

Country Name	Project for Maintenance of the Equipment for Disaster Risk Management
Republic of Peru	

I. Project Outline

Background	The Peru-Chile Trench is located on the boundary between the South American Plate and the Nazca Plate along the Peruvian coastline, and Peru is located in the circum-Pacific earthquake belt. Therefore, large earthquakes have occurred in Peru in the past, and the risk of tsunami disasters is significant. Since disasters associated with natural phenomena were increasing without disaster control, strengthening earthquake observations and associated tsunamis as well as warnings to residents became an urgent issue. In addition, there was a shortage of tide gauges, making precise measurement difficult. Regarding the transmission of earthquake and tsunami warnings to residents, local governments and others issued warnings to them by using sirens, megaphones, etc., so information did not reach all residents. It was also an urgent task to develop an information transmission network.		
Objectives of the Project	To develop the capacity of tsunami disaster prevention and promote early warning in Peru, by procuring tsunami observation equipment and warning system equipment, thereby contributing to reducing disaster damages.		
Contents of the Project	1. Project Site: Coastal areas of Peru 2. Japanese side: Procurement of the equipment for the tide level monitoring system and the emergency warning broadcast system (EWBS). 3. Peruvian Side: Installation of gates at the entrance of the pier, assignment of security guards, contract exchange for data communication telephone lines between the tide level measurement system and the Tsunami Warning Center of the Directorate of Hydrography and Navigation of the Peruvian Navy (DHN), installation of equipment buildings for the Integrated Services Digital Broadcasting-Terrestrial (ISDB-T), power connection works, etc.		
Project Period	E/N Date	December 18, 2012	Completion Date January 25, 2016
	G/A Date	February 25, 2014	
Project Cost	E/N /Grant Limit: 700 million yen		Actual Grant Amount: 699 million yen
Implementing Agency	National Institute of Civil Defense (INDECI)		
Contracted Agencies	Main Contractor: Itochu Corporation Main Consultant: Yachiyo Engineering Co., Ltd. Agent; Japan International Cooperation System		

II. Result of the Evaluation

<Special Perspectives Considered in the Ex-Post Evaluation>

- At the ex-ante evaluation, the following two indicators were set for verifying qualitative effects. 1) The improved accuracy of tsunami observation will provide accurate and prompt information, leading to people's early evacuation behavior and contributing to reduction of damages. 2) Awareness of disaster prevention will be increased in the community. As the early evacuation behavior and reduction of damages of the Indicator 1) are effects of early transmission of warnings which is the project objective (outcome), they were verified as impacts.

- At the ex-ante evaluation, one of the indicators of the quantitative effects was set as "tsunami warnings" (target figure: more than 1 minute after an earthquake occurrence), although it was described as "the transmission time from COEN to its local offices after the decision of the disaster information" (target figure: less than 1 minute per time) in the preparatory survey report. Since EWBS equipment was procured by the project, aiming at reducing the transmission time from COEN to its local offices after the decision of the disaster information (tsunami warning), it was considered that the latter indicator would reflect the aim more appropriately. Therefore, "the transmission time from COEN to its local offices after the decision of the disaster information" (target figure: less than 1 minute per time) would be used at the ex-post evaluation.

1 Relevance

<Consistency with the Development Policy of Peru at the Time of Ex-Ante and Ex-Post Evaluation>

The "National Disaster Management Plan" (2012) had a goal to reduce the loss of human lives and property by natural and human-made disasters for sustainable development. In the "Disaster Risk Management Plan" (2014-2021), strategic goals include improving knowledge related to disasters, improving emergency response capabilities, and strengthening organizational capacities on disaster risk management. Thus, the project was consistent with the development policy of Peru at the time of both ex-ante evaluation and ex-post evaluation.

<Consistency with the Development Needs of Peru at the Time of Ex-Ante and Ex-Post Evaluation >

At the time of ex-ante evaluation, the number of seismometers was insufficient, making it difficult to conduct precise seismic observations. It was an urgent task to develop an earthquake and tsunami warning transmission network. Until the time of ex-post evaluation, it has been required to enhance the early transmission of disaster information such as earthquakes and tsunamis. Therefore, the project was consistent with development needs of Peru.

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

One of the priority areas in the "Country Assistance Policy of Peru" (2012) was the support for disaster prevention and measures. It described that in order to reduce the risk of damage associated with natural disasters and strengthen their response capabilities, support would be for strengthening disaster-resistant infrastructures and warning systems that Japan had knowledge and experiences about, aiming at improving disaster prevention capacities.

