

10.7 Community Development in the Mapanuepe Lake Basin

Outline of Development

After the eruption of Mount Pinatubo in 1991, the Marella valley and the Sto. Tomas River were buried by lahar forming Mapanuepe Lake in the downstream reach of the Mapanuepe River. The lake has a surface area of 6.8 km². The GOP and LGUs have promoted the tourism development of the lake and have constructed certain facilities such as observatories. Residents who had lived in the submerged four barangays expect to create and develop their livelihoods by utilizing the lake and its water including for aquaculture.

In the master plan stage, a community development in the Mapanuepe Lake basin was proposed as shown in Figure 10.25 analyzing the development potential for the sectors of tourism, aquaculture and agriculture.

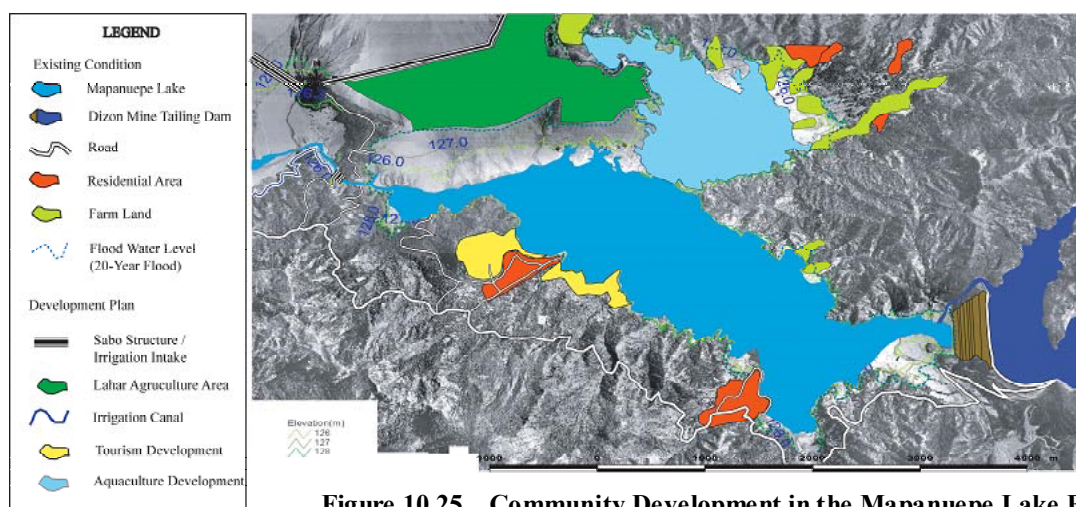


Figure 10.25 Community Development in the Mapanuepe Lake Basin

Present Issues for Community Development

Two major issues exist at present for the community development as follows:

- Safety against collapse of the Dizon Mine Tailings Dam located upstream of Mapanuepe Lake,
- Safety against water contamination of Mapanuepe Lake as well as Dizon Dam reservoir,

The development should be realized after resolving the above issues. For the detailed study on the possibility of development, investigations were carried out as mentioned below.

Safety of Dizon Tailings Dam

The spillway of the Dizon Tailings Dam started to collapse at the downstream end during the rainy season in 2001, which was followed by further damage during the next rainy season in 2002. It then totally collapsed in September 2002 as shown in Figure 10.26. There have been no repair works for the spillway, so future spill-out of the reservoir water through the collapsed spillway might induce serious impact on the dam body and the lake downstream. Urgent countermeasures should be taken by the owner of the dam to ensure the safety of the Dizon Dam and strong instruction to the owner by the GOP is needed.



Figure 10.26 Collapse of Spillway of Dizon Dam

Water Quality of Mapanuepe Lake

The water of Mapanuepe Lake is contaminated, with the main suspect being water discharged from the reservoir of the Dizon Mine Tailings Dam. Local people report that released fingerlings cannot survive in the Lake. Investigations of quality of water and bed materials were conducted at four points in Mapanuepe Lake and at one point in the Dizon Dam reservoir.

Through the investigations, manganese, copper and lead were detected at all the points, of which the values greatly exceeded the allow limits of the Philippine standard. Mercury was also detected at some points with the value of two orders greater than permitted by the standard. Based on the results, it was concluded that the water of Mapanuepe Lake cannot be used for irrigation, drinking, aquaculture or recreation.

Test parameters of the investigations were as follows:

- 1) For water quality test: pH, BOD, COD, DO, color, nitrogen as nitrate, nitrogen as nitrite, chloride, cyanide, mercury, phosphorus, iron, manganese, zinc, lead, chromium, cadmium, arsenic, fluoride, calcium, magnesium, phenols,
- 2) For bed material quality test: pH, mercury, phosphorus, iron, manganese, zinc, lead, chromium, cadmium, phenols.

