Internal Ex-Post Evaluation for Technical Cooperation Project (SATREPS)[1]

conducted by Indonesia Office: December, 2019

Country Name	Multi-Disciplinary Hazard Reduction from Earthquakes and Volcanoes in Indonesia
Republic of Indonesia	

I. Project Outline

Background	Indonesia is an island country composed of more than 17,000 islands located on the earthquake belts. Earthquakes of the magnitude more than 4 have occurred more than 450 times a year. In addition, there are 129 active volcanos located along the earthquake belts and eruptions and pyroclastic flows have occurred almost every year. In addition, tsunami damaged the coastal areas. In December 2004, the Indian Ocean Tsunami induced by the Sumatra-Andaman earthquake hit the coastal areas of Sumatra Island and caused fatal damages with 237,448 death only in Indonesia. Although Indonesia has high disaster risks, the Government of Indonesia did not have a sufficient capacity, including technologies and skills to deal with the issues of disaster prediction, disaster control, emergency operation, and reconstruction. Also, it was necessary to enhance a foundation for collaboration between scientific technology and administration such as the national platform which has been promoted by the National Agency Disaster Management (BNPB) as well as to enhance research capacity
Objectives of the Project	Through development of methodologies for short-term and long-term predication of volcanic eruptions, development of mitigation measures against tsunami, establishment of community-based disaster preparedness mechanism, the project aimed at strengthening the platform of collaboration among researchers and officials concerned for disaster risk reduction, thereby contributing to enhancement of capacities on disaster prediction and community preparedness to earthquakes, tsunamis and volcanic hazards for resilient society . 1. Expected Overall Goal: To enhance capacities on disaster prediction and community preparedness to earthquakes, tsunamis and volcanic hazards for resilient society. 2. Project Purpose: To strengthen the platform of collaboration among researchers and officials concerned for disaster risk reduction.
Activities of the Project	1. Project site: Indonesia 2. Main activities: 1) Studies and investigation on active fault, tsunami deposit, coastal geology, strong ground motion prediction, and submarine active faults, 2) prediction of tsunami by numerical simulations, 3) researches on mechanism of explosive eruption, long and mid-term forecast of volcanic eruption, 4) development of mitigation measures against tsunami, 5) strengthening of community-based disaster preparedness mechanism and development of long-term recovery framework from natural disaster, 6) development of effective disaster education program at school, 7) establishment of collaboration mechanism between researchers and government officials. 3. Inputs (to carry out above activities) Japanese Side 1) Experts: 102 persons 2) Trainees received: 85 persons 3) Equipment: Global Positioning System (GPS), data loggers, earthquake sensors, etc Indonesian Side 1) Staff allocated: 110 persons 2) Land and facilities: Project office 3) Equipment: Software, software applications, geographic information system (GIS) application, etc. 4) Local cost: Utility cost (electricity and water)
Project Period	May, 2009 – May 2012 / Project Cost: (ex-ante) 390 million yen, (actual) 419 million yen
Implementing Agency	Ministry of Research, Technology and Higher Education(RISTEKDIKTI), Indonesian Institute of Science (LIPI), Ministry of National Education (DIKNAS), Syiah Kuala University (Unsyiah), Andalas University (Unand), Gadjah Mada University (UGM), University of Indonesia (UI), Brawijaya University (Unibraw), Sam Ratulangi (University (Unsrat), Hasanuddin University (Unhas), State University of Jakarta (UNJ), Ministry of Energy and Mineral Resources (ESDM), Ministry of Marine Affairs and Fisheries (DKP), Ministry of Communication and Information Technology (KOMINFO), Ministry of Public Works (PU), Ministry of Home Affairs (MENDAGRI), Agency for Assessment and Application of Technology (BPPT), National Agency Disaster Management (BNPB), Agency for Meteorology, Climatology and Geophysics (BMKG), National Coordinating Agency for Surveys and Mapping (BAKOSURTANAL), Institute of Technology Bandung (ITB), Center for Volcanology and Geological Hazard Mitigation (PVMBG)
Cooperation Agency in Japan	Earthquake research Institute of University of Tokyo (ERI), Disaster Prevention Research Institute of Kyoto University (DPRI), Tohoku University, Nagoya University, Fuji Tokoha University, Asian Disaster Reduction Center (ADRC), etc.