<Evaluation Result>

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

2 Effectiveness/Impact

<Effectiveness>

The objective (early transmission of tsunami warnings) was achieved. In this project, the tide level monitoring system was established in 8 locations, and the tsunami measurement interval was about 8 minutes (not based the direct measurement but information provided by the National System for Tsunami Warning) in 2019. It achieved to reduce the time of the tsunami measurement interval to the half of the targeted time. As well, the time for transmitting the tsunami information from the National Emergency Operation Center (COEN) to its local offices was reduced to less than one minute, as targeted. Through EWBS procured by the project, the disaster information is analyzed at COEN and transmitted to the Institute National of Radio and Television (IRTP). There, the information is automatically converted to EWBS signals and simultaneously transmitted to digital TV receivers of the Regional Emergency Operation Center (COER) and municipal disaster prevention organizations via IRTP local stations via satellite lines. This has led to much reduction in time.

As qualitative effects, INDECI's has become capable to provide accurate information about earthquakes and tsunamis to the organizations of first response. Specifically, as explained above, DHN issues tsunami information (warnings, alarms, cancellations, etc.) based on the earthquake data acquired and issued by the Geophysical Institute of Peru (IGP). Through EWBS, the disaster information is automatically transmitted from INDECI to the 15 COERs, Provincial Emergency Operation Center (COEP), and other organizations of first response (police stations, fire stations, security offices under the jurisdiction of municipalities), via IRTP. By automating and shortening the conventional process, the risk of miscommunication has been reduced. Regarding EWBS, with some power generating facilities in case of emergency, the emergency alerts can be transmitted stably without being affected by the blackouts. In addition, according to INDECI, in some areas, sirens were installed for sending alarms within the area, which has led to further improvement of the transmission route of tsunami information to the residents.

<Impact>

As expected impacts, it can be presumed that residents' awareness of disaster controls has been improved, and it can be assumed that disaster risk has been reduced. As promoting factors, INDECI has conducted training for community organizations and operation centers in the target sites. During the trainings, the information is given about how tsunami information is transmitted to residents under the early warning system, and their evacuation routes have been constructed. INDECI also has encouraged local governments to set up evacuation signs. As a result, Furthermore, INDECI has conducted the national evaluation drills, using EWBS since 2016, and awareness of residents and public administration regarding the importance of information has been raised.

As unexpected impacts, first, according to INDECI, local first response organizations, and residents who participated in the training, women have been empowered due to their active participation in related community activities. Because women are familiar with family and housing situation of elderly persons, children, and persons with disabilities within their community, their opinions were appreciated in order to identify evaluation routes accessible for everyone. Second, the data collected by DHN from the tide gauges installed by the project has been monitored in real-time and published on the DHN website, which is open to national and foreign organizations. Third, accurate and quick information about disaster, has been provided through subtitles in some of the broadcasting news programs. Fourth, in cooperation with the Radio ASSOCIATION, INDECI has provided trainings to the staff of radio stations so that they can send emergency alert information promptly while their radio programs are on air. They have utilized the EWBS receivers of electric bulletin board prototype, being developed and provided through Japan's assistance after the project's completion. Fifth, according to INDECI, in addition to the organizations including COER and COEL in which EWBS receivers were installed through the project, the regional and local governments have joined the National Early Warning Network (RNAT) meetings conducted by INDECI. Such local staff in charge of disaster risk management have deepened their understanding of the Network.

<Evaluation Result>

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

Quantitative Effects:

Indicator	Baseline 2012	Target 2019	Actual 2016	Actual 2017	Actual 2018	Actual 2019
1. Tsunami measurement interval (minutes)	Approx. 30	Approx. 15	Approx. 15	Approx. 8	Approx. 8	Approx. 8
2. Transmission time from COEN to its local offices after the decision of the disaster information (minutes)	15 and more	Less than 1	NA	NA	Less than 1	Less than 1

Source: Updated Operational Protocol of the National Tsunami Early Warning System, documents prepared by IGP, DHN and INDECI.

3 Efficiency

Both the project cost and period were within the plan (Ratio against the plan: 100% and 88%, respectively). Therefore, the efficiency of the project is high.