Possibility of Community Development

The investigations mentioned above confirmed the existing serious problems with the stability of the Dizon Dam and safety of the water quality of Mapanuepe Lake. It is therefore concluded that the community development in Mapanuepe Lake basin can be realized after resolving the problems. It is also reiterated that the problems should be tackled with strong intention of the GOP.

10.8 Community Road Development in Mountainous Area

Outline of Development

The community roads buried by volcanic materials from the eruption in 1991 at the upstream mountainous area of the Bucao and Sto. Tomas River basins are still not accessible. The social services provided by the LGUs cannot reach the isolated areas and people's livelihoods have not recovered. The watershed/disaster prevention management activities have not been activated yet. In view of the social development aspect as well as the disaster prevention mentioned above, recovery and extension of the community roads were proposed in the master plan.

Three routes of the community road were identified, route-A of (48 km long) in the Bucao River basin and route-B (15 km) and route-C (45 km) in the Sto.Tomas River basin. Among these routes, a 16-km section in the downstream part of route-A shown in Figure 10.27 was selected as the priority project.

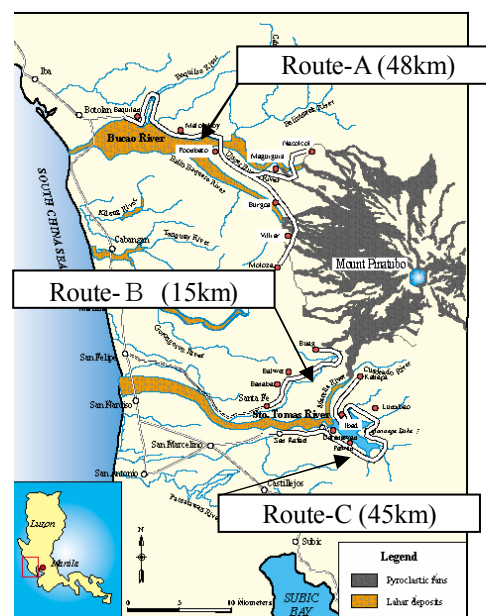


Figure 10.27 Community Road Development

Design of Community Road

The community road was designed on the basis of the following design criteria:

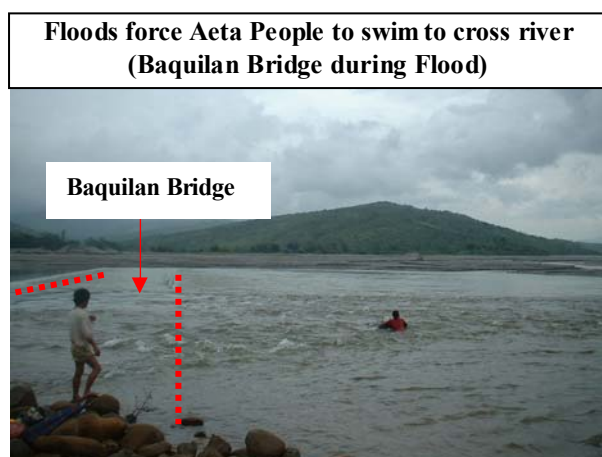
Table 10.14 Design Criteria of Community Road

No	Items	Criteria	Description
1	Travel way width	4 m	One lane
2	Total road width	8 m	More allowance to mountain side for slope failure
3	Travel way width at bridge	4 m	One lane
4	Total bridge width	5 m	Less than DPWH standard of 9.54 m because of small traffic volume
5	Max gradient	10%	Climbable for jeepney, light truck, etc.
6	Pavement	Gravel	200 mm thick gravel surfacing
7	River structures	Less than 500 m ³ /s	Causeway
		More than 500 m ³ /s	Bridge

Seven barangays are located along the 48 km long community road of route-A and they are populated by people of the Aeta community. Development of the community road is expected to support the Aeta community and strengthen their forest management activities. The population of the seven barangays is 11,000, which is 18% of the total Aeta population of 62,000 in the Philippines.

The priority project of 16 km long community road runs from Sitio Baquilan, which is the end point of the existing road, to Barangay Poonbato along the right bank of the Bucao River. The route-A is planned to be extended up to Barangay Moraza with a 1 km long bridge crossing the Bucao River, the construction of which requires high construction cost. As the first phase implementation, therefore, construction of the 16 km downstream part of route-A is proposed; about 3 hours saving of travel time will be attained.





Project Cost and Evaluation

Total project cost of the 16 km long community road construction amounts to 189 million pesos. The amount seems to be too large for Zambales Province to implement by their own finance, which has the annual development fund of only 62 million pesos. Financial assistance from the national government is needed to implement the 16 km community road so that effective forest, soil and watershed management, strong support to the Aeta community, and efficient peace and order operations can be realized. The active participation of the LGUs and the community is required in the operation and maintenance works.