II. Result of the Evaluation

< Special Perspectives Considered in the Ex-Post Evaluation >

[Assessment of the Project Purpose]

The framework of the project was defined by the Master Plan attached to the Record of Discussions signed by the both sides of Indonesia and Japan in May, 2009 but no verifiable indicator was set forth in the document. However, the following three indicators for the Project Purpose were set forth by the ex-ante evaluation sheet: 1) the number of original research papers by the project members, 2) the number of agendas submitted and discussed at a platform to be established, and 3) the number of organizations participating the platform to be established. The terminal evaluation report mentioned that

[1] SATREPS: Science and Technology Research Partnership for Sustainable Development

these indicators were not appropriate to verify the achievement level of the Project Purpose and did differently explain these indicators as 1) the number of presentations made by the project members, 2) the number of meeting agenda discussed in JCC meetings, and the number of organizations participated in JCC. Therefore, this ex-post evaluation reconsidered the achievement level of the Project Purpose by the original indicators set forth by the ex-ante evaluation because they are deemed appropriate to assess the achievement level of the Project Purpose for enhancement of the platform to collaborate researchers and the government officials on disaster prevention.

[Assessment of the Expected Overall Goal]

Since no verifiable indicator for the Expected Overall Goal set in the Record of Discussion (R/D) is set forth, the achievement level of the Expected Overall Goal was assessed by the actual performance of the government actions taken for disasters of volcanic eruptions, earthquakes and tsunamis as well as preparedness and disaster mitigation at community level, including evacuation of the local residents and reduction of death by disasters.

1 Relevance

<Consistency with the Development Policy of Indonesia at the Time of Ex-Ante Evaluation and Project Completion>

The project was consistent with the Indonesia's development policies to build national resilience to natural disasters and to ensure safety of people and property against disasters as well as to establish disaster management system, such as the "National Medium-Term Development Plan (RPJMN)" (2005-2009) and (2010-2014), the "National Action Plan for Disaster Reduction" (2006-2009), "the National Priority 9 on Environment and Natural Disasters" and the "National Disaster Management Plan" (2010-2014).

<Consistency with the Development Needs of Indonesia at the Time of Ex-Ante Evaluation and Project Completion >

The project was consistent with the Indonesia's development needs for disaster prediction, disaster control, emergency operation, rehabilitation and reconstruction in order to mitigate damages by natural disasters of earthquakes, volcanos and tsunami.

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

The project consistent with the Japan's ODA policy for Indonesia prioritizing support for peace and stability, which was set in "the Country Assistance Program for Indonesia" (2004) and "the Initiative for Disaster Reduction through ODA" (2005) more prioritizing disaster management in development policy of developing countries.

<Evaluation Result>

In light of the above, the relevance of the project is high.

2 Effectiveness/Impact

<Status of Achievement of the Project Purpose at the time of Project Completion>

The Project Purpose was not achieved by the time of project completion. The number of original academic research papers published by the project members reached to 50 original research papers in total (Indicator 1). The number of agendas submitted to and discussed at the platform (Indicator 2) and the number of organizations participating in the platform (Indicator 3) were not confirmed because such platform has not been established.

<Continuation Status of Project Effects at the time of Ex-post Evaluation>

The project effects have been partially continued by the time of ex-post evaluation. 13 academic research papers have been published by the most of the ex-counterpart organizations since 2012 (Indicator 1). Since no specific platform has been established, informal discussions among the relevant organizations have been held on ad hoc basis (Indicator 2 and 3). The ongoing SATRPES project, namely Integrated Study on Mitigation of Multimodals Disaster Caused by Ejection of Volcanic Products, has facilitated discussions about volcanology subjects among the relevant organizations.

