

5.7 Dinanggasan River Basin

5.7.1 Basin Conditions

(1) Natural Conditions

1) Existing River System and Structures

Dinanggasan River originates from the slopes of Hibok-Hibok volcano and drains towards Macajalar Bay of Mindanao Sea. The closest river is the Compol River to the east, however, is almost buried. The Dinanggasan River Basin has a catchment area of around 29 km², and is composed mainly of two rivers; Dinanggasan River with a length of about 9.3 km, and Tag-Ibo River with a length of about 3.8 km. The existing river system is shown in Table 5.108.

Table 5.108 Rivers in the Dinanggasan River Basin

River	Catchment Area (km ²)	Length (m)	Remarks
Dinanggasan	29.0	9,300*	*Excluding Tributary
Tag-Ibo	2.9	3,800	Tributary

Dinanggasan River is typical torrential stream. The gradient of the mainstream is summarized as shown in Table 5.109. Sediment size of the riverbed is very large in general.

Table 5.109 River Gradient of Dinanggasan River

Reach	Slope
0 – 2.5 km	1/30
2.5 – 7.8 km	1/20
7.8 – 9.3 km	1/7

The major river structures relating to flood control are, as follows:

- Boulder dike with rubble concrete surface stretching 650 m around the river mouth on the left side of Dinanggasan River; and
- Boulder dike with rubble concrete surface stretching 80 m around the river mouth on the right side of Dinanggasan River.

Figure 5.45 shows topographic map of the basin.

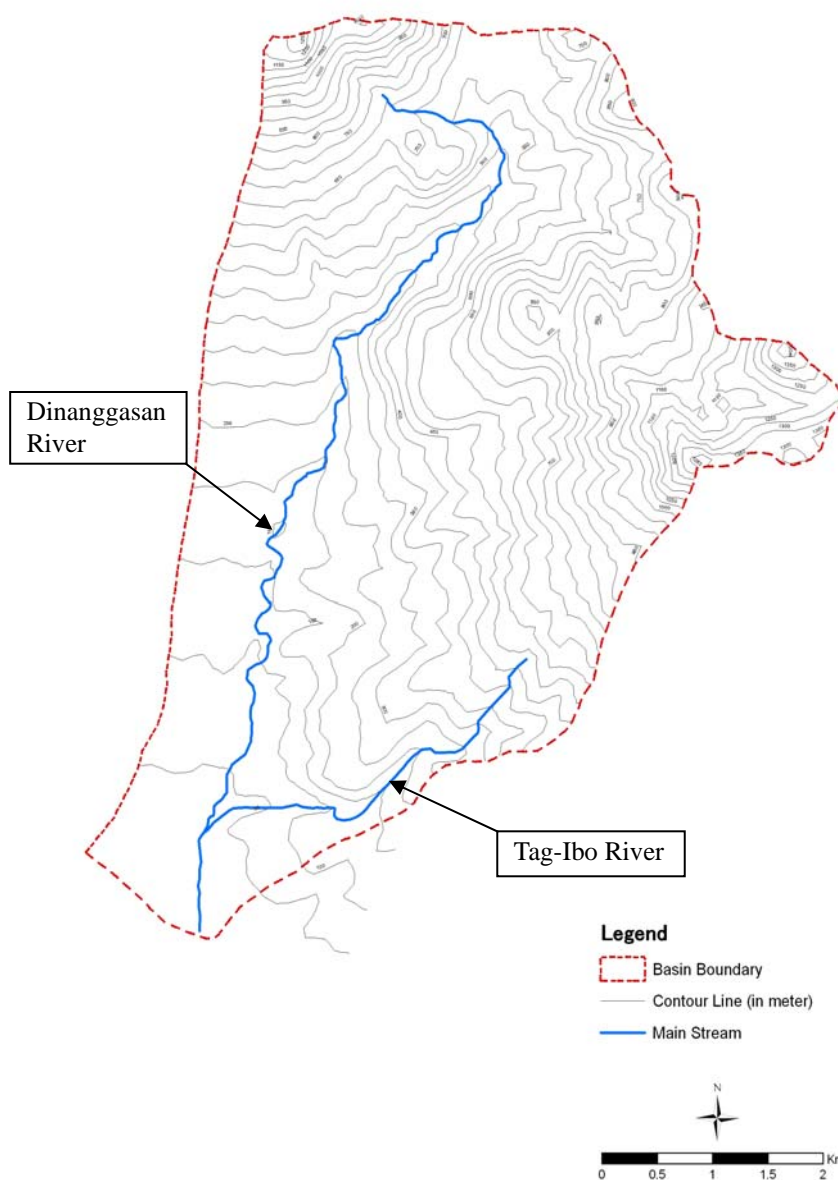


Figure 5.45 Topographic Map of the Dinanggasan River Basin

2) Meteorology and Hydrology

The Catarman Municipality, that covers almost all of the Dinanggasan River Basin, falls under the Type II of the Corona climate classification. This climate type is characterized by a very pronounced rainy period during the months of December to February and the absence of a definite dry season.

There is only one rainfall station located in Camiguin Island, and this station is operated by the PHIVOLCS. The daily rainfall data has been collected since 1990.

(2) Social and Economic Conditions

1) Population and its Growth

The total population of the Catarman Municipality based on the 2000 NSO Census is 15,386, an increase of 864 individuals from the 1995 NSO Census. The average annual growth rate from 1995 to 2000 is 1.21%. It is noteworthy that there is a steady and modest increase in population from 1980 to 2000. Based on the Municipality CLUP, the population by 2008 is projected to reach 17,099.

2) Land Use

The total land area of the Catarman Municipality is about 5,690 ha. The dominant land use in the Municipality can be categorized into built-up areas, agro-industrial area, forestland, grassland and other uses, such as quarry and tourist areas, as follows:

a) Built-up Areas

Urban built-up area is 44.33 ha, while the aggregate total of other barangays is 202.90 ha.

b) Agri-industrial areas

Agri-industrial area is generally coconut plantation with inter crops of lanzones, mango, cultivated crops and other fruit trees. This covers 3,818.62 ha or roughly 71.04 % of the total area of the Municipality.

c) Grassland

The grassland area of 412.83 ha is generally located in the slopes of Mt. Catarman and Mt. Vulcan, while 186.50 ha are located within the alienable and disposable (A & D) classification.

d) Forestland

Forestland is mostly secondary growth forest. Forestland still covers 888.80 ha. Total open canopy forest covers 745 ha, while close canopy forest covers 143.80 ha.

e) Quarry

Quarry sites for sand and gravel locate in two rivers and are used as tourist spots. These are small areas but they have impact on the economy of the Municipality.

f) Other Uses

Rice land covers 29 ha mostly found in Barangay Mainit and Liloan.

Figure 5.46 shows the land use of the basin (2002/03) and Table 5.110 shows the specific details of the land use.

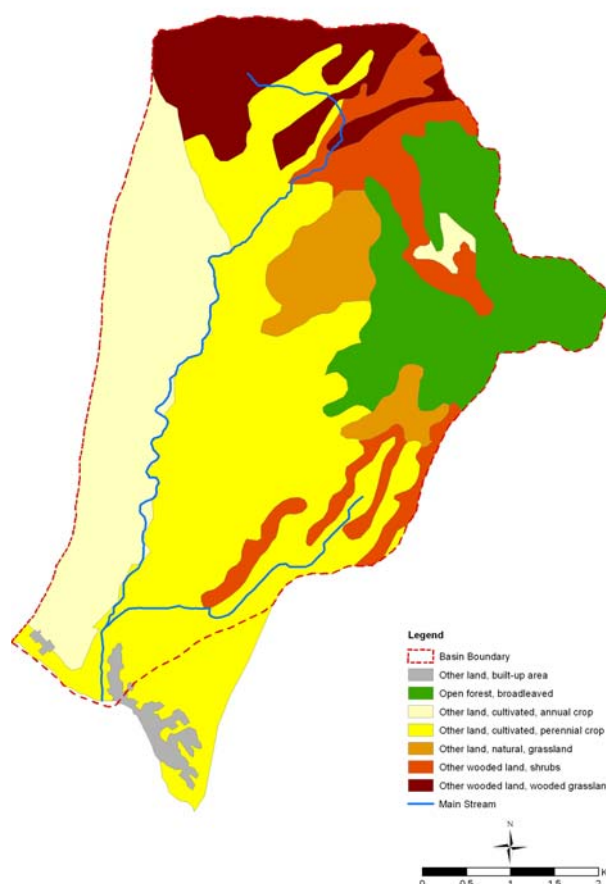


Figure 5.46 Land Use in the Dinanggasan River Basin

Table 5.110 Share of Land Use in the Dinanggasan River Basin

Land Use	Land Area (km ²)	Percent of Total (%)
Open Land, Built-up	0.1	0.4
Other Land, Cultivated, Annual Crop	6.0	20.5
Other Land, Cultivated, Perennial Crop	10.6	36.2
Other Land, Natural, Grassland	1.8	6.2
Other Wooded Land, Wooded Grassland	3.0	10.1
Other Wooded Land, Shrubs	3.0	10.2
Open Forest, Broadleaved	4.8	16.4
Total	29.3	100.0

3) Local Economy

a) Agriculture

Coconut is the dominant crop planted in the Catarman Municipality covering 5,355 ha. Inside this area, lanzones, banana, root crops, vegetables and other fruit trees are planted as inter-crop. Within this multi-storey cropping, the coconut and lanzones area covers 107 ha; coconut and banana area covers 119 ha; coconut and mango covers 143 ha; coconut and

corn area covers 261 ha; coconut and root crops/vegetables covers 91 hectares; and the remaining area of 4,605 ha is dominantly planted with coconuts.

Having a shoreline of 16.35 kilometers, this municipal water is the richest fishing ground in terms of pelagic fisheries.

b) Commerce and Trade

The Central Business District in the Catarman Municipality is host to major business establishments, banking and financial institutions, and convention and conference centers.

The business establishments in the Municipality are mostly general merchandise stores, small town drugstores, banks, restaurants and fuel stations.

c) Industry

The Catarman Municipality has a couple of industries, such as wood appliance industries, bamboo craft industries and “nito” industries. These products are mainly sold locally.

Dinanggasan River has been declared as the only quarry area in the province. The extracted volume serves the requirement for the concreting of road pavements and low stress infrastructures.

(3) Floods and Flood Damage

1) Floods and Flood Damage

The Dinanggasan River Basin experienced severe floods on November 2001 when the tropical typhoon “Nanang” passed northern Mindanao through the islands of Cebu and Panay. A total of 166 persons died, 84 missing and 146 injured in the whole Camiguin Island due to Typhoon Nanang.

Regarding to the casualties of the Dinanggasan River Basin under Typhoon Nanang, the DPWH regional officer said that the flood had killed three (3) persons and damaged almost the entire portion of the rubble concrete on the surface of the existing dike. The damage was evaluated at 11 million pesos. The major flood type of this river basin is debris flows and flash flood.

2) Major Causes of Floods

The basin is generally underlain by volcanic rocks, and covered by the pyroclastic sedimentation and large rocks. Especially, large volcanic rocks are observed in the upstream area with steep slope. Under these river conditions, heavy rainfall and consequent rapid runoff resulted in debris flows.

(4) Previous Related Study

Disaster caused by Typhoon Nanang pushed forward the “Basic Study on Disaster Prevention and Reconstruction Project for Camiguin Island, Mindanao, Philippines, December 2003, JICA”. The purposes of this study were to (1) analyze and evaluate the present flooding characteristics

and sediment conditions of Camiguin Island, (2) formulate a basic plan for disaster prevention and reconstruction; and (3) prepare an action plan for urgent undertaking.

Based on this analysis, the characteristics of the basin are, as follows:

- Population in the Basin: 2,241 persons which is the largest population among the 28 river basins in Camiguin Island;
- Population in Dangerous Area: 124 persons which is the 10th largest population among the river basins in Camiguin Island; and
- Volume of Specific Movable Sediment: 48,082 m³/km² which is the 5th largest among the river basins in Camiguin Island.

The Dinanggasan River Basin was not included in the action plan.

5.7.2 Hydrologic Analysis

(1) Specific Discharge Formula

The design discharge of the Dinanggasan River Basin is computed with the following Specific Discharge Formula. Furthermore, since this river is a debris flow stream, the design discharge is increased by 1.5 times.

$$q = c \cdot A^{(A^{-0.048}-1)}$$

Where, q = specific discharge (m³/s/km²)

c = constant (11.29, decided by region and return period)

A = catchment area (km²)

(2) Design Discharge Distribution

Distribution of design discharge for 20-year return period is shown in Figure 5.47.

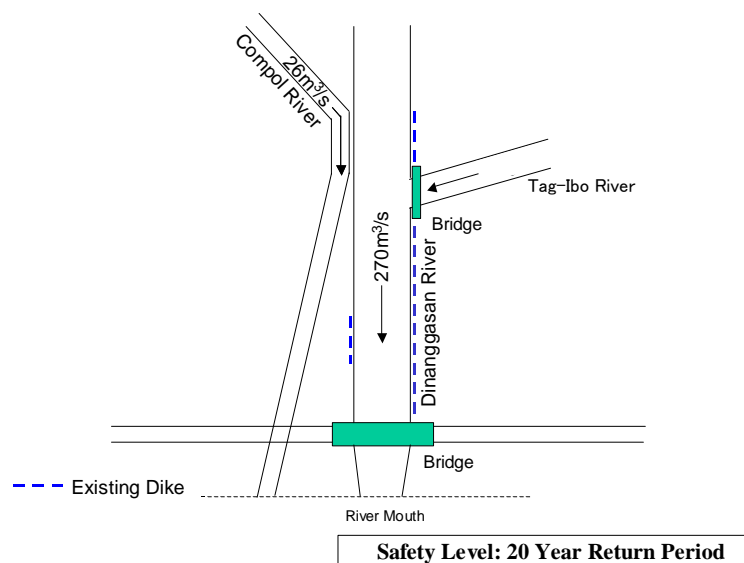


Figure 5.47 Design Discharge Distribution in the Dinanggasan River Basin

5.7.3 Flood Inundation Analysis

(1) Flow Capacity

The flow capacity of the existing river channel is analyzed with HEC-RAS using the river cross sections newly obtained in the survey. The flow capacity is estimated as shown below.

Table 5.111 Flow Capacity of Existing River Channel in the Dinanggasan River Basin

Location of Calculation	Flow Capacity (m ³ /sec)
Dinanggasan River (Upstream Portion)	180

(2) Flood Inundation Area

The upper stream from 500m from the river mouth is the debris flow section with the riverbed gradient of 1/30 or more. Based on these characteristics, it is considered that the flood damage is mainly caused by sand and rock with water. Therefore, the damage area is estimated based on the potential area of debris flows shown in the previous Basic Study in due consideration of the topography and river conditions. The flood inundation area is preliminary estimated at Compol area in the right bank and Catarman area in the left bank, as shown in Figure 5.48. The total inundation area is estimated at around 147 ha as shown below.

Table 5.112 Area of Flood Inundation of the Dinanggasan River Basin

Land Use	Inundation Area (Unit: ha)
Built-up area	6.0
Fishpond	0.0
Cultivated, Annual Crop	91.5
Other	49.3
Total	146.8

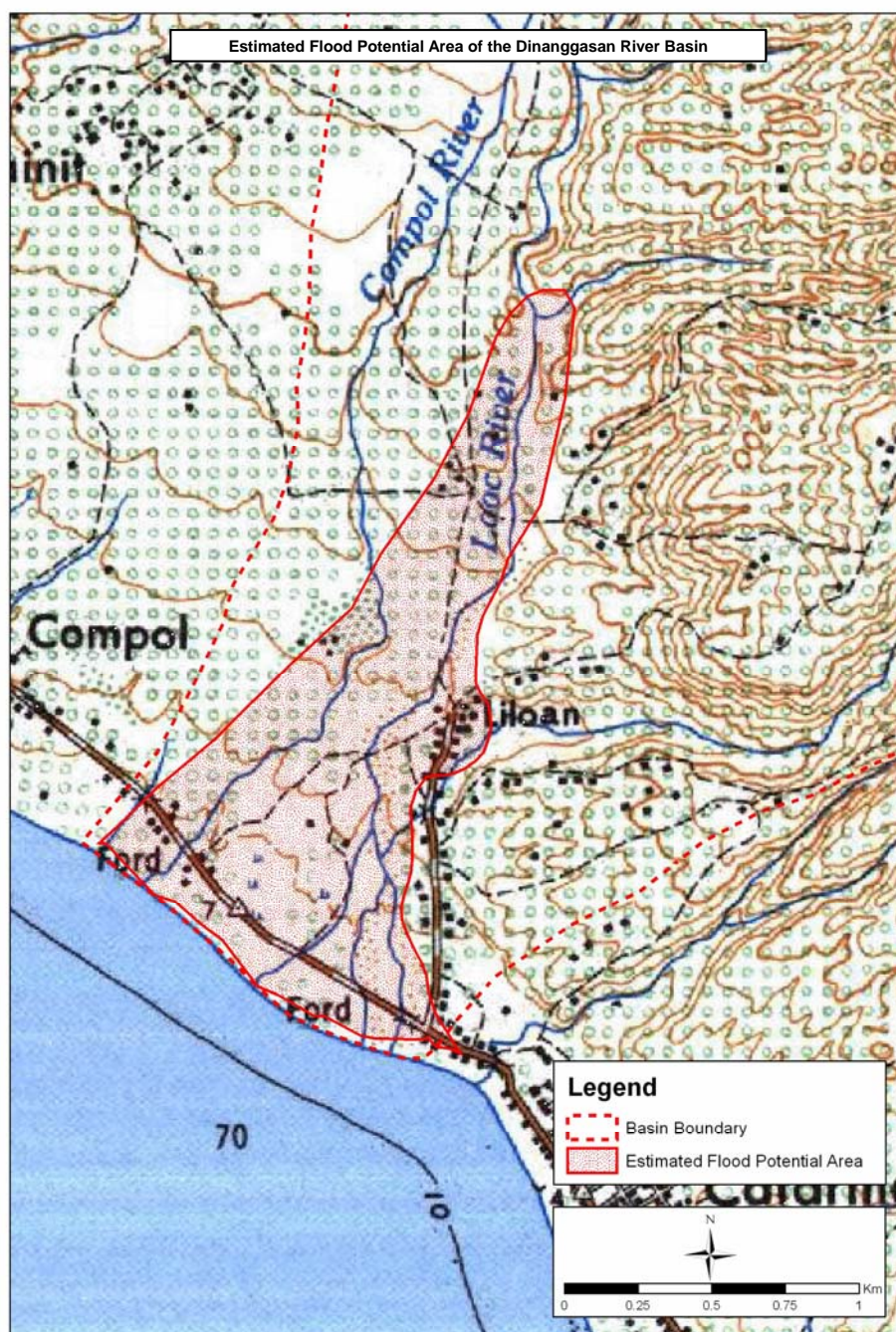


Figure 5.48 Flood Inundation Area of the Dinanggasan River Basin

5.7.4 Basic Layout of Main Structural Measures

(1) Applicable Structural Measures

The flood type of the Dinanggasan River Basin is F+O+B+I+L (Group 6). Comparing with the flood type of this basin, the following structural measures are considered as the applicable ones:

Table 5.113 Basic Applicable Structural Measures for Flood Type in the Dinanggasan River Basin

Flood Type	Applicable Measures				
	River Channel Improvement	Dam and Reservoir and/or Sabo Dam	Retarding Basin	Diversion Channel	Drainage Facilities
Flash Flow (F)	O	O			
Over Flow (O)	O	O	O	O	O
Bank Erosion (B)	O				
Inland Flooding (I)	O				O
Lahar / Debris Flow (L)	O	O			

Judging from the river basin conditions, retarding basin, diversion channel and drainage facilities are not applicable to the basin considering the topographic and land use conditions. Hence, applicable measures are river channel improvement and sabo facilities as described below.

1) River Channel Improvement

River channel improvement for Dinanggasan River is applicable to confine and carry the design discharge. For this river channel improvement, alignment of the existing dikes is adopted in principle.

2) Sabo Dam and Sand Pocket

Observing the riverbed gradient, river width and riverbed materials and other conditions along Dinanggasan River, sabo dam and sand pocket sites were preliminarily selected at around 5 km and 2.5 km upstream from the river mouth, respectively.

Based on the study above mentioned, the following structural measures are recommended as the applicable structural measures for the basin:

Table 5.114 Applicable Structural Measures in the Dinanggasan River Basin

Flood Type	Applicable Measures				
	River Channel Improvement	Sabo Facilities	Retarding Basin	Diversion Channel	Drainage Facilities
F+O+B+I+L	O	O			

(2) Basic Idea of Layout

1) Relationship with the Compol River

The Compol River lies in the right bank of Dinanggasan River. The shortest distance between the both rivers is around 300m. Based on the field survey, the overflow from Dinanggasan River to Compol River has been observed during Typhoon Nanang at around 1.5 – 2 km from the river mouth. On the other hand, there was a information that the floods from the upper stream of the Compol River flow into Dinanggasan River. Therefore, the flood mitigation of Dinanggasan River only will not solve the flood problems in this basin. Hence, in this Study, the both river basins are studied for the formulation of the plan. However, due to the period of

this Study, the available data and information are limited, therefore, further investigations are necessary.

2) Target Area of Flood Mitigation

Based on the idea above mentioned, the target area of flood mitigation is a potential flood area of the rivers. Based on the results of the previous Basic Study, the target area has been set at 0 – 2.5 km. In this target area, the following damageable assets are located:

- Built-up areas of Catarman and Compol;
- Houses located around the river mouth and the confluence with Tag-Ibo River; and
- Annual crop area.

3) Sabo Facilities

In many cases, flash floods and/or debris flows cause severe damages including loss of human lives although its damage area is limited.

Based on the previous Basic Study, the debris flows in this area are classified into two types, one is debris flow with mainly boulder in the upstreams and the other is with mainly sand and gravel in the lower stream. The sabo facilities are planned against the boulders flown in debris flow in the upstream.

The effects of sabo facilities are to reduce risks for:

- Sediment disaster due to debris flows;
- Flooding caused by severe aggradation of river bed due to heavy and sudden sediment load; and
- Flooding caused by backwater at structures such as bridges due to clogging of woody debris, etc.

In the previous Basic Study in 2003, the specific movable sediment in the Dinanggasan River Basin was estimated at 48,082 m³/km². In principle, it is desirable to construct necessary sabo works, which total capacity is corresponding to the total sediment discharges, in order to eradicate the sediment disasters. For this achievement, it is required to construct a number of sabo facilities, and it will cost considerably.

In this regard, one sabo dam and one sand pocket are preliminary proposed in this plan. The main purpose of these sabo facilities is to catch the front of debris flow, the most dangerous portion of debris flow, in order to weaken its destructive power.

Actually in this Study, estimation of benefit does not include intangible damages such as casualties because of difficulty of counting value of human lives. This is another aspect of planning the minimum size of sabo facilities. However, in the further studies, the number of sabo facilities will be increased so as to make the plan more safety, if this will be judged to be necessary from the viewpoint of the stability of communities and others. On the other hand, it is also important to improve the accuracy of planning by the monitoring of sediment discharges and others.

4) River Channel Improvement

Around the downstream of the confluence with Tag-Ibo River, the main component of sediments in debris flows is sand and gravel. Under this condition, as mentioned before, the boulder dikes with rubble concrete surface were constructed in this downstream in order to protect built-up and agricultural areas. Based on the field survey, these dikes are judged to be well functioned against debris flows here. Therefore, river channel improvement with the same dike type is planned for the remaining portion (other than the existing dike portion) in order to mitigate the risks of flooding caused by the debris and flash flows.