The benefits from the community road development were counted based on the saving of the accumulated travel time of 792,000 hours/year and GRDP per capita of Pesos 10.54/hour. The annual benefit amounts to 8.35 million pesos. The EIRR is 2.1%.

The effect of the community road development on poverty alleviation was analyzed in the same manner as was mentioned in 10.5 for the CBFM program. Among the 15 poverty related factors, a factor of “access time to town proper” was applied for the analysis. Results of the analysis are shown in Figure 10.28.

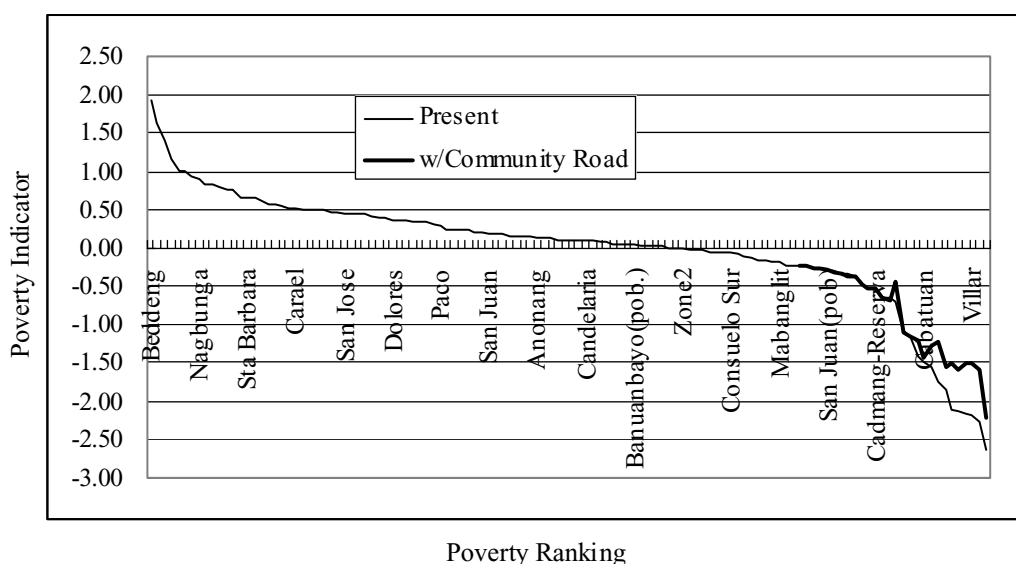


Figure 10.28 Effect of Community Road Development on Poverty Alleviation

10.9 Establishment of Aeta Assistance Station (AETAS)

Outline of AETAS

The Aeta tribe, which is the majority of the indigenous people living in the Zambales Province, is believed to be the first indigenous people that transmigrated to the Philippines 20,000 years ago. Their original livelihood was hunting, but is now slash-and-burn agriculture. The Aeta people worship Mount Pinatubo as the holy mountain where the head spirit lives. The total population of the Aeta tribe is 62,000 in the whole Philippines, among which 35,000 were obliged to be evacuated due to the eruption of Mount Pinatubo and subsequent lahar. The Aeta people have had bitter experiences in the evacuation and resettlement centers because of difference in cultures and ways of living between the Aeta tribe and other groups.

About 50,000 of the Aeta people live in the Zambales Province, so that the province is regarded as the center of cultural exchange between the Aeta and the others. There are six Aeta communities in the upstream of the Bucao River basin and 16 communities in the upstream of the Sto. Tomas River basin. After the eruption in 1991, almost all the area for the Aeta communities on the flanks of Mount Pinatubo was buried by volcanic materials. The people have lost not only their families and friends, residential areas, and agricultural lands, but also are likely to lose their culture and identity due to their resettlement in the lowland. Many Aeta people have returned to their original barangays at present, although the natural conditions remain damaged and great efforts for recovery are still needed.

The Aeta Assistance Station (AETAS) aims to support the Aeta people to uplift their living standard and recover their identity, and also to support the NGOs in assisting the people.

Implementation Program

The Aeta Assistance Station was originally planned by the local NGO for the Aeta people “FOCUS (Foundation for Cultural Survival)”. It is proposed to consist of the following action program:

- 1) Improvement of upland entrepreneurship school of Aeta including transferring of technologies on agro-forestry and SALT,
- 2) Assistance in ancestral land protection, development and management activities,
- 3) Detailed study for establishment of AETAS,
- 4) Assistance in Aeta health, nutrition and livelihood program.

