

3. Performance of the Project

3.1 Inputs to the Project

3.1.1 Inputs by the Japanese side

(1) Dispatch of experts

1) Long-term experts

Two (2) long-term experts have been dispatched.

Field of Assignment	Name	Period of Assignment
Strengthening of Flood Forecasting & Warning Administration	Mr. Hiroyuki NAKAJIMA	From Apr. 5, 2004 to Apr. 4, 2006
Project Coordination	Mr. Hideo ITO	From Nov. 22, 2004 to Apr. 4, 2006

2) Short-term experts

In total 6 short-term experts have been dispatched to ensure smooth implementation of the Project. (Details: see Annex 3)

(2) Training of Counterpart personnel in Japan

In total, 5 counterparts were trained in Japan. (Details: see Annex 4)

(3) Provision of equipment

The Japanese side has provided equipment for data collection system, computer and computer related equipment, water level gauges etc. (Details: see Annex 5)

(4) Local operation expenses borne by the Japanese side

Total amount of the operation expenses spent by the Japanese side is 13,056,754.46 Pesos. Expenses by year are as follows. (Details: see Annex 6)

(Unit: Peso)	JFY2004	JFY2005*	Total
Local operation expenses	6,918,145.91	6,138,608.55	13,056,754.46

JFY: Japanese Fiscal Year (From April to March of next year)

Amount of JFY 2005: from April 2005 to December 2005

3.1.2 Inputs by the Philippine side

(1) Assignment of counterpart personnel

Currently, 17 counterparts are assigned to the Project. (Details: see Annex 7)

(2) Provision of Land, Buildings and Facilities

The Philippine side provided necessary office space for use under the Project.

(3) Allocation of Budget by the Philippine side

Budget allocated to the Project by Philippine side is as follows.

Year	2004	2005	Total
Budget (Unit: Peso)	3,086,347.12	6,690,133.11	9,776,480.233

Budget has been allocated for equipment, supplies and materials, traveling expenses, repair of facilities, repair of vehicles, gasoline, and other services. (Details: see Annex 8)

3.2 Outputs of the Project

3.2.1 Achievement of Output 1. "Maintenance program for telemetry/multiplex equipment established and utilized."

(1) Indicator 1.1: "Maintenance programs are established."

Three (3) kinds of manuals have been revised under the Project and are being utilized by the telecom engineers of PAGASA. These manuals were distributed to the River Flood Forecasting & Warning Centers in Pampanga, Agno, Bicol and Cagayan (the PABC).

- Quick Reference Manual for Telemetry Equipment Maintenance
- Quick Reference Manual for Multiplex Radio Communications Equipment
- Revised Operation and Maintenance Guidance Manual for FFWS Telemetry System

The maintenance of telemetry and multiplex equipment is conducted according to the maintenance programs (or according to the manuals). C/Ps are quite satisfied with contents and usefulness of above-mentioned manuals. Accordingly, it is considered that the maintenance programs for telemetry/multiplex equipment are well established.

(2) Indicator 1.2: "Maintenance programs are implemented."

The database for equipment and spare parts was developed by the telecom engineers of PAGASA and the short-term experts through visits to all the gauging stations (rainfall, water level, repeater) and the field centers of the PABC.

The database was updated regularly every time the telecom engineers conduct regular maintenance (every 3 months) and emergency repairs and available spare parts are also checked.

Accordingly, it is considered that the maintenance programs are implemented appropriately.

Considering the achievement of indicators 1.1 and 1.2, it can be said that degree of achievement of the Output 1 is satisfactory.

3.2.2 Achievement of Output 2. "FFB is equipped with FFW equipment and facilities."

(1) Indicator 2.1: "Hydrometeorological on-line database is established and updated regularly."

The following studies were carried out and the following database software package were developed.

- "Baseline Study on Pampanga and Agno Rivers for Flood Forecasting and Warning Administration"
- "Baseline Study on Bicol and Cagayan Rivers for Flood Forecasting and Warning Administration"
- "Hydrological Data Availability for Pampanga and Agno Rivers"
- "Hydrological Data Availability for Bicol and Cagayan Rivers"

The software of database for Bicol and Cagayan is being developed and it will be accomplished by

the end of March 2006 (by the end of the Project).