5) Treatment of the Compol River

There are two alternatives regarding to the treatment of the Compol River, as follows:

a) Connecting Compol River to Dinanggasan River

The river channel improvement is proposed to confine and carry the design discharge flows of Dinanggasan River and Compol River.

b) Separating Compol River from Dinanggasan River

The river channel improvement is proposed to confine and carry the design discharge flows of Dinanggasan River only. For this treatment, training dike and a channel are planned in order to separate both rivers. With these measures, the flooding of Compol River will be avoided, which may cause severe damages to the Dinanggasan River Basin.

(3) Possible Alternative Cases

Considering the above idea, two alternative cases are conceivable as shown in Table 5.115 and Figure 5.49.

Table 5.115 Alternative Cases in the Dinanggasan River Basin

Alternative Cases	Basic Layout of Main Structural Measures
Case-1	<ul style="list-style-type: none"> • River channel improvement in the lower reach of Dinanggasan River • Training dike guiding the flow of Compol River into Dinanggasan River • A sand pocket and a sabo dam in the middle reach of Dinanggasan River
Case-2	<ul style="list-style-type: none"> • River channel improvement in the lower reach of Dinanggasan River • Training dike avoiding the over flow from Dinanggasan River to Compol River • A channel along Compol River to flow down its flood • A sand pocket and a sabo dam in the middle reach of Dinanggasan River

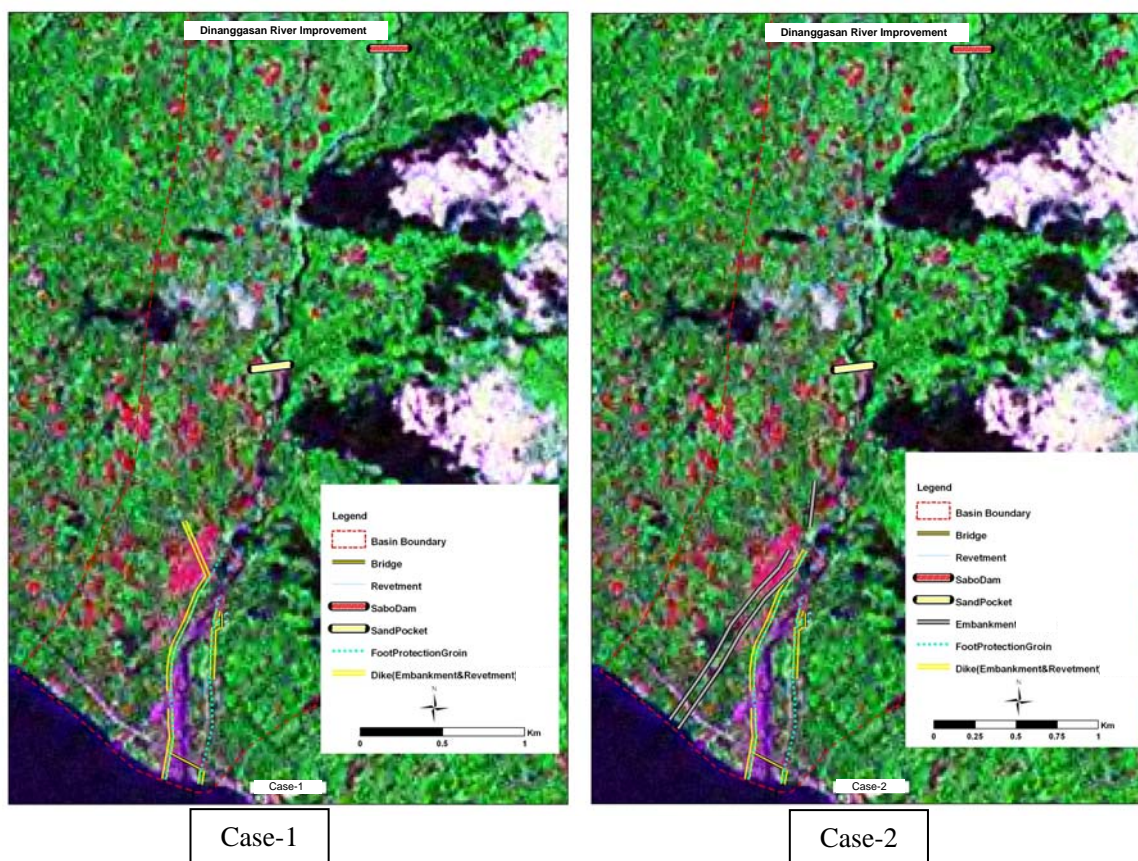


Figure 5.49 Comparison of Alternative Cases in the Dinanggagan River Basin

(4) Recommended Structural Measures

1) Optimum Case

The cost for each alternative case is roughly estimated as shown in Table 5.116. Based on the estimation results, the difference in the costs is very small. However, because of the economical advantage, Case-1 is preliminarily recommended as the main structural measures for the time being. It is recommended that the selection of the optimum case and the specifications of the structural measures should be reviewed in the further study.

Table 5.116 Result of Cost Comparison for Alternative Cases in the Dinanggagan River Basin

Alternative Cases	Cost (mil. Pesos)
Case-1	147.5
Case-2	149.8

Based on the above, the main structural measures are proposed as shown in Table 5.117. Figure 5.50 shows the design discharge distribution with the proposed structural measures.

Table 5.117 Major Work Items in the Dinanggasan River Basin

	Components	Work Item	Quantity
1	Dinanggasan River Improvement	Dike, Foot Protection, Excavation, Training Dike	Around 1.6 km
2	Sabo Dam	Impermeable Type Dam	1 no.
3	Sand Pocket	Impermeable Type Dam	1 no.
4	Re-Construction of Bridge	Concrete Bridge	1 no.

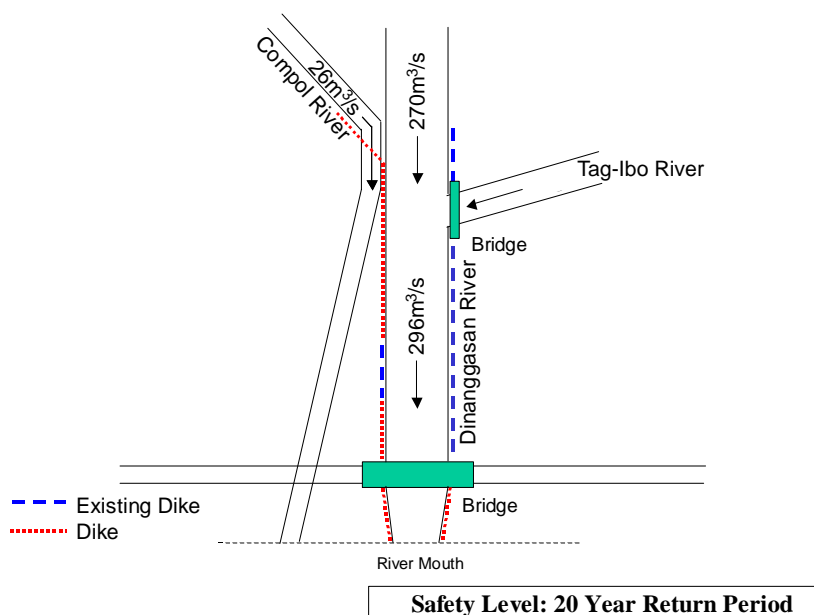


Figure 5.50 Design Discharge Distribution with Optimum Structural Measures in the Dinanggasan River Basin

2) Preliminary Design of Main Structural Measures

The preliminary design of the river channel improvement and sabo facilities are presented below.

a) River Channel Improvement

The improvement works will be required for the following rivers in order to attain the flood mitigation against the project scale of 20-year return period.

Table 5.118 Subjective Rivers for Improvement in the Dinanggasan River Basin

No.	River	Remarks
1	Dinanggasan River	Main Stream
2	Tag-Ibo River	Confluence part and Re-construction of Bridge

The length and section for the improvement are tabulated in Table 5.119. On the other hand, longitudinal profile and typical cross sections of the improvement are shown in Fig.5-9.

Table 5.119 Improvement Plan of Dinanggasan River

Stretch	Station Number		Design Discharge (m ³ /s)	Length (km)	Width (m)
	From	To			
1	0	0.12	296	0.12	215
2	0.12	0.53	296	0.41	260
3	0.53	0.88	296	0.35	215
4	0.88	1.40	296	0.52	80
Total				1.40*	

*: In addition to the above, training dike of 0.2km is planned for the right bank.

b) Sand Pocket and Sabo dam

The salient features of the planned sabo dam and sand pocket are shown below.

Table 5.120 Salient Features of the Planned Sabo Structures

Dimension	Sabo Dam	Sand Pocket
Dam Type	Impermeable Type Dam	
Storage Capacity (Thousand m ³)	19.1	6.4
Dam Height (m)	8.0	5.5
Dam Length (m)	72.5	30.0

Based on the above design, the basic layout of the main structure is presented in Figure 5.51.

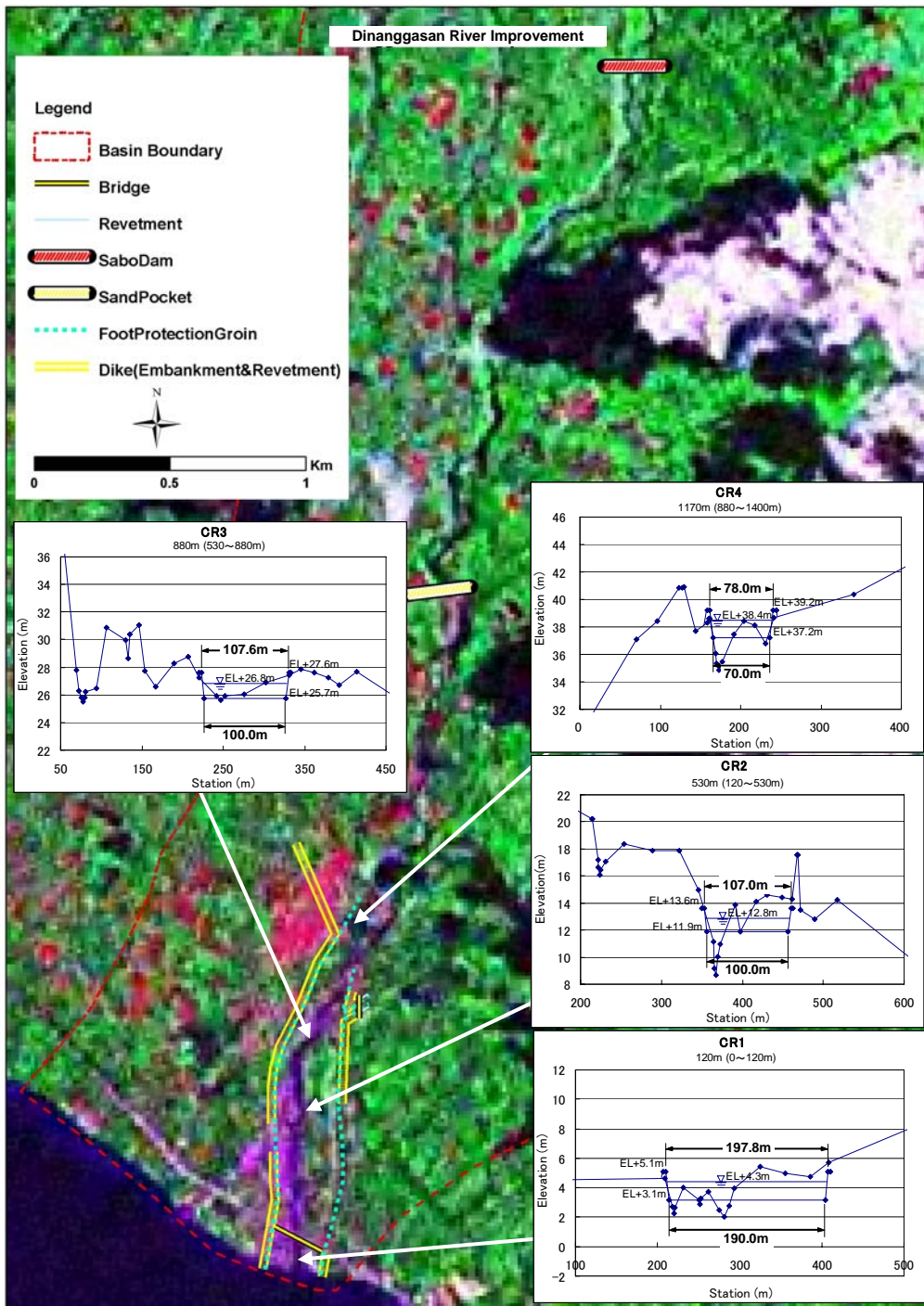


Figure 5.51 Proposed Works of the Optimum Plan of the Dinanggasan River Basin

(5) Estimation of Cost for Structural Measures

1) Construction Cost of Structural Measures

The construction cost of the recommended structural measures is estimated at 98.0 million pesos as shown below.

Table 5.121 Main Construction Cost for Structural Measures of the Dinanggasan River Basin

No.	Work Item	Unit	Quantity	Unit Cost	Amount (thousand Pesos)
1	Channel Excavation	m ³	134,309	150	20,146
2	Embankment	m ³	6,071	130	789
3	Revetment	m ²	16,455	1,100	18,101
4	Concrete	m ³	5,913	6,000	35,478
5	Gabion	m ³	3,300	3,200	10,560
6	Bridge	m ²	210	40,000	8,400
7	Road (10m x 500m)	m ²	5,000	900	4,500
	Total				97,974

Note: River Improvement 55.8 mil. Pesos, Sabo dam 33.0 mil. Pesos, Sand Pocket 9.2 mil. Pesos.

2) Project Cost of Structural Measures

The project cost of the recommended structural measures is estimated at 147.5 million pesos as shown below.

Table 5.122 Project Cost for Structural Measures of the Dinanggasan River Basin

No.	Description	Amount (thousand Pesos)
1.	Construction Cost	112,670
(1)	Preparatory Work	14,696
(2)	Main Construction Cost	97,974
2.	Administration Cost	3,380
3.	Engineering Services	18,027
4.	Compensation Cost	Negligible
5.	Physical Contingency	13,408
	Total	147,485

3) Economic Cost

The economic project cost is estimated as shown below.

Table 5.123 Financial and Economic Costs of the Project of the Dinanggasan River Basin

	Financial (mil. Pesos)	Economic (mil. Pesos)
Project Cost	147.5	107.7

(6) Estimation of Benefit of Structural Measures

1) Estimation of Flood Damage

The damageable asset value is preliminarily estimated assuming the number of houses and area of crop, which are damaged by the debris flow.

The total number of the houses in Compol is 266 by Census data. Based on this, the number of houses affected by the debris flow under the project scale is obtained with a couple of assumptions, as follows:

- 50% of those houses are located in built-up, which area is 14.3 ha.;
- Out of 14.3 ha, assuming 6.0 ha is damaged by the debris flow, by which 56 houses are damaged; and

- Damageable value of the house is 313.2 thousand pesos/house (economic term) based on the Second Screening.

On the other hand, the area of damaged crop area is estimated at 91.5 ha based on the results of the inundation analysis.

2) Estimation of Flood Damage

The flood damage is estimated considering with and without project conditions as shown below.

Table 5.124 Flood Damage in the Dinanggasan River Basin

Item	Damaged Houses (nos.) /Area Inundated (ha)	Assets Inundated (mil. Pesos)	Flood Damage (mil. Pesos)
I. Direct Damage			25.8
Built-up Area	56 houses	17.5	17.5
Annual Crop	91.5	0.9	0.9
Infrastructure			7.4
II. Indirect Damage			5.2
III. Total			31.0

3) Annual Average Benefit

Based on the estimated flood damage, the annual average benefit under present condition is computed at 11.8 million pesos. The future benefit is shown in Tab.5-11.

5.7.5 Non-Structural Measures

(1) General

Non-structural measures are examined on the basis of filed survey and preliminary studies on flood warning system and soil loss related to reforestation. The methodology and detailed results of the study are described in Supporting Report H. It should be reminded that the Study is preliminary level because of limited time frame and resources. The Study concentrated to discuss general direction of flood mitigation using currently available information. Further detailed study toward implementation of flood mitigation measures is recommended at the next stage such as feasibility study. The recommended non-structural measures at this stage are summarized below.

(2) Recommendation on Non-Structural Measures

1) Recommended Flood Warning System

Community Based Flood Early Warning System (CBFEWS), which PAGASA is now introducing, is recommended. Almost same scheme as the PAGASAs system can be applied into the Dinanggasan River Basin. Because time of concentration of flood wave is very small (less than an hour), it is very difficult to get benefit by reduction of tangible damage by introducing the flood warning system. Disaster management should consider more on

“response” including information dissemination and evacuation than “forecast” in order to reduce causality when the flood warning system is introduced.

After initial introduction of the warning system, it is recommended to refine the system every 3 years using the accumulated data and knowledge. Equipment introduced should also be checked at the same time.

2) Recommendation on Baseline Activities on Watershed Management

Watershed management includes many aspects than flood mitigation. In the present Study, it is recommended that at least minimum necessary activities related to flood mitigation be implemented as baseline activities on watershed management. The following activities are recommended.

- To revise watershed characterization and watershed management plan periodically
 - Watershed Management Plan for the Dinanggasan River Basin has already been prepared. The watershed characterization and watershed management plan should be reviewed and revised every 5 years to reflect the watershed situation properly.
- Reforestation with at least same rate as current national average
 - In order to keep at least current condition of watershed so that sediment load from catchment will not increase drastically in future, reforestation should be continued with at least same rate as current national average, e.g. reforestation of grass land (Total area in 26 years = 5.7% of land without forest in the basin).
- Supporting of River Basin Council
 - To enhance more communication within a basin, it is recommended to prepare budget to support activities of river basin council.

3) Recommendation on Other Measures

Issues and recommendations for further improvement for disaster management activity for the Dinanggasan River Basin based on the result of field survey are summarized.

General recommendations are, as follows:

- Enhancement of disaster management activities at community level;
- Necessity of periodical refinement of disaster management plan; and
- Necessity of preparation and dissemination of hazard map for excess flood after completion of structural measures.

Recommended other measures for the Dinanggasan River Basin are, as follows:

- Enhancement of disaster management activities at community level
 - In Dinanggasan river basin, disaster management for flood-related disaster is very active. This seems to be mainly because of the previous JICA study for non-structural measures. The activity should be continued, however, condition of disaster management seems to be different from one barangay to another barangay. For example, Barangay Looc, which was not selected as pilot barangay at the

previous JICA study, feels that their condition is not so good. More support should be provided to such barangay to enhance their condition. BDCC workshop between neighboring BDCCs to exchange of know-how of disaster management and to enhance communication each other is recommended.

- Revision of flood hazard map
 - One important thing, which was pointed out during the meeting with stakeholders, is the necessity of updating hazard map based on the latest flood. Experience of different floods would bring more updated knowledge on flood condition and dangerous area. The updated knowledge on the flood condition should be reflected to the hazard map and it should be disseminated to communities.

(3) Rough Estimation of Cost and Benefit for Reference

As a reference, rough cost estimation is made for the flood warning system and the baseline activity on watershed management.

Cost for flood warning system is roughly estimated as follows. O&M cost for 26 years includes 1) cost for refinement of the system every 3 years and 2) cost for observer.

**Table 5.125 Rough Cost Estimation for Flood Warning System for 26 years
in the Dinanggasan River Basin (2009 to 2034)**

Cost for Initial Setting (mil. Pesos)	Total Cost for O&M for 26 years (mil. Pesos)	Total Cost for 26 years (mil. Pesos)
0.3	1.2	1.5

Cost for recommended baseline activities on watershed management for 26 years (2009 to 2034) is roughly estimated as shown in the following table.

Table 5.126 Rough Cost Estimation for Recommended Baseline Activities on Watershed Management for 26 years in the Dinanggasan River Basin (2009 to 2034)

Cost			
Preparation of Watershed Characterization & Watershed Management Plan (mil. Pesos)	Reforestation (mil. Pesos)	Supporting of River Basin Council (mil. Pesos)	Total Cost (mil. Pesos)
3.00	1.08	2.60	6.68

The breakdown of the estimated costs is shown in Supporting Report H.

Possible benefit by flood forecasting and warning system is preliminary estimated to examine appropriate flood forecasting and warning system in this river basin. Based on it, the above-mentioned flood warning system is recommended. The detail discussion is presented in Supporting Report H.

5.7.6 Initial Environmental Examination

(1) Result of the IEE

The IEE for the structural measures was carried out based on the information and data collected during this Study and consultation with concerned government and stakeholders.

In the Matrix (refer to Tab.5-12), the major environmental resources are shown in the horizontal line, and the activities for implementation of the proposed plan are shown in the vertical line. The assessment of impacts was made in terms of magnitude (e.g., significant, moderate, and negligible) of the negative or positive affecting the environmental elements.

Table 5.127 Activities for Each Project Phase in the Dinanggasan River Basin

Phase	Project Activity
Pre-construction Phase	Resettlement of Project affected Persons/Families
	Land Acquisition
	Project Mobilization
Construction Phase	Reconstruction of Tag-Ibo Bridge and Reconstruction of the New Bridge
	Demolition of Tag-Ibo Bridge and Reconstruction of the New Bridge
	Construction of Concrete Dike and Foot Protection Groin along the Left and Right Bank of Dinanggasan River (Lower Stream)
	Bank Erosion Protection Work (Revetment and Foot Protection) along Tag-Ibo River
	Construction of Sand Pocket
	Excavation of Compol River and Construction of Embankment
	Construction of Additional Embankment at the Upper Reach (right side) of Dinanggasan River
	Construction of Sabo Dam
O & M Phase	Dredging and Excavation
	Watershed Management
	Installation of Flood Warning System

Positive impacts are not considered in the cumulative quantification of the environmental impact score for each alternative since they would not lead to any hindrance in decisions of whether or not to proceed with the project. On the other hand, negative environmental impacts remain critical in so far as decisions in the proper selection of project alternatives.

As the result of the assessment, it is evaluated that the construction of the Sabo facilities, dredging and construction of embankment along Compol River, and the construction of the concrete dike beginning at the river mouth of Dinanggasan River channel are considered to cause the potential adverse impact for this area. The particular evaluations for these impacts are described below (for details, refer to Supporting Report I).

1) Social Environment

a) Resettlement

The resettlement should be one of the most critical social impacts in project identification. The displacement of approximately 18 residential households along Compol River will be affected by the civil (construction) works. The construction of the dike will also disrupt local transport since the river improvement works requires bridge reconstruction – a case of Tag-Ibo Bridge.

Even though the social or human related impacts are reversible in nature, short-term solution must be quickly engage to avoid project delays and economic loss (in case the project is implemented using funds borrowed from lending institutions). This includes the immediate resettlement of PAPs/PAFs (displaced) and the consultation of community/stakeholders that will be directly affected by the disruption in local transport in the area.

b) Reconstruction of Tag-Ibo Bridge

The reconstruction of Tag-Ibo Bridge will no longer need a separate and more detailed environmental impact assessment since the limits prescribed under DAO 2003-30, for the bridge whose length is over or equal to 80m, or whose capacity (length/width) is increased by 50% or more, is not expected to be surpassed. However, it may require traffic impact assessment to properly carve-out a traffic management plan that can address the traffic hazards and negative impact of reconstructing Tag-Ibo Bridge.

2) Natural Environment

a) Removal of plants

Ecological impact may require the removal of vegetation within the riparian environment. Among the vegetation that will be removed and will require the issuance of tree cutting permit from the Philippine Coconut Authority are strips of coconut trees found along the river channels.

b) Construction of the Sabo Dam

With the construction of the Sabo facilities, the composition of the soil and the topography of the immediate vicinity will be altered. However, the operation of the Sabo facilities will contribute to the long-term positive impact of reducing downstream siltation and the decrease in danger to life and property caused by the occurrence of lahar flow.