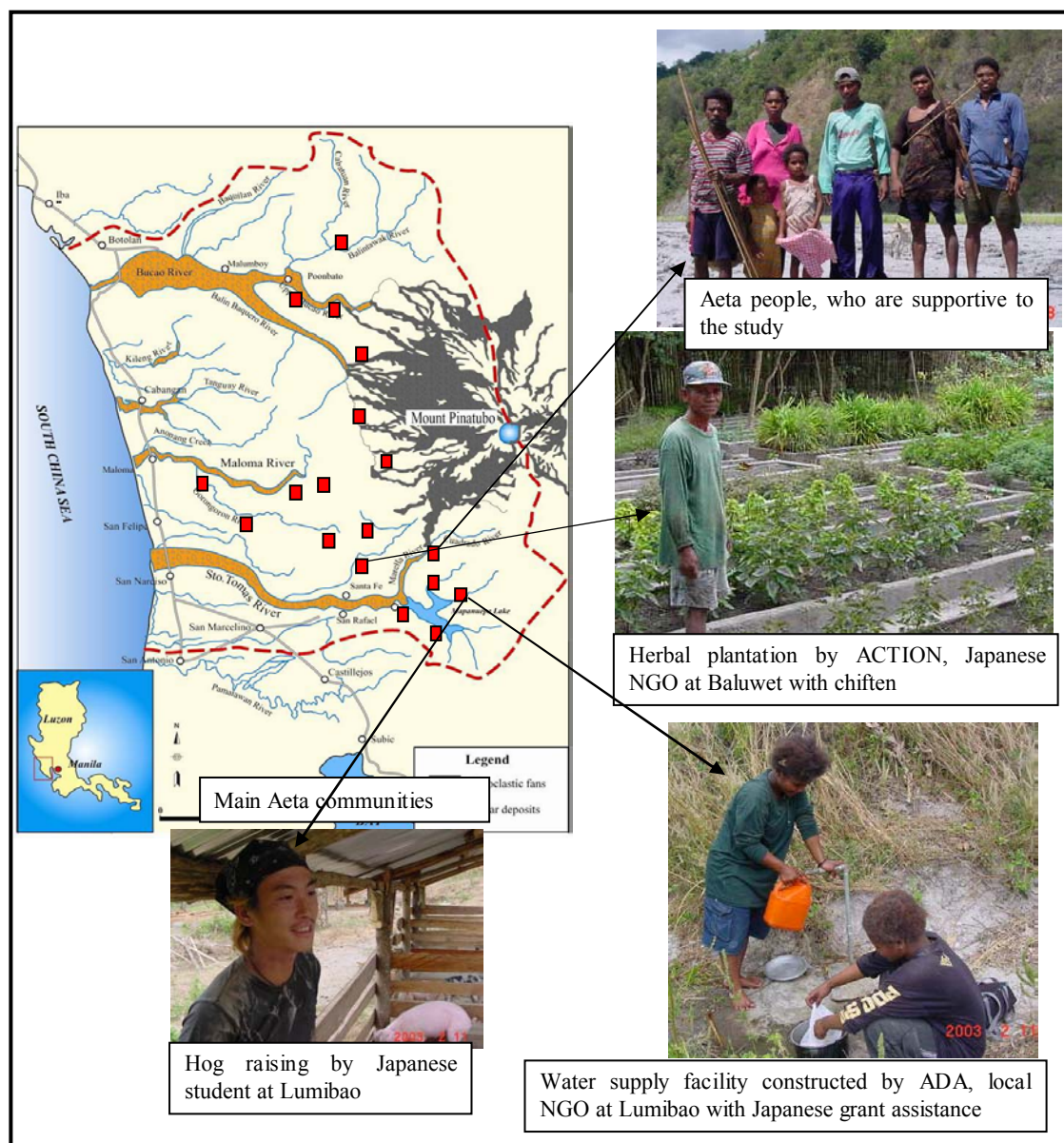
Among many NGOs assisting the Aeta people, FOCUS is the most active one and has a lot of experience to cooperate with foreign NGOs including Japanese ones. The assistance of the GOP and foreign lending institutions to FOCUS is the key to the success of retaining the Aeta culture, improving their living level, and managing watershed and forests.

Implementation Schedule and Cost

The implementation of the above mentioned program is planned with the duration of 5 years. The implementation cost is 15 million pesos.

Project Evaluation

Although the quantitative evaluation of the project is difficult, it is recognized that recovery of life and culture of the Aeta people is essential for disaster management in the Mount Pinatubo area.



