

# PHILIPPINES

## Flood Forecasting and Warning System for Dam Operation Project (II)

Report Date: October 1998

Field Survey: Not implemented

### 1 Project Summary and JBIC's Cooperation

Flood Forecasting and Warning System for Dam Operation Project aims to contribute to mitigation of flood damage on human life and assets, and stabilize the lives of residents in the downstream reaches of the dams in the Philippines, a country that, due to its geographic location, suffers serious flood damage from typhoons, etc. every year. Under this project, the flood forecasting and warning system was constructed at 5 major dams (Angat, Pantabangan, Binga, Ambuklao and Magat) on Luzon Island, where are the most populated and industrialized parts of the Philippines. Of the five dams listed above, the dams at Angat and Pantabangan were covered by the "Flood Forecasting and Warning System for Dam Operation Project (FFWS) (I)". This project continued from that project, covering the remaining three dams at Binga, Ambuklao and Magat. The ODA loan covers the entire foreign currency portion of the project.

### 2 Evaluation Results

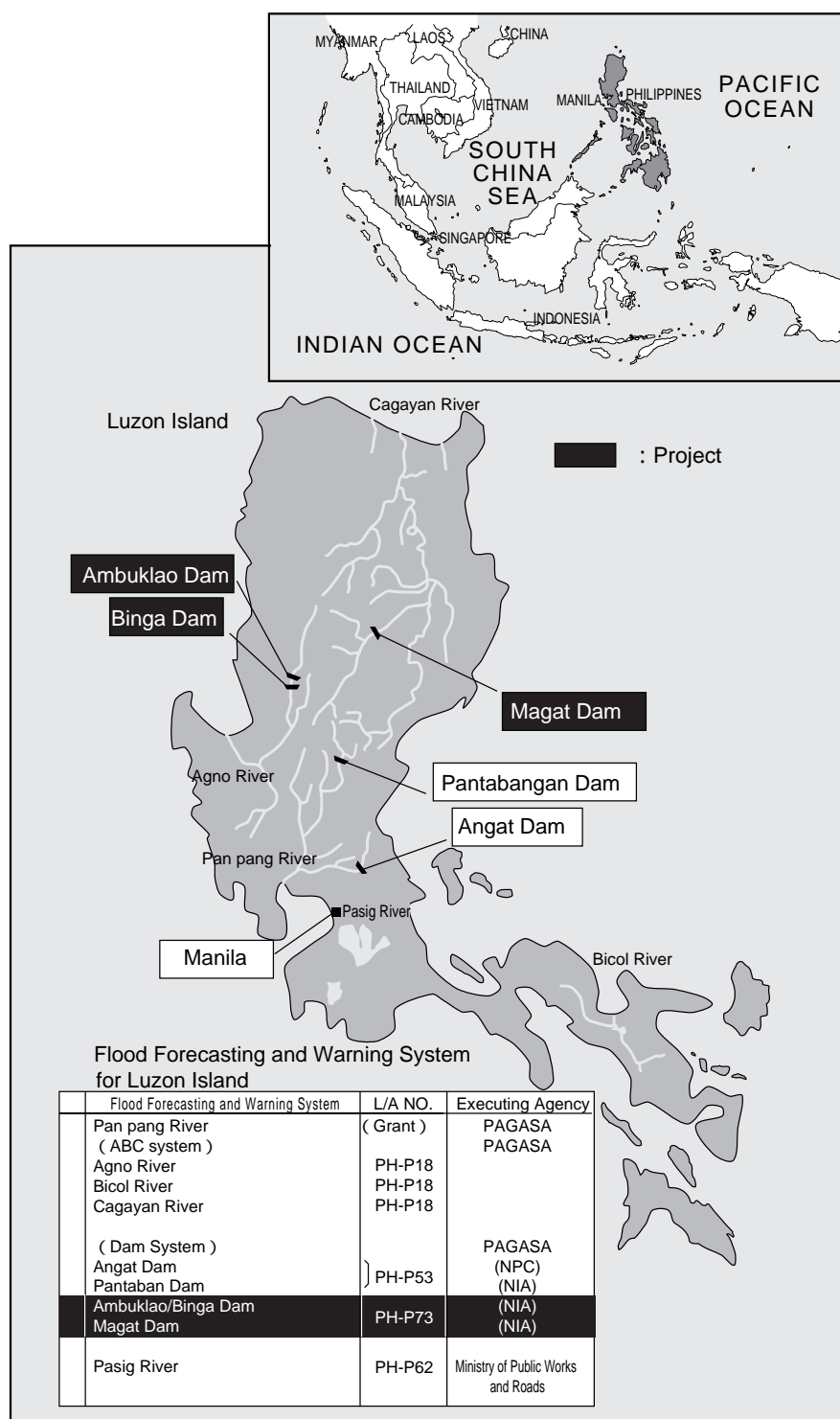
#### (1) Project Implementation

##### (i) Project Scope

There were no changes in the project scope, and the project was implemented as planned.

##### (ii) Implementation Schedule

The completion of this project was 49 months (approximately 4 years) behind schedule compared to the original plan. The main reasons for this delay were (1) delays in the procurement procedures of consultants and contractors caused by the change of government (38 months), and (2) construction delays due to the natural disasters (the earthquake in Baguio and the eruption of Mt.