3) Pollution

a) Disposal of dredge materials and spoils

The extent and magnitude of the proposed activities has a high potential for indiscriminate disposal of dredge materials. If left unmanaged and with the absence of an acceptable disposal site, the dredge materials may end up in vacant lots and agricultural lands resulting to irreversible negative aesthetic impacts. Hence, it is a primordial concern to identify,

procure and prepare the land for ultimate disposal prior to the start of the construction works.

b) Increase in turbidity

Increase in turbidity along Dinanggasan River will occur alongside the proposed dredging activities. On the other hand, turbidity may not be an issue in the case of constructing the embankment along Compol River since the whole stretch of the river is mostly dried-up and the flow is currently along the Dinanggasan River channel. Withstanding the provision of silt traps, the increase in turbidity will be short-term and insignificant since there is no known wildlife or sensitive habitat of aquatic fauna.

(2) Management/Mitigation Plan

Overall, environmental management and mitigation plan shall be closely exercised during the development phase of these major project components in order to minimize if not totally eradicated the negative environmental impacts. Several potential adverse impacts identified in the evaluation were concluded that the Environmental Impact Assessment (EIA) is required in the succeeding study period.

5.7.7 Project Evaluation

(1) Technical Feasibility

The Philippines has experienced the construction of river channel improvement and sabo facilities many times. Thus, no difficulty would be encountered in the actual construction of the river channel improvement and sabo facilities. The recommended non-structural measures have also been experienced in the country. This project is, therefore, evaluated to have a technical feasibility.

(2) Economical Viability

The economic viability is assessed based on the economic cost and benefit stream of the proposed structural measures. As for the assessment of the non-structural measures, this is not carried out based on the situation as discussed before.

Tab. 5-11 shows the economic cost and benefit stream. As the results, the economic viability is figured out as follows:

Table 5.128 Economic Viability of the Optimum Plan in the Dinanggasan River Basin

Viability Index	
EIRR (%)	15.7
NPV (mil. Pesos)	3.5
B/C	1.06

Based on the above results, EIRR becomes higher than the opportunity cost of capital of 15%. Therefore, the project is evaluated to have an adequate economic viability.

(3) Environmental and Social Acceptance

As the social environmental impacts, the resettlement and reconstruction of the bridge are expected for the project implementation. However, these environmental issues can be settled down through the coordination with local authorities as well as stakeholders. As the natural environmental impacts, no significant issue is expected except cutting or removal of plants, which can be accepted judging from the magnitude of impact. As the public hazard, the disposal of dredge materials and spoils for the channel improvement is expected. This issue can be settled down through preparation of the appropriate disposal site prior to construction work.

Overall, environmental management and mitigation plan shall be closely exercised during the development phase of these major project components in order to minimize if not totally eradicated the negative environmental impacts.

The project plan was explained and discussed with the stakeholders through the stakeholder meetings at each end of the field survey and workshop in the site. Through these experiences and activities, it is concluded that, at this stage, implementation of this project is socially and environmentally accepted by the stakeholders.

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

In the First Screening, flood risk areas have been firstly prioritized by applying the indexes derived from the statistical data on economic and natural conditions for the 1,164 river basins related to the cities or municipalities with 947 flood prone areas and, finally, 120 river basins has been selected. Then, in the Second Screening for the selected 120 river basins, these river basins have been arranged in accordance with the ranking by score considering the economic efficiency for flood control project implementation for each river basin and, finally, 56 river basins that could be accommodated by the budgetary amount for the target year have been selected in due consideration of the ranking and other factors.

For the selected 56 river basins, the prioritization and arrangement of the implementation schedule of flood control projects have been examined by dividing the projects into two groups; namely, foreign-assisted projects and locally funded projects. Furthermore, the flood mitigation plans for the six (6) model areas selected from the 56 river basins have been prepared.

Through these study procedure, it is concluded that the selection and prioritization of the flood risk areas and the preparation of flood mitigation plans are adequate for the implementation of flood control projects by the Philippines Government in the coming years.

6.2 Recommendations

1. The implementation schedules of the flood control projects for the selected 56 river basins have been arranged in this Study. The number of 56 river basins has been decided, considering the expected investment amount during the period of 26 years from 2009 to 2034 and assuming that the budgetary growth rate for the flood control sector of DPWH is 8.2%. In this connection, first of all, it is necessary to assure the 8.2 % of growth rate, and in case that the achievement of such growth rate is difficult, it is also necessary to review the number of river basins to be accommodated within the implementation schedule.
2. As well as the assurance of budgetary growth rate, it is recommended that the implementation schedule should be utilized by the agencies concerned, especially DPWH, to prepare a medium-term plan as well as a long-term plan in the flood control sector.
3. For the preparation of the implementation schedule, the 56 river basins have been classified into two groups; namely, 26 river basins under the foreign-assisted projects and 30 river basins under the locally funded projects. The classification was based on the share of 95% and 5% in previous practices under the DPWH Medium-Term Investment Program from 2005 to 2010. It is therefore necessary to further review the adequacy of such sharing, which will be affected by the availability of national funds and international funding sources.

4. In the above classification, river basins whose expected project costs may be above 1.0 billion pesos have been classified as river basins with foreign-assisted projects since international funds is, in general, applied to projects requiring a rather large amount of cost. However, some river basins like Agus and Tagoloan, which are classified under the locally funded project group, are already included in the request-list for foreign-assisted projects and thus require implementation of the flood control projects as early as possible. Under the circumstances, it is recommended that the request for funding of the river basins mentioned above shall be made into one package to facilitate the early implementation with international funds.
5. In the course of the Study, the 1,164 river basins, which are related to the cities or municipalities with 947 flood prone areas, have been identified by using the 1/250,000 topographic maps. Since the topographic map scale of 1/250,000 topographic maps is rather rough to identify the river basin boundaries, it is preferable to review the river basin boundaries using more precisely scaled maps like 1/50,000.
6. To evaluate the flood vulnerability of the 1,164 river basins, 14 indexes derived from the statistical data on economic and natural conditions have been employed. Among the 14 indexes, the most essential indexes are those related to flood damage such as casualties and flood damage amount. Since these flood damage data as well as the other statistical data have to be renewed year by year, it is recommended that evaluation of flood vulnerability of the 1,164 river basins should be renewed according to the updated flood damage data and other statistical data.
7. In this Study, the above 1,164 river basins are classified into three groups; namely, Major River Basins, Principal River Basins and Other River Basins. Among these, the definition of major river basins with more than 1,400 km² in the catchment area and the principal river basins with more than 40 km² in the catchment area are based on the definition of NWRB, while the rest are tentatively designated in this Study. However, it is pointed out that the definition of such river basins may not be clear as identified by the fact that some of river basins belonging to “Other River Basins” have more than 40 km² in the catchment area, and also there are several points to be improved on the institutional arrangement especially in the view point of administration of these river basins; namely, the responsibility on implementation, operation and maintenance. Since it is significant to clarify such definition of river basins and the responsibility of administration by the agencies concerned with the river basins from the effective river basin management point of views including flood control, further discussions regarding these matters should be made among the agencies concerned.
8. For the Second Screening, the economic efficiency based on the project cost and benefit has been examined and the results used as the indexes for scoring. In this procedure for calculation of cost and benefit, the flood inundation area was identified through hydraulic analysis applying the HEC-RAS and HEC-GeoRAS Model using satellite images of “Landsat 7”. Since the accuracy of the HEC-RAS and HEC-GeoRAS Model and the satellite image is not so high, it is preferable to

- enhance the accuracy of hydraulic analysis by applying a more precise hydraulic model and satellite images in the future.
9. For the Second Screening, the project cost in a manner of river channel improvement was based on the relation between design discharge and unit price for river channel improvement prepared by applying previous study results. This relation should be renewed using additional data, whenever the other studies on flood mitigation are conducted.
 10. Regarding the above cost estimation, some of the river basins that have damages caused by sediment include the cost for sediment control facilities in addition to the cost for river channel improvement. The cost for sediment control facilities is based on rough calculation assuming the produced sediment amount and site for the facilities. In this connection, it is necessary to review the cost of such sediment facilities in the further project study stage.
 11. For the benefit calculation in the Second Screening stage, several rates such as damage rate and conversion rate from damage to benefit, which were obtained from the previous studies, were used. Such rates also should be renewed whenever the other studies on flood mitigation projects are examined in the future.
 12. The GIS database and system related to the First and the Second Screening have been set up in the computer at DPWH-FCSEC in this Study. These systems as well as the data itself should be updated and utilized to not only review or evaluate flood vulnerability but also policy-making in the flood control sector. Especially, DPWH-FCSEC, which is expected to play the important role as the source of the information on flood control, should maintain and upgrade these systems and database, so that DPWH as a whole can use them as more effective tools for policy-making in this flood control sector of the Philippines.
 13. The flood control plans for the six (6) selected model river basins have been examined and prepared to show the formulation process for the different flood damage types. These plans should be utilized and referenced by the agencies concerned of the Philippine Government, especially DPWH, in the formulation of flood control plans for the other river basins considering the similarity of flood damage types and DPWH-FCSEC should provide support to develop the formulation of such plans.
 14. The Study including the IEE survey for the formulation of flood control plans for the six (6) model river basins has been conducted within the limited time and data; therefore, the accuracy of outputs is rather rough. When the project proceeds to the next study stage, it is recommended that further study shall be conducted with additional or more data to upgrade the accuracy of outputs and the mitigation and alternative plans for the adverse impacts will be reviewed appropriately.
 15. Some of the six (6) river basins require not only flood control measures but also sabo facilities to mitigate the disaster caused by sediment emphasized especially in the lahar or debris flow damage type river basins. Unfortunately, the available measures for sediment control sometimes requires a huge cost, while the benefit is not enough to satisfy the economic viability. Under these circumstances, the proposed sabo facilities in this Study, which were planned with less dimensions

so as to satisfy the economic viability, are not enough to cope with the disasters caused by sediment. Therefore, it is recommended in the future to review the necessity of such sediment control facilities with enough dimensions to cope with the sediment disaster from the social view points in the future.

16. In the course of the Study, the technical knowledge, applied in this Study including the study procedures to conduct the above Items 5. to 14., has been transferred in a manner of on the job training, seminar and workshop that were held several times on the occasion of presentation of the study reports. Therefore, it is presumed that basic knowledge has been transferred successfully. However, compared with the volume of knowledge used in the Study, such opportunities were very short and limited. In this connection, it is recommended that the dispatch of short-term experts should be arranged to assure the continued transfer of knowledge used in the Study and thus enable the counterpart personnel of the Philippine Government particularly the agencies concerned like DPWH to update, modify and/or adjust the outputs of the Study on their own.

TABLES

Tab. 2-1 List of Water Resources Regions

Code	Name	Major River Basin	No. of Principal Rivers
WRR I	Ilocos Region	Abra River	14
WRR II	Cagayan Valley	Cagayan River	39
WRR III	Central Luzon	Pampanga and Agno Rivers	24
WRR IV	Southern Tagalog	Pasig-Laguna de Bay Rivers	97
WRR V	Bicol Region	Bicol River	30
WRR VI	Western Visayas	Panay, Jalaur and Ilog-Hilabangan Rivers	37
WRR VII	Central Visayas	-	19
WRR VIII	Eastern Visayas	-	34
WRR IX	Southwestern Mindanao	-	34
WRR X	Northern Mindanao	Agusan, Cagayan de Oro and Tagoloan Rivers	29
WRR XI	Southeastern Mindanao	Davao, Tagum-Libuganon, Buayan Rivers	35
WRR XII	Southern Mindanao	Agus and Mindanao Rivers	30

Source: "Principal River Basin of the Philippines" published by NWRC in October 1976

Tab. 2-2 Eighteen Major River Basins

Code No.	Rank	River Basin	Water Resources Region	Catchment Area (km ²)
02001	1	Cagayan	Region II	25,469
12342	2	Mindanao	Region XI and XII	23,169
10315	3	Agusan	Region XIII	10,921
03059	4	Pampanga	Region III	9,759
03070	5	Agno	Region III	5,952
01036	6	Abra	Region I	5,125
04076	7	Pasig-Laguna Bay	NCR and Region IVA	4,678
05114	8	Bicol	Region V	3,771
02028	9	Abulug	Region II	3,372
11303	10	Tagum-Libuganon	Region XI	3,064
06235	11	Ilog-Hilabangan	Region VI and VII	1,945
06197	12	Panay	Region VI	1,843
10331	13	Tagoloan	Region X	1,704
12336	14	Agus	Region XII and ARMM	1,645
11307	15	Davao	Region XI	1,623
10332	16	Cagayan	Region X	1,521
06205	17	Jalaur	Region VI	1,503
11364	18	Buayan-Malungun	Region XI	1,434

Source: "Principal River Basins of the Philippines" published by NWRC in October 1976

Tab. 2-3 Recorded Annual Flood Damages, Philippines, 1980-2005

Year	Population Affected		Casualties			House Damaged		Damage Value* (mil. Peso)
	Families	Persons	Dead	Missing	Injured	Totally	Partially	
1980	248,164	1,666,498	36	4	55	16,510	51,101	1,472
1981	250,325	1,472,417	484	264	1,922	44,994	159,251	1,273
1982	266,476	1,569,017	337	223	347	84,027	97,485	1,754
1983	140,604	747,155	126	168	28	29,892	85,072	523
1984	741,510	4,048,805	1,979	4,426	732	310,646	313,391	416
1985	318,106	1,643,142	211	300	17	8,204	211,151	3
1986	287,240	1,524,301	171	43	155	3,162	14,595	1,838
1987	464,162	2,591,914	1,020	213	1,455	180,550	344,416	8,763
1988	1,173,994	6,081,572	429	195	468	134,344	585,732	8,675
1989	501,682	2,582,822	382	89	1,088	56,473	184,584	4,494
1990	1,265,652	6,661,474	676	262	1,392	223,535	636,742	11,713
1991	150,894	759,335	5,201	4,278	357	15,458	83,664	74
1992	418,964	2,097,693	145	95	51	3,472	8,342	7,359
1993	1,523,250	8,202,118	814	214	1,637	166,004	456,773	25,038
1994	670,078	3,306,783	266	54	260	58,869	226,291	3,401
1995	1,710,619	8,567,666	1,255	669	3,027	294,654	720,502	57,781
1996	260,581	1,254,989	124	49	97	2,690	17,557	10,109
1997	777,997	3,954,175	199	28	66	13,225	53,980	4,842
1998	1,590,905	7,197,953	498	116	873	137,020	406,438	17,823
1999	270,424	1,281,194	56	3	25	144	687	1,555
2000	1,426,965	6,852,826	338	59	370	24,573	195,536	7,217
2001	756,938	3,629,295	431	134	418	14,899	54,422	6,924
2002	538,600	3,546,469	169	33	71	2,980	15,947	829
2003	702,223	3,362,991	139	28	182	12,306	51,579	4,567
2004**	-	-	1,046	437	836	-	-	7,679
2005**	-	-	62	36	51	-	-	2,487
Total	16,456,353	84,602,604	16,594	12,420	15,980	1,838,631	4,975,238	198,609

*) Total damages in infrastructure, agriculture and private properties.

**) Source: DSWD for Casualties.

-) Not available here.

Tab. 2-4 Destructive Tropical Disturbance and Corresponding Casualties, Philippines

Tropical Disturbance	Date of Occurrence	Casualties		
		Dead	Missing	Injured
T Ruping	Nov 10-14, 1990	508	246	
TS Uring	Nov 2-6, 1991	5,101	1,256	292
TD Ditang	July 17-21, 1992	36	77	
T Kadiang	Sep 30-Oct 7, 1993	126	26	37
T Monang	Dec 3-4, 1993	273	90	607
T Puring	Dec 24-29, 1993	187	52	280
TS Mameng	Sep 27 - Oct 1, 1995	116	126	49
TS Pepang	Oct 26 -30, 1995	265	67	323
T Rosing	Oct 31 - Nov 3, 1995	936	316	4,152
T Emang & TS Gading	Sept 16-21, 1998	108	20	
Loleng	Oct 15-23, 1998	303	29	751
Reming	Oct 26-Nov 1, 2000	114	10	
T Feria	July 2-6, 2001	188	44	241
T Nanang	Nov 6-10, 2001	236	88	169
Hambalos, Inday	June 28-July 14, 2002	85	4	45
T Harurut	July 19-21, 2003	64	2	154
T Igme	June 25-July 2, 2004	57	20	39
T Unding	Nov 14-21, 2004	56	79	25
TD Winnie	Nov 28-30, 2004	821	417	400

T: Typhoon, TS: Tropical Storm, TD: Tropical Depression

Source: Office of Civil Defense

Tab. 2-5 GOJ Grant Aid Projects (1971-2004)

Year	Agency	Project	Amount (million Yen)	Status
1972	PAGASA	Flood Forecasting and Warning System in Pampanga River Basin	80	Completed
1977	UP	Strengthening of National Hydraulic Research Center	60	Completed
1980	PAGASA	Rehabilitation of Flood Forecasting and Warning System in Pampanga River Basin	21	Completed
1989	DPWH	Retrieval of Flood Prone Areas in Metro Manila	1,231	Completed
1991	DPWH	Equipment for Mt. Pinatubo Hazard Urgent Mitigation	1,455	Completed
1992	DPWH	Retrieval of Flood Prone Areas in Metro Manila (II)	1,254	Completed
1997-2001	DPWH	Flood Mitigation in Oemoc City (I) & (II)	3,255	Completed
2000	DPWH	Rehabilitation of Flood Control Operation and Warning System in Metro Manila	1,048	Completed
2002	DPWH	Construction of Hydraulic Laboratory Building	794	Completed
Total		9 Projects	9,198	

Source: "Water & Floods", DPWH, March 2004

Tab. 2-6 JICA Studies (1971-2004)

Year	Agency	Project	Status
1976-1978	DPWH	Planning Report on the Pasig-Potrero River Flood Control and Sabo Project	Completed
1976-1977	PAGASA	Survey for the Flood Forecasting System Project	Completed
1978-1981	DPWH	Master Plan for Mayon Volcano Sabo and Flood Control Project	Completed
1979-1982	DPWH	Pampanga Delta Development Project	Completed
1982-1983	DPWH	Re-study of Mayon Volcano Sabo and Flood Control Project	Completed
1983-1986	DPWH	Panay River Basinwide Flood Control Study	Completed
1987-1990	DPWH	Study on Flood Control and Drainage Project in Metro Manila	Completed
1988-1991	DPWH	Study of Agno River Basin Flood Control Project	Completed
1989-1991	DPWH	Study on Ilog-Hilabangan River Basin Flood Control Project	Completed
1992-1995	DPWH	The Study on Flood Control and Mudflow Control for Sacobia-Bamban/ Abacan River Basin Draining from Mt. Pinatubo	Completed
1996-1997	DPWH	The Study on Sabo and Flood Control in the Laoag River Basin	Completed
2000	DPWH	The Study on Comprehensive Disaster Prevention Around Mayon Volcano	Completed
2000	DPWH	The Study on Existing Drainage Laterals in Metro Manila (LDSP)	Completed
2000	DPWH	The Feasibility Study on Lower Cagayan River Flood Control Project	Completed
2002-2003	DPWH	The Study in Sabo and Flood Control for Western River Basins of Mount Pinatubo	Completed
2003	DPWH	Basic Study on Disaster Prevention & Reconstruction Project for Camiguin Island, Mindanao (LDSP)	Completed
2003	DPWH	Study on Drainage Improvement in Core Area of Metropolitan Manila	Completed
Total		17 Studies	

Source: "Water & Floods", DPWH, March 2004.

Tab. 2-7 OECF/JBIC Projects (1971-2004)

L/A Date	Agency	Project	L/A Amount (million Yen)	Status
03/23/1973	PAGASA	Flood Forecasting and Warning System in Pampanga River Basin	3,028	Completed
08/01/1974	DPWH	Flood Control Dredging Project in the Pampanga, Bicol & CoTabato River Basins	3,187	Completed
09/09/1975	DPWH	Pasig River Flood Control Project	5,112	Completed
01/04/1978	PAGASA	The Flood Forecasting Systems Project	1,774	Completed
11/09/1978	DPWH	River Dredging Project (II)	2,429	Completed
05/31/1982	DPWH	Lower Agusan Development Project (ES)	330	Completed
05/31/1982	PAGASA	Flood Forecasting and Warning System for Dam Operation Project	3,600	Completed
09/09/1983	DPWH	Nationwide Flood Control Dredging Project (Telemetry)	1,140	Completed
05/07/1984	DPWH	Metro Manila Drainage System Rehabilitation Project	3,012	Completed
05/30/1986	DPWH	Pampanga Delta Development Project (ES)	705	Completed
05/30/1986	PAGASA	Flood Forecasting and Warning System for Dam Operation Project (II)	3,988	Completed
01/27/1988	DPWH	Metro Manila Flood Control Project (II)	10,818	Completed
01/27/1988	DPWH	Small Water Impounding Management Project	3,193	Completed
01/27/1988	DPWH	Lower Agusan Development Project, Stage I, Phase I	3,372	Completed
02/09/1990	DPWH	Pampanga Delta Development Project, Flood Control Component (I)	8,637	Completed
02/09/1990	DPWH	North Laguna Lakeshore Urgent Flood Control & Drainage Project (ES)	454	Completed
08/30/1995	DPWH	Agno and Allied Rivers Urgent Rehabilitation Project	8,312	Completed
03/29/1996	DPWH	Mt. Pinatubo Hazard Urgent Mitigation Project	6,911	Completed
03/18/1997	DPWH	The Metro Manila Flood Control Project West of Mangahan Floodway	9,411	Completed
03/18/1997	DPWH	Lower Agusan Development Project (Flood Control Component - Phase II)	7,979	Completed
09/10/1998	DPWH	Agno River Flood Control Project (II-A)	6,734	Completed
12/28/1999	DPWH	Pasig-Marikina River Channel Improvement Project (ES)		Completed
12/28/1999	DPWH	Mt. Pinatubo Hazard Urgent Mitigation Project (II)	9,013	Completed
04/07/2000	DPWH	KAMANAVA Flood Control and Drainage System Improvement Project	8,929	On-Going
05/30/2001	DPWH	Laoag River Basin Flood Control and Sabo Project	6,309	On-Going
05/30/2001	DPWH	Agno River Flood Control Project (Phase II-B)	2,789	On-Going
03/28/2002	DPWH	Iloilo Flood Control Project	6,790	On-Going
Total		27 Projects	128,975	

Source: "Water & Floods", DPWH, March 2004.