11. PROJECT IMPLEMENTATION PLAN

Institutional Arrangement

The selected priority projects for the feasibility study are multi-sectoral. Project components and the responsible agencies under the present government structures are as follows:

Table 11.1 Priority Projects and Responsible Agencies

Category	Priority project \ Responsible agencies	DPWH	PAGASA	PHIVOLCS	OCD/ PDCC	DENR	DA	DAR/ NCIP	DECS	Zambales
Structural	Bucao dike improvement	⊙								
	Reconstruction of Bucao Bridge	⊙								
	Sto. Tomas dike improvement	⊙								
Non-structural	Mudflow monitoring & warning	○	○	○	○	○				⊙
	Rainfall / Water Level at Crater Lake	○		⊙	○					○
	Monitoring on Riverbed Movement	⊙		○						○
	Evacuation system		○		○				○	⊙
CDPP	Community based forest management					⊙	○			○
	Agriculture development on lahar area	○					⊙			○
	Community road rehabilitation	○				○				⊙
	Aeta assistance station					○	○	⊙		○

Notes: ⊙ Direct responsible agency, ○ Related agency

For the structural measures, DPWH is the responsible agency. For the non-structural measures and the CDPP, however, many agencies are involved, and it is difficult to implement them by a single agency in the existing government structure.

On the other hand, the Presidential Office of the Philippines instructed all the line agencies to rationalize the project implementation by (1) Unified PMO (to integrate the similar projects to one PMO), and (2) Multi-sectoral PMO (to strengthen the capability to meet the multi-sectoral comprehensive project).

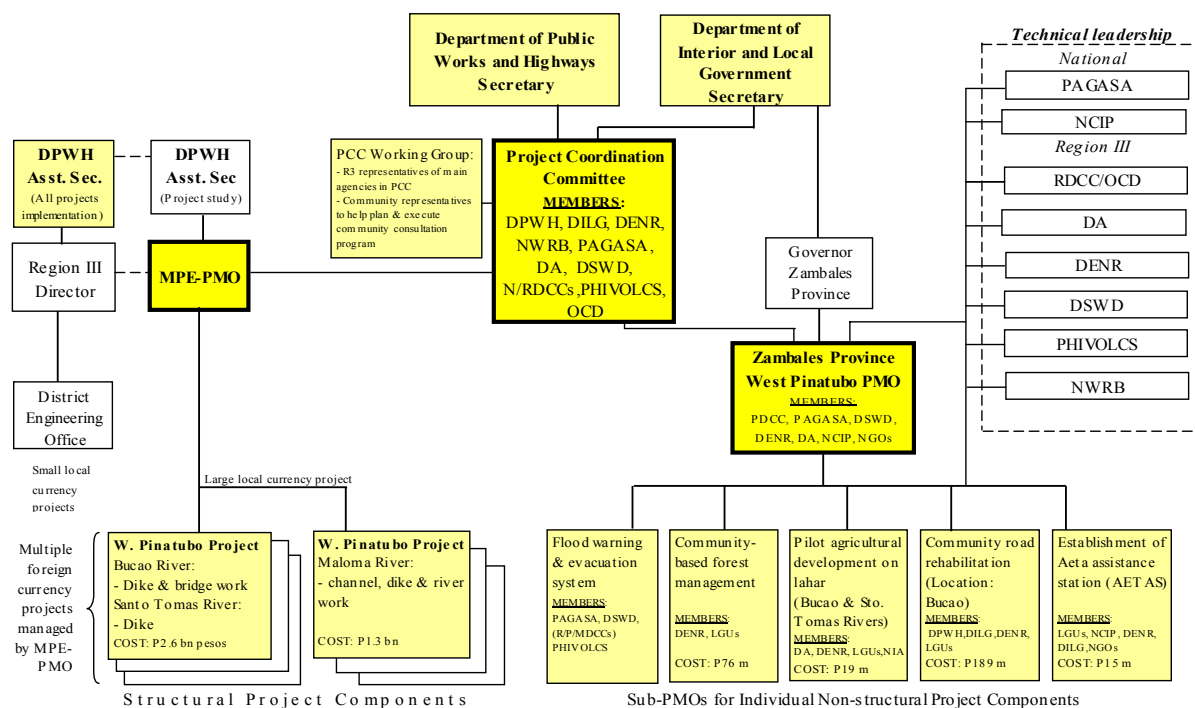
In this study, establishment of a multi-sectoral PMO by DPWH and other related agencies was initially proposed. However, DPWH commented that it is rather difficult because the related agencies are too many, and the budget allocation for the project implementation, the definition of responsibility of respective agency to the project, and staffing and management would be quite complicated and cannot be managed under the existing government institutional framework. In addition, most of the proposed non-structural and CDPP measures are locally oriented projects, and it would be more effective that the nominated projects be implemented by the leadership of the provincial government under the national policy of decentralization.