The research outputs, including official hazard maps on volcanic eruptions, earthquakes, and tsunami (PVMBG), disaster management area-informatics database, Information Mapping System on Disaster and Society (on the web GIS) and School Disaster Education Guideline, have been continuously utilized among the relevant organizations. In particular, PVMBG has been continuously involved with the ongoing SATREPS project as mentioned above. The active fault research also has been continued. According to LIPI, those official hazard maps become input for Book and Map of Source and Earthquake Hazards, 2017, SNI (Indonesia National Standard). Book and Map of Sources and Earthquake Hazard – 2010 consisted of 81 active faults and became 295 active faults in 2017. LIPI also mentioned that the liquefaction micro-zonation map of Padang City (from official hazard map) has been taken into account in revision of City Planning Regulation of Padang in 2012. On the school disaster education guideline, disaster awareness upgrading program, and disaster risk reduction education, some organizations including BNPB, UNESCO, BMKG, BPBD Cilegon City, Mataram City, Lampung City, Palu City, and Ambon City are utilizing the research outputs as reference. According to ITB, the research output has become an input for updating National Seismic Hazard (NSH) map of Indonesia.

The equipment under PVMBG such as data logger installed in active volcanos have been utilized for monitoring of the volcanic activities. Also, the equipment installed at ITB, including fixed accelerometer, mobile accelerometer, laptop computers and adaptors, has been utilized by students of ITB for course works.

<Status of Achievement for Expected Overall Goal at the time of Ex-post Evaluation>

The Expected Overall Goal was achieved at the time of ex-post evaluation. In terms of disaster prediction of volcanic eruptions, earthquakes and tsunamis, a hazard map of Padang has been used to delineate tsunami hazard area at Padang City and to mark at the road in the city. Also, the discovery of trace of paleo-earthquakes in the Lembang Fault (Bandung City) has influenced the Bandung City Government during formulation of city development plan. The activities of community preparedness have been continued by some organizations such as LIPI and BNPB and local governments. As for disaster education, many activities were conducted by the member of group 5 for the SATREPS project, who had been engaged in the development of disaster education materials. One case in February 2018, when the disaster education was conducted in one primary school "SD Tetum Bunaya" in South Jakarta City. Another case is the tsunami hazard map at Ambon City is also introduced to the preliminary school and the community at several areas in Ambon.

In addition, there are some policies/ programs formulated from the result of the project. For example, the Ministry of Public Works and Housing has regularly published "Source and Earthquake Hazard Map" in 2010 and 2017 that was supported by inter-institutional team involving the SATREPS project, the government of Indonesia utilized the result of analysis of tsunami hazard to make priority area for DRR and to make road map program for tsunami DRR at prone tsunami areas. The government of Padang City had included the Liquefaction Hazard Map to the revision of City Spatial Planning Regulation in 2012.

<Other Impacts at the time of Ex-post Evaluation>

There are some positive impacts of the project confirmed at the time of ex-post evaluation. One of the outputs produced by the project is highlighting the importance of gender analysis in managing disaster. According to LIPI, it influences more gender consideration on the policy makers (Bappenas and BNPB) and further research related to gender and disaster. As for impacts of the disaster education, in the paleo-earthquake and paleo tsunami domains, alumni of the SATREPS project have trained a lot of students in some universities. The project introduced methods for seismic strengthening of existing houses using available materials as well as ways to do reconnaissance research on earthquake and tsunami disaster areas and to collect important data. The capacity of researchers has been improved through training, conference or fieldwork about installation/ maintenance. Development of the disaster monitoring system also improved the interpretation, because PVMBG has a more detailed data, which enables a deeper analysis. PVMBG also can apply what learned from the project on the work, especially for evaluation of volcanic activity. As for geological fieldwork, the results became PVMBG database and can be used at any time for evaluation material or for future reference research. The cross-knowledge obtained from this project among diverse sectors is really useful. The group from social science can learn about the natural hazards (especially earthquake and tsunami) and became able to translate into a more popular information. This is being manifested into the importance of sustainability science based on interdisciplinary collaboration and networking of researchers and stakeholders. Also, the project brought about improving researchers' capacity in designing the appropriate technologies for disaster preparedness. Through participation on the project, there is an improvement on Indonesian young researchers in getting higher education i.e. PhD in a university in Japan. Besides, more exposure towards a higher technology was obtained from the project. In addition, the Graduate Research School on Earthquakes and Active Tectonics (GREAT) – ITB, which had been initiated by the members participating in the SATREPS project, has been appointed by RISTEKDIKTI as a Center of Excellence for earthquakes.

<Evaluation Result>

Therefore, the effectiveness/impact of the project is fair.