Tab. 2-8 Proposed Project (DPWH Medium-Term Public Investment Program)

Fund	Name of River Basin	JBIC loan applied	Budget Allocation	Implementation schedule	Ranking	Remarks (Present Status)
Foreign Assisted Project	Mt Pinatubo (Phase III)	27th	2006	2008-2010	-	
	Pasig-Marikina (Phase II)	27th	2007	2007-2013	-	accepted
	Cagayan	27th	2006	2009-2011	39	
	Panay (1st Stage)	27th	2008	2009-2014	17	
	Bicol	-	2006	2008-2012	21	
	Agno & allied (Phase-III)	-	2008	2009-	27	
	VOM (Meycauayan)	-	2008	2009-2013	6	
	Mayon volcano	-	2008	2009-	7	
	Lower Cotabato	-	2008	2009-2011	11	
	Davao urban drainage	-	2008	2009-2010	14	
	Tagaloan	-	2008	2009-2010	40	
	Upper Agusan	-	2008	2008-2011	33	
	Tagum-Libuganon	-	2008	2009-2011	45	
	Agus	-	2008	2009-2011	48	
	Buayan-Malungun	-	2008	2009-2011	44	
	Tarlac	-	2008	2009-2013	27	
	Iloilo (Phase-II)	-	2008	2009-2014	-	
	Ilog-Hilabangan	-	2008	2009-2010	28	
East-Mangahan	-	2009	2009-2014	2		
Local Fund Project	Kinanliman*	-	2008		25	Implementation will be started soon
	Yawa	-	2008		6	Updating of M/P and F/S is requested
	Agos*	-	2008		33	Detailed design is requested
	Dinalupihan-Hermosa-Lubao*	-	2008		-	Not included in 56 river basins

*: Not listed in the DPWH Medium-term Program

Tab. 3-1 List of Flood Susceptible Areas Nominated by NDCC in 2004 (1/5)

No.	City/Municipality	Province	No.	City/Municipality	Province	No.	City/Municipality	Province
(Region 1)			35	Quirino	ILOCOS SUR	70	Agno	PANGASINAN
1	Bacarra	ILOCOS NORTE	36	Salcedo		71	Aguilar	
2	Badoc		37	San Esteban		72	Alaminos	
3	Bangui		38	San Ildefonso		73	Alcala	
4	Batac		39	San Juan		74	Asingan	
5	Burgos		40	San Vicente		75	Balungao	
6	Currimao		41	Santa		76	Bani	
7	Dingras		42	Santa Catalina		77	Basista	
8	Espiritu		43	Santa Cruz		78	Bautista	
9	Laoag		44	Santa Lucia		79	Bayambang	
10	Marcos		45	Santa Maria		80	Binalonan	
11	Nueva Era		46	Santiago		81	Binmaley	
12	Pagudpud		47	Santo Domingo		82	Bugallon	
13	Paoay		48	Sinait		83	Calasiao	
14	Pasuguin		49	Suyo		84	Dagupan	
15	Piddig		50	Tagudin		85	Dasol	
16	Pinili		51	Vigan		86	Labrador	
17	San Nicolas		52	Agoo		87	Lingayen	
18	Sarrat		53	Aring-ay		88	Mabini	
19	Solsona		54	Bacnotan		89	Malasiqui	
20	Vintar		55	Balaoan		90	Manaoag	
21	Alilem		56	Bangar		91	Mangaldan	
22	Banayoyo		57	Bauang		92	Mangatarem	
23	Bantay		58	Caba		93	Mapandan	
24	Burgos		59	Luna		94	Natividad	
25	Cabugao		60	Naguilian		95	Pozorrubio	
26	Candon		61	Pugo		96	Rosales	
27	Caocayan		62	Rosario		97	San Carlos City	
28	Cervantes		63	San Fernando		98	San Fabian	
29	G. del Pilar		64	San Gabriel		99	San Jacinto	
30	Galimuyod		65	San Juan		100	San Manuel	
31	Lidlidda		66	Santo Tomas		101	San Nicolas	
32	Magsingal		67	Santol		102	San Quintin	
33	Nagbukel		68	Sudipen		103	San Tomas	
34	Narvacan		69	Tubao	104	Santa Barbara		

No.	City/Municipality	Province	No.	City/Municipality	Province	No.	City/Municipality	Province	
105	Santa Maria	PANGASINAN	139	Alicia	ILOCOS SUR	174	Bambang	NUEVA VIZCAYA	
106	Sison		140	Angadanan		175	Bayombong		
107	Tayug		141	Aurora		176	Diadi		
108	Umingan		142	Benito Soliven		177	Dupax del Norte		
109	Urbiztondo		143	Burgos		178	Dupax del Sur		
110	Urdaneta		144	Cabagan		179	Quezon		
111	Villasis		145	Cabatuan		180	Santa Fe		
(Region 2)			146	Cauayan		181	Solano		
112	Abulug		CAGAYAN	147		Dinapiqui	182		Villa Verde
113	Alcala			148		Divilican	183		Madella
114	Allacapan			149		Echague	184		Nagtipunan
115	Amulong	150		Gamu	(Region 3)				
116	Aparri	151		Ilagan	185	Baler	AURORA		
117	Baggao	152		Jones	186	Casiguran			
118	Ballesteros	153		Luna	187	Dipaculao			
119	Buguey	154		Maconacon	188	Dilasag			
120	Camalaniugan	155		Magsaysay	189	Dinalungan			
121	Claveria	156		Mallig	190	Dingalan			
122	Enrile	157		Naguilian	191	Maria Aurora			
123	Gattaran	158		Palanan	192	San Luis			
124	Gonzaga	159		Quirino	193	Abucay			
125	Iguig	160		Ramon	194	Bagac			
126	Lallo	161		Reina Mercedes	195	Balanga			
127	Lasam	162		Roxas	196	Dinalupihan			
128	Pamplona	163		San Agustin	197	Hermosa			
129	Penablanca	164		San Guillermo	198	Mariveles			
130	Piat	165		San Mariano	199	Morong			
131	Rizal	166		San Mateo	200	Orani			
132	Sanchez-Mira	167		San Pablo	201	Pilar			
133	Santa Ana	168		Santa Maria	202	Samal			
134	Santa Teresita	169		Santiago	203	Angat			
135	Solana	170		Santo Tomas	204	Balagtas			
136	Sto. Nino	171		Tumauini	205	Baliuag			
137	Tuao	172		Aritao	206	Bocau			
138	Tuguegarao	173		Bagabag	207	Bulacan			

Tab. 3-1 List of Flood Susceptible Areas Nominated by NDCC in 2004 (2/5)

No.	City/Municipality	Province	No.	City/Municipality	Province	No.	City/Municipality	Province
(Region 3)			242	Palayan	NUEVA ECIJA	277	Anao	TARLAC
208	Bustos	BULACAN	243	Peñaranda		278	Bamban	
209	Calumpit		244	Quezon		279	Camiling	
210	Guiguinto		245	Rizal		280	Capas	
211	Hagonoy		246	San Antonio		281	Concepcion	
212	Malolos		247	San Isidro		282	Gerona	
213	Marilao		248	San Jose		283	La Paz	
214	Masantol		249	San Leonardo		284	Mayantoc	
215	Meycauyan		250	Santa Rosa		285	Moncada	
216	Norzaragay		251	Santo Domingo		286	Paniqui	
217	Obando		252	Talavera		287	Pura	
218	Paombong		253	Talugtug		288	Ramos	
219	Plaridel		254	Zaragoza		289	San Clemente	
220	Pulilan		255	Angeles		290	San Manuel	
221	San Ildefonso		256	Apalit		291	Tarlac	
222	San Miguel		257	Arayat		292	Victoria	
223	San Rafael		258	Bacolor		293	Botolan	
224	Santa Maria		259	Calumpit		294	Candelaria	
225	Aliaga		260	Candaba		295	Castillejos	
226	Bongabon		261	Floridablanca	296	Iba		
227	Cabanatuan	262	Guagua	297	Masinloc			
228	Cabiao	263	Lubao	298	Olongapo			
229	Carranglan	264	Mabalacat	299	Palauig			
230	Cuyapo	265	Macabebe	300	San Antonio			
231	Gabaldon	266	Magalang	301	San Felipe			
232	Gapan	267	Masantol	302	San Marcelino			
233	General Tinio	268	Mexico	303	San Narciso			
234	Guimba	269	Minalin	304	Santa Cruz			
235	Jaen	270	Porac	305	Subic			
236	Laur	271	San Fernando	(Region 4A)				
237	Licab	272	San Luis	306	Balayan			
238	Llanera	273	San Simon	307	Batangas			
239	Muñoz	274	Santa Ana	308	Bauan			
240	Nampicuan	275	Santa Rita	309	Calaca			
241	Natividad	276	Sasmuan	310	Calatagan			

No.	City/Municipality	Province	No.	City/Municipality	Province	No.	City/Municipality	Province		
(Region 4A)			345	Santa Maria	LAGUNA	380	Cainta	RIZAL		
311	Canda	BATANGAS	346	Santa Rosa		381	Jala-jala			
312	Lemery		347	Siniloan		382	Montalban			
313	Lian		348	Agdangan		383	San Mateo			
314	Lobo		349	Atimonan		384	Taytay			
315	Nasugbu		350	Bordeos		(Region 4B)				
316	San Juan		351	Buenavista		385	Boac			
317	San Luis		352	Calauag		386	Gasan			
318	San Pascual		353	Catanauan		387	Mogpog			
319	Taal		354	General Luna		388	Santa Cruz			
320	Bacoor		355	General Nakar	389	Torrijos				
321	Cavite City	356	Guinayangan	390	Abra de Ilog					
322	General Trias	357	Gumaca	391	Calintaan					
323	Imus	358	Infanta	392	Magsaysay					
324	Kawit	359	Lopez	393	Mamburao					
325	Naic	360	Lucena	394	Rizal					
326	Noveleta	361	Macalelon	395	Sablayan					
327	Rosario	362	Padre Burgos	396	San Jose					
328	Tanza	363	Pagbilao	397	Santa Cruz					
329	Ternate	364	Panukulan	398	Baco					
330	Bay	365	Pitogo	399	Bansud					
331	Binan	366	Plaridel	400	Bongabong					
332	Cabuyao	367	Polillio	401	Bulalakao					
333	Calamba	368	Quezon	402	Calapan					
334	Famy	369	Real	403	Gloria					
335	Kalayaan	370	Sampaloc	404	Mansalay					
336	Lumban	371	San Andres	405	Naujan					
337	Mabitac	372	San Francisco (Aurora)	406	Pinamalayan					
338	Paete	373	San Narciso	407	Pola					
339	Pagsanjan	374	Sariaya	408	Roxas					
340	Pakil	375	Taakawayan	409	Socorro					
341	Pangil	376	Unisan	410	Aborlan					
342	Pila	377	Angono	411	Araceli					
343	San Pedro	378	Antipolo	412	Bataraza					
344	Santa Cruz	379	Binangonan	413	Brooke's Point					

Tab. 3-1 List of Flood Susceptible Areas Nominated by NDCC in 2004 (3/5)

No.	City/Municipality	Province	No.	City/Municipality	Province	No.	City/Municipality	Province	
(Region 4B)			447	Santa Elena	Camarines Norte	482	Balud	Masbate	
414	Dumaran	PALAWAN	448	Talisay	Camarines Sur	483	Batuan		
415	El Nido		449	Vinzons		484	Cawayan		
416	Narra		450	Baao		485	Dimasalang		
417	Puerto Princesa		451	Bato		486	Milagros		
418	Quezon		452	Bombon		487	Placer		
419	Rizal		453	Bula		488	San Fernando		
420	Roxas		454	Calabanga		489	San Jacinto		
421	San Vicente		455	Caramoan		490	San Pascual		
422	Sofronio Espanola		456	Del Gallego		491	Uson		
423	Taytay		457	Garchitorena		492	Bacon	Sorsogon	
424	Alcantara	458	Goa	493	Barcelona				
425	Cajidiocan	459	Iriga City	494	Bulan				
426	Looc	460	Libmanan	495	Bulusan				
427	Magdiwang	461	Milaor	496	Casiguran				
428	Odiangan	462	Minalabac	497	Castilla				
429	Romblon	463	Nabua	498	City of Sorsogon				
430	San Andres	464	Pasacao	499	Donsol				
431	San Fernando	465	Pili	500	Gubat				
432	Santa Fe	466	Ragay	501	Irosin				
(Region 5)			467	Sagnay		502	Matnog	Sorsogon	
433	City of Ligao	Albay	468	Sipocot	Catanduanes	503	Pilar		
434	Daraga (Locsin)		469	Tinambac		504	Prieto Diaz		
435	Guinobatan		470	Bagamanoc		(Region 6)			
436	Libon		471	Baras		505	Altavas		AKLAN
437	Malinao		472	Bato		506	Batan		
438	Oas		473	Caramoran		507	Kalibo		
439	Pio Duran		474	Gigmoto		508	Numancia		ANTIQUE
440	Tiwi		475	Pandan		509	Anini-y		
441	Basud		476	Panganiban (Payo)		510	Belison		
442	Capalonga		477	San Andres (Calolbon)		511	Hamtic		
443	Daet	478	San Miguel	512	San Jose				
444	Jose Panganiban	479	Viga	513	Sibalom				
445	Mercedes	480	Virac	514	Tibiao				
446	Paracale	481	Aroroy	515	Cuartero	CAPIZ			

No.	City/Municipality	Province	No.	City/Municipality	Province	No.	City/Municipality	Province	
(Region 6)			550	La Carlota	NEGROS OCCIDENTAL	584	Cebu City	CEBU	
516	Dao	CAPIZ	551	La Castellana		585	Compostela		
517	Dumalag		552	Pontevedra		586	Consolacion		
518	Dumarao		553	Pulupandan		587	Daanbantayan		
519	Ivisan		554	Silay City		588	Danao City		
520	Jamindan		555	Sipalay		589	Dumanjug		
521	Ma-ayon		556	Talisay		590	Liloan		
522	Mambusao		557	Victorias		591	Mandawe		
523	Panay		(Region 7)			592	Medellin		
524	Pontevedra		558	Anda		593	Minglanilla		
525	Roxas City		559	Bien Unido	594	Pinamungahan			
526	Siapian	560	Buenavista	595	Ronda				
527	Sigma	561	Calape	596	San Fernando				
528	Anilao	562	Candijay	597	San Remegio				
529	Balasan	563	Clarín	598	Sibonga				
530	Barotac Nuevo	564	Cortes	599	Tabuelan				
531	Carles	565	Guindulman	600	Talisay				
532	Dingle	566	Inabanga	601	Toledo City				
533	Dumangas	567	Jetafe	602	Tuburan				
534	Estancia	568	Loon	603	Amlan				
535	Iloilo City	569	Mabini	604	Ayungon				
536	Leganes	570	Maribojoc	605	Bacong				
537	Oton	571	San Miguel	606	Bais				
538	Pototan	572	Tagbilaran City	607	Basay				
539	Sara	573	Talibon	608	Bayawan				
540	Zarraga	574	Trinidad	609	Dauin				
541	Bacolod	575	Tubigon	610	Dumaguete City				
542	Bago	576	Ubay	611	Manjuyod				
543	Cadiz	577	Aloguinsan	612	San Jose				
544	Enrique Magalona	578	Argao	613	Santa Catalina				
545	Escalante	579	Asturias	614	Siaton				
546	Himamaylan	580	Balamban	615	Tanjay				
547	Hinigaran	581	Borbon	616	Tayasan				
548	Ilog	582	Carcar	617	Zamboangita				
549	Kabankalan	583	Carmen	618	Lazi	SIIQUIJOR			

Tab. 3-1 List of Flood Susceptible Areas Nominated by NDCC in 2004 (4/5)

No.	City/Municipality	Province	No.	City/Municipality	Province	No.	City/Municipality	Province
(Region 8)			653	Mondragon	NORTHERN SAMAR	686	Mahinog	CAMIGUIN IS.
619	Almeria	BILIRAN	654	San Roque	SAMAR	687	Iligan City	LANAO DEL NORTE
620	Biliran		655	Basey		688	Kalambagan	
621	Culaba		656	Calbayog City		689	Kapatagan	
622	Kawayan		657	Calbiga		690	Karomatan (Sultan Naga)	
623	Naval		658	Pagsanghan		691	Lala	
624	Balangiga		659	Hinunangan		692	Maigo	
625	Can-Avid	EASTERN SAMAR	660	Saint Bernard	SOUTHERN LEYTE	693	Nunungan	MISAMIS OCCIDENTAL
626	Dolores		(Region 9)			694	Tubod	
627	Llorente		661	Dipolog City	ZAMBOANGA	695	Baliangao	
628	Oras		662	Katipunan	DEL NORTE	696	Bonifacio	
629	Taft		663	Labason	DEL SUR	697	Calamba	
630	Abuyog		664	Manukan	ZAMBOANGA	698	Lopez Jaena	
631	Albuera	665	Mahayag	DEL SUR	699	Plaridel		
632	Barugo	666	Pagadian City	ZAMBOANGA	700	Sapang Dalaga		
633	Bato	667	Zamboanga City	SIBUGAY	701	Tangub City		
634	Baybay	668	Boug	ZAMBOANGA	702	Clarin		
635	Carigara	669	Ipil	SIBUGAY	703	Tudela		
636	Dagami	(Region 10)			704	Sinacaban	MISAMIS ORIENTAL	
637	Dulag	670	Baungon	BUKIDNON	705	Jimenez		
638	Hilongos	671	Malaybalay		706	Balingasag		
639	Javier	672	Maramag		707	Cagayan de Oro City		
640	Julita	673	San Fernando		708	El Salvador		
641	La Paz	674	Kalilangan		709	Gingog		
642	MacArthur	675	Valencia City		710	Island, Manticao		
643	Matag-ob	676	Manolo Fortich	711	Lagonglong			
644	Mayorga	677	Malitbog	712	Magsaysay (Linogos)			
645	Merida	678	Kadangilan	713	Manticao			
646	Ormoc	679	Kibawe	714	Medina			
647	Palo	680	Pangantucan	715	Naawan			
648	Pastrana	681	Dangcagan	716	Opol			
649	San Miguel	682	Damulog	717	Salay			
650	Tananuan	683	Catarman	718	Tagoloan			
651	Catarman	684	Mambajao	CAMIGUIN IS.	719	Villanueva		
652	Laoang	NORTHERN SAMAR	685	Sagay				

No.	City/Municipality	Province	No.	City/Municipality	Province	No.	City/Municipality	Province
(Region 11)			(Region 12)			788	Lebak	SULTAN KUDARAT
720	Compostela	COMPOSTELA VALLEY	754	Banisan	NORTH COTABATO	789	Lutayan	
721	Mabini		755	Carmen		790	Palimbang	
722	Maco		756	Kabacan		791	Pres. Quirino	
723	Monkayo		757	Kidapawan		792	Sen. Ninoy Aquino	
724	Montevista		758	Libungan		793	Tacurong	
725	Nabunturan		759	Makilala		(Region 13)		
726	New Bataan	760	Matalam	SARANGANI	794	Cabadbaran	AGUSAN DEL NORTE	
727	Pantukan	761	Midsayap		795	Carmen		
728	Asuncion	762	M'Lang		796	Jabonga		
729	Carmen	763	Pigcawayan		797	Santiago		
730	Kapalong	764	Pikit		798	Tubay		
731	New Corella	765	Tulunang		799	Buenavista		
732	Panabo	766	Alabel	SOUTH COTABATO	800	Butuan City	AGUSAN DEL SUR	
733	Santo Tomas	767	Glan		801	Kitcharao		
734	Tagum	768	Kiamba		802	Las Nieves		
735	Bansalan	769	Maasim		803	Magallanes		
736	Davao City	770	Maitum		804	Nasipit		
737	Digos	771	Malapatan		805	R. T. Romualdez		
738	Hagonoy	772	Banga	SULTAN KUDARAT	806	Rosario	SURIGAO DEL NORTE	
739	Magsaysay	773	Gen. Santos City		807	Trento		
740	Malita	774	Koronadal		808	Veruela		
741	Matanao	775	Norala		809	Bayugan		
742	Padada	776	Polomolok		810	Bunawan		
743	Santa Cruz	777	Sto. Nino		811	Esperanza		
744	Santa Maria	778	Surallah	812	La Paz			
745	Baganga	779	Tampakan	813	Loreto			
746	Banaybanay	780	Tantangan	814	Prosperidad			
747	Caraga	781	Tupi	815	San Francisco			
748	Cateel	782	Bagumbayan	SULTAN KUDARAT	816	San Luis	SURIGAO DEL NORTE	
749	Lupon	783	Columbio		817	Santa Josefa		
750	Manay	784	Don Mariano Marcos		818	Sibatog		
751	Mati	785	Esperanza		819	Talacogon		
752	San Isidro	786	Isulan		820	Cagdianao		
753	Tarragona	787	Kalamansig		821	Alegria		

Tab. 3-1 List of Flood Susceptible Areas Nominated by NDCC in 2004 (5/5)

No.	City/Municipality	Province	No.	City/Municipality	Province	No.	City/Municipality	Province	
(Region 13)			856	Carmen	SURIGAO DEL SUR	890	Mulundo	LANAO DEL SUR	
822	Claver	SURIGAO DEL NORTE	857	Carrascal		891	Pagayawan		
823	Dapa		858	Cortes		892	Saguiaran		
824	Dinagat		859	Hinatuan		893	Sultan Gumander		
825	Malimono		860	Lianga		894	Tamparan		
826	San Isidro		861	Madrid		895	Taraka		
827	Sison		862	Marihatag		896	Tugaya		
828	Tubajon		863	San Agustin		897	Ampatuan		
829	Bacuag		864	San Miguel		898	Barira		
830	Basilisa		865	Tagbina		899	Buluan		
831	Burgos		866	Tago		900	Cotabato City		
832	Del Carmen		(ARMM)			901	Datu Piang		
833	General Luna		867	Isabela		902	Datu Saudi-Ampatuan		
834	Gigaquit		868	Lamitan		903	Dinaig (Datu Odin Sinsua)		
835	Libjo		869	Lantawan	904	Gen. S. K. Pendatun			
836	Loreto	870	Maluso	905	Kabuntalan (Tumbao)				
837	Mainit	871	Sumisip	906	Pagalungan				
838	Pilar	872	Tipo-tipo	907	Parang				
839	Placer	873	Tuburan	908	Shariff Aguak (Maganoy)				
840	San Benito	874	Bacolod-Kalawi (Bacolod)	909	Sultan Kudarat (Nuling)				
841	San Francisco	875	Balabagan	910	Sultan Mastura				
842	San Jose	876	Balindong (Watu)	911	Sultan sa Barongis				
843	Santa Monica	877	Bayang	912	Talayan				
844	Socorro	878	Binidayan	913	Upi				
845	Surigao City	879	Buadipuso Buntong	914	Bongao				
846	Taganaan	880	Butig	(CAR)					
847	Tubod	881	Ditsaan-Ramain	915	Bucay	ABRA			
848	Barobo	882	Ganassi	916	La Paz				
849	Cagwait	883	Kapatagan	917	Lagangilang				
850	Lanuza	884	Lumbatan	918	San Juan	APAYAO			
851	Lingig	885	Madalum	919	Luna				
852	Tandag	886	Madamba	920	Pudtol				
853	Bayabas	887	Malabang	921	Baguio	BENGUET			
854	Bislig	888	Marawi City	922	Itogon				
855	Cantilan	889	Masui	923	La Trinidad				

No.	City/Municipality	Province
(CAR)		
924	Tabuk	KALINGA
925	Bontoc	MOUNTAIN PROVINCE
(NCR)		
926	Caloocan City	METRO MANILA
927	Las Pinas	
928	Makati	
929	Malabon	
930	Mandaluyong	
931	Manila	
932	Marikina	
933	Muntinlupa	
934	Paranaque	
935	Pasay	
936	Pasig	
937	Pateros	
938	Quezon City	
939	Taguig	
940	Valenzuela	

**Tab. 3-2 Number of Principal River Basins Categorized by Water Resources Region
(Excluding Eighteen Major River Basins)**

Water Resources Region	Number of River Basins		
	Independent	Tributaries of Major River	Total
No.1	11	1	12
No.2	11	24	35
No.3	15	7	22
No.4	87	6	93
No.5	27	1	28
No.6	20	6	26
No.7	19	0	19
No.8	30	0	30
No.9	26	0	26
No.10	15	11	26
No.11	30	2	32
No.12	10	17	27
Total	301	75	376

Tab. 3-3 Major River Basins Categorized by Water Resources Region

Water Resources Region	Number of Rivers	Name of Major River Basins
No.1	1	Abra
No.2	2	Abulug, Cagayan
No.3	2	Agno, Pampanga
No.4	1	Pasig-Laguna Bay
No.5	1	Bicol
No.6	3	Panay, Jalaur, Ilog-Hilabangan
No.7	0	
No.8	0	
No.9	0	
No.10	3	Cagayan de Oro, Tagoloan, Agusan
No.11	3	Tagum-Libuganon, Davao, Buayan-Malungan
No.12	2	Agus, Mindanao
Total	18	