Considering the above conditions, it is recommended to arrange the project implementation body as follows:

- 1) For structural measures, the existing MPE-PMO under DPWH shall be assigned as the implementation agency under the unified PMO policy. The integration between the eastern and western parts would be realized through the management of MPE-PMO, which would be responsible for all the structural measures for the disaster prevention activities of Mount Pinatubo Basins.
- 2) For the non-structural and CDPP measures, a new PMO shall be established under the Provincial office of Zambales, as PMO-Zambales. This would require multi-sectoral approaches including disaster monitoring, warning and evacuation, forest management, agriculture development, community infrastructure development, and support to Aeta people and so on. Zambales Province is therefore responsible to coordinate with the related line agencies for seeking necessary technical advice, staff assignment and so on.
- 3) A Project Coordination Committee (PCC) shall be established to coordinate the two PMOs (MPE-PMO and PMO-Zambales) with the concerned LGUs, NGOs and the local

people. The synergistic effects of the strong coordination of the two PMOs for the respective projects are expected by the activities of PCC.

Figure 11.1 shows the proposed institutional chart for the project implementation.



- Notes:**
1. Consultants would support the PCC, WG and all project sub-PMOs.
 2. Lightly shaded boxes indicate agencies, offices, groups or individuals directly responsible for project implementation
 3. Darker boxes indicate the three main implementing bodies: PCC (coordination), MPE-PMO (management of structural components), and Zambales Province W. Pinatubo PMO (management of non-structural components)
 4. It is assumed that local currency funds will be available to implement the Maloma River project alongside the Bucao and Santo Tomas components.

Figure 11.1 Proposed Institutional Chart for the Project

Project Implementation Schedule

Figure 11.2 shows the implementation schedule for the priority projects. The implementation period is set at 10 years. This schedule would be totally unrealistic unless immediate actions are taken for institutional arrangements for implementation and funding. The institutional and funding arrangement should commence within the year 2003, immediately after the completion of this study.

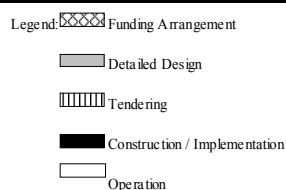
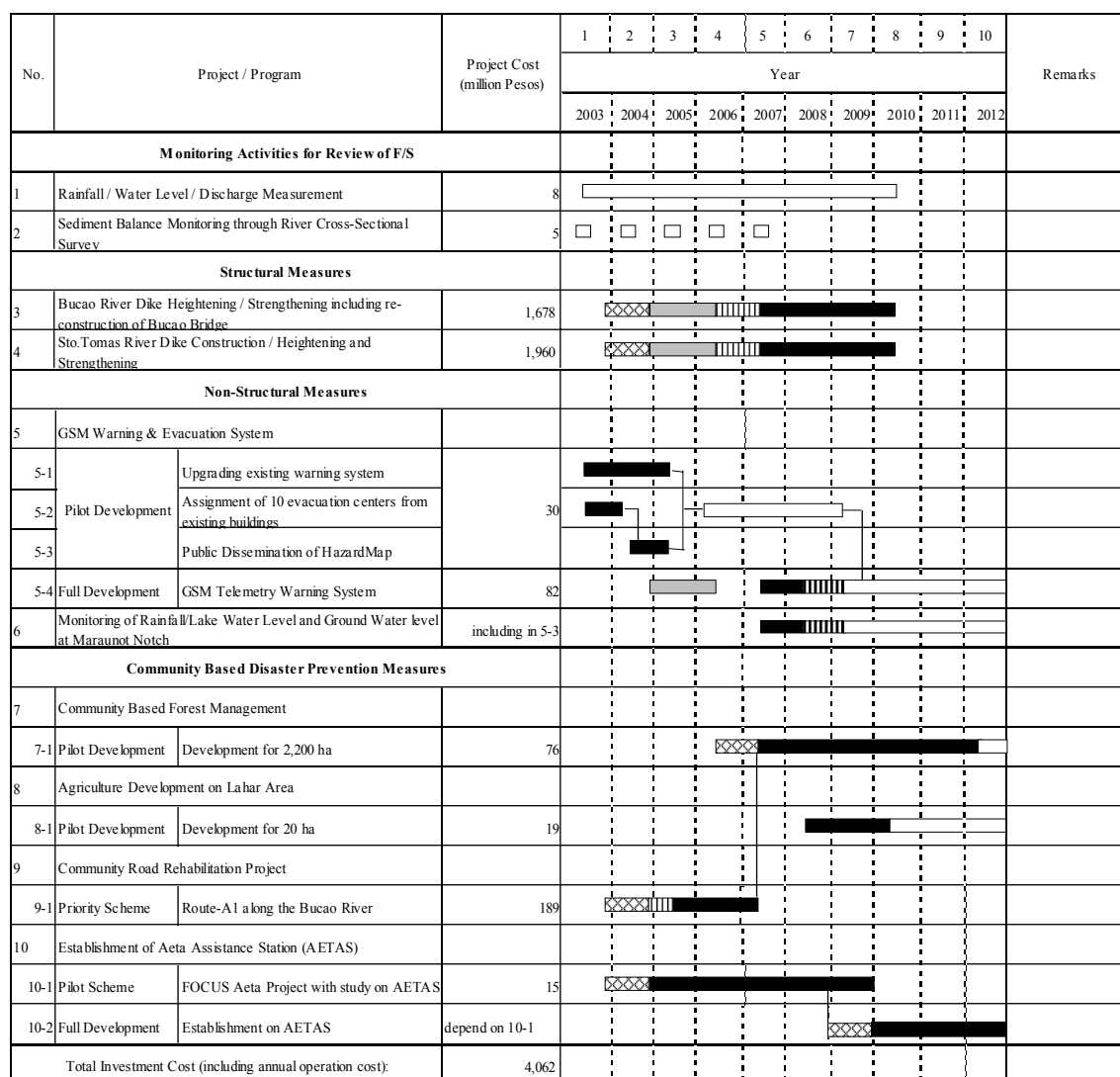


