

Country Name	Project for Improvement of Equipment and Facilities on Meteorological and Hydrological Services
Lao People's Democratic Republic	

I. Project Outline

Background	Laos is located in the Greater Mekong Sub-region and has ample rainfall of over 3,000 mm in a year, in particular, in northern and central hilly provinces. Floods took place every year in the river basin of Xe Bangfai, Xe Banghiang, Xe Done and Xe Kong and caused cumulative damages on agriculture and husbandry and on the local economies in the regions eventually. For mitigating the damages, it was necessary to capture the risk of disaster by monitoring real-time data of rainfall and river water level (precipitations, disaster-hit areas, etc.). However, since there was no observation network in Laos, automatic observation of surface meteorological phenomena and transmission of the observation data on a real-time basis has not been conducted. Under these circumstances, it was difficult to provide timely and accurate meteorological forecast and warning to the public, especially to the population in the affected river basins.			
Objectives of the Project	To improve the capacity of the Department of Meteorology and Hydrology (DMH) for meteorological and hydrological observation by providing automatic meteorological and hydrological observation equipment and deploying mutual observation data transmission systems in the eighteen meteorological observation stations in the country and for four target river basins in northern provinces, thereby contributing to the improvement of accuracy of weather forecast and flood disaster prediction.			
Contents of the Project	<ol style="list-style-type: none"> 1. Project Site: 18 provincial meteorological observation stations in Vientiane and 16 provinces, four river basins in southern provinces, namely, Xe Bangfai River in Ban Dong Makfai, Na Teu, Xe Banghiang River in Bang Kengkok, Dong Hence, Xe Done River in Souvannkhily, Phonbok and Xe Kong River in Phon Xai, Nang Yong. 2. Japanese side: <ol style="list-style-type: none"> 1) Provision of grant necessary for the procurement of equipment (Automatic Weather Observation System, Automatic Water Level Observation System, Automatic Rainfall Observation System, GTS¹ message switching system, World Meteorological Organization Information System (WIS), high resolution meteorological satellite data receiving system, etc.) and construction of facilities (power backup shed, equipment shed, etc.). 2) Technical assistance (soft component of grant aid for operation and maintenance (O&M) of equipment, maintenance of observation data accuracy, etc.). 3. Lao side: Logistical arrangements and clearances 			
Project Period	E/N Date	March 4, 2014	Completion Date	November 23, 2017 (completion date of the soft component follow-up training)
	G/A Date	March 11, 2014		
Project Cost	E/N Grant Limit / G/A Grant Limit: 584 million yen, Actual Grant Amount: 583 million yen			
Executing Agency	Department of Meteorology and Hydrology (DMH), Ministry of Natural Resources and Environment (MONRE)			
Contracted Agencies	Main Contractor: Marubeni Protechs Corporation Main Consultants: Japan Weather Association, International Meteorological Consultant Inc., CTI Engineering International Co., Ltd. Agent: Marubeni Protechs Corporation			

II. Result of the Evaluation

<Special Perspectives Considered in the Ex-Post Evaluation>

- In the ex-ante evaluation, the ex-post evaluation was scheduled to be conducted in 2019, three years after the project completion. However, since the project was completed in 2017, the ex-post evaluation was conducted in 2020. Therefore, the realization of quantitative and qualitative effects expected by the project was verified with the effects observed over a period from 2017 to 2020.

1 Relevance

<Consistency with the Development Policy of Laos at the Time of Ex-Ante Evaluation>

The “National Adaptation Program of Action (NAPA)” (2009) was formulated to cope with the negative impacts caused by the climate change on the main sectors including agriculture, forestry, water resources, and health. The Program included the improvement and expansion of meteorological and hydrological network and weather monitoring system, the establishment of early warning system in flood risk areas and so on. Therefore, the project was consistent with the development policies of Laos at the time of ex-ante evaluation.

<Consistency with the Development Needs of Laos at the Time of Ex-Ante Evaluation>

At the time of ex-ante evaluation in 2013, there was no meteorological observation network in Laos that could observe the surface meteorological phenomena automatically and transmit the observed data on a real-time basis. In addition, there were only a few hydrology observation stations which could observe the river water level and transmit the observed data automatically. It resulted for the DMH in difficulties in the timely provision of accurate meteorological and hydrological forecast and warning to the public, especially to the population in the target river areas. Therefore, the project was consistent with the development needs of Laos at the time of ex-ante evaluation.