Tab. 3-4 List of Major River Basins and Principal River Basins

No.	River Name (Major River Basins)	W.R.R.	No.	River Name	W.R.R.	No.	River Name	W.R.R.	No.	River Name	W.R.R.
1	ABRA	01	18	LINAO	02	131	DAET-BASUD	05	244	ITSBAO	09
2	ABULUG	02	20	PALANAN-PINACANAUAAN	02	132	DARRAGA	05	245	TUMAGA	09
3	CAGAYAN	02	21	PALAWA	02	133	DONSOL	05	246	TUPLAC	09
4	PAMPANGA	03	22	PAMPONA	02	134	FAROLA-TUGRUGAN-	05	247	ALILILIP	10
5	AGNO	04	23	TABOAN	02	135	GUINALE	05	248	ASGA	10
6	PASSI-LAGUNA BAY	05	24	AGUANG	03	136	GUJOM	05	249	BALATOCCAN	10
7	BICO	06	25	ALAMBOS	03	137	KILIGAY-CATABANGAN	05	250	CARABIGARRAN	10
8	JLOG-HILABANGAN	06	26	ANGAT	03	138	LABO	05	251	CABULUG	10
9	JALAUD	06	27	BALANGA	03	139	LAGONJOY	05	252	GAS LULET	10
10	PANAY	06	28	BALANGA	03	140	LANANG	05	253	GINASOOG	10
12	CAGAYAN DE ORO	10	29	BALINCIGUIN	03	141	MALBAGO	05	254	IRONDIH	10
13	TAGALUAN	10	30	BUCAO	03	142	MANDAONG	05	255	LAKE MAINIT-TUBAY	10
14	SUBAYAN-MALINGUN	11	31	DAGUPAN	03	143	MATNOG	05	256	LINUGOS	10
15	DAVAO	11	32	LAWIS	03	144	NAMDAY	05	257	MAGALLANES	10
16	TAGUM-LIBUGANON	11	33	MORON	03	145	NAJOCO-AGUADA-	05	258	MALINDAO INLET	10
17	AGUS	12	34	NAYAM	03	146	OGOD	05	259	MANDULOG	10
18	MINDANAO	12	35	PANATAWAN	03	147	PAJO	05	260	ODONGAN	10
			36	PATALAN	03	148	PUTAO	05	261	SURBIAO	10
			37	SANTO TOMAS	03	149	RAGAY	05	262	BANGANGA-MAHANEB	11
			37	UMIRAY	03	150	TAMBANG	05	263	BIG LUN	11
			38	ABONGAN	04	151	TINALMUD	05	264	BISLIG	11
			39	ARCOLAN	04	152	AKALAYANGAN	06	265	DIANAYAN	11
			40	ABRA DE ILOG	04	153	AKLAN	06	266	BUGNAN-MAYO	11
			41	AGCOS	04	154	ALINGON	06	267	CANTILLAN	11
			42	AGSALIN	04	155	BAGO	06	268	CARAGA	11
			43	ANWAY	04	156	CAINTITAN	06	269	CASANIUAN	11
			44	ANAHAWN	04	157	CAIRAUAN	06	270	CATUL	11
			45	ANIBAWAN	04	158	DALANAS	06	271	DAPRAS	11
			46	ARURAUAN	04	159	DANAO	06	272	DEGOS	11
			47	ARAMAYAWAN	04	160	GRANDE	06	273	GLAN	11
			48	RABUYAN	04	161	GUMBRAL	06	274	HUO	11
			49	BACUNGAN	04	162	HMOCCAN	06	275	HINATUAN	11
			50	BALETE	04	163	IMBANG	06	276	HUBO-CITEZA	11
			51	BANABANG-MOLINO	04	164	JALO	06	277	LASANG	11
			52	BANSANG	04	165	JARO AGANAN	06	278	LIPADAS	11
			53	BANSUD	04	166	MALCOG	06	279	LITTLE LUN	11
			54	BARAKAN	04	167	PIVATIAN	06	280	TAGO	11
			55	BAROC	04	168	SIBALOM-WEST-	06	281	MANURIGAO	11
			56	BATON-BATON	04	169	SICABA	06	282	MATIBO	11
			57	BROOL	04	170	SIBLAY	06	283	PALADA MAINIT	11
			58	BOAC	04	171	TIBIAO	06	284	QUINONAN	11
			59	BOLBOK-LAWAYA-	04	172	ABATAN	07	285	SIKUL	11
			60	BONGABON	04	173	BALAMBAN	07	286	SUMLOG	11
			61	BULLALAGAO	04	174	IBANG	07	287	TAGO	11
			62	BUTAS	04	175	CANDUGAY	07	288	TAGULAYA-SIBULAN	11
			63	CAGARAY	04	176	CAJITAN	07	289	TALOMO	11
			64	CALALUG	04	177	GUINABASAN	07	290	TANDAG	11
			65	CANAS	04	178	IBANG	07	291	TORARAN	11
			66	CANIPAN	04	179	IPIL	07	292	DAPAO	12
			67	CARAMAY	04	180	KOTKOT	07	293	KALAOING	12
			68	CATANAUAN	04	181	LIBERTAD	07	294	KRAAN	12
			69	CONDUGA	04	182	IBANG	07	295	LIANGAN	12
			70	CULASIAN	04	183	MANANGA	07	296	MARANDING	12
			71	ERAN	04	184	MATULID	07	297	MATABER	12
			72	EUANTROPIA	04	185	IBANG	07	298	MATALING	12
			73	GUBALINAN	04	186	SAPANG DAKO	07	299	NITUAN	12
			74	IBOD	04	187	SIATON	07	300	TIAN	12
			75	ILANG-IJANG	04	188	SIPONG	07	301	TY-LANG	12
			76	IBOC-PALAWAN-	04	189	PANAY	07			
			77	IMUS	04	190	TYABANAN	07			
			78	INAGAUAN	04	191	BALANGA	08			
			79	IWAHIG	04	192	IBANG	08			
			80	IWAHIG PENAL	04	193	BIHAHAN	08			
			81	IWAHIG-BROOKES-	04	194	BISAY	08			
			82	IYAM	04	195	BUNGGUPOGON	08			
			83	KALWA	04	196	IBANG	08			
			84	KAPUMPONG	04	197	CADACAN	08			
			85	KINLUGAN	04	198	CALBGA	08			
			86	LABANGAN	04	199	CATARMAN	08			
			87	LALAYA	04	200	LAGUITAN-MARABANG	08			
			88	LABOC-BALSAHAN-	04	201	DOLORES	08			
			89	LAGOLA-PAGSANJAN	04	202	GANDARA	08			
			90	LAMARAN	04	203	HIMANGAN	08			
			91	LANGOGAN	04	204	JIBATAN	08			
			92	LIAN	04	205	LLORENTO	08			
			93	LUGAN-MALAYBALAY	04	206	MANO	08			
			94	LUNBITAO	04	207	ORAS	08			
			95	MAAFON	04	208	PAGBANGARAN	08			
			96	MACALELON	04	209	PAGSANGAHAN	08			
			97	MAG-SAWANG TUBIG	04	210	PALO	08			
			98	MABANDI	04	211	PAMBUKHAN	08			
			99	MALABANGAN	04	212	PANDAN	08			
			100	MALAKING ILOG	04	213	SALANO-QUILOT-	08			
			101	MALASSAO	04	214	SALUS	08			
			102	MALAYLAY-BACO	04	215	SANSPUTAN	08			
			103	MAMBURAO	04	216	SILAGA	08			
			104	MARAGONDONG	04	217	SULAT	08			
			105	MONONG	04	218	SURBIAO	08			
			106	OKAYAN	04	219	TAFT	08			
			107	PAGBAHAN	04	220	ULOT	08			
			108	PANDANAN	04	221	ALORAN	09			
			109	PANTIAN	04	222	ANUNGAN	09			
			110	PANSIPIT	04	223	BAKALIN	09			
			111	ROLA	04	224	CLARIN	09			
			112	PULA	04	225	DESA	09			
			113	PULANG TUBIG	04	226	DIKAY	09			
			114	PULOT	04	227	DIPOLOG	09			
			115	REAL	04	228	GUBAUAN	09			
			116	ROGARDO-LOBO	04	229	SUMALANG	09			
			117	SAMAGUI	04	230	KAMALARANG	09			
			118	SANTA LUCIA	04	231	LABANGAN	09			
			119	SILONGIN	04	232	MALAYAT-ALMPAYA	09			
			120	FAMERAN-TAGUM	04	233	WAPANG	09			
			121	TIGA PLAN	04	234	ORQUETA	09			
			122	TRINIDAD	04	235	PALLAN	09			
			123	VINAS	04	236	PANGMIRAN	09			
			124	YABAHAAN	04	237	PARO (DAPITAN)	09			
			125	ASID	05	238	PATAUG	09			
			126	BANUANG-DUAN	05	239	QUIPIT	09			
			127	BATO	05	240	SANTO	09			
			128	BELENO	05	241	SIBUCO	09			
			129	CABUYAN	05	242	SIBUGUEY	09			
			130	CADACAN	05	243	TAGUIEY	09			

Tab. 3-5 Number of Other River Basins Categorized by Water Resources Region

Water Resources Region	Number of Small River Basins
No.1	43
No.2	46
No.3	71
No.4	157
No.5	86
No.6	23
No.7	52
No.8	40
No.9	46
No.10	41
No.11	124
No.12	41
Total	770

Tab. 3-6 List of Other River Basins (1/2)

No.	River Name	W.R.R.	No.	River Name	W.R.R.	No.	River Name	W.R.R.	No.	River Name	W.R.R.
1	AGOO-1	01	113	DINGALAN-3	03	225	LOBO-2	04	337	CAPALONGA-2	05
2	AGOO-2	01	114	DINGALAN-4	03	226	LOBO-3	04	338	CARAMOAN-1	05
3	BACNOTAN	01	115	DINGALAN-5	03	227	LOBO-4	04	339	CARAMOAN-2	05
4	BALAOAN	01	116	DIPACULAO-1	03	228	LOPEZ	04	340	CARAMORAN-1	05
5	BANGAR	01	117	DIPACULAO-2	03	229	LUBANG	04	341	CARAMORAN-2	05
6	BANGUI	01	118	DIPACULAO-3	03	230	MABINI-1-(a)	04	342	CARAMORAN-3	05
7	BANTAY	01	119	GENERAL NAKAR-1-(a)	03	231	MAGSAYSAY-1-(a)	04	343	CASIGURAN-1-(b)	05
8	BAUANG-1-S	01	120	GENERAL NAKAR-2-(a)	03	232	MAGSAYSAY-2-(b)	04	344	CASIGURAN-2-(b)	05
9	BAUANG-2-S	01	121	GUGUA	03	233	MAMBURAO-1-S	04	345	CASTILLA	05
10	BURGOS-1-(a)	01	122	INFANTA	03	234	MAMBURAO-2-S	04	346	DARAGA (LOCSIN)	05
11	BURGOS-2-(a)	01	123	LABRADOR	03	235	MANSALAY-1	04	347	DIMASALANG	05
12	BURGOS-3-(a)	01	124	LIMAY-1	03	236	MANSALAY-2	04	348	DONSOL-1-S	05
13	GABA	01	125	LIMAY-2	03	237	MAUBAN-1	04	349	GAINZA	05
14	CABUGAO	01	126	LINGAYEN	03	238	MAUBAN-2	04	350	GIGMOTO	05
15	CANDON-1	01	127	MARIVELES-1	03	239	MAUBAN-3	04	351	GUBAT	05
16	CANDON-2	01	128	MARIVELES-2	03	240	MAUBAN-4	04	352	JOSE PANGANIBAN-1	05
17	CURRIMAO	01	129	MARIVELES-3	03	241	MMANILA	04	353	JOSE PANGANIBAN-2	05
18	LAOAG-1-S	01	130	MASINLOC	03	242	MOGPOG-1	04	354	LEGAZPI CITY	05
19	MAGSINGAL	01	131	MORONG-1	03	243	MOGPOG-2	04	355	MALILIPOT	05
20	NARVACAN-1	01	132	MORONG-2	03	244	MULANAY	04	356	MANDAON-1	05
21	NARVACAN-2	01	133	MORONG-3	03	245	NASUGBU-1	04	357	MANDAON-2	05
22	NUUEVA ERA	01	134	MORONG-4	03	246	NASUGBU-2	04	358	MANITO	05
23	PAGUDPUD-1	01	135	OLONGAPO CITY	03	247	NASUGBU-3	04	359	MATNOG-1-S	05
24	PAGUDPUD-2	01	136	ORION-1	03	248	NAUJAN	04	360	MATNOG-2-S	05
25	PAGUDPUD-3	01	137	ORION-2	03	249	PADRE BURGOS	04	361	MILAGROS-1	05
26	PAGUDPUD-4	01	138	PALAUIG-1	03	250	PAGBILAO-1	04	362	MILAGROS-2	05
27	PAOAY	01	139	PALAUIG-2	03	251	PAGBILAO-2	04	363	MILAGROS-3	05
28	PASQUIN-1	01	140	ROSARIO-1-(a)	03	252	PALUAN-1	04	364	MILAGROS-4	05
29	PASQUIN-2	01	141	SAMAL	03	253	PALUAN-2	04	365	OAS-1	05
30	PASQUIN-3	01	142	SAN ANTONIO-1	03	254	PALUAN-3	04	366	OAS-2	05
31	PASQUIN-4	01	143	SAN ANTONIO-2	03	255	PANUKULAN	04	367	PANDAN-1-S	05
32	SAN ESTEBAN	01	144	SAN ANTONIO-3	03	256	PINAMALAYAN	04	368	PANDAN-2-S	05
33	SAN FERNANDO-1-(a)	01	145	SAN ANTONIO-4	03	257	PITOGO	04	369	PARACALE-1	05
34	SAN FERNANDO-2-(a)	01	146	SAN FABIAN-1	03	258	POLA-1-S	04	370	PARACALE-2	05
35	SAN JUAN-1-(a)-S	01	147	SAN FABIAN-2	03	259	POLILLO	04	371	PASACAO	05
36	SAN JUAN-2-(a)-S	01	148	SAN FELIPE	03	260	PUERTO GALERA	04	372	PILAR-1-(a)	05
37	SANTA CRUZ-1-(a)	01	149	SAN LUIS-1-(a)	03	261	PUERTO PRINCESA CITY-1	04	373	PIO DURAN	05
38	SANTIAGO	01	150	SAN LUIS-2-(a)	03	262	PUERTO PRINCESA CITY-10	04	374	PRESENTACION (PARUBCAN)-1	05
39	SANTO DOMINGO	01	151	SAN LUIS-3-(a)	03	263	PUERTO PRINCESA CITY-2	04	375	PRESENTACION (PARUBCAN)-2	05
40	SANTO TOMAS-1-S-(a)	01	152	SAN NARCISO-1-(a)	03	264	PUERTO PRINCESA CITY-3	04	376	PRIETO DIAZ-1	05
41	SANTOL	01	153	SANTA CRUZ-1-(b)	03	265	PUERTO PRINCESA CITY-4	04	377	PRIETO DIAZ-2	05
42	SINAIT	01	154	SANTA CRUZ-2-(b)	03	266	PUERTO PRINCESA CITY-5	04	378	RAGAY-1-S	05
43	SUYO	01	155	SANTO TOMAS-1-S-(b)	03	267	PUERTO PRINCESA CITY-6	04	379	SAGNAY-1	05
44	BAGGAAO	02	156	SUAL-1	03	268	PUERTO PRINCESA CITY-7	04	380	SAGNAY-2	05
45	BALLESTEROS	02	157	SUBIC-1	03	269	PUERTO PRINCESA CITY-8	04	381	SAN ANDRES-1-(b)	05
46	BUGUEY	02	158	SUBIC-2	03	270	PUERTO PRINCESA CITY-9	04	382	SAN JACINTO	05
47	CASIGURAN-1-(a)	02	159	SUBIC-3	03	271	QUEZON-1	04	383	SAN LORENZO RUIZ (MELDA)	05
48	CASIGURAN-2-(a)	02	160	SUBIC-4	03	272	QUEZON-2	04	384	SAN MIGUEL-1-(a)	05
49	CASIGURAN-3-(a)	02	161	ABORLAN-1	04	273	QUEZON-3	04	385	SAN PASCUAL-1-(b)	05
50	CASIGURAN-4-(a)	02	162	ABORLAN-2	04	274	QUEZON-4	04	386	SANTA ELENA	05
51	CLAVERIA	02	163	ABORLAN-3	04	275	QUEZON-5	04	387	SANTA MAGDALENA	05
52	DILASAG	02	164	ABORLAN-4	04	276	QUEZON-6	04	388	SIPOCOT-1-S	05
53	DINALUNGAN-1	02	165	ABRA DE ILOG-1	04	277	QUEZON-7	04	389	SIRUMA	05
54	DINALUNGAN-2	02	166	ABRA DE ILOG-2	04	278	QUEZON-8	04	390	SORSOGON-1	05
55	DINAPIGUE-1	02	167	ABRA DE ILOG-4	04	279	QUEZON-9	04	391	SORSOGON-2	05
56	DINAPIGUE-2	02	168	AGDANGAN	04	280	REAL-1	04	392	SORSOGON-3	05
57	DINAPIGUE-3	02	169	ARACELI	04	281	REAL-2	04	393	TALISAY	05
58	DINAPIGUE-4	02	170	ATIMONAN	04	282	RIZAL-1-S-(a)	04	394	TIGAON	05
59	GATTARAN	02	171	BALAYAN	04	283	RIZAL-2-S-(a)	04	395	TINAMBAC-1	05
60	GONZAGA-1	02	172	BATANGAS CITY-1	04	284	RIZAL-3-S-(a)	04	396	TINAMBAC-2	05
61	GONZAGA-2	02	173	BATANGAS CITY-2	04	285	ROXAS-1	04	397	TINAMBAC-3	05
62	GONZAGA-3	02	174	BATANGAS CITY-3	04	286	ROXAS-2	04	398	TIWI-1	05
63	ILAGAN-1-S	02	175	BATARAZA-1	04	287	ROXAS-3	04	399	TIWI-2	05
64	ILAGAN-2-S	02	176	BATARAZA-2	04	288	SABLAYAN-1	04	400	VIGA	05
65	LAL-LO-1	02	177	BOAC-1-S	04	289	SABLAYAN-2	04	401	VIRAC-1	05
66	LAL-LO-2	02	178	BONGABONG-1	04	290	SABLAYAN-3	04	402	VIRAC-2	05
67	PALANAN-1	02	179	BONGABONG-2	04	291	SABLAYAN-4	04	403	VIRAC-3	05
68	PALANAN-2	02	180	BROOKE'S POINT-1	04	292	SABLAYAN-5	04	404	AJUJ	06
69	PALANAN-3	02	181	BROOKE'S POINT-2	04	293	SAN AGUSTIN	04	405	BACOLOD CITY	06
70	PALANAN-4	02	182	BROOKE'S POINT-3	04	294	SAN ANDRES-1-(a)	04	406	BANATE	06
71	PALANAN-5	02	183	BROOKE'S POINT-4	04	295	SAN FERNANDO-1-(b)	04	407	BAROTAC NUEVO	06
72	PAMPLONA-1-S	02	184	BROOKE'S POINT-5	04	296	SAN FRANCISCO-1	04	408	BELISON	06
73	PENABLANGA-1	02	185	BROOKE'S POINT-6	04	297	SAN FRANCISCO-2	04	409	CADIZ CITY	06
74	PENABLANGA-2	02	186	BROOKE'S POINT-7	04	298	SAN JOSE-1-(a)	04	410	ENRIQUE B. MAGALONA (SARANA)	06
75	SAN MARIANO-1	02	187	BUENAVISTA-1-(a)	04	299	SAN JUAN-1-(b)-S	04	411	ESCALANTE CITY	06
76	SAN MARIANO-2	02	188	BUENAVISTA-2-(a)	04	300	SAN JUAN-1-(b)-S	04	412	HIMAMAYLAN CITY	06
77	SAN PABLO-1	02	189	BULALACAO-1-S	04	301	SAN LUIS-1-(b)	04	413	LA CARLOTA CITY	06
78	SAN PABLO-2	02	190	BULALACAO-2-S	04	302	SAN NARCISO-1-(b)	04	414	MIA-GAO	06
79	SAN PABLO-3	02	191	BULALACAO-3-S	04	303	SAN PASQUAL-1-(a)	04	415	MURCIA-1	06
80	SANCHEZ-MIRA-1	02	192	BULALACAO-4-S	04	304	SAN VICENTE	04	416	MURCIA-2	06
81	SANCHEZ-MIRA-2	02	193	BULALACAO-5-S	04	305	SANTA CRUZ-1-(c)	04	417	NEW WASHINGTON	06
82	SANCHEZ-MIRA-3	02	194	BULALACAO-6-S	04	306	SANTA CRUZ-2-(c)	04	418	ILOILO	06
83	SANTA ANA-1	02	195	BURDEOS-1	04	307	SANTA CRUZ-3-(c)	04	419	PONTEVEDRA	06
84	SANTA ANA-2	02	196	BURDEOS-2	04	308	SANTA CRUZ-4-(c)	04	420	SAGAY	06
85	SANTA ANA-3	02	197	CALACA	04	309	SARIAYA	04	421	SAN DIONISIO	06
86	SANTA ANA-4	02	198	CALAPAN CITY	04	310	TANZA-1	04	422	SAN JOAQUIN	06
87	SANTA ANA-5	02	199	CALATAGAN-1	04	311	TANZA-2	04	423	TANGALAN	06
88	SANTA ANA-6	02	200	CALATAGAN-2	04	312	TAYABAS	04	424	TOBIAS FERNIER (DAO)	06
89	SANTA PRAXEDES	02	201	CALATAGAN-3	04	313	TAYATAY	04	425	TOBOSO	06
90	ABUCAY	03	202	CALAUAG-1-S	04	314	TERNATE	04	426	VICTORIAS CITY	06
91	AGNO-1-S	03	203	CALAUAG-2-S	04	315	TORRIGOS-1	04	427	ALCANTARA	07
92	AGNO-2-S	03	204	CATANAUAN-1-S	04	316	TORRIGOS-2	04	428	ALGUINSAN	07
93	ALAMINOS-1-S	03	205	CATANAUAN-2-S	04	317	UNISAN	04	429	AMLAN	07
94	BAGAC-1	03	206	CATANAUAN-3-S	04	318	ARORAY-1	05	430	ARGAO-1	07
95	BAGAC-2	03	207	DUMARAN	04	319	ARORAY-2	05	431	ARGAO-2	07
96	BAGAC-3	03	208	EL NIDO-1	04	320	ARORAY-3	05	432	AYUNGON-1	07
97	BAGAC-4	03	209	EL NIDO-2	04	321	BACON-1	05	433	AYUNGON-2	07
98	BAGAC-5	03	210	GASAN	04	322	BACON-2	05	434	BARILI	07
99	BAGAC-6	03	211	GENERAL LUNA-1	04	323	BACON-3	05	435	BILAR	07
100	BALANGA-1-S	03	212	GENERAL LUNA-2	04	324	BAGAMANOC	05	436	BINDOY	07
101	BALER	03	213	GENERAL NAKAR-1-(b)	04	325	BALATAN	05	437	BORBON	07
102	BANI	03	214	GENERAL NAKAR-2-(b)	04	326	BARCELONA	05	438	BUENAVISTA-1-(b)	07
103	BOLINAO	03	215	GENERAL NAKAR-3-(b)	04	327	BASUD-1	05	439	CARCAR	07
104	BURGOS-1-(b)	03	216	GENERAL NAKAR-4-(b)	04	328	BASUD-2	05	440	CARMEN-(a)	07
105	BURGOS-2-(b)	03	217	GENERAL NAKAR-5-(b)	04	329	BASUD-3	05	441	CEBU CITY	07
106	CABANGAN-1	03	218	GLORIA	04	330	BULAN-1	05	442	DALAGUETE	07
107	CANDELARIA	03	219	GUMACA	04	331	BULAN-2	05	443	DANAOG CITY	07
108	DASOL-1	03	220	IMUS-1-S	04	332	BULUSAN-1	05	444	DAUIN-1	07
109	DASOL-2	03	221	LEMERY-1	04	333	BULUSAN-2	05	445	DAUIN-2	07
110	DINALUPIHAN	03	222	LEMERY-2	04	334	CALABANGA-1	05	446	DUMANJUG	07
111	DINGALAN-1	03	223	LIAN-PALAWAN	04	335	CALABANGA-2	05	447	GUINDULMAN-1	07
112	DINGALAN-2	03	224	LOBO-1	04	336	CAPALONGA-1	05	448	GUINDULMAN-2	07