Therefore, hydrometeorological on-line databases for the PABC river basins are established mostly and will be accomplished by the end of the Project. These databases are updated regularly before the commencement of the flood season. These on-line data system will facilitate the real-time transfer of rainfall and water level data from the remote stations to the PABC field centers. To enhance the database in the FFB Operations Center, the PAGASA employed the Short Messaging System (SMS) in the transmission of data from the ABC field centers to the FFB Operation Center. In 2004, SMS for Agno has been completed and now operational. For Bicol and Cagayan, the SMS has been installed and undergoing tests. For Pampanga river basin, the center is in the FFB Operation Center, therefore SMS is not necessary.

Accordingly, it is considered that the hydrometeorological on-line database is mostly established satisfactorily.

(2) Indicator 2.2: "Flood forecasting models are developed."

The following flood forecasting model and the user's manuals for Pampanga and Agno river basins have been developed.

- "Upgrading of Flood Forecasting Model for Pampanga and Agno Rivers for Flood Forecasting and Warning Operation"
- "Manual on Flood Forecasting for Pampanga and Agno River Basins"

The user's manual for PABC river basins have been developed and initial calibration of the model's parameters were undertaken using the past rainfall and discharge data in the 1990s. But after the year 2000, there are not enough flood data to correlate water level and discharge due to defective sensors and changes in the river cross-sections. The calibration or simulation of the model is usually done before the models can be used for operational purposes. ("Manual on Flood Forecasting for Bicol and Cagayan River Basins")

After the replacement of defective sensors and updating the correlation between water level and discharge data by river cross section and discharge measurements, flood forecasting models will be fully calibrated and Indicator 2.1 and 2.2 will be achieved. However, as achievement during the project period, it can be said that the degree of achievement of the Output 2 is satisfactory.

3.2.3 Achievement of Outputs 3. "Skill of FFB personnel in issuing adequate, accurate and timely bulletins is enhanced."

There are 2 indicators for the Output 3. Indicator 3.1 is "Hydrologists and electronics/communication personnel skills are enhanced", and Indicator 3.2 is "20 FFB personnel (12 hydrologists of River Centers, 8 telecom engineers/technicians) are provided with appropriate training".

1) Enhancement of skill of telecom engineers/technicians

The On-the-Job Trainings (OJTs) for the telecom engineers/technicians of FFB have been conducted at the field centers by 2 short-term experts on telecommunication.

Two (2) OJTs were conducted by the short-term experts on telecommunication from September 13 to December 11, 2004 (1st short-term expert) and from May 11 to August 06, 2005 (2nd short-term expert). Main contents of the OJTs were actual troubleshooting or repairs of flood forecasting and warning (FFW) equipment and facilities. In total, 15 telecom engineers/technicians both from the central office and field centers participated in the OJTs as follows:

Section		Total number
Field centers (RFFWC)	Pampanga	*
	Agno	2
	Bicol	2
	Cagayan	1
Central office of FFB	TSSS	10
Total		15

* Since Pampanga Field Center is located in the Central Office, the Telemetry System Service Section (TSSS) takes care of the maintenance of Pampanga FFWS.

2) Enhancement of skills of hydrologists

The OJTs for hydrologists of FFB also have been conducted by 4 short-term experts for development and improvement of manuals and flood forecasting models. One of the short-term experts had conducted the Joint Workshops twice for the hydrologists who are working in the central office and the field centers. The main topics of the Joint Workshops were issues related to flood forecasting and warning activities such as 1) revision of the operation manuals for the flood forecasting and warning, 2) adjustment of parameters for the flood forecasting model and 3) preparation/ revision of flood bulletin formats based on the output of flood forecasting models, etc. Training modules in the form of handouts were given to the trainees as guide in the calibration of models. The 1st and 2nd Joint Workshops were conducted on September 19 – 22, 2005 and November 22 – 25, 2005, respectively. The total numbers of participants in the said workshops are listed in the table below.

Section		Total number
Field centers (RFFWC)	Pampanga	4
	Agno	4
	Bicol	3
	Cagayan	2
Central office of FFB	OWSC	1
	HISSS	5
	FFWS	8
Total		27

Note: OWSC = Office of the Weather Services Chief

HISSS = Hydrometeorological Investigation and Special Studies Section

FFWS = Flood Forecasting and Warning Section
RFFWC = River Flood Forecasting and Warning Center

According to the questionnaire survey conducted by the short-term expert who conducted the Joint Workshops, most of the hydrologists evaluated that their knowledge and skills have been strengthened very much and they were satisfied with contents and explanations of the Joint Workshops. From the results of the interview with several C/Ps conducted by a member of the Joint Evaluation Team, the C/Ps expressed that the technical transfer under the Project has been carried out very appropriately and their degree of satisfaction is very high.