Pinatubo) (9 months). (1) was caused by a paralysis of administrative functions brought by the transition from the Marcos regime to the Aquino administration, and (2) was clearly not preventable, so that the delay in the implementation schedule is considered to have been unavoidable.

Borrower / Executing Agency	Republic of the Philippines / Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)
Exchange of Notes / Loan Agreement	December 1985 / May 1986
Loan Amount / Loan Disbursed Amount	· 3,988 million / · 3,980 million
Loan Conditions	Interest: 3.5%, Repayment period: 30 years (10 years for grace period), General Untied (partial untied for consultants)
Final Disbursement Date	November 1994

### (iii) Project Cost

There were no particular problems related to project costs, with everything going mostly as planned in terms of local and foreign currency portion.

## Comparison of Original Plan and Actual

(1) Project Scope	Plan	Actual
Hydrological stations	Rainfall gauging stations (9), water stage gauging stations (2), rainfall /water stage gauging stations (2)	} Same as planned
Flood forecasting and warning system facility	Warning posts (33), repeater stations (3)	
Telecommunications facilities	Observatories, dam offices	
Data information center	1 system	
Rehabilitation of existing systems	ABC system, Pampanga system	
Consulting service	409M/M	
(2) Implementation Schedule		
Start of procuring consultants - completion of project	November 1985 - September 1990 (58 months)	November 1986 - October 1994 (95 months)
(3) Project Cost		
Foreign currency portion	· 3,988 million	· 3,980 million
Local currency portion	42.7 million peso	51.9 million peso
Total	· 4,585 million	· 4,342 million
Exchange Rate	1 peso = · 14	1 peso = · 7

## (2) Organization of the Executing Agency (implementation and operation/maintenance after completion)

### (i) Implementation Scheme

The executing agency of this project is PAGASA, but coordination with the National Irrigation Administration (NIA) and the National Power Corporation (NPC), both of which are related organizations (owners of the dams covered by this project), was an important point regarding the adequate implementation and operation of this project. During the implementation of this project and following its completion, these organizations formed committees consisting of representatives from each organization, which proved efficient in solving problems that occurred in relation to this project. A look at the results achieved by these committees shows that almost everything went as planned, and the anticipated results are considered to have been obtained.

### (ii) Operations and Maintenance

This project is considered to have been largely carried out in a smooth way. However, the DIC (Data Information Center) has failed in part to achieve real-time processing of data. Maintenance system is being implemented mainly by Joint Operation and Management Committees (JOMC), which are subordinate organizations of each of the aforementioned related organizations, and no particular problems are thought to exist in this area as the required personnel has been secured in this area.

## (3) Project Effects and Impacts

The results obtained through the dam flood forecasting and warning shows that it has contributed to a certain point to mitigate flood damage and stabilizing the lives of residents. From existing data it is difficult to gauge this project's direct contribution to alleviating flood damage in the Philippines due to typhoons and other causes, but since this project went into operation there has

been no case of a single large disaster killing a large number of people. Furthermore, the findings of discussions with residents attending annual disaster prevention seminars indicate that the project has yielded some degree of reduction in human disaster casualties.

The data gathered and accumulated by the equipment installed under this project will be further analyzed and interpreted in future to be of use in the planned management of water resources for power generation, irrigation and flood control. The management of this project by JMOC has established a cooperative system with the related agencies (PAGASA, NIA, NPC, Department of Public Works and Highways, the Office of Civil Defence and the National Water Resources Board). The technical training and on-the-job training carried out as part of this project achieved technology transfer for system management between the various agencies concerned with the project.

### No. of Flood Forecastings and Warnings Made at Magat and Binga Dams

Year	Magat Dam	Binga Dam
1993	27	14
1994	40	5
1995	4	2
1996	Data is unavailable.	15

(Source) PAGASA

### Situation of Damage Suffered from Typhoons etc. in the Philippines

			(Complete collapse)	(Casualty)	(Injured)	(Million peso)
1992	Flood	R3	1,569	22	—	681
	Typhoon	R1, 2, NCR	1,428	22	—	1,347
1993	Typhoon	R1~4, CAR	35,069	75	121	2,775
1994	Storm	R1~3	2,174	11	21	155
	Typhoon	R3, 4, CAR	14,596	45	24	1
1995	Storm	R1, 3, 4, 5, 6, 7, 8, 10NCR**	21,852	133	108	3,172
	Typhoon	R1, 2, 3, 4, 5, 7, NCR CAR**	225,872	916	2,860	10,818

(Source) NSCB

(Note) \*: R (Region) 1-Ilocos  
 R2-Cagayan Valley  
 R3-Central part of Luzon  
 R4-Southern part of Tagalog  
 R5-Bicol  
 R6-Western part of Visayas  
 R7-Central part of Visayas  
 R8-Eastern part of Visayas  
 R9-Southwest part of Mindanao  
 R10-Northern part of Mindanao  
 R11-Southern part of Mindanao  
 R12-Central part of Mindanao  
 NCR-Metro Manila  
 CAR-Mountainous area

\*\* : Suffered area includes not only where the flood forecasting and warning systems are installed but overall administrative area.

## 3 Lessons Learned

Nothing in particular.