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

The “Country Assistance Policy for Lao People's Democratic Republic (Lao PDR)” (April 2012) placed the development of economic and social infrastructure as one of its four priority areas (intermediary goals). To realize a balanced economic growth, the Policy planned to

¹ GTS: Global Telecommunication System

assist to build a society paying attention to the compatibility of environment and economic growth, sustainable development, and the necessity of measures against climate change. Therefore, the project was consistent with the Japan's ODA policy for Laos at the time of ex-ante evaluation.

<Evaluation Result>

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

2 Effectiveness/Impact

<Effectiveness>

The project has achieved its objectives by improving the capacity of DMH for meteorological and hydrological observation by providing the automatic meteorological and hydrological observation equipment and deploying mutual observation data transmission systems in the target observation stations and river basins. The equipment was provided as planned and has been properly functioning. Automatic meteorological observations were conducted in the 17 out of 18 target observation stations (Indicator 1) with the observation interval of 60 minutes (Indicator 2). One non-functioning station is in Khammuane province, which has not been working due to the total system breakdown since May 2020. The data have not been collected, and the observation has not been done as comprehensively as it could have been if all stations had been functioning. However, it did not affect the overall effectiveness of the project since other stations remained functioning properly. DMH plans to investigate to find the cause and solutions for the breakdown by the end of 2020. DMH has collected data from the 17 target observation stations in 10 minutes (Indicator 3) and transmitted them in 10 minutes after the collection (Indicator 4). Hydrological observation interval on the four target rivers has been shortened from 12 hours by direct observation by observation staff before the project to 1 hour by automatic observation after the project completion (Indicator 5). With these improvements of the capacity of DMH, flood arrival time prediction for the four target rivers, which was not conducted before the project, has become possible (Indicator 6).

<Impact>

When floods were caused by the typhoon Mangkhut in central and northern part of Lao PDR in 2018, by using the water level data transmitted automatically from the hydrological stations equipped by the project, DMH issued and periodically updated warnings to the people in flood areas. Thus, the human and economic damages were reduced to the minimum. In time of peace, DMH has provided observation data to the authorities concerned including agriculture, water management, energy, and other sectors. The National Agriculture and Forestry Institute of the Ministry of Agriculture and Forestry, for example, has utilized the evaporation data from DMH for farming plans in cropping seasons. No resettlement and land acquisition were caused by the project, and no other negative impact on natural, social and economic environment has been observed.

<Evaluation Result>

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

Quantitative Effects

Indicators	Baseline 2013 Baseline Year	Target 2019 3 Years after Completion	Actual 2017 Completion Year	Actual 2018 1 Year after Completion	Actual 2020 3 Years after Completion
Indicator 1: Automatic meteorological observation will be conducted in the 18 target observation stations.	Not conducted.	Conducted in all the 18 target stations.	Conducted in all the 18 target stations.	Conducted in all the 18 target stations.	Conducted in the 17 target stations except the one in Khammuane province. DMH plans to investigate by the end of 2020 to find the cause and solutions for the total system breakdown of the station. The breakdown took place in May 2020.
Indicator 2: Meteorological observation interval will be 60 minutes (automatic) in the 18 target observation stations.	180 minutes by manual observation.	60 minutes by automatic observation.	60 minutes by automatic observation.	60 minutes by automatic observation.	60 minutes by automatic observation in 17 stations.
Indicator 3: DMH will collect data from the 18 target observation stations in 10 minutes.	In 60-70 minutes.	In 10 minutes.	In 10 minutes.	In 10 minutes.	In 10 minutes in 17 stations.
Indicator 4: DMH will transmit the data in 10 minutes after the collection to the meteorology organizations in the world through GTS.	More than 90 minutes after the collection of data.	In 10 minutes after the collection of data.	In 10 minutes after the collection of data.	In 10 minutes after the collection of data.	In 10 minutes after the collection of data in 17 stations.
Indicator 5: Hydrological observation interval on the 4 target rivers will be 1 hour (automatic).	12 hours by direct observation by observation staff.	1 hour by automatic observation.	1 hour by automatic observation.	1 hour by automatic observation.	1 hour by automatic observation in 8 stations.
Indicator 6: Flood arrival time of the 4 target rivers will be predicted.	Not predicted.	Predicted.	Predicted.	Predicted.	Predicted by 8 stations.