Figure 11.2 Project Implementation Schedule for Priority Projects

12. PROJECT EVALUATION

Environmental Evaluation

Initial Environmental Examination (IEE) for the master plan and Environmental Impact Assessment (EIA) for the feasibility study for the structural measures were carried out in the course of the study. For implementation of the structural measures, the five major issues are listed as the environmental monitoring items. They are 1) soil erosion, 2) air pollution and noise, 3) water contamination, 4) effects on the existing ecological system due to tree cutting, 5) resettlement issues. The environmental management plan is therefore formulated for the project implementation for the above five items.

In the course of the study, the first scoping meeting was conducted on 31 January 2003, and the second scoping meeting was held on 21 May 2003 by DPWH and DENR and the environmental monitoring items identified. DPWH should request to DENR to issue the Environmental Compliance Certificate (ECC) after submission of Environmental Impact Statement (EIS).

It was concluded that no serious environmental issues were identified for implementation of the structural measures except for the resettlement issue, which will be discussed in the following subsection, social evaluation.

On the other hand, community development in the Mapanuepe Lake Basin, which was identified as one of the priority projects under the CDPP measures, is judged as non-feasible in terms of the un-satisfied water quality of the lake owing to the contamination by the upstream mining activities.

Social Evaluation

The priority projects of the structural measures on the Bucao and Sto. Tomas Rivers will require the resettlement of 106 households. The total land acquisition and compensation cost is estimated at 82.8 million pesos. In this study, all the affected families were visited to determine their requirements for resettlement activities. The results were as follows:

Table 12.1 Required Mode of Resettlement and Compensation

No.	Mode of Resettlement / Compensation	% of affected families
1	Cash compensation	22%
2	To provide alternative land	28%
3	To provide alternative houses	29%
4	To resettle the existing resettlement centers	19%
5	Others	2%
	Total	100%

Along with the requirement of the affected people, the study team conducted detailed investigation of the resettlement areas with the cooperation of Botolan and San Marcelino municipalities, and listed three alternative resettlement areas. Further investigation and continuous discussion with the affected people are essential to realize the resettlement activities, which should be taken under the initiatives of the LGUs.

On the other hand, the integration of the NGOs resettlement centers in Tektek RC and improvement of community infrastructure, which was identified as a priority project under the CDPP measures, is concluded non-feasible because of social aspects. Most of the target people in the three NGOs resettlement centers opposed to the idea of integration. Therefore, consulting with the people in the NGOs resettlement centers should be continued by the initiative of the LGUs to find the best way to improve the living conditions of the NGOs resettlement centers.

Economic Evaluation

The results of economic evaluation for the priority projects are summarized as follows:

Table 12.2 Results of Economic Evaluation for Priority Projects

No.	Project Name	Project Cost	Annual Benefit	EIRR	Comments
		million pesos	million pesos/yr	%	
	Structural measures	3,638			
1	Bucao River dike improvement and bridge reconstruction	1,678	283.7	15.7	Possible for stage-wise development (1 st for bridge, and 2 nd for dike)
2	Sto.Tomas dike improvement	1,960	668.5	26.3	Possible for stage-wise development (1 st for middle reach, and 2 nd for the downstream reach)
	Non-structural and CDPP	381			
3	Mudflow warning and evacuation system	82	-	-	For security of human life, which is not countable in monetary terms
4	Improvement of Tektok Resettlement Centers	-	-	-	Non-feasible from social viewpoint
5	CBFM-pilot project	76	35	21.5	2,200 ha for pilot scheme
6	Agriculture development on Lahar area –pilot project	19	2.6	9.8	20 ha for pilot scheme, Low EIRR, however, highly required from social viewpoint
7	Community development on Mapanuepe Lake basin	-	-	-	Non-feasible from environmental viewpoints
8	Community road rehabilitation on upper Bucao River basin	189	8.35	2.1	Low EIRR, however, highly required from environmental and social viewpoints
9	Aeta Assistance Station –pilot project	15	-	-	For preservation of tradition and culture of Aeta tribe, this is not suitable for economic evaluation.
	Overall Projects	4,019		20.0	