Tab. 3-6 List of Other River Basins (2/2)

No.	River Name	W.R.R.	No.	River Name	W.R.R.	No.	River Name	W.R.R.
449	JIMALALUD	07	561	ZAMBOANGA CITY-6	09	673	MABINI-1-(b)	11
450	LOON	07	562	ZAMBOANGA CITY-7	09	674	MABINI-2-(b)	11
451	MANJUJOD	07	563	ZAMBOANGA CITY-8	09	675	MABINI-3-(b)	11
452	MARIBOJOC	07	564	ZAMBOANGA CITY-9	09	676	MACO	11
453	MINGLANILLA	07	565	BACUJAG	10	677	MAITUM-1-(a)	11
454	NAGA	07	566	BALINGASAG	10	678	MALALAG	11
455	PINAMUNGAHAN-1	07	567	BALINGOAN	10	679	MALAPATAN-1	11
456	PINAMUNGAHAN-1	07	568	BUENAVISTA-1-(c)	10	680	MALAPATAN-2	11
457	SAGBAYAN	07	569	BUENAVISTA-2-(c)	10	681	MALAPATAN-3	11
458	SAN FERNANDO-1-(c)	07	570	CABADBARAN-1-S	10	682	MALITA-1	11
459	SAN JOSE-1-(b)	07	571	CARMEN-(b)	10	683	MALITA-2	11
460	SANTA CATALINA-1	07	572	CARRASCAL-1	10	684	MALITA-3	11
461	SANTA CATALINA-2	07	573	CARRASCAL-2	10	685	MALITA-4	11
462	SANTA CATALINA-3	07	574	CARRASCAL-3	10	686	MANAY-1	11
463	SIATON-1-S	07	575	CATARMAN-1-S	10	687	MANAY-2	11
464	SIATON-2-S	07	576	CLAVER-1	10	688	MANAY-3	11
465	SIQUJOR	07	577	CLAVER-2	10	689	MARIHATAG	11
466	SOGOD	07	578	CLAVER-3	10	690	MATI-1	11
467	TABOGON	07	579	CLAVER-4	10	691	MATI-10	11
468	TAGBILARAN CITY	07	580	CLAVER-5	10	692	MATI-11	11
469	TAYASAN	07	581	CLAVER-6	10	693	MATI-12	11
470	TOLEDO CITY	07	582	DAPA	10	694	MATI-13	11
471	TRINIDAD	07	583	DEL CARMEN	10	695	MATI-14	11
472	TUBIGON	07	584	EL SALVADOR-1	10	696	MATI-15	11
473	TUBURAN-1-(a)	07	585	EL SALVADOR-2	10	697	MATI-2	11
474	TUBURAN-2-(a)	07	586	GINGOOG CITY-1	10	698	MATI-3	11
475	UBAY-1	07	587	GINGOOG CITY-2	10	699	MATI-4	11
476	UBAY-2	07	588	GINGOOG CITY-3	10	700	MATI-5	11
477	VALENCIA (LUZURRIAGA)	07	589	JABONGA	10	701	MATI-6	11
478	ZAMBOANGUITA	07	590	JASAAN-1	10	702	MATI-7	11
479	ALBUERA	08	591	JASAAN-2	10	703	MATI-8	11
480	BALANGKAYAN	08	592	LAGONGONG	10	704	MATI-9	11
481	BASEY-1-S	08	593	MAGSAYSAY-1-(b)	10	705	PANABO CITY	11
482	BAYBAY-1	08	594	MAINIT	10	706	PANTUKAN-1	11
483	BAYBAY-2	08	595	MALIMONO-1	10	707	PANTUKAN-2	11
484	BAYBAY-3	08	596	MALIMONO-2	10	708	PANTUKAN-3	11
485	BAYBAY-4	08	597	MANOLO FORTICH	10	709	POLOMOLOK	11
486	BOBON-1	08	598	MEDINA-1-(b)	10	710	ROSARIO-1-(b)	11
487	BOBON-2	08	599	OPO	10	711	SAN ISIDRO-1	11
488	BONTOC	08	600	PILAR-1-(b)	10	712	SAN ISIDRO-2	11
489	CALBAYOG CITY-1	08	601	PLACER	10	713	SAN ISIDRO-3	11
490	CALBAYOG CITY-2	08	602	SALAY	10	714	SAN ISIDRO-4	11
491	CALBAYOG CITY-3	08	603	SURIGAO CITY-1	10	715	SAN ISIDRO-5	11
492	CALBAYOG CITY-4	08	604	SURIGAO CITY-2	10	716	SANTA CRUZ-1-(d)	11
493	CALBAYOG CITY-5	08	605	TAGANA-AN	10	717	SANTA CRUZ-2-(d)	11
494	CALBIGA-1-S	08	606	ALABEL	11	718	SANTA CRUZ-3-(d)	11
495	CAN-AVID	08	607	BAGANGA-1	11	719	SANTA MARIA-1	11
496	CARIGARA	08	608	BAGANGA-2	11	720	SANTA MARIA-2	11
497	CULABA	08	609	BAGANGA-3	11	721	SANTA MARIA-3	11
498	GENERAL MACARTHUR	08	610	BAGANGA-4	11	722	TAGBINA-1	11
499	GIPORLOS	08	611	BAGANGA-5	11	723	TAGBINA-2	11
500	HINUNDAYAN	08	612	BANAYBANAY-1	11	724	TAGUM CITY	11
501	JAVIER	08	613	BANAYBANAY-2	11	725	TANDAG-1-S	11
502	LEYTE	08	614	BANAYBANAY-3	11	726	TANDAG-2-S	11
503	LIBAGON	08	615	BAROBO	11	727	TARRAGONA-1	11
504	LILUAN	08	616	BISLIG-1-S	11	728	TARRAGONA-2	11
505	MARABUTI	08	617	BISLIG-2-S	11	729	TARRAGONA-3	11
506	MATALOM	08	618	BISLIG-3-S	11	730	BALABAGAN	12
507	MERIDA-1-(a)	08	619	BISLIG-4-S	11	731	DATU ODIN SINSUAT (DINAIG)	12
508	MERIDA-2-(a)	08	620	BOSTON	11	732	ILIGAN CITY-1	12
509	MONDRAGON	08	621	CAGWAIT	11	733	ILIGAN CITY-2	12
510	ORAS-1-S	08	622	CARAGA-1-S	11	734	INITAO	12
511	ORMOC CITY	08	623	CARAGA-2-S	11	735	KALAMANSIG-1	12
512	PALOMPON	08	624	CATEEL	11	736	KALAMANSIG-2	12
513	SAINT 1	08	625	CORTES-1	11	737	KALAMANSIG-3	12
514	SAINT BERNARD	08	626	CORTES-2	11	738	KAROMATAN (SULTAN NAGA DIMAPO)-1	12
515	SAN MIGUEL-1-(b)	08	627	DAVAO CITY	11	739	KAROMATAN (SULTAN NAGA DIMAPO)-2	12
516	SAN POLICARPO	08	628	DAVAO CITY4	11	740	KAROMATAN (SULTAN NAGA DIMAPO)-3	12
517	SAN ROQUE	08	629	DIGOS-1-S	11	741	LALA	12
518	TAFT-1-S	08	630	DON MARCELINO6	11	742	LEBAK	12
519	BUUG-1	09	631	GENERAL SANTOS CITY-1	11	743	MAIGO	12
520	BUUG-1	09	632	GENERAL SANTOS CITY-2	11	744	MAITUM-1-(b)	12
521	CALAMBA	09	633	GLAN-1-S	11	745	MAITUM-2-(b)	12
522	IPIL-1-S	09	634	GLAN-2-S	11	746	MAITUM-3-(b)	12
523	ISABEL	09	635	GLAN-3-S	11	747	MAITUM-4-(b)	12
524	JOSE DALMAN (PONOT)	09	636	GLAN-4-S	11	748	MANTICAO	12
525	KALAWIT	09	637	GLAN-5-S	11	749	MATANOG-1	12
526	KATIPUNAN	09	638	GLAN-6-S	11	750	MATANOG-2	12
527	LABASON-1	09	639	GLAN-7-S	11	751	NAAWAN	12
528	LABASON-2	09	640	GOVERNOR GENEROSO-1	11	752	PALIMBANG-1	12
529	LAMITAN-1	09	641	GOVERNOR GENEROSO-2	11	753	PALIMBANG-2	12
530	LAMITAN-2	09	642	GOVERNOR GENEROSO-3	11	754	PALIMBANG-3	12
531	LANTAWAN	09	643	GOVERNOR GENEROSO-4	11	755	PALIMBANG-4	12
532	LOPEZ JAENA	09	644	GOVERNOR GENEROSO-5	11	756	PALIMBANG-5	12
533	MANUKAN-1	09	645	GOVERNOR GENEROSO-6	11	757	PALIMBANG-6	12
534	MANUKAN-2	09	646	GOVERNOR GENEROSO-7	11	758	PALIMBANG-7	12
535	OZAMIS CITY	09	647	GOVERNOR GENEROSO-8	11	759	SULTAN GUMANDER-1	12
536	PAGADJAN CITY	09	648	HINATUAN-1-S	11	760	SULTAN GUMANDER-2	12
537	PRES. MANUEL A. ROXAS	09	649	HINATUAN-2-S	11	761	TANGCAL	12
538	RIZAL-1-S-(b)	09	650	JOSE ABAD SANTOS (TRINIDAD)-1	11	762	TUBOD	12
539	SAPANG DALAGA	09	651	JOSE ABAD SANTOS (TRINIDAD)-2	11	763	UPI-1	12
540	SIBUCO-1-S	09	652	JOSE ABAD SANTOS (TRINIDAD)-3	11	764	UPI-2	12
541	SIBUCO-2-S	09	653	KIAMBA-1	11	765	UPI-3	12
542	SINACABAN	09	654	KIAMBA-2	11	766	UPI-4	12
543	SUMISIP-1	09	655	KIAMBA-3	11	767	UPI-5	12
544	SUMISIP-2	09	656	KIAMBA-4	11	768	UPI-6	12
545	SUMISIP-3	09	657	KIAMBA-5	11	769	UPI-7	12
546	TANGUB CITY	09	658	KIAMBA-6	11	770	UPI-8	12
547	TIPO-TIPO	09	659	LANUZA-1	11			
548	TUBURAN-1-(b)	09	660	LANUZA-2	11			
549	TUKURAN	09	661	LANUZA-3	11			
550	ZAMBOANGA CITY-1	09	662	LANUZA-4	11			
551	ZAMBOANGA CITY-10	09	663	LIANGA-1	11			
552	ZAMBOANGA CITY-11	09	664	LIANGA-2	11			
553	ZAMBOANGA CITY-12	09	665	LIANGA-3	11			
554	ZAMBOANGA CITY-13	09	666	LIANGA-4	11			
555	ZAMBOANGA CITY-14	09	667	LINGIG-1	11			
556	ZAMBOANGA CITY-15	09	668	LINGIG-2	11			
557	ZAMBOANGA CITY-2	09	669	LINGIG-3	11			
558	ZAMBOANGA CITY-3	09	670	MAASIM-1	11			
559	ZAMBOANGA CITY-4	09	671	MAASIM-2	11			
560	ZAMBOANGA CITY-5	09	672	MAASIM-3	11			

Tab. 3-7 Collected Data and Data Arrangement for Evaluation Indexes

Evaluation Index		Collected Data	Source of Data
S1	Poverty Incidence	Provincial poverty incidence was collected (%).	NSCB, 2000
S2	Population	City/municipality population (2000) was collected (persons).	NSO, 2000 Population Census
S3	Population Movement	City/municipality population (2005 projection) was collected, and growth rate was calculated (%).	NSO, 2005 Population Projection
S4	Production	Provincial average annual family income and family number were collected, and production was estimated by multiplying them (million pesos).	NSCB, 2000
S5	Forest Cover Ratio	Nationwide land use map was collected.	NAMRIA, s=1/100,000, Land Sat 2002-03
S6	Built-up Area Ratio	Nationwide land use map was collected.	NAMRIA, s=1/100,000, Land Sat 2002-03
S7	Flood Casualties	City/municipality annual casualties caused by typhoons and flashfloods were collected and averaged (persons/year).	DSWD, 1996-2005 (10 years)
S8	Flood Damages	Provincial damage per destructive typhoon was collected and averaged (million pesos /typhoon).	NDCC, 2001-2005 (25 Typhoons)
N1	Frequency of Tropical Cyclones	Provincial annual average passage of tropical cyclones was collected (times/year).	PAGASA, 1948-2000
N2	Rainfall Intensity	Nationwide isohyet graph (1/25) was collected, and basin value was estimated (mm/day).	FCSEC, 2003
N3	River Gradient	DEM data was collected, and averaged slope of river was estimated (degree).	DEM, NASA 2000
N4	Ratio of Hazards Zone of Volcano	Location of active/potential volcano and its influential area (ground gradient is greater than 2 degrees) was prepared, and ratio was estimated.	Volcano Location: PHIVOLCS, 2005
N5-C	Frequency of Floods based on Flood Casualty Data	Flood frequency was estimated based on the same data as S7 (times/10 years).	DSWD, 1996-2005 (10 years)
N5-D	Frequency of Floods based on Flood Damage Data	Flood frequency was estimated based on the same data as S8 (times/5 years).	NDCC, 2001-2005 (25 Typhoons)

Tab. 3-8 River Basin Data

Condition	Evaluation Index		Basic Data	River Basin Data
Socio-Economic	S1	Poverty Incidence	Provincial poverty incidence (%)	Basin poverty incidence (%) (refer to Fig. 3-2)
	S2	Population	City/municipality 2000 population (persons)	Basin population (persons) (refer to Fig. 3-3)
	S3	Population Movement	City/municipality population growth rate (%)	Basin population growth rate (%) (refer to Fig. 3-4)
	S4	Production	Provincial production (million pesos)	Basin production (million pesos) (refer to Fig. 3-5)
	S5	Forest Cover Ratio	Nationwide land use map	Basin forest cover ratio (%) (refer to Fig. 3-6)
	S6	Built-up Area Ratio	Nationwide land use map	Basin built-up area ratio (%) (refer to Fig. 3-7)
	S7	Flood Casualties	City/municipality annual average casualties (persons/year)	Basin annual average casualties $\left(\frac{\text{Persons km}^2}{\text{Year } 100}\right)$ (refer to Fig. 3-8)
	S8	Flood Damages	Provincial damages per destructive typhoon (million pesos/typhoon)	Basin annual average damages (million pesos/year) (refer to Fig. 3-9)
Natural	N1	Frequency of Tropical Cyclones	Provincial annual average passage of tropical cyclones (times/year)	Basin annual average passage of tropical cyclones (times/yr) (refer to Fig. 3-10)
	N2	Rainfall Intensity	Nationwide isohyet graph	Basin daily rainfall (mm/day) (refer to Fig. 3-11)
	N3	River Gradient	Estimated average slope based on DEM	Averaged slope of river (degree) (refer to Fig. 3-12)
	N4	Ratio of Hazards Zone of Volcano	Nationwide map of hazards zone of volcano	Basin ratio of hazards zone of volcano (%) (refer to Fig. 3-13)
	N5-C	Frequency of Floods based on Flood Casualty Data	City/municipality frequency of floods based on flood casualty data (times/10 years)	Basin frequency of floods (times/10 years) (refer to Fig. 3-14)
	N5-D	Frequency of Floods based on Flood Damage Data	Provincial frequency of floods based on flood damage data (times/5 years)	Basin frequency of floods (times/5 years) (refer to Fig. 3-15)

Tab. 3-9 List of Score

Category	Sub-Category	Index		Assessment Mark (score)/ Range Condition
Socio-Economic Conditions	Poverty	S1	Poverty Incidence	1-5
	Population	S2	Population	1-5
	Population	S3	Population Movement	1-5
	Assets	S4	Production	1-5
	Land Uses	S5	Forest Cover Ratio	1-5
	Land Uses	S6	Built-up Area ratio	1-5
	Flood Damage Records	S7	Flood Casualties	1-15
	Flood Damage Records	S8	Flood Damages	1-15
Natural Conditions	Meteorology	N1	Frequency of Typhoons	1-5
	Hydrology	N2	Rainfall Intensity	1-5
	Topography	N3	River Gradient	1-5
	Geology	N4	Ratio of Hazards Zone of Volcano	1-5
	Flood Frequency	N5-C	Flood Frequency based on Flood Casualties	1-5
		N5-D	Flood Frequency based on Flood Damages	1-5

Tab. 3-10 Scoring from the First Place to the 100th Place in the First Screening

Rank	RIVER_NAME	W.R. REGION	River Basins	Score Total	Rank	RIVER_NAME	W.R. REGION	River Basins	Score Total
1	BICOL (whole)	06	M-A	57	44	GENERAL NAKAR-2-(b)	04	Other	39
2	GUAGUA	03	Other	56	52	PANAY (whole)	06	M-A	38
3	AMBURAYAN	01	P	55	52	TUGUERARAO	02	P	38
4	CAGAYAN (whole)	02	M-A	54	52	DUMON	02	P	38
4	SIFFU-MALLIG	02	P	54	52	GENERAL NAKAR-2-(a)	03	Other	38
6	DAGUPAN	03	P	53	52	GENERAL NAKAR-5-(b)	04	Other	38
7	ABRA (whole)	01	M-A	52	52	GENERAL NAKAR-4-(b)	04	Other	38
7	ABULUG (whole)	02	M-A	52	52	GENERAL NAKAR-3-(b)	04	Other	38
7	CATARMAN-1-S	10	Other	52	59	JALAUD (whole)	06	M-A	37
10	CHICO	02	P	51	59	CAMILING	03	P	37
10	ANGAT	03	P	51	59	LABO	05	P	37
10	PATALAN	03	P	51	59	PAMPLONA	02	P	37
10	ARINGAY	01	P	51	59	MATUNO	02	P	37
14	PARET	02	P	50	59	AGOS	04	P	37
15	RIO CHICO	03	P	49	59	TANUDAN	02	P	37
15	BAUANG	01	P	49	59	BARARO	01	P	37
17	PAMPANGA (whole)	03	M-A	47	59	TIGNOAN	04	P	37
17	AGNO (whole)	04	M-A	47	59	GENERAL NAKAR-1-(a)	03	Other	37
17	ILAGAN	02	P	47	69	PULANGGI	12	P	36
17	LAOAG	01	P	47	69	PASIG-LAGUNA BAY (whole)	05	M-A	36
21	TINEG	01	P	46	69	BACARRA-VINTAR	01	P	36
21	MMANILA	04	Other	46	69	PALANAN-PINACANAUAN	02	P	36
21	UMIRAY	03	P	46	69	AGUANG	03	P	36
21	MARIKINA	04	P	46	69	LAL-LO-2	02	Other	36
25	CAGARAY	04	P	45	69	HIMOCAAN	06	P	36
26	ABUAN	02	P	44	69	JALAU	06	P	36
26	KALIWA	04	P	44	69	DAGUITAN-MARABANG	08	P	36
28	GANANO	02	P	43	69	BALINCUGUIN	03	P	36
28	SALTAN-BABACA	02	P	43	69	SUYO	01	Other	36
28	DISABUNGAN	02	P	43	69	LEGAZPI CITY	05	Other	36
28	PAGBANGARAN	08	P	43	81	MINDANAO (whole)	12	M-A	35
32	O-DONNEL-MORIONES	03	P	42	81	PANTABANGAN	03	P	35
33	ILOG-HILABANGAN (whole)	06	M-A	41	81	IBULAO	02	P	35
33	MAGAT	02	P	41	81	JALANO	06	P	35
33	SIPOCOT	05	P	41	81	SILAG-SANTA MARIA	01	P	35
36	AGUSAN (whole)	10	M-A	40	81	DONSOL	05	P	35
36	BAGO	06	P	40	81	DAET-BASUD	05	P	35
36	TIAN	12	P	40	81	PULA	04	P	35
36	AMBAYABANG	03	P	40	81	BACOLOD CITY	06	Other	35
36	BALETE	04	P	40	81	IMUS	04	P	35
36	LABAYAT	04	P	40	91	TAGO	11	P	34
36	REAL-2	04	Other	40	91	CORONELL	03	P	34
36	REAL-1	04	Other	40	91	SAN AGUSTIN	04	Other	34
44	ILOG	06	P	39	91	CULABA	08	Other	34
44	HILABANGAN	06	P	39	91	PAGSANGAHAN	08	P	34
44	ADDALAM	02	P	39	91	NUEVA ERA	01	Other	34
44	SIMULAO	10	P	39	91	SANTOL	01	Other	34
44	AKLAN	06	P	39	91	SANTA ANA-1	02	Other	34
44	MATALAG	02	P	39	91	MANSALAY-2	04	Other	34
44	BONGABON	04	P	39	91	BAYBAY-2	08	Other	34

Tab. 3-11 Result of Sensitivity Analysis

	CASE-1	CASE-2	CASE-3
RANK	Analysis with 10 Points for S7 and S8	Analysis with 15 Points for S7 and S8	Analysis with 20 Points for S7 and S8
1	BICOL (whole)	BICOL (whole)	GUAGUA
2	GUAGUA	GUAGUA	BICOL (whole)
3	DAGUPAN	AMBURAYAN	AMBURAYAN
4	AMBURAYAN	DAGUPAN	ANGAT
5	PATALAN	ANGAT	CATARMAN-1S
6	ARINGAY	PATALAN	DAGUPAN
7	ABULUG (whole)	CATARMAN-1S	ABULUG (whole)
8	BAUANG	ABULUG (whole)	PATALAN
9	ABRA (whole)	ARINGAY	ARINGAY
10	CATARMAN-1S	ABRA (whole)	ABRA (whole)
11	PAMPANGA (whole)	BAUANG	CAGAYAN (whole)
12	LAOAG	CAGAYAN (whole)	BAUANG
13	ANGAT	LAOAG	PAMPANGA (whole)
14	CAGAYAN (whole)	PAMPANGA (whole)	UMIRAY
15	MMANILA	MMANILA	LAOAG
16	AGNO (whole)	UMIRAY	KALIWA
17	UMIRAY	CAGARAY	CAGARAY
18	KALIWA	KALIWA	MMANILA
19	CAGARAY	AGNO (whole)	PAGBANGARAN
20	BAGO	PAGBANGARAN	AGNO (whole)
21	PAGBANGARAN	BAGO	TIAN
22	BALETE	TIAN	LABAYAT
23	ILOG-HILABANGAN (whole)	BALETE	REAL-2
24	JALAUD (whole)	LABAYAT	REAL-1
25	LABO	REAL-2	BALETE
26	AKLAN	REAL-1	GENERAL NAKAR-2-(b)
27	BONGABON	AKLAN	AGOS
28	BARARO	BONGABON	BONGABON
29	BACOLOD CITY	GENERAL NAKAR-2-(b)	GENERAL NAKAR-2-(a)
30	LEGAZPI CITY	ILOG-HILABANGAN (whole)	GENERAL NAKAR-5-(b)
31	TIAN	GENERAL NAKAR-2-(a)	GENERAL NAKAR-4-(b)
32	BACARRA-VINTAR	GENERAL NAKAR-5-(b)	GENERAL NAKAR-3-(b)
33	HIMOCAAN	GENERAL NAKAR-4-(b)	BAGO
34	BALINCUGUIN	GENERAL NAKAR-3-(b)	AKLAN
35	SUYO	LABO	TIGNOAN
36	DAET-BASUD	PAMPLONA	GENERAL NAKAR-1-(a)
37	IMUS	AGOS	ILOG-HILABANGAN (whole)
38	LABAYAT	BARARO	PAMPLONA
39	REAL-2	TIGNOAN	PALANAN-PINACANAUAN
40	REAL-1	GENERAL NAKAR-1-(a)	AGUANG
41	PAMPLONA	JALAUD (whole)	LAL-LO-2
42	PAGSANGAHAN	BACARRA-VINTAR	LABO
43	LAL-LO-2	PALANAN-PINACANAUAN	BACARRA-VINTAR
44	SILAG-SANTA MARIA	AGUANG	DAGUITAN-MARABANG
45	DONSOL	LAL-LO-2	JALAUD (whole)
46	DAGUITAN-MARABANG	HIMOCAAN	CULABA
47	PULA	DAGUITAN-MARABANG	MAGBANDO
48	GENERAL NAKAR-2-(b)	BALINCUGUIN	HIMOCAAN
49	SAN AGUSTIN	SUYO	SUYO
50	PALANAN-PINACANAUAN	BACOLOD CITY	PULA