Therefore, it is considered that skill of telecom engineers/technicians and hydrologists of FFB is enhanced with the provision of more timely forecast, use of forecasting models, on-line data collection system, the degree of achievement of the Output 3 is satisfactory.

3.3 Achievement of the Project Purpose

The Project Purpose is "PAGASA (FFB) capability to manage and operate the flood forecasting and warning system is improved."

- (1) Indicator 1: "Forecast compared with actual occurrence is improved in terms of accuracy and timeliness."

There are 2 examples of feedback reports from the Local Government Units (LGUs) that indicate improvement of flood forecasting in terms of accuracy and timeliness. Details are as follows:

1) In case of Bulacan LGUs

During the passage of Typhoon Yoyong (in December 2004), the PAGASA through its Pampanga River Flood Forecasting and Warning Center (PRFFWC) issued flood bulletins to the Provincial Disaster Coordinating Council (PDCC) Office in Bulacan with two-day lead time. The Bulacan PDCC was able to forewarn the people and make the necessary evacuations for the residents living in the low-lying areas in Bulacan Province. (When flood forecasts and warnings were announced early the communities who are threatened of the impending flood will have sufficient time to prepare for appropriate actions such as evacuation to higher grounds.)

Before the project, there were instances when flooding had occurred before the warning was issued. This was due to limited monitoring facilities in some areas of the river basin. With the project, more analysis on the basin features and runoff studies were carried out. Also, additional flood markers were installed for the LGUs to monitor the flood in their area. Such information was transmitted to PAGASA during flood periods and these data have improved the timeliness of forecasting the flood in the area.

The hydrologists of PAGASA have now a better understanding on the correlation of rainfall and runoff with basin features. Flood forecasting has greatly improved under this project.

Regarding the accuracy of flood forecasts, still there is a need to improve the qualitative flood forecasts that are presently issued with quantitative forecasts that will specify the peak flood and the time of occurrence of the peak. In such case, the flood forecast will be more accurate and useful for the disaster management. Therefore, there is a need to conduct further calibration of flood forecasting models. In addition, it is also important to identify the areas that are to be flooded and the height and extent or limits of flooding or inundation in a certain area or locality. This can be achieved through flood hazard mapping and the use of Geographic Information System (GIS).

(2) In case of Cagayan LGUs

During the 2nd JCC Meeting dated 18 April 2005, the PDCC of Cagayan acknowledged the efforts being done by the Cagayan River Flood Forecasting and Warning Center (CRFFWC) during the flood events in the Year 2004. Because of the timely issuance of the flood bulletins, appropriate actions were done, particularly in the evacuation of residents who were greatly affected by the floodwaters.

Before the Project, flood bulletins were issued only when the alert water level was reached and that moderate and heavy rainfall was forecasted. At present, with the availability of high resolution rainfall forecasts, flood bulletins are now issued with greater lead time at least 12 hours before the occurrence of flood, giving more time to prepare for evacuation. The timeliness in the issuance or announcement of flood warning is improved considerably.

(2) Indicator 2: "Public perception of PAGASA has improved."

Before the project, the appreciation of the reliability of PAGASA's flood bulletins was low. With the conduct of intensive public information in the monitored river basins, the public including the LGUs understood the warnings issued and responded accordingly. The improved collaboration between the PAGASA and the LGUs can be illustrated below.

During the passage of the typhoons Winnie and Yoyong (from November 28 to December 4, 2004), as mentioned above, PAGASA through the Pampanga River Flood Forecasting and Warning Center was able to give a two-day lead-time flood warnings to the PDCC of Bulacan. Because of these flood warnings, the related institutions were forewarned and enabled them to prepare for contingency measures to mitigate the impacts of flood in the municipalities along Pampanga and Angat rivers. Thereafter, PAGASA received a citation (a certificate of commendation) from Bulacan provincial government for its timely flood warnings in the major flood prone areas within the Bulacan province.

(3) Indicator 3: NDCC, DCCs and local communities act on disaster preparedness activities based on FFWS issuances and established system."

The reason why the NDCC, DCCs and local communities are able to act or conduct preparations

effectively is mainly due to the early and accurate issuances of forecasts from PAGASA, in the case of flood, the flood bulletins or general flood advisories in the threatened areas or regions. For instance, the DCCs can evacuate people before the occurrence of a flood based on the flood warnings of PAGASA that a flood is imminent in the area. Generally, there is no direct referral to PAGASA as a result of a good flood forecast, but more on those agencies involved in evacuation, rescue and relief operations. In fact, it is because of the early warnings that the people were not harmed or damages to properties were minimal.