Source: Weather Forecasting and Warning Division, DMH

3 Efficiency

Although the project cost was within the plan (the ratio against the plan: 100%), the project period exceeded the plan (the ratio against the plan: 134%) due to the delay of tax exemption procedures for importing the equipment. Outputs were produced as planned. Therefore, the efficiency of the project is fair.

4 Sustainability

<Institutional/Organizational Aspect>

There has been no change either in organizational structures or in responsibilities and mandates of DMH since the time of ex-ante evaluation of the project. The total number of staff of DMH has been decreased from 305 in 2013 to 233 in 2020. This was mainly due to

retirements of the staff exceeded new staff recruitments and the government's policy to cut temporary staff of all government offices. Because of this, the manpower of DMH has not been sufficient for its expanding roles and responsibilities.

<Technical Aspect>

According to the interviews with the technical staff of DMH, they themselves and provincial and district staff involved in the project have kept using the knowledge and skills learned in the project in their daily operations with the help of manuals and guidelines prepared by the project. On the other hand, they still need capacity development and training to catch up with the rapidly advancing technologies in order to meet the demand of the public for safety and security. However, training including refresher training, newcomers training, and support for self-study has been limited due to the limitation of the government budget. Training for the staff of DMH, therefore, depends on the external opportunities provided by the projects under the support of development partners including the World Bank, Asia Development Bank, Food and Agriculture Organization, and others.

<Financial Aspect>

The amount of budget for DMH has been on a slightly decreasing trend since 2015 due to the government budget cut. This was because, by cutting the budget of almost all sectors, the Lao government has preferentially allocated the budget to recovery works from the damages by natural disasters such as droughts and floods and the domestic animal infectious disease control against outbreaks of African swine fever and foot-and-mouth disease. Financial constraints of DMH have affected its activities particularly the training of the staff and operation and maintenance (O&M) of the equipment granted by the project.

<Current Status of Operation and Maintenance>

Operation check, maintenance check, and cleaning of observation stations have been conducted before and after the rainy season as suggested by the project and planned by DMH. Most of the facilities and equipment procured by the project have been well-maintained and in full utilization except some cases including the case in Khammuane province. Although the spare parts provided by the project are still in stock, it is not certain whether the budget for additional purchase in future is adequate due to the limited O&M budget.

<Evaluation Result>

Some problems have been observed in terms of the institutional/organizational aspect, technical aspect and financial aspect. Therefore, sustainability of the project effects is fair.

5 Summary of the Evaluation

The project has achieved its objectives by improving the capacity of DMH through the procurement of equipment, construction of buildings, and technical training for the staff. Based on this capacity improved, automatic meteorological and hydrological observation and data transmission have become possible. Therefore, timely issuance and periodical updates of flood warnings to the people have been realized and contributed to the reduction of damages on human lives and economy. As for sustainability, most of the equipment and facilities have been well-maintained and operated. Technical level of the staff of DMH has been improved by the project, but the number of staff has been insufficient for its increasing roles and responsibilities. Financial constraints have caused insufficient training of the staff. As for efficiency, the project period exceeded the plan. Considering all of the above points, this project is evaluated to be satisfactory.

III. Recommendations & Lessons Learned

Recommendations to Executing Agency:

- It is recommended for DMH to accelerate the investigation of the failed station in Khammuane province, fix the problem and restart its operation as soon as possible. And it's also recommended to document the cause and solutions for the problem. It could be a lesson learned to prevent the recurrence of similar problems in other stations.
- It is recommended for DMH to make an internal on-the-job training system to share the knowledge and skills the staff learned in the projects supported by the development partners. It is also recommended that DMH keeps requesting MONRE to recruit staff for DMH to cope with its expanding tasks and responsibilities.

Lessons Learned for JICA:

- O&M of the equipment granted by the project has not necessarily been implemented properly due to financial constraints. Funding for recurrent cost could be a critical factor in O&M of equipment or sustainability of effects of a grant aid project. Therefore, in a soft component of a grant aid project, adding to the technical training for O&M, it is recommended to include a planning of specific O&M plans implementable within the limits of O&M budget and human resource of the implementing agency.



Hydrological station
in Songkhone village, Lamam District, Sekong Province

Meteorological station
in Seno, Savannakhet Province