Tab. 3-12 Selected 100 River Basins (1/3)

	No.	RIVER NAME	Catchment Area (km ²)	Category	Administrative Region
River Basins Implemented or Scheduled by DFWH		LAOAG	1,384	P	
		MMANILA	846	Other	
		PAMPANGA (whole)	8,237	M-A	
		AGNO (whole)	5,706	M-A	
		AGUSAN (whole)	11,935	M-A	
		ORMOC CITY	222	Other	
		JARO AGANAN	439	P	
		PASIG-LAGUNA BAY (whole)	4,092	M-A	
Major River Basins	1	BICOL (whole)	2,997	M-A	V
	2	ABULUG (whole)	2,881	M-A	II,CAR
	3	ABRA (whole)	4,704	M-A	I,CAR
	4	CAGAYAN (whole)	26,885	M-A	II,CAR
	5	ILOG-HILABANGAN (whole)	3,261	M-A	VI,VII
	6	JALAUD (whole)	1,454	M-A	VI
	7	PANAY (whole)	2,052	M-A	VI
	8	AGUS (whole)	1,976	M-A	ARMM
	9	MINDANAO (whole)	20,759	M-A	X,XII,ARMM
	10	TAGALUAN (whole)	1,757	M-A	X
	11	BUAYAN-MALUNGUN (whole)	1,570	M-A	XI,XII
	12	DAVAO (whole)	1,837	M-A	XI
	13	TAGUM-LIBUGANON (whole)	2,343	M-A	XI
	14	CAGAYAN DE ORO (whole)	1,348	M-A	X
Dangerous River Basins on Flood Events	15	GUAGUA	1,574	Other	III
	16	AMBURAYAN	1,011	P	I
	17	CATARMAN-1-S	245	Other	X
	18	AGOS	548	P	IV-A
	19	LEGAZPI CITY	120	Other	V
	20	DONSOL	367	P	V
	21	IMUS	122	P	IV-A
	22	OLONGAPO CITY	119	Other	III
	23	CEBU CITY	232	Other	VII
	24	KAPUMPONG	592	P	IV-A
	25	SANTO TOMAS	301	P	III
	26	BUCAO	725	P	III
	27	CATARMAN	527	P	VIII
	28	SURIGAO	176	P	XIII
	29	IYAM	113	P	IV-A
	30	DARAGA (LOCSIN)	47	Other	V
	31	AMNAY	413	P	IV-B
	32	TAYABAS	159	Other	IV-A
	33	MAG-ASAWANG TUBIG	429	P	IV-B
	34	TUMAGA	217	P	IX

Note:
 The extraction of the dangerous river basins on flood events refers to Water & Floods (DPWH 2004).
 SUC : the Study on Flood Control for Rivers in the Selected Urban Centers in the Philippines (JICA 1994)

Tab. 3-12 Selected 100 River Basins (2/3)

	No.	RIVER NAME	Administrative Region	Basin Area (km ²)	Category	Population (Persons)	Remarks
Selection of River Basins for Respective Administrative Region	35	DAGUPAN	I	1,034	P	960,659	
	36	PATALAN	I	595	P	369,237	
	37	ARINGAY	I	501	P	279,298	
	38	PAMPLONA	II	669	P	32,470	
	39	PALANAN-PINACANAUAN	II	599	P	13,606	
	40	LAL-LO-2	II	406	Other	31,920	
	41	ANGAT	III	900	P	402,278	
	42	AGUANG	III	545	P	40,214	
	43	NAYAM	III	226	P	24,714	
	44	UMIRAY	IV-A	640	P	69,085	
	45	KALIWA	IV-A	479	P	175,250	
	46	LABAYAT	IV-A	80	P	12,426	
	47	LABO	V	986	P	118,052	
	48	DAET-BASUD	V	260	P	104,590	
	49	GUINALE	V	175	P	124,087	
	50	BAGO	VI	893	P	219,409	
	51	AKLAN	VI	805	P	145,582	
	52	BACOLOD CITY	VI	184	Other	354,251	
	53	BALAMBAN	VII	192	P	230,625	
	54	SAPANG DAKO	VII	170	P	136,130	
	55	SIPOCONG	VII	385	P	1,990,553	
	56	PAGBANGARAN	VIII	246	P	44,347	
	57	DAGUITAN-MARABANG	VIII	346	P	85,074	
	58	PAGSANGAHAN	VIII	452	P	135,028	
	59	JOSE DALMAN (PONOT)	IX	274	Other	37,170	
	60	SIBUGUEY	IX	1,010	P	127,013	
	61	MAPANGI	IX	1,301	P	258,734	
	62	MARANDING	X	841	P	160,900	
	63	IPONON	X	471	P	329,236	
	64	MANDULOG	X	748	P	123,275	
	65	PADADA, MAINIT	XI	1,306	P	306,487	
	66	HILJO	XI	648	P	125,488	
	67	MACO	XI	61	Other	11,026	
	68	TIAN	XII	739	P	92,681	
	69	POLOMOLOK	XII	676	Other	221,348	
	70	SIGUIL	XII	383	P	49,549	
	71	TAGO	XIII	1,286	P	95,738	
	72	LAKE MAINIT-TUBAY	XIII	617	P	69,365	
	73	BOSTON	XIII	73	Other	3,673	
	74	CAGARAY	IV-B	423	P	42,096	
	75	BALETE	IV-B	191	P	35,493	
	76	BONGABON	IV-B	535	P	55,938	
	77	MATALING	ARMM	485	P	155,911	
	78	NITUAN	ARMM	446	P	64,612	
	79	MATABER	ARMM	220	P	16,659	
	80	BAUANG	CAR	507	P	231,932	
		PAMPLONA	CAR	669	P	32,470	Refer to [II]

Tab. 3-12 Selected 100 River Basins (3/3)

	No.	RIVER NAME	Administrative Region	Basin Area (km ²)	Category	Population (Persons)	Remarks
Principal River basins (Allocation 8-2 Ratio)		BAUJANG	I	507	P	231,932	Refer to [CAR]
	81	BARARO	I	217	P	62,285	
		LABO	IV-A	986	P	118,052	Refer to [V]
	82	TIGNOAN	IV-A	91	P	6,835	
	83	BACARRA-VINTAR	I	609	P	69,635	
	84	BALINCUGUIN	I	324	P	37,617	
	85	HIMOCAAAN	VI	406	P	126,332	
	86	SILAY-SANTA MARIA	I	369	P	62,663	
	87	PULA	IV-B	258	P	61,312	
	88	BUAYA	I	215	P	46,062	
	89	CABICUNGAN	II	254	P	18,894	
	90	BAUA	II	119	P	7,841	
	91	RAGAY	V	222	P	32,750	
	92	MALAYLAY-BACO	IV-B	482	P	55,195	
	93	MAGBANDO	IV-B	472	P	40,301	
	94	BAROC	IV-B	123	P	25,738	
	95	POLA	IV-B	216	P	9,547	
	96	ALAMINOS	I	230	P	67,947	
	Other River Basins	97	REAL-2 (LALAVINAN)	IV-A	70	Other	6,913
98		REAL-1	IV-A	54	Other	4,077	
99		GENERAL NAKAR-2-(b)	IV-A	34	Other	541	
100		GENERAL NAKAR-2-(a)	IV-A	83	Other	1,333	

Tab. 3-13 Regional Distribution of River Basins

Regional Distribution	Total Number of River Basins	Regional Distribution	Total Number of River Basins
Region I	11	Region VIII	4
Region II	6	Region IX	4
Region III	7	Region X	6
Region IV-A	13	Region XI	6
Region IV-B	10	Region XII	4
Region V	8	Region XIII	4
Region VI	7	Region CAR	2
Region VII	4	Region ARMM	4

Tab. 3-14 Selected 120 River Basins by the First Screening

No.	River Name	Region	Basin Area (km ²)	Category	1st Screening Result		No.	River Name	Region	Basin Area (km ²)	Category	1st Screening Result	
					Score	Rank						Score	Rank
1	ABRA	I	4,951	M	52	7	61	SIRUGUEY	IX	994	P	29	349
2	AMBURAYAN	I	1,307	P(D)	55	3	62	MAPANGI	IX	1,306	P	28	485
3	SINOCALAN/MAROSUY(DAGUPAN)	I	1,023	P	53	6	63	TAGOLOAN	X	1,762	M	30	236
4	PATALAN/CAYANGA/ANGALACAN	I	656	P	51	10	64	CAGAYAN DE ORO	X	1,365	M	29	349
5	ARINGAY	I	421	P	51	10	65	DINANGASAN(CATARMAN-1S)	X	25	O(D)	52	7
6	BARARO	I	192	P	37	59	66	MARANDING	X	634	P	28	485
7	BACARRA-VINTAR	I	627	P	36	69	67	IPONAN	X	412	P	27	607
8	BALINCUGUIN/MABINI PANGSINAN	I	378	P	36	69	68	MANDULOG	X	780	P	26	721
9	SILAG-SANTA MARIA	I	510	P	35	81	69	BUAYAN-MALUNGUN	XI	1,400	M	31	170
10	BUAYA	I	246	P	33	101	70	DAVAO	XI	1,992	M	29	349
11	ALAMINOS/TAGOONG	I	221	P	32	125	71	TAGUM-LIBUGANON	XI	2,434	M	32	125
12	NANGALISAN/BAGGAO-PARED(CAGAYAN)	II	27,743	M	53	6	72	PADADA MAINIT	XI	1,216	P	30	236
13	PAMPLONA	II	698	P	37	59	73	HIO	XI	642	P	30	236
14	PALANAN-PINACANAUAAN	II	755	P	36	69	74	MACCO	XI	30	O	30	236
15	BANURBOUR(LAL-LOI)	II	511	O	36	69	75	MINDANAO	XII	20,673	M	35	81
16	CLAVERIA(CABICUNGAN)	II	270	P	33	101	76	TRIAN	XII	808	P	40	36
17	BAUA	II	118	P	33	101	77	SILWAY-POPONG-SINAUAL(POLOMOLOK)	XII	577	O	29	349
18	GUAGUA	III	1,605	O(D)	56	2	78	SIGUEL	XII	358	P	27	607
19	SANTA RITA/KALAKLAN(OLONGAPO CITY)	III	102	O(D)	32	125	79	SURIGAO	XIII	170	P(D)	30	236
20	SANTO TOMAS-GABOR	III	334	P(D)	31	170	80	TAGO	XIII	1,370	P	34	91
21	BUCAO	III	664	P(D)	31	170	81	LAKE MAINIT-TUBAY	XIII	473	P	32	125
22	ANGAT	III	417	P	51	10	82	BOSTON	XIII	43	O	32	125
23	MALUPA-DIAN(AGUANG)	III	666	P	36	69	83	AMAY	IV-B	495	P(D)	30	236
24	NAYUM	III	229	P	31	170	84	MAG-ASAWANG TUBIG	IV-B	443	P(D)	28	485
25	AGOS	IV-A	483	P(D)	37	59	85	CAGURAY	IV-B	361	P	45	25
26	IMUS	IV-A	112	P(D)	35	81	86	BALETE	IV-B	132	P	40	36
27	CALUMPANG(KAPUMPONG)	IV-A	446	P(D)	31	170	87	BONGBONG	IV-B	574	P	39	44
28	IYAM/LUCENA	IV-A	158	P(D)	30	236	88	PULA	IV-B	245	P	35	81
29	DOMACAN/TAMBAK(TAYABAS)	IV-A	45	O(D)	29	349	89	MAG(MALAYLAY-BACO)	IV-B	505	P	33	101
30	UMIRAY	IV-A	628	P	46	21	90	MAGBANDO/BUSWANGA	IV-B	466	P	33	101
31	KALIWA	IV-A	468	P	44	26	91	BAROC	IV-B	162	P	33	101
32	TIGNOAN	IV-A	87	P	37	59	92	POLA	IV-B	140	P	33	101
33	LALAVINAN(REAL-2)	IV-A	46	O	40	36	93	AGUS/BUAYAN	ARMM	1,898	M	31	170
34	KINANI-IMAN(REAL-1)	IV-A	10	O	40	36	94	MATALING	ARMM	420	P	29	349
35	GENERAL NAKAR-2-(b)	IV-A	17	O	39	44	95	INTUAN	ARMM	365	P	28	485
36	GENERAL NAKAR-2-(a)	IV-A	37	O	38	52	96	MATABER	ARMM	197	P	26	721
37	KABILIGAN/VELASCO(BATO LAKE/BICOL)	V	2,999	M	57	1	97	ABULUG	CAR	2,766	M	52	7
38	YAWA/BASUD-QUIRANGAY(LEGAZPI CITY)	V	126	O(D)	36	69	98	BAUANG	CAR	510	P	49	15
39	DONSOL/MANLATO	V	413	P(D)	35	81	99	UPSTREAM of AGNO(include AMBAYAWAN, BANILA)	I	5722	P(D)	47	17
40	LABO	V	931	P	37	59	100	UPSTREAM of PAMPANGA(include RIO CHICO)	III	8122	P(D)	47	17
41	DAET-BASUD	V	277	P	35	81	101	MEYCAUAYAN	III	154	O(D)	46	21
42	QUINAL-EB	V	182	P	33	101	102	UPPER MARIKINA	NCR	515	P(D)	46	21
43	RAGAY	V	176	P	33	101	103	EAST MANGAHAN	IV-A	84	P(D)	39	44
44	LOG-HILABANGAN	VI	2,162	M	41	33	104	SAN JUAN	NCR	90	P(D)	34	91
45	JALAU	VI	1,534	M	37	59	105	JARO-AGANAN	VI	464	P(D)	32	125
46	PANAY/MAMBUSAO	VI	2,311	M	38	52	106	CAIRAWAN	VI	71	P(D)	28	485
47	BAGO	VI	868	P	40	36	107	SIBALOM	VI	690	P(D)	32	125
48	AKLAN	VI	1,010	P	39	44	108	DALANAS	VI	184	P(D)	24	957
49	MANDALAGAN(BACOLOD CITY)	VI	187	O	35	81	109	TIBAO	VI	72	P(D)	24	957
50	HIMOCAAAN	VI	462	P	36	69	110	SIPALAY	VI	336	P(D)	30	236
51	CEBU/MANDAWA	VII	241	O(D)	31	170	111	MANANGA	VII	86	P(D)	29	349
52	COMBADO/BALAMBAN	VII	237	P	31	170	112	GUINABASAN	VII	131	P(D)	27	607
53	SAPANG DAKO	VII	169	P	31	170	113	BANTAYAN	VIII	89	O(D)	29	349
54	SIPOCONG/STA.CATALINA/CAWITAN	VII	320	P	27	607	114	DALE	VIII	169	P(D)	30	236
55	CATARMAN	VIII	632	P(D)	31	170	115	CADACAN	VIII	523	P(D)	30	236
56	DUNGAAN/PAGBANGANAN	VIII	176	P	43	28	116	BALATIKAN	X	221	P(D)	25	831
57	DAGUITAN/MARABONG	VIII	292	P	36	69	117	LAGANAY	XI	747	P(D)	25	831
58	PAGSANGA-AN	VIII	511	P	34	91	118	LIPADAS	XI	163	P(D)	27	607
59	TUMAGA	IX	255	P(D)	22	1121	119	FALOMO	XI	279	P(D)	27	607
60	DISACAN/MANUKAN/JOSE DALMAN PONOT(I)	IX	274	O	30	236	120	UPPER AGUSAN	XI	1745	P(D)	46	21

M : Major River Basin, P : Principal River Basin, O : Other River Basin, (D) : Dangerous River Basin

Tab. 4-1 List of the Existing Projects for Extraction of the Project Costs

	Project Title	Year of Formulation	Related Rivers
1	Nationwide Flood Control Plan and River Dredging Program	1982	8 rivers
2	The Panay River Basin-Wide Flood Control Study	1985	1 river (including 3 cases)
3	Flood Control and Drainage Project in Metro Manila	1990	13 rivers
4	Study of Agno River Basin Flood Control	1991	13 rivers
5	Study on Ilog-Hilabangan River Basin Flood Control Project	1991	1 river
6	Study on the Flood Control for Rivers in the Selected Urban Centers	1995	12 rivers
7	The Study on Flood and Mudflow Control for Sacobia-Bamban/Abacan River Draining from Mt. Pinatubo	1996	2 rivers
8	The Study on Sabo and Flood Control in the Laoag River Basins	1997	6 rivers
9	The Study on Sabo and Flood Control for Western River Basins of Mount Pinatubo	2003	2 rivers
10	The Feasibility Study on Flood Control and Drainage Improvement Project for MIAA Compound and Paranaque-Las Pinas River System	2004	5 rivers
	Total		65 Rivers

Tab. 4-2 List of Averaged CPI (Year of 2006 = 100) in the Philippines

Year	CPI	Year	CPI	Year	CPI
1981	9.7	1990	32.6	1999	69.8
1982	10.7	1991	38.9	2000	72.5
1983	11.7	1992	41.2	2001	77.4
1984	17.6	1993	44.0	2002	79.8
1985	21.6	1994	49.7	2003	82.5
1986	21.8	1995	53.1	2004	87.5
1987	22.7	1996	57.1	2005	94.1
1988	25.9	1997	60.3	2006	100.0
1989	29.0	1998	65.8		

Note:

1) Source: Consumer prices index for all income households in the Philippines by NSO

2) Standard prices level in NSO is the prices level in 2000 and the price level above table is revised with the prices level in 2006.