One good aspect that can be cited to support this activity is the increasing collaboration between PAGASA and the related government agencies in disaster management as well as the local government units. This has been mentioned earlier such as in the cases of Bulacan and Cagayan provinces. Because of more intensive participation of PAGASA field personnel in PDCC meetings and the conduct of public information drives, more and more people and agencies became aware of the forecasts and acted accordingly when flood bulletins are issued.

In general, it is concluded that PAGASA (FFB) capability to manage and operate the flood forecasting and warning system is improved satisfactorily as recognized by the different stakeholders.

3.4 Achievability of the Overall Goal

The Overall Goal is "Reduce loss of lives and damage to properties due to floods in the monitored river basins."

Indicator: "Evacuation and preparedness to reduce flood damage are systematically implemented in monitored river basins."

PAGASA's role in providing timely and accurate forecasts includes regular coordination with concerned agencies and local governments units to ensure adequate, appropriate and timely response such as evacuation and preparedness. In support of this, the project focused on the capability strengthening of human resources who are engaged in management and operation of the flood forecasting and warning system through optimum utilization of the existing equipment and facilities. Evacuation and preparedness plans to reduce flood damage are systematically implemented through community-based disaster mitigation activities (for example, community-based flood forecasting and warning system), and continuous information and education program for people's awareness on flood forecasting and warning system. Another important component is the provision and sustainability of more reliable monitoring and communication facilities.

In order to achieve the overall goal, there are several issues that needed to be addressed. One of these is the provision of more accurate and quantitative forecast that specifies the peak and time of flood occurrence, which may take some time given the present status of monitoring facilities. This concern is partially addressed by some approved and currently being negotiated projects

funded by the Philippine government such as the rehabilitation of 5 radars, the acquisition of 2 Doppler radars as well as the upgrading of PAGASA's satellite ground receiving facility and the replacement of some water level sensors in the PABC gauging stations. The Investment Portfolio prepared by PAGASA in 2005 also include projects being proposed for the medium and long-term such as strengthening or upgrading of existing facilities, installation of 3 additional Doppler radars, more researches on the use of remote sensing for rainfall forecasting, which will be very important in improving the accuracy of forecasts and at the same time enhancing the monitoring network of PAGASA. Another issue that needs to be addressed is the operation of the dams upstream of the monitored rivers. The discharge from these reservoirs affects the condition of the monitored rivers, hence there is a need to integrate flood forecasting and warning system for dam operation and flood forecasting and warning system in the river basins.

4. RESULT OF THE EVALUATION

4.1 Relevance

(1) Consistency with the National Development Plan of Philippine

There are 5 major thrusts for the Environmental and Natural Resources Sector in the Medium-Term Philippine Development Plan 2004-2010. One of those thrusts is "mitigate the occurrence of natural disasters to prevent the loss of lives and properties". One of the priority areas of the Science and Technology development stipulated the National Science and Technology Plan 2002-2020 is natural disaster mitigation. Considering the priority aspects in the plans mentioned above, the Project Goal is in conformity with the Medium-Term Philippine Development Plan 2004-2010 and the National Science and Technology Plan 2002-2020.

(2) Consistency with the Official Development Assistance (ODA) policy of Japan

The assistance policy of Japan for the Philippines is under revision. However, in the previous assistance policy of Japan, one of the priority areas was "Environmental conservation and disaster management". With regards to disaster management, assistance for natural disaster mitigation (flood, earthquake and volcanic disaster etc.) is a priority issue. Therefore, this project is in conformity with the priority assistance subjects of the ODA policy of Japan.

(3) Conformity with needs of PAGASA in regard to the flood forecasting and warning activities.

The improvement of flood forecasting and warning system (FFWS) in terms of accuracy and timeliness is an important issue for PAGASA. There are several needs for improvement of FFWS, such as replacement or upgrading of deteriorated equipment and facilities, improvement of flood forecasting model, maintenance of equipment and facilities and allocation of appropriate budget and human resources for the flood forecasting and warning activities. As a technical cooperation project, the Project is in conformity with the needs of improvement of flood forecasting model and maintenance of equipment through strengthening capability of PAGASA's officials engaged in the flood forecasting and warning activities for monitored 4 river basins (Pampanga, Agno, Bicol and Cagayan river basins).