Achievement of Project Purpose and Overall Goal

Aim	Indicators	Results
(Project Purpose) To strengthen the platform of collaboration among researchers and officials concerned for disaster risk reduction.	(Indicator 1) The number of original academic research papers published by the project members.	Status of the Achievement: Achieved (Continued) (Project Completion) ● In total, 50 original research papers were published. (Ex-post Evaluation) ● 13 academic research papers were published for the period from 2012 to 2017.
	(Indicator 2) The number of agendas submitted to discussed at the platform to be established.	Status of the Achievement: Not achieved. (Partially continued) (Project Completion) ● No official platform was established. (Ex-post Evaluation) ● Informal discussions have been held after the project completion, without specific platform. ● A platform namely J-Rapid Meeting in Sendai was held after the 2011 Great East Japan Earthquake. J-Rapid is a collaborative program between Japan and foreign researchers to discuss and share knowledge regarding natural or anthropogenic disaster. The agenda covered (1) Resident Evacuation Performance, (2) Resident conception on the scientist responsibility and resident's knowledge, (3) Survey on evacuation after the Indian Ocean Earthquake that occurred on 11 April 2012, (4) Visit plan to selected sites along the affected coastal area. During the meeting, Projects members had the opportunity to reunite and strengthen their collaborative relationships. ● The Project for Integrated Study on Mitigation of Multimodal Disasters Caused by Ejection of Volcanic Products facilitates relevant counterpart agencies to coordinate related to volcanology subject.
	(Indicator 3) The number of organizations participating in the platform to be established.	Status of the Achievement: Not achieved. (Partially continued.) (Project Completion) ● No official platform was established. (Ex-post Evaluation) ● No special platform established after this project completion. Only informal meetings based on the project have been held, such as (1) discussion between ITB, PNPB and BMKG for preparing Tsunami hazard map at Palu city and Padang, and (2) discussion between ITB, BNPB, BPBD Maluku, BPBD Seram, BPBD Ambon City for preparing Tsunami hazard map at Ambon City and Seram Other involved institutions include: LIPI, Geological Agency (Badan Geologi)/ESDM , BIG, BPPT.

(Overall Goal) To enhance capacities on disaster prediction and community preparedness to earthquakes, tsunamis and volcanic hazards for resilient society.	No indicator set	Status of the achievement: Achieved (Ex-post Evaluation) ● Disaster prediction of volcano eruption, earthquakes and tsunamis: The hazard map of Padang and discovery of trace of paleo-earthquakes in the Lembang Fault (Bandung) have been used. ● Community preparedness: Some organizations such as LIPI and BNPB have continued the activities on community preparedness. In Manado, Banten, Padang, Bantul have continued Tsunami Early Warning System and Tsunami evacuation drills.

Source：Terminal Evaluation Report, Data and information provided by LIPI, BPPT, PVMBG, ITB, RISTEKDIKTI

3 Efficiency

Although the project period was as planed (the ratio against plan: 100%), the project cost slightly exceeded the plan (the ratio against plan: 107%) due to the additional research activities on the disasters occurred, including Padang Earthquakes in September, 2009, Mentawai Tsunami in October, 2010 and Higashi-Nippon Earthquakes and Tsunami in March, 2011. The project outputs were produced as planned. Therefore, the efficiency of the project is fair.

4 Sustainability

<Policy Aspect>

"The Ministerial Regulation No. 40 Year 2018 on National Research Priorities of 2017-2019" focuses disaster management as one of the priorities by RISTEKDIKTI. Also, BNPB, BMKG and BPPT issued "Tsunami Mitigation" (2012-2015) for implementation of roadmap of tsunami mitigation.

<Institutional Aspect>

As mentioned above, there is no platform to coordinate the relevant organizations as the implementation arrangement during the project implementation. Currently, the role of coordination on disaster management issue is under the auspices of BNPB, whereas RISTEKDIKTI, which is responsible for administration related to research and technologies and had been engaged in the SATREPS project, in order to promote "utilization of research outputs/outcomes", is under the Coordinating Ministry for Human Development and Culture. One of the tasks of PVMBG is to coordinate all government agencies involved in geological disasters in Indonesia. All results of monitoring and research are used in evaluating volcanic activities, until technical recommendations are issued for local governments and communities by PVMBG. PPMB/Research Center for Disaster Mitigation in ITB is responsible for research and disaster mitigation and proposing recommendations for the government. They have the sufficient number of staff with more than 15 researchers and 6 administrators. The Research Center for Geotechnology/LIPI is conducting research activities in geotechnology works but no information about staff was available.