Among the nine priority projects, No.4: Improvement of Tektok Resettlement Center, and No.7: Community development on Mapanuepe Lake basin, are concluded as not feasible from social and environmental viewpoints. The other seven projects are concluded as feasible for implementation from comprehensive viewpoints. It is generally observed that the structural measures are basically evaluated through economic evaluation as the investment cost is quite expensive and the regional economic impacts by implementation of the project are quite important. For the non-structural and CDPP measures, economic viability should not be the only criterion for judgment but the social impact should also be assessed.

In this study, it is strongly recommended that the project evaluation should be conducted as an overall project including all the priority projects and should not be evaluated separately because a basin-wide comprehensive approach should be taken for further disaster prevention, recovery of the damaged communities, and regional development. The importance of basin-wide development should be recognized through overall approach for plan formulation, evaluation and implementation. The both aspects of 1) upstream vs. downstream, 2) structural prevention measures vs. non-structural management measures, and 3) economic growth vs. poverty reduction, should be taken into account for the project evaluation.

Based on the economic evaluation of the overall projects, the EIRR is estimated at 20.0%, which is much higher than the development criteria set by NEDA in the Philippines. In addition, the total project cost for the non-structural and CDPP measures is only 10% of that for the structural measures, so that there is a possibility to implement the non-structural and CDPP in combination with the structural measures.

13. CONCLUSION AND RECOMMENDATIONS

It is concluded that the following seven projects are feasible among the nine selected priority projects from an overall viewpoint.

Table 13.1 Results of the Project Evaluation and Recommendations

No.	Project	Economy	Financial	Natural Environment	Social Environment	Recommendations
1	Bucao, Structural measures	○	○	△	○	To implement
2	Sto.Tomas Structural measures	○	○	△	○	To implement
3	Warning and Evacuation system	N.A.	○	△	○	Stage-wise development
4	Integration of NGOs RC in Tektok RC	N.A.	N.A.	○	×	Need to continue discussion with people by LGUs
5	Community based forest management	○	○	◎	◎	To implement pilot scheme
6	Agriculture development on lahar area	△	○	△	◎	To implement pilot scheme
7	Community development on Mapanuepe Lake Basin	N.A.	N.A.	×	◎	Need to continue the monitoring of water quality
8	Community road rehabilitation	△	△	○	◎	To implement Route A1
9	Aeta Assistance Station	N.A.	N.A.	◎	◎	To implement pilot scheme by NGO

Evaluation : ◎highly effective、○effective、△not so effective、×problematic

The seven projects which are judged as feasible from all viewpoints are recommended to be implemented according to the implementation schedule presented in Chapter 11. For the structural measures, the detailed design should be conducted prior to implementation. Continuous monitoring activities for hydrology and sediment balance is quite important to review the feasibility of the design at the detailed design stage, by which more accurate and economic design can be realized.

It is also recommended that DPWH shall apply for the required certificates for project implementation such as ECC from DENR, a resolution of Regional Development Council (RDC) and Investment Coordination Committee (ICC) clearance from NEDA. Moreover, the agreement for the project implementation for all concerned municipalities should be taken by DPWH as well as the province of Zambales.

For the resettlement activities, the concerned LGUs would be the most appropriate to act as leading body for the implementation because they are the most beneficial by the project and they are responsible for the security of the affected residents in the municipality. Moreover, some measures to restrict legally the settlement in the affected area should be made by LGUs as soon as possible. As experienced in the course of the study, the number of affected family increases day by day if no proper zoning regulation for the further development is made. Earlier land acquisition by the government is another way to restrict further settlement in the affected area. Without legal arrangement for settlement control in the project affected area, it would be rather difficult to restrict settlement in the affected area by the concerned LGUs. Memorandum of Agreements (MOAs) among concerned government agencies and LGUs should be secured to ensure the above activities.

For the institutional arrangements for project implementation, PMO-Zambales shall be established by the Province of Zambales as soon as possible for commencement of the financial arrangement. Also the Project Coordination Committee shall be established prior to project implementation.