(4) Conformity with needs of target area

The Philippines is a natural disaster prone country. Flood is one major natural disasters affecting lives and properties in the country. In the Pampanga, Agno, Bicol and Cagayan river basins, floods have been recurrent in the past and up to the present. Every year, an average of 19 tropical cyclones pass through the Philippine Area of Responsibility (PAR), and around 4 million people are affected, and claiming about 200 lives on the average (according to flood damage data for the entire country from 2001 to 2004 from the NDCC). The necessity of appropriate flood forecasting and warning is increasing because of urbanization and population increase in the flood vulnerable areas, and also rampant utilization of flood plains, for example for agricultural production, infrastructures, etc.

(5) The approach and methodology of the Project

The main focus of the Project is to strengthen the capability of operation and management of the flood forecasting and warning system through improvement of flood forecasting model and improvement of maintenance of existing equipment and facilities for the monitored 4 river basins (Pampanga, Agno, Bicol and Cagayan river basins) through technology transfer by the Japanese experts. Recognizing the needs of replacement, upgrading and rehabilitation of deteriorated equipment and facilities, the DOST-PAGASA has embarked to tackle this plan through phases. In addition, locally fabricated equipment has been considered, for instance the replacement of 4 water level sensors in PABC was funded by the DOST and the use of SMS in the transmission of real-time rainfall and water level data. The improvement of forecasting model and conduct of appropriate maintenance of existing equipment and facilities is very important in the present condition and it can be said that the project approach was adequately selected.

4.2 Effectiveness

The technical skills of the hydrologists and telecommunication engineers/technicians who are working in the central office of FFB and the field centers in the monitored 4 river basins have been strengthened satisfactorily through the OJTs, the Joint Workshops and the trainings in Japan that have been conducted under the Project. Several manuals for interactive flood forecasting models were developed while existing manuals for maintenance were revised. The issue on the accuracy and timeliness of flood forecasts being issued, as mentioned in the Section 3.3 can be best attested by the 2 examples that indicated improvement of flood forecasting activities of PAGASA. The certificate of appreciation (citation) conferred by a local government unit to PAGASA proves that public's perception on PAGASA has improved. As a whole, the Project Purpose, which is "PAGASA (FFB) capability to manage and operate the flood forecasting and warning system is improved" is achieved mostly. Considering the fact that the Outputs of the Project will be almost fully achieved by the end of the Project, it is therefore concluded that the effectiveness of the Project is sufficiently high.

4.3 Efficiency

(1) Appropriateness of inputs by both sides

Dispatch of long-term and short-term experts was appropriate. The provision of equipment was conducted appropriately in terms of kind and quantity. However, the timing of provision of equipment by Japanese side in the second year of the Project was delayed (more than half year delay compared to the procurement schedule due to administrative and budgetary concerns). This delay of procurement affected progress of the activity of the community-based program and upgrading of flood forecasting model for Bicol and Cagayan rivers for flood forecasting and warning operation. Nevertheless, adjustment in the work schedule has been made and procurement and installation of water level gauges for the community-based flood and warning system in the allied rivers of Agno river basin and the on-line data collection system for Bicol and Cagayan river basins will be carried out before the completion of the project. The remaining activities related to these will be carried out by PAGASA.

The C/P trainings in Japan were conducted appropriately. Assignment of C/Ps was appropriate

in term of number and capability. Aside from one C/P who retired (mandatory) and replaced immediately, all other C/Ps engaged in the Project continuously. PAGASA provided appropriate office space and facilities for utilizing for the Project. As mentioned earlier, the counterpart budget of the Philippine side included was allocated for repair of facilities, supplies and materials, and travel expenses, etc. The budget allocated in year 2004 and 2005 are 3.08 million pesos and 6.69 million pesos, respectively. The budget expenditure by the Philippines side was mostly appropriate.

(2) Project management

The Joint Coordination Committee (JCC) meeting has been held twice. These JCC meetings functioned appropriately. The active participation of key officials from concerned the LGUs to 2nd JCC meetings has contributed the improvement of relationship between PAGASA and LGUs (10 persons from 8 LGUs had participated), and they became more aware on flood mitigation and supportive to the PAGASA's flood forecasting and warning services.

All activities pertaining to the Project are discussed regularly among the Philippine counterparts and Japanese experts. Meetings are done weekly or more often as the need arises. These periodical meetings functioned very well also.