4 Sustainability

<Institutional Aspect>

The tide level measurement system is the responsibility of DHN. The Tsunami Warning Center of DHN has assigned staff in charge to operate the system. The system has been maintained by three electronic engineers and two assistant water engineers from the Oceanographic Technology Operations Office. There has not been reported with any problem in operation so far, and it is understood that the number of staff is sufficient. DHN also has dispatched a technical team twice a year to check tide gauges in the respective locations, sometimes accompanied by INCECI staff.

The disaster prevention information server has been under the jurisdiction of INDECI, while other broadcasting equipment (EWBS server, satellite transmission apparatus, ISDB-T transceiver, etc.) has been maintained by IRTP. At the IRTP Lima Broadcasting Station (Headquarters), the Technical Operations Office has been in charge of equipment maintenance, and three staff have been assigned to the EWBS equipment. Since almost all equipment has been fully operational, the number of staff is understood as sufficient for operation.

<Technical Aspect>

According to INDECI, as there has not been reported with any problem in operation of the tide level measurement system and

maintenance of the equipment so far, DHN is understood as acquired with the necessary knowledge. Eight tide gauges have been maintained by DHN. Regarding the maintenance of the 15 EWBS receivers, INDECI has conducted an emergency warning transmission signal test every month, and there has not been reported with any mayor problem that could not be resolved. Also, it has provided guidance to the local operation centers on the receiver inspection and maintenance. Its staff trained by the project at the time of equipment provision have continued their jobs and tasks at INDECI. Therefore, it is understood that INDECI has sustained necessary knowledge on operation and maintenance of EWBS equipment (disaster prevention information sever, EWBS server, digital terrestrial signal satellite transmission device, transmission/reception system, etc.). Staff of INDECI and IRTP were also trained on equipment operation and maintenance when the equipment for EWBS was provided in further with Japan's Ministry of Internal Affairs and Communications after the project. IRTP has indicated that the equipment for EWBS was easier to handle than ordinary broadcasting equipment, and there has been no particular technical problem.

<Financial Aspect>

No financial document was available from INDECI, DHN, and IRTP at the time of ex-post evaluation. The equipment of the tide level measurement system has been donated to and registered at INDECI, and therefore DHN that actually operates the equipment cannot obtain their budget specific to such equipment. The registration was transferred from INDECI to DHN on November 25, 2019, by the Resolution of the General Administration Office No. 458-2019-INDECI. Periodic inspections and maintenance have been carried out within the overall budget of INDECI personnel expenses and business trip expenses. For this reasons, there has been no budgted funding specific to purchase consumables of the provided equipment including batteries. At IRTP, the equipment for EWBS has been maintained within the budget allocated to the maintenance office. For maintenance of the equipment at the local organizations of first response including EWBS receivers, no specific budget has been secured. Due to this situation, there have been cases in which INDECI staff personally bears the cost of antenna repair, and so on.

<Current Status of Operation and Maintenance>

The equipment provided at INDECI by the project has been in good condition and the inspection status of the tide level measurement system has been also good. Although the equipment status of the ISDB-T transmitter at IRTP could not be confirmed, according to INDECI's test results of transmission and reception, there has been no problem in function.

Part of the ISDB-T transmitter air filter has been replaced. There are cases in whichsome of the consumables and spare parts of the tide level measurement systems and other equipment for EWBS have been purchased, and there has been no problem found.

<Evaluation Result>

There have been slight problems in the financial aspect of the implementing agency. Therefore, the sustainability of the project effect is fair.

5 Summary of the Evaluation

The project objective was achieved. The tsunami measurement interval has been greatly shortened by the tide level measurement system, ad, the transmission time of the tsunami warning after the occurrence of the earthquake was shortened, as targeted. In addition, INDECI's capacity of risk management for tsunami and local residents' awareness of disaster prevention have been improved. These could contribute to improve the residents' early evacuation behavior and risk reduction. Regarding sustainability, although budgets have not been sufficiently secured, techniques for operation and maintenance of the tide level measurement system have been sustained.

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

III. Recommendations & Lessons Learned

Recommendations to Implementing Agency:

- It is recommended to INDECI to prepare the equipment maintenance plan in the future, and based on the plan, it is desirable to conduct inspections and maintenance and to budget funds for purchasing consumables and updating equipment.
- It is recommended to INDECI to discuss with DHN and other related organizations in order to develop a mechanism in which disaster information, including earthquake information of IGP and tsunami information of DHN, could be input and transmitted simultaneously from various communication media.
- It is recommended to DHN to secure budgets for maintenance of the equipment of the tide level measurement system, after it is transferred from INDECI to DHN.



EWBS receiver at COEL



INDECI training for community residents