

Date of Submission	2021/12/17
--------------------	------------

IPL Project Proposal Form 2022

1. Project Title: The Collaboration of debris flow early warning system between Vietnam and Taiwan

2. Main Project Fields

(1) Technology Development

A. Monitoring and Early Warning, B. Hazard Mapping, Vulnerability and Risk Assessment

3. Name of Project leader (PI): Nguyen Quoc Dinh

Affiliation: Head of Economic Geology and Geomatics Department, Vietnam Institute of Geosciences and Mineral Resources (VIGMR), Vietnam.

Contact: 67, Chien-Thang-Str., Ha Dong, Ha Noi, 100000, Viet Nam

Phone: +84917703233,

Email: dinhnq@gmail.com

Co- Project leader (Co-PI): Chih-Chung Chung, National Central University, Taiwan (ccchung@ncu.edu.tw)

Core members of the Project:

1. Dr Nguyen Thanh Long, Economic Geology and Geomatics Department, Vietnam Institute of Geosciences and Mineral Resources (VIGMR), Vietnam
2. Mr. Nguyen Van Hoang, Economic Geology and Geomatics Department, Vietnam Institute of Geosciences and Mineral Resources (VIGMR), Vietnam
3. Assoc. Prof. Tseng, Kuo-Hsin, Center for Space and Remote Sensing Research, NCU. Taiwan.
4. Assoc. Prof. Chiang, Shou-Hao, Center for Space and Remote Sensing Research, NCU. Taiwan.

4. Objectives:

- Study and develop a smart and real-time debris flow early warning system in mountainous areas of Vietnam. Pilot study in Da Bac district, Hoa Binh province is to support the early warning of this natural disaster for authorities and local people.

5. Background Justification:

Debris flow is a dangerous disaster that regularly happens in the mountainous areas of Vietnam. According to VNDMA¹ statistics in the past 20 years (2001 - 2019), there have been 590 debris flows occurred in Vietnam. In which most of them appeared in the Northern mountainous provinces in Vietnam such as Hoa Binh, Ha Giang, Lao Cai, Lai Chau, Son La, Tuyen Quang, Cao Bang, Bac Kan, etc. On average, there are about 30 debris flow happening in Vietnam every year. The damage caused by debris flows from 2001-2017 in only 15 northern mountainous provinces of Vietnam indicated that 748 people was death, 52,544 houses were damaged; 3,910 households had to relocate. Therefore, study for developing a smart and real-time debris flow early warning system is very important for reducing debris flow damages in mountainous areas in Vietnam.

6. Study Area:

The case study for developing a smart and real-time debris flow early warning system in focused mountainous areas of Da Bac district, Hoa Binh province in Vietnam

7. Project Duration: 2 year (2022-2023)

¹ Vietnam Disaster Management Authority

8. Resources necessary for the Project and their mobilization

Personnel, Facilities, and Budgets

The Economic Geology and Geomatics Department includes 16 scientists, 3 PI, focusing on the application of remote sensing and GIS in geosciences, especially landslide study.

We have equipped with range of facilities from geotechnic laboratory, UAV, and software for RS and GIS analysis.

Budget: 60000 usd (the IPL will partly support based on their budget; VIGMR and NCU will secure different source of funding from Vietnam and Taiwan as matching funds)

9. Project Description: (30 lines maximum)

Da Bac is a mountainous district belonging Hoa Binh province with rough terrain, stiff slope, high frequent landslides and debris flows seriously threatening local people lives and property. In 17/17 communes and towns of the district, there are 83/122 villages and hamlets still at high risk of landslide and debris flow disasters, with 170 places at high risk of landslides and debris flows. In the whole district, there are about 850 households located in disaster-prone areas, of which 630 households are located in areas at risk of landslides; 190 households are located in the area at risk of debris flow. In particular, there are 4 places with dense population of lakes in hamlets such as: Bua Xen, Coi, Duoc (Nanh Nghe commune) with 74 households located in the area of debris flow since 2018. Tuong Bai hamlet (Muong Chieng commune) has 51 households located below the subsidence point since 2016 and the debris flow since 2017. In Rang hamlet (Cao Son commune) there are still 14 households located in landslides and debris flow since 2017. Rieng hamlet (Tu Ly commune) has 12 households located in the landslide since the rainy season in 2016.

Hence, study for developing a smart and real-time debris flow early warning system is very important for reducing debris flow damages in Da Bac district is very important. In this study, some work components are as following:

- CP1: Assessing the current status of landslide and debris flow inventory in Da Bac district, Hoa Binh province. On that, identification and delineation of high-risk sub-basins of debris flow is done;
- CP2: Develop landslide risk maps as a basis for determining the most suitable location to develop a smart and real time debris flow early warning station in Da Bac district, Hoa Binh province;
- CP3: Develop a report on designing a debris flow early warning system in the selected basin in Da Bac district, Hoa Binh province; in which using InSAR for landslide/debris flow monitoring will be enhanced.
- CP4: Install and operate 01 debris flow early warning system in selected basin in Da Bac district, Hoa Binh province.
- CP5: Develop a draft process of constructing and installation of a real-time smart debris flow early warning system in mountainous areas of Vietnam.
- CP6: Write and complete the final report.
- CP7: International publication and support for training and research capacity building for young staff of the Institute of Geosciences and Mineral Resources.

10. Work Plan/Expected Results: (20 lines maximum; work phases and milestones)

The project will be started from 2/2022 to 4/2024

11. Deliverables/Time Frame: (10 lines maximum; what and when will you produce?)

No	Deliverables	Timeline	Organization
----	--------------	----------	--------------

1	Report of current status of landslide and debris flow inventory in Da Bac district, Hoa Binh province	02/2022 - 04/2022	VIGMR
2	Landslide risk map for Da Bac district, Hoa Binh province.	04/2022 - 08/2022	VIGMR&NCU
3	Install and operate 01 debris flow early warning system in selected basin in Da Bac district, Hoa Binh province, in which using InSAR for landslide/debris flow monitoring will be enhanced.	08/2022 - 12/2022	VIGMR&NCU
4	Report for process of constructing and installation of a real-time smart debris flow early warning system in mountainous areas of Vietnam	01/2023 - 04/2023	VIGMR&NCU
5	Final report	04/2023 - 09/2023	VIGMR&NCU
6	International publication	01/2023 – 12/2023	VIGMR&NCU

12. Project Beneficiaries: (5 lines maximum; who directly benefits from the work?)

13. References (Optional): (6 lines maximum; i.e. relevant publications)

Note: Please fill and submit this form **by 15 December 2021** to ICL Network <icl-network@iclhq.org> and ICL secretariat <secretariat@iclhq.org>