The Project Management Office was established in the Flood Forecasting Branch (FFB) of PAGASA in July 2004 and several staff of PAGASA assigned as staff of PMO. Because of good understanding of officials related in PAGASA and good performance of PMO, PAGASA provided appropriate budget for the project activities. A monitoring team was also established within FFB for monitoring of activities of the different sections of FFB and the field centers. The establishment of PMO and monitoring team and its performance has contributed to the efficient implementation of the Project.

As whole, it is evaluated that the efficiency of the Project is high.

4.4 Impacts

(1) Expectation of achievement of the Overall Goal

Impact on the Overall Goal is positive. As for recent major flood event, which recorded highest water flood level since 1982 (since the start of the FFWS) in Cagayan river basin in January 2006, there were no human lives lost. People were able to evacuate from the risk areas by following the flood warnings issued by PAGASA. But it must be noted that its impact would be greatly improved once other measures for accurate forecast are implemented as described in item 3.4.

(2) Other impacts

The Project has created renewed awareness in the staff of FFB on importance of flood forecasting and warning services. This awareness has made good impact on their working attitude to performing their duties and responsibilities. The public information drive conducted during the project implementation generated an increase in awareness on the flood warnings issued by

PAGASA and enhanced the collaboration between the PAGASA and the local government units. This led to the establishment of the community-based flood forecasting and warning system established in the allied rivers of Agno and in the lower Pampanga river basin.

4.5 Sustainability

(1) Political aspect

In view of the recent spate of natural calamities, the need for increased public awareness and involvement in measures being put in place by the government for disaster preparedness, the Four Point Action Plan for Disaster Preparedness was issued by the National Disaster Coordinating Council (NDCC) in January 2005. The first in the Action Plan is "Upgrading of the forecasting capabilities of PAGASA and PHIVOLCS". Therefore, the importance of strengthening the capability of PAGASA with regards to forecasting and warning of hydrometeorological hazards will remain a high priority in the political agenda of the government.

(2) Organizational aspect

The capability of PAGASA on operation and management of flood forecasting and warning system has been strengthened satisfactorily by the Project. In the course of the project implementation, PAGASA assigned additional staff to the field centers in Pampanga, Agno and Bicol. The number of staff assigned in those field centers seems appropriate. In case of Cagayan field center, the number of staff is not sufficient and should be increased. The Rationalization Plan which contains the proposed structural and functional modification of PAGASA seeks to strengthen the operation and improve the delivery of services. It is expected that the number of staff for the Cagayan center will be increased after approval of the Rationalization Plan. Therefore, it is expected that FFB will have more appropriate organizational framework for operation and management of the flood forecasting and warning activities.

(3) Financial aspect

In line with the implementation of the NDCC Four Point Action Plan for Disaster Preparedness, the PAGASA will have more budgetary support from the National Government and financial assistance from other sources.

(4) Technical aspect

Most of the personnel involved in the Project expressed that technical transfer has been conducted very effectively and the C/Ps have improved their knowledge and skills related the flood forecasting and warning system. The trained personnel were satisfied with the knowledge and the skills acquired.

It was observed that there are few young hydrologists and telecom engineers/technicians. Thus, there is an apprehension on the sustainability of trained personnel in the future. Due to the attrition policy of the government, PAGASA was able to hire limited number of young personnel for the past 10 years. The FFB hired 3 young staff since last year. It is expected that PAGASA continues to employ new young staff and conduct necessary capacity development.

The proper maintenance of equipment and facilities is a very important component for accurate and timely flood forecasting and warning. The telecom engineers of FFB are technically capable of maintaining outmoded and deteriorated equipment for the flood forecasting and warning system. But in due time, these equipment will need to be replaced.

5. CONCLUSION

Based on the criteria set by the JICA guidelines for project evaluation, the following can be concluded:

(1) Relevance – high.

The Project is in conformity with the development policy of the Philippines, the ODA policy of Japan and the need for flood forecasting and warning in the target areas. The project approach was adequately selected.

(2) Effectiveness – high.

The Project Purpose will be achieved satisfactorily by the end of the Project.

(3) Efficiency – high.

The provision of some equipment by Japanese side was delayed and implementation some activities delayed, but in general, most inputs to the Project are well utilized for the project activities, project management conducted well by PAGASA with good ownership and contributed for the achievement of the Outputs.

(4) Impact – positive.

The project provided a renewed awareness in the staff of FFB on importance of the flood forecasting and warning services.