<Technical Aspect>

The research institutes and organization participating in the project have sustained their research capacity to continue the related research activities. The Research Center Geotechnology/LIPI has sustained research on paleo-earthquakes in their program. ITB and LIPI developed a new research program based on the research outputs of the project. Also, the research institutes and organizations have sustained necessary skills and knowledge for operation and maintenance of the research and monitoring equipment installed by the project. The seismographs installed by the project for monitoring volcanos have been continuously operated and maintained by PVMBG.

<Financial Aspect>

Research Center for Geotechnology LIPI still provided research budget for seismic microzonation studies in Padang and Banda Aceh using microtemor method in 2012 to 2014. The total budget was approximately 500 million Rupias (Rps). From 2015-2018, some research budget of 300 million Rps. also allocated to conduct a seismic microzonation study in Bandung Basin using microtemor method. There are several joint research funds initiated by the Ministry of Research, Technology, and Higher Education of the Republic of Indonesia and foreign partners in the field of disaster management to sustain and improve the capacity of Indonesian researchers.

For the maintenance of monitoring equipment installed by the project, PVMBG provided budget for maintenance. PVMBG also secured financial resources for the ongoing SATREPS project. Unfortunately, their budget was cut due to government policy. PVMBG seeks to optimize the budget so that some activities related to the SATREPS project can still work, but JICA also provides sufficient funds for this activity. BPPT received some equipment for laboratory tsunami experiments to measure tsunami flow and forces. There is no financial support by the institution for maintenance. This is because the equipment is still working until now. The most institutions stated that they secure the financial resources for operation and maintenance of the equipment provided from this project. However, no specific data provided to strengthen the fact. The institutions said that they keep using the equipment and the financial resources are coming from the internal budget for operation and maintenance.

The institutions stated that once the policy is implemented, then in parallel the budget is allocated for policy/ program implementation. The financial resources are coming from the internal budget.

<Evaluation Result>

Therefore, the sustainability of the effects through the project is high.

5 Summary of the Evaluation

The project was not achieved the Project Purpose but achieved the Overall Goal through the continuous research works on disasters of earthquakes and tsunami as well as the continuous activities for disaster management based on the research outputs by the project. As for sustainability, although no specific platform for coordination is established, the research institutions/organizations have sustained their organizational setting and technical capacity as well as necessary budget. As for efficiency, the project cost slightly exceeded the plan.

Considering all of the above points, this project is evaluated to be satisfactory.

III. Recommendations & Lessons Learned

Recommendations for Implementing Agency:

(LIPI and PVMBG)

In order to enhance the connectivity between research with different subject (i.e. technical and social), it is recommended to formulate a

joint research program. Two or more related organizations can collaborate a research that requires interdisciplinary subject. This will strengthen the capacity of researchers and generate a more holistic research output at the same time.
(LIPI, BMKG, PVMBG and ITB)

It is recommended to establish a national platform for research on disaster reduction by involving Bappenas and other universities besides the key institutes participating the SATREPS project in order to promote researches on earthquakes and mitigation of associated disasters.

Lessons Learned for JICA:

Implementation of SATREPS project involves multi- disciplinary approach, from technical/ engineering subject to social matters. This allows expert from different subject to learn from each other during the project implementation through a project management mechanism through the Joint Coordination Committee (JCC) Meetings. It enables impact on their approach to deal with disaster issues, which are not only from one specific issue, by different aspects. Therefore, it is essential to establish a kind of sustainable mechanism such as a platform to facilitate multi-disciplinary discussions among the relevant researchers and the government authorities through implementation of the SATREPS project though this project has failed it. Also, it is better to consider set up a joint program which is composed of sub-program to be independently funded by each member institute or stakeholder participating the platform in order to ensure their sustainable commitments and good coordination among them.

Fixed Accelerometer installed at front yard of Life Science Faculty, ITB

Water Purifier and Barnstead NANOpure Diamond base stored at PVMBG Laboratory