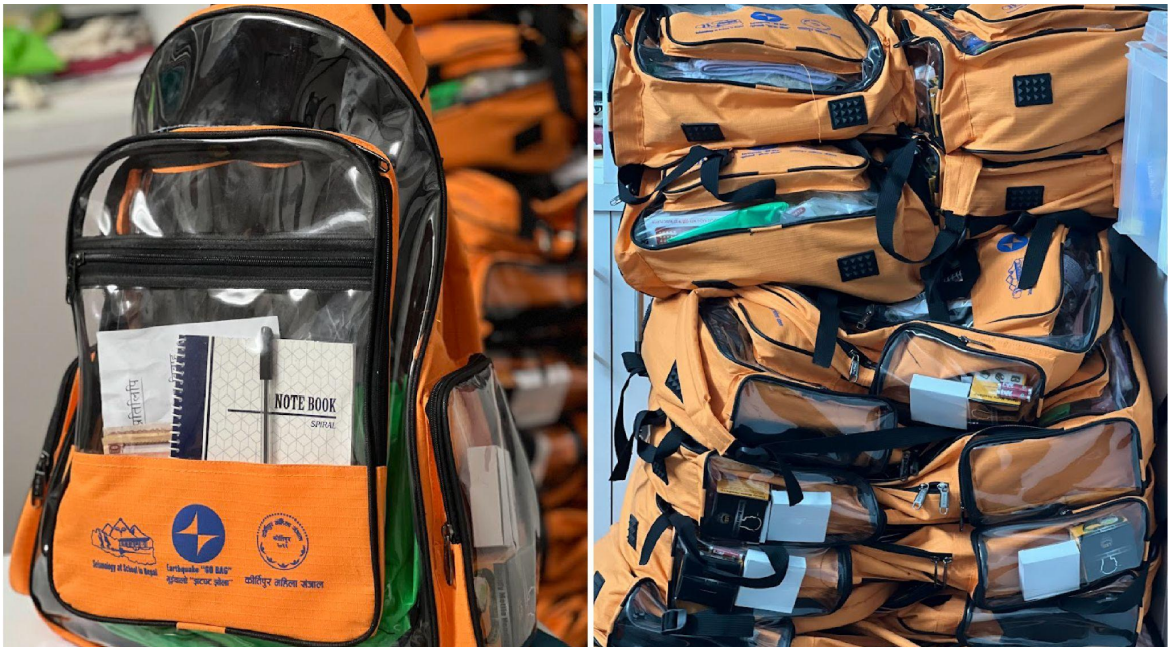
1 - 3 May 2023 | Pokhara, Nepal



*Group photo during the teacher workshop in Pokhara.*



*A damaged school building (left) and an example of a damaged house ( right) from the Bajhang Earthquake.*




*Go Bag with items.*