(5) Sustainability – assured.

The sustainability of the Project is expected to be assured in terms of political, organizational, financial and technical aspects.

Based on a series of discussions with Philippines officials and counterparts as well as results of discussion by the Joint Evaluation Team, the Team evaluates that the project performance is very satisfactory.

6. RECOMMENDATIONS AND LESSONS LEARNED

6.1 Recommendations

The following are the recommendations as a follow up action by PAGASA:

(1) Monitoring and evaluation of the Community-based Flood Forecasting and Warning System in the Allied Rivers of Agno

Due to the delay of procurement of some equipment, such as water level gauges and portable radios for communication etc., installation of the equipment will be completed by the end of February 2006. After then, it is planned to conduct trainings for the water level observers. This community-based system will be tested during the flood season of 2006 therefore, it is

recommended that PAGASA should monitor whether the activities for flood and warning system are carried out smoothly as scheduled and assess the results of implementation of the activities after the flood season. The results of the monitoring and assessment of the activities can be utilized for further improvement of the system in the Allied rivers for the succeeding flood seasons. It is also necessary to make a plan for the monitoring and assessment of the system before the commencement of the flood season in 2006. The monitoring and assessment of the CBFFWS can serve as a model for other areas.

(2) Forging stronger linkage between PAGASA and concerned agencies and LGUs

To ensure the sustainability of coordination of flood forecasting and warning activities, it is important to grasp the degree of participation of communities such as people's understanding/recognition/cooperation of the activities, cooperation of LGUs, and also continuity of financial support of LGUs.

(3) Capacity development of younger staff in FFB

The capability improvement of FFB staff was carried out under the project. However, there is the situation that an average age of the staff rises. To sustain the high capability of FFB, recruitment and capacity building of younger staff is important. Therefore, capacity development such as in house training and seminars should be carried out continuously.

6.2 Lessons Learned

Utilization of the Project Design Matrix (PDM) as a tool for project management

The PDM for the Project was made based on the results of the Project Cycle Management workshop with participation of PAGASA, JICA and other concerned agencies. In spite of the generation of good outcomes by the Project, the indicators for the overall goal and project purpose that support the results of the Project are difficult to verify in the absence of relevant data and information. For properly verifying the indicators, means of verification such as reports from LGUs and DCCs would require basic information e.g. estimated damage to properties, casualties, number of affected people, relief and rehabilitation costs, etc. From these data, analyses on the correlation between flood features, actions taken by PAGASA, concerned agencies and LGUs with the corresponding impacts are carried out.

An insufficiency in the explanation and understanding on the use of the PDM effectively was also observed. Therefore, it is necessary to get enough understanding by personnel directly involved in the Project on how to utilize the PDM effectively from the planning to the monitoring and evaluation stages of a project. The development of the PDM should involve all the stakeholders up to the community level. The need for regular collection of basic information was recognized and the institutionalization on the use of PDM is encouraged.

Annex 1 Schedule of the Evaluation

(from January 16 to February 2, 2006)

Date		Time	Schedule for PAGASA project	Schedule for PHIVOLCS project	Venue
Jan. 16	Mon	9:00-11:30	Meeting at JICA Office		JICA office
		13:30-14:20	Courtesy call to PAGASA		PAGASA
		14:30-15:00	Explanation of the terminal evaluation to counterparts (C/Ps)		ditto
		15:00-17:00	Interview with C/Ps		ditto
Jan. 17	Tue	9:00-17:00	Interview with C/Ps		PAGASA
Jan. 18	Wed	(all day)	Filed survey (Pampanga)		Pampanga
Jan. 19	Thu	(all day)	Field survey (Agno)		Agno
Jan. 20	Fri	9:00-17:00	Data collection and additional interview		PAGASA
Jan. 21	Sat		Preparation of draft evaluation report		
Jan. 22	Sun		Preparation of draft evaluation report		
Jan. 23	Mon	9:00		Courtesy call to PHIVOLCS	PHIVOLCS
		14:00		Interview with C/Ps	
Jan. 24	Tue	9:00-17:00		Interview with C/Ps and data collection	PHIVOLCS
Jan. 25	Wed	(all day)		Filed survey (Tagaytay)	Tagaytay
Jan. 26	Thu	9:00-17:00		Data collection	PHIVOLCS
Jan. 27	Fri	9:00-17:00	Data collection		PAGASA
Jan. 28	Sat			Preparation of draft evaluation report	
Jan. 29	Sun		Preparation of draft evaluation report	Preparation of draft evaluation report	
Jan. 30	Mon	9:00	Joint Evaluation		PAGASA
		10:00	JOMC (Joint Operation & management Committee)		ditto
		14:00	Courtesy call to the Department of Science and Technology		ditto
Jan. 31	Tue	9:00-17:00	Joint Evaluation		PAGASA
Feb. 1	Wed	9:00	Joint Evaluation		PAGASA
		13:30	Joint Evaluation (Explanation to Officer-in-charge of PAGASA)		ditto
		14:30	Joint Evaluation		ditto
Feb. 2	Thu	9:00	Joint Evaluation		PAGASA
		11:00	Registration for JCCM		ditto
		13:00	Joint Coordination Committee Meeting, signing of Minutes of Meetings		ditto

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Annex 2 PDM latest version

Project Name: Strengthening of Flood Forecasting and Warning Administration Modified version (May 31, 2005) Indicators enhanced August 3, 2005
 Implementing Agency: Flood Forecasting Branch, PAGASA Target Group: FFB Target Areas: Pampanga, Agno, Bicol & Cagayan River Basins
 Duration: April 5, 2004 – April 4, 2006

Narrative Summary	Objective Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Reduce loss of lives and damage to properties due to floods in the monitored river basins.	Evacuation and preparedness to reduce flood damage are systematically implemented in monitored river basins.	1. Reports from NDCC 2. Records from municipal and provincial agriculture offices	Disaster preparedness of local DCCs and their readiness to respond remains a high priority.
Project Purpose PAGASA (FFB) capability to manage and operate the flood forecasting and warning system is improved.	1. Forecast compared with actual occurrence is improved in terms of accuracy and timeliness. 2. Public perception of PAGASA has improved. 3. NDCC, DCCs and local communities act on disaster preparedness activities based on FFWS issuances and established system.	1. Feedback report from NDCC/PDCCs 2. Project Reports of actual occurrence 3. Copy of minutes of meeting with FFWS showing regular agenda of NDCCs and DCCs	Present policy of the administration/ management to strengthen the capability of FFB for flood forecasting and warning operation does not change largely.
Outputs 1. Maintenance program for telemetry/multiplex equipment established and utilized. 2. FFB is equipped with FFW equipment and facilities. 3. Skills of FFB personnel in issuing adequate, accurate and timely bulletins is enhanced.	1.1 Maintenance programs are established. 1.2 Maintenance programs are implemented. 2.1 Hydrometeorological on-line database is established and updated regularly. 2.2 Flood forecasting models are developed. 3.1 Hydrologists and electronics/communication personnel skills are enhanced. 3.2 20 FFB personnel (12 hydrologists of River Centers, 8 telecom engineers/technicians) are provided with appropriate training.	1.1 Maintenance manuals 1.2 Inventory record 2.1 Database software package 2.2 Software package and User's manuals 3.1 Training modules 3.2 List of participants: Training reports	Assigned field staff remain in the project Trained field staff remain in place Resources for the completion of database are secured/in place Budget for additional stations is secured and the project is accepted by the LGUs and the community.

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Activities	Inputs		Trained personnel continue working with FFB.
	<Japanese side>	<Philippine side>	
1.1 Make inventory of equipment and gauging instruments 1.2 Update Maintenance Guidance Manual 1.3 Conduct regular and emergency telemetry/telecom maintenance 2.1 Conduct equipment and facility assessment 2.2 Repair/Replace defective/outmodeled FFW equipment 2.3 Establish additional monitoring facilities in Allied Rivers 2.4 Set-up Short Messaging Service (SMS) 2.5 To set up on-line database in field centers 3.1 Develop training programs 3.2 To prepare the interactive flood forecasting models for PABC system 3.3 Carry out training & seminars 3.4 Undertake follow-through activities of trained personnel 3.5 To deploy personnel according to the technical needs of the Field Centers	1. Dispatch of Japanese experts Long term expert on strengthening of FFW administration (1) Project coordinator (1) Short term experts: FFW modeling (4) O&M of telecoms system (2) 2. Acceptance of Filipino trainees in Japan for FFW 3. Local cost for training, surveys and supplies related to 4. Provision of necessary equipment	1. Assignment of counterpart personnel 2. Provision of office space for use in the project 3. Counterparts for local costs, such as travel expenses, fuel for vehicles, electricity, supplies and materials, etc.	Precondition PMO is established.

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