Tab. 4-3 List of Project Costs for the Existing River Improvement Projects

No	River Name	Design Properties		Breakdown of Existing Project Cost													Adjustment				Project Title		
		Scale	Discharge (m³/s)	River Length (km)	Preparation Works	Construction Cost	Miscellaneous Cost	Main Construction Cost	Administrative Cost			Engineering Service Cost	Compensation Cost	Physical Contingency		Project Cost (Million Pesos)	Million PHP/km	CPI (2006)	Correction 2006 Level-Million PHP/km				
									2%	10%	A			10% with A	10% without A				with A	without A		with A	without A
1	Pisiga River	100	1,150	27	95	947	95	1,137	34	187	159	152	136	1,669	61.8	32.6	189.8	169.9	1990	Flood Control and Drainage Project in Metro Manila (1990)			
2	San Juan River	100	900	11	58	580	58	696	21	115	177	101	83	1,110	100.9	32.6	309.9	255.5	1990	Flood Control and Drainage Project in Metro Manila (1990)			
3	Marikina River	100	2,800	20	72	715	72	859	26	142	851	188	103	2,096	103.3	32.6	317.3	173.5	1990	Flood Control and Drainage Project in Metro Manila (1990)			
4	Mahaba River	30	160	6	7	65	7	79	2	13	133	23	9	250	41.7	32.6	128.0	52.9	1990	Flood Control and Drainage Project in Metro Manila (1990)			
5	Babo River	30	275	9	13	125	13	151	5	25	139	32	18	352	39.1	32.6	120.1	67.9	1990	Flood Control and Drainage Project in Metro Manila (1990)			
6	Bull River	30	270	11	21	212	21	254	8	42	269	57	30	630	57.3	32.6	175.9	93.4	1990	Flood Control and Drainage Project in Metro Manila (1990)			
7	Tributary-B	30	95	6	6	69	6	74	2	12	39	13	9	139	23.2	32.6	71.2	49.5	1990	Flood Control and Drainage Project in Metro Manila (1990)			
8	Tributary-C	30	50	5	3	26	3	32	1	5	45	8	4	91	18.2	32.6	55.9	25.7	1990	Flood Control and Drainage Project in Metro Manila (1990)			
9	Malabon River	30	500	6	20	199	20	239	7	39	133	42	29	460	76.7	32.6	235.5	160.5	1990	Flood Control and Drainage Project in Metro Manila (1990)			
10	Tullahan River	30	420	22	20	197	20	237	7	39	126	41	28	450	20.5	32.6	62.8	43.5	1990	Flood Control and Drainage Project in Metro Manila (1990)			
11	Las Pinas River	30	210	8	27	271	27	325	10	54	133	52	39	574	71.8	32.6	220.4	164.3	1990	Flood Control and Drainage Project in Metro Manila (1990)			
12	South Paranaque River	30	520	5	14	137	14	165	5	27	136	33	20	369	73.2	32.6	224.0	133.1	1990	Flood Control and Drainage Project in Metro Manila (1990)			
13	Danakil River	30	170	4	7	65	7	79	2	13	36	13	9	143	35.8	32.6	109.8	79.4	1990	Flood Control and Drainage Project in Metro Manila (1990)			
14	Jaro River	50	1,400	26	74	744	74	892	27	147	458	152	107	1,676	64.5	49.7	129.6	90.7	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
15	Bolo River	50	600	7	22	222	22	266	8	44	52	37	32	407	58.1	49.7	116.9	100.5	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
16	Mandurao River	50	70	5	12	122	12	146	4	24	69	24	17	266	53.2	49.7	106.9	77.0	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
17	Bulacao River	50	220	5	7	74	7	88	3	15	111	22	11	239	47.8	49.7	96.1	46.9	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
18	Kinalunan River	50	220	4	14	137	14	165	5	27	279	48	20	524	131.0	49.7	263.3	108.9	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
19	Quedabue River	50	240	4	14	140	14	168	5	28	307	57	20	625	156.3	49.7	314.1	111.1	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
20	Lahut River	50	120	7	19	180	19	216	6	36	425	68	26	751	107.3	49.7	215.7	81.5	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
21	Subing Daku River	50	210	5	20	209	20	243	7	40	546	84	29	922	184.4	49.7	370.7	129.3	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
22	Anlan River	50	910	2	13	128	13	154	5	25	29	21	18	234	117.0	49.7	235.2	203.4	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
23	Malibago River	50	330	2	9	88	9	104	3	17	25	15	12	164	92.0	49.7	164.8	137.1	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
24	Jaro River	20	1,000	11	36	360	40	436	27	70	112	65	53	710	64.5	49.7	129.7	107.1	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
25	Bolo River	20	400	7	15	147	15	178	11	28	52	27	22	296	42.3	49.7	85.0	68.5	1994	Study on the Flood Control for Rivers in the Selected Urban Centers (1995)			
26	Cagayan River	100	21,750	234				8,098	243	1,335	513	1,019	968	11,208	47.9	8.7	492.9	468.1	1981	Nationwide Flood Control Plan and River Dredging Program (1982)			
27	Pangasinan River	100	7,900	80				774	23	128	159	108	93	1,191	14.9	8.7	153.2	130.9	1981	Nationwide Flood Control Plan and River Dredging Program (1982)			
28	Bicol River	100	4,580	118				1,135	34	187	185	152	136	1,673	14.2	8.7	145.9	130.1	1981	Nationwide Flood Control Plan and River Dredging Program (1982)			
29	Jiluz River	100	3,780	52				963	29	158	42	119	115	1,312	25.2	8.7	259.7	250.0	1981	Nationwide Flood Control Plan and River Dredging Program (1982)			
30	Tagoloan River	50	3,840	12				84	3	14	5	11	10	117	9.8	9.7	100.3	95.3	1991	Nationwide Flood Control Plan and River Dredging Program (1982)			
31	Mindanao River	100	4,480	86				1,156	35	191	32	141	138	1,555	18.1	8.7	186.1	181.9	1981	Nationwide Flood Control Plan and River Dredging Program (1982)			
32	Laag River	50	10,500	116				912	27	150	47	114	109	1,250	10.8	8.7	110.9	106.3	1991	Nationwide Flood Control Plan and River Dredging Program (1982)			
33	Anney-Patrick River	50	4,460	30				513	15	84	23	64	61	699	23.3	8.7	239.8	230.9	1981	Nationwide Flood Control Plan and River Dredging Program (1982)			
34	Paray River	10	1,880	22	29	413	22	464	14	76	32	59	55	645	29.3	17.6	166.4	157.2	1984	The Paray River Basin-Wide Flood Control Study (1985)			
35	Paray River	25	2,750	39	49	702	39	827	25	136	40	109	99	1,131	29.8	17.6	168.9	162.3	1984	The Paray River Basin-Wide Flood Control Study (1985)			
36	Paray River	100	4,520	147	217	3,095	344	3,656	110	609	145	451	437	4,985	33.8	17.6	191.7	185.5	1984	The Paray River Basin-Wide Flood Control Study (1985)			
37	Bucaco River	20	3,800	12				1,095	31	171	45	128	124	1,410	117.5	79.8	147.3	142.2	2003	The Study on Sabo and Flood Control for Western River Basins of Mount Pinatubo (2003)			
38	Sto. Tomas River	20	1,200	20				1,192	36	196	38	146	142	1,608	90.4	79.8	100.8	98.2	2003	The Study on Sabo and Flood Control for Western River Basins of Mount Pinatubo (2003)			
39	Banban River	20	1,260	25	84	1,679	168	1,931	59	318	34	234	231	2,575	103.0	53.1	184.0	191.2	1995	The Study on Flood and Mudflow Control for Sacobia-Bamban/Abacan River Draining from Mt. Pinatubo (1996)			
40	Abacan River	20	520	24	30	591	59	680	20	112	8	82	81	902	37.6	53.1	70.8	70.1	1995	The Study on Flood and Mudflow Control for Sacobia-Bamban/Abacan River Draining from Mt. Pinatubo (1996)			
41	Cura/Labugan River	25	2,360	12	42	385	39	466	14	77	2	56	56	615	51.3	57.1	89.8	89.5	1996	The Study on Sabo and Flood Control in the Laag River Basin (1997)			
42	Solona River	25	1,120	10	19	174	17	210	6	35	0	25	25	276	27.6	57.1	48.4	48.4	1996	The Study on Sabo and Flood Control in the Laag River Basin (1997)			
43	Midongan River	25	1,870	9	25	229	23	277	8	46	0	33	33	364	40.4	57.1	70.9	70.9	1996	The Study on Sabo and Flood Control in the Laag River Basin (1997)			
44	Paga River	25	690	7	15	139	14	168	5	28	0	20	20	221	31.6	57.1	55.3	55.3	1996	The Study on Sabo and Flood Control in the Laag River Basin (1997)			
45	Lower Bonga River	25	3,220	11	8	77	7	92	3	15	1	11	11	122	11.1	57.1	19.4	19.3	1996	The Study on Sabo and Flood Control in the Laag River Basin (1997)			
46	Upper Bonga River	25	1,160	10	31	278	28	337	10	56	0	40	40	443	44.3	57.1	77.6	77.7	1996	The Study on Sabo and Flood Control in the Laag River Basin (1997)			
47	Agro River	25	9,000	110				9,895				490		9,385	85.3	29.0	294.1	278.8	1989	Study of Agro River Basin Flood Control (1991)			
48	Tarso River	25	2,600	36				1,277				44		1,321	37.4	29.0	128.9	124.0	1989	Study of Agro River Basin Flood Control (1991)			
49	Camiling River	25	1,850	20				382				4		386	19.3	29.0	66.5	65.8	1989	Study of Agro River Basin Flood Control (1991)			
50	Banila River	25	1,000	31				767				6		773	24.9	29.0	86.0	85.9	1989	Study of Agro River Basin Flood Control (1991)			
51	Vinay-Dipak River	25	350	20				293				7		300	15.0	29.0	51.7	50.5	1989	Study of Agro River Basin Flood Control (1991)			
52	Antayuan River	25	1,350	9				176				3		179	19.9	29.0	68.6	67.4	1989	Study of Agro River Basin Flood Control (1991)			
53	Pantal-Sincalan River	10	1,800	50				907				9		916	18.3	29.0	63.2	62.5	1989	Study of Agro River Basin Flood Control (1991)			
54	Cagayan River	10	700	28				582				4		586	20.9	29.0	72.2	71.7	1989	Study of Agro River Basin Flood Control (1991)			
55	Ingatera River	10	360	38				550				4		554	14.6	29.0	50.3	49.9	1989	Study of Agro River Basin Flood Control (1991)			
56	Mecabang River	10	130	22				97				5		102	4.6	29.0	16.0	15.2	1989	Study of Agro River Basin Flood Control (1991)			
57	Cavayag-Pantalan River	10	1,500	38				582				9		601	15.8	29.0	54.5	53.7	1989	Study of Agro River Basin Flood Control (1991)			
58	Bued River	10	750	19				367				9		376	19.8	29.0	68.2	66.6	1989	Study of Agro River Basin Flood Control (1991)			
59	Alonagat River	10	300	21				147				2		149	7.1	29.0	24.5	24.1	1989	Study of Agro River Basin Flood Control (1991)			
60	Iba-Hilagagan River	100	5,450	23	116	776		892	27	147	64	113	107	1,243	54.0	32.6	166.0	156.6	1990	Study on Iba-Hilagagan River Basin Flood Control Project (1991)			
61	Paranaque River	30	110	3				267	8	44	0	32	32	361	117.0	82.5	141.8	141.7	2003	The Feasibility Study on Flood Control and Drainage Improvement Project for MAA Compound and Paranaque-Las Pinas River System (2004)			
62	Donago River	30	160	7				278	8	46	0	33	33	365	52.1	82.5	63.2	63.2	2003	The Feasibility Study on Flood Control and Drainage Improvement Project for MAA Compound and Paranaque-Las Pinas River System (2004)			
63	South Paranaque River	30	240	3				1,565	47	259	0	187	187										

Tab. 4-4 Comparison of Flood Areas

Item	No.	River Basin	Flood Area (Km ²)		Ratio (a)/(b)
			By Reports/Survey (a)	HEC Analysis (b)	
Existing Study Reports	1	Bicol	387.2	386.7	1.0
	2	Tagaloan	11.7	12.9	0.9
	3	Upper Agusan	95.9	93.1	1.0
	4	Panay	206.7	115.1	1.8
	5	Ilog-Hilabangan	119.4	52.9	2.3
	6	Cagayan	968.0	650.0	1.5
	7	Jaro	28.0	18.3	1.5
	Sub-Total		1,816.9	1,328.9	1.4
Field Survey	1	Balatukan	5.0	3.3	1.5
	2	Aringay	11.6	10.3	1.1
	3	Bararo	4.3	7.6	0.6
	4	Guinale	5.7	7.0	0.8
	5	Olongapo	2.0	3.2	0.6
	6	Agos	21.0	17.7	1.2
	7	Bago	50.5	31.7	1.6
	8	Maco	0.9	1.2	0.8
	9	Iponon	5.7	7.8	0.7
	10	Tagaloan	4.7	12.9	0.4
	11	Davao	53.7	28.6	1.9
	Sub-Total		165.1	131.3	1.3
Total			1,982.0	1,460.2	1.4

Tab. 4-5 Ratio of Damageable Value to Gross Income

(Irrigated Paddy)

River Basin	Yield (t/ha)	Price (P/t)	Gross Income (P/ha)	Production Cost (P/ha)	Net Income (P/ha)	Damageable Value (P/ha)	Ratio of Damageable Value to Gross Income
Bicol	4.8	1,490	7,152	1,995	2,028	1,550	0.22
Upper Agno	4.5	3,780	17,010	8,215	8,795	9,452	0.56
Laoag	8.0	8,000	64,000	35,940	28,060	18,019	0.28
Lower Cagayan	5.6	10,300	57,680	28,090	28,560	17,536	0.30
Jaro & Iloilo	5.8	8,200	47,560	31,580	15,980	15,830	0.33
Ilog-Hilabangan	6.0	4,880	29,280	7,200	7,440	9,919	0.34
Jalaur	3.9	1,490	5,811	1,995	2,177	2,058	0.35
Upper Agusan	5.5	1,490	8,195	1,995	2,475	1,025	0.13
Lower Mindanao	3.8	1,490	5,662	1,995	2,028	1,487	0.26
Min							0.13
Max							0.56
Average							0.31
Adopt							0.30

(Rainfed Paddy)

River Basin	Yield (t/ha)	Price (P/t)	Gross Income (P/ha)	Production Cost (P/ha)	Net Income (P/ha)	Damageable Value (P/ha)	Ratio of Damageable Value to Gross Income
Bicol	2.5	1,490	3,725	1,995	538	674	0.18
Upper Agno	2.8	3,780	10,584	7,650	2,934	4,726	0.45
Laoag	2.4	8,000	19,200	14,761	4,439	13,737	0.72
Lower Cagayan	2.0	8,100	16,200	6,829	13,771	12,329	0.76
Pasig-Marikina	2.3	11,600	26,680	12,399	13,933	9,502	0.36
Jalaur	2.2	1,490	3,278	1,995	538	918	0.28
Upper Agusan	3.1	1,490	4,619	1,995	687	615	0.13
Lower Mindanao	2.2	1,490	3,278	1,995	538	691	0.21
Min							0.13
Max							0.76
Average							0.39
Adopt							0.40

(Corn)

River Basin	Yield (t/ha)	Price (P/t)	Gross Income (P/ha)	Production Cost (P/ha)	Net Income (P/ha)	Damageable Value (P/ha)	Ratio of Damageable Value to Gross Income
Bicol	1.2	1,049	1,259	587	147	155	0.12
Pasig-Marikina	2.7	9,200	24,840	9,705	14,832	2,047	0.08
Tagaloan	0.8	996	797	587	111	190	0.24
Upper Agusan	2.6	955	2,483	587	750	295	0.12
Lower Mindanao	2.6	936	2,434	587	443	455	0.19
Min							0.08
Max							0.24
Average							0.15
Adopt							0.20

(Sugarcane)

River Basin	Yield (t/ha)	Price (P/t)	Gross Income (P/ha)	Production Cost (P/ha)	Net Income (P/ha)	Damageable Value (P/ha)	Ratio of Damageable Value to Gross Income
Bicol	55.0	339	18,645	5,709	12,936	15,540	0.83
Upper Agno	60.0	235	14,100	11,400	2,700	7,093	0.50
Ilog-Hilabangan	70.0	480	33,600	20,000	13,600	28,571	0.85
Panay	52.0	205	10,660	7,750	2,910	7,278	0.68
Jalaur	50.8	339	17,221	5,709	11,512	14,372	0.83
Min							0.50
Max							0.85
Average							0.74
Adopt							0.70

(Fishpond-Milkfish)

River Basin	Yield (t/ha)	Price (P/t)	Gross Income (P/ha)	Production Cost (P/ha)	Net Income (P/ha)	Damageable Value (P/ha)	Ratio of Damageable Value to Gross Income
Ilog-Hilabangan	1.50	30,000	45,000	30,000	15,000	11,765	0.26
Jaro & Iloilo	3.0	45,000	135,000	90,000	45,000	32,550	0.24
Min							0.24
Max							0.26
Average							0.25
Adopt							0.30

(Fishpond-Prawn)

River Basin	Yield (t/ha)	Price (P/t)	Gross Income (P/ha)	Production Cost (P/ha)	Net Income (P/ha)	Damageable Value (P/ha)	Ratio of Damageable Value to Gross Income
Panay	-	-	28,800	4,275	24,525	10,108	0.35
Ilog-Hilabangan	3.00	150,000	450,000	270,000	180,000	140,000	0.31
Min							0.31
Max							0.35
Average							0.33
Adopt							0.30

Tab. 4-6 Summary of Damage Rate

River Basin	Crop				Fish-pond	Built-up Area	Infra-structure	Indirect Damage
	Irrigated Paddy	Rainfed Paddy	Corn	Sugarcane				
Bicol	0.58	0.54	0.79	0.05	-	0.11	0.50	0.05
East & West Mangahan	-	-	-	-	-	0.09	-	-
Malabon-Navotas	-	-	-	-	-	0.05	-	-
Upper Agno	-	-	-	-	-	0.10	0.26	0.29
Sacobia-Bamban	-	-	-	-	-	0.12	0.21	0.17
Abacan	-	-	-	-	-	0.12	0.18	0.14
Laoag	0.51	0.78	-	-	-	0.30	0.51	0.10
Lower Cagayan	0.52	0.50	-	-	-	0.47	0.20	0.18
Pasig-Marikina	-	-	-	-	-	0.24	0.35	0.20
Tagaloan	-	-	0.51	-	-	0.18	0.60	0.05
Upper Agusan	0.70	-	0.80	-	-	0.32	0.33	0.05
Lower Mindanao	0.57	0.59	0.61	-	-	0.06	0.35	0.05
Panay	-	-	-	0.02	-	0.32	0.27	0.15
Jalaur	0.49	0.54	-	0.05	-	0.41	0.42	0.05
Ilog-Hilabangan	0.28	-	-	0.33	0.98	0.10	0.02	0.03
Cebu	-	-	-	-	-	0.07	0.35	0.10
Ormoc	-	-	-	-	-	0.17	0.35	0.10
Jaro	0.21	-	-	-	0.46	0.08	0.35	0.10
Iloilo	0.29	-	-	-	0.49	0.10	0.35	0.10
Flood Area Weighted Average	0.52	0.54	0.75	0.08	0.87	0.27	0.28	0.17
Adopt	0.5	0.5	0.8	0.1	0.9	0.3	0.3	0.2
	0.6 (Crop Area Weighted Average)							

Tab. 4-7 Ratio of Annual Benefit to Flood Damage

River Basin Name	Flood Damage for 20-Year Return Preiod	Annual Benefit (Million Pesos)	Ratio
	(a)	(b)	(b)/(a)
East and West of Mangahan	1,194.2	381.6	0.320
Ormoc (urgent plan)	228.5	101.0	0.442
Iloilo (urgent plan)	1,124.6	528.0	0.470
Banban/Abacan	419.0	87.1	0.208
Laoag	210.0	24.6	0.117
Cura	159.2	79.2	0.497
Solsona	98.2	51.5	0.524
Madongan	113.0	55.4	0.490
Papa	42.7	23.3	0.546
Upper Bongo	1,451.4	373.2	0.257
Pantal-Sinocalan	1,132.4	439.6	0.388
Ilog-Hilabangan	409.8	104.3	0.255
Paranaque/Dongalo/South			
Paranaque/Las Pinas/Zapote	5,271.5	2,201.5	0.418
Average			0.38

Tab. 4-8 Benefit Index from Flood Control under Future Condition (1/11)

Item	Selected River Basins					
	1. Abra	2. Amburayan	3. Dagupan	4. Patalan	5. Aringay	6. Bararo
I. Inundated Property						
1. Built-up Area (ha)	0.0	5.6	183.1	353.1	6.8	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	0.0	5.6	183.1	353.1	6.8	0.0
2. Agricultural Area (ha)	919.8	303.4	6,918.1	2,363.4	652.0	427.7
a. Annual Crop	919.8	303.4	5,619.7	2,292.5	569.5	427.7
b. Fishpond	0.0	0.0	1,298.4	70.9	82.5	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	0.0	155.9	5,125.8	9,886.6	190.0	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	0.0	155.9	5,125.8	9,886.6	190.0	0.0
2. Agricultural Area	38.6	12.7	355.5	102.8	31.5	18.0
a. Annual Crop	38.6	12.7	236.0	96.3	23.9	18.0
b. Fishpond	0.0	0.0	119.5	6.5	7.6	0.0
3. Total	38.6	168.6	5,481.3	9,989.4	221.5	18.0
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	30.2	70.7	2,322.8	3,938.6	101.7	14.0
(1) Built-up Area	0.0	46.8	1,537.7	2,966.0	57.0	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	0.0	46.8	1,537.7	2,966.0	57.0	0.0
(2) Agricultural Area	23.2	7.6	249.1	63.7	21.2	10.8
a. Annual Crop	23.2	7.6	141.6	57.8	14.4	10.8
b. Fishpond	0.0	0.0	107.5	5.9	6.8	0.0
(3) Infrastructure	7.0	16.3	536.0	908.9	23.5	3.2
2. Indirect Damage	6.0	14.1	464.6	787.7	20.3	2.8
3. Total Damage	36.2	84.8	2,787.4	4,726.3	122.0	16.8
4. Area Adjusted	50.7	118.7	3,902.4	6,616.8	170.8	23.5
IV. Annual Average Damage	19.3	45.1	1,482.9	2,514.4	64.9	8.9
V. Time Adjusted Damage (Benefit Index)	65.6	153.3	5,041.9	8,549.0	220.7	30.3

Item	Selected River Basins					
	7. Bacarra-V.	8. Balingcuguin	9. Silag-Sta M.	10. Buaya	11. Alaminos	12. Cagayan
I. Inundated Property						
1. Built-up Area (ha)	16.4	3.1	2.5	2.7	26.8	2,234.5
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	16.4	3.1	2.5	2.7	26.8	2,234.5
2. Agricultural Area (ha)	619.9	1,405.8	675.8	354.1	1,184.6	44,231.9
a. Annual Crop	619.9	1,405.8	675.8	354.1	1,123.6	44,231.9
b. Fishpond	0.0	0.0	0.0	0.0	61.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	458.7	86.1	70.8	76.2	751.6	62,565.4
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	458.7	86.1	70.8	76.2	751.6	62,565.4
2. Agricultural Area	26.0	59.0	28.4	14.9	52.8	1,857.7
a. Annual Crop	26.0	59.0	28.4	14.9	47.2	1,857.7
b. Fishpond	0.0	0.0	0.0	0.0	5.6	0.0
3. Total	484.7	145.1	99.2	91.1	804.4	64,423.1
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	199.2	79.6	49.7	41.3	336.6	25,849.5
(1) Built-up Area	137.6	25.8	21.2	22.9	225.5	18,769.6
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	137.6	25.8	21.2	22.9	225.5	18,769.6
(2) Agricultural Area	15.6	35.4	17.0	8.9	33.4	1,114.6
a. Annual Crop	15.6	35.4	17.0	8.9	28.3	1,114.6
b. Fishpond	0.0	0.0	0.0	0.0	5.1	0.0
(3) Infrastructure	46.0	18.4	11.5	9.5	77.7	5,965.3
2. Indirect Damage	39.8	15.9	9.9	8.3	67.3	5,169.9
3. Total Damage	239.0	95.5	59.6	49.6	403.9	31,019.4
4. Area Adjusted	334.6	133.7	83.4	69.4	565.5	43,427.2
IV. Annual Average Damage	127.1	50.8	31.7	26.4	214.9	16,502.3
V. Time Adjusted Damage (Benefit Index)	432.1	172.7	107.8	89.8	730.7	56,107.8

Tab. 4-8 Benefit Index from Flood Control under Future Condition (2/11)

Item	Selected River Basins					
	13. Pamplona	14. Palanan-P.	15. LAL-Lo2	16. Cabcungan	17. Baua	18. Guagua
I. Inundated Property						
1. Built-up Area (ha)	2.2	0.0	0.0	9.2	5.0	700.5
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	2.2	0.0	0.0	9.2	5.0	700.5
2. Agricultural Area (ha)	464.7	1,828.5	483.8	667.2	150.7	5,839.4
a. Annual Crop	464.7	1,828.5	483.8	667.2	150.7	3,372.4
b. Fishpond	0.0	0.0	0.0	0.0	0.0	2,467.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	62.0	0.0	0.0	256.6	140.1	19,614.7
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	62.0	0.0	0.0	256.6	140.1	19,614.7
2. Agricultural Area	19.5	76.8	20.3	28.0	6.3	368.6
a. Annual Crop	19.5	76.8	20.3	28.0	6.3	141.6
b. Fishpond	0.0	0.0	0.0	0.0	0.0	227.0
3. Total	81.5	76.8	20.3	284.6	146.4	19,983.3
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	39.4	59.9	15.9	121.9	59.5	8,025.8
(1) Built-up Area	18.6	0.0	0.0	77.0	42.0	5,884.4
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	18.6	0.0	0.0	77.0	42.0	5,884.4
(2) Agricultural Area	11.7	46.1	12.2	16.8	3.8	289.3
a. Annual Crop	11.7	46.1	12.2	16.8	3.8	85.0
b. Fishpond	0.0	0.0	0.0	0.0	0.0	204.3
(3) Infrastructure	9.1	13.8	3.7	28.1	13.7	1,852.1
2. Indirect Damage	7.9	12.0	3.2	24.4	11.9	1,605.2
3. Total Damage	47.3	71.9	19.1	146.3	71.4	9,631.0
4. Area Adjusted	66.2	100.7	26.7	204.8	100.0	13,483.4
IV. Annual Average Damage	25.2	38.3	10.1	77.8	38.0	5,123.7
V. Time Adjusted Damage (Benefit Index)	85.7	130.2	34.3	264.5	129.2	17,420.6

Item	Selected River Basins					
	19. Olongapo	20. Santo_Tomas	21. Bucao	22. Angat	23. Aguang	24. Nayum
I. Inundated Property						
1. Built-up Area (ha)	53.4	10.1	0.3	74.9	58.7	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	53.4	10.1	0.3	74.9	58.7	0.0
2. Agricultural Area (ha)	0.0	251.6	354.4	667.3	352.2	504.6
a. Annual Crop	0.0	251.6	354.4	605.7	352.2	504.6
b. Fishpond	0.0	0.0	0.0	61.6	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	1,495.4	282.3	9.3	2,098.3	1,644.2	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	1,495.4	282.3	9.3	2,098.3	1,644.2	0.0
2. Agricultural Area	0.0	10.6	14.9	31.1	14.8	21.2
a. Annual Crop	0.0	10.6	14.9	25.4	14.8	21.2
b. Fishpond	0.0	0.0	0.0	5.7	0.0	0.0
3. Total	1,495.4	292.9	24.2	2,129.4	1,659.0	21.2
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	583.2	118.3	15.2	844.9	652.7	16.5
(1) Built-up Area	448.6	84.7	2.8	629.5	493.2	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	448.6	84.7	2.8	629.5	493.2	0.0
(2) Agricultural Area	0.0	6.3	8.9	20.4	8.9	12.7
a. Annual Crop	0.0	6.3	8.9	15.3	8.9	12.7
b. Fishpond	0.0	0.0	0.0	5.1	0.0	0.0
(3) Infrastructure	134.6	27.3	3.5	195.0	150.6	3.8
2. Indirect Damage	116.6	23.7	3.0	169.0	130.5	3.3
3. Total Damage	699.8	142.0	18.2	1,013.9	783.2	19.8
4. Area Adjusted	979.7	198.8	25.5	1,419.5	1,096.5	27.7
IV. Annual Average Damage	372.3	75.5	9.7	539.4	416.7	10.5
V. Time Adjusted Damage (Benefit Index)	1,265.8	256.7	33.0	1,834.0	1,416.8	35.7

Tab. 4-8 Benefit Index from Flood Control under Future Condition (3/11)

Item	Selected River Basins					
	25. Agos	26. Imus	27. Kapumpong	28. Iyam	29. Tayabas	30. Umiray
I. Inundated Property						
1. Built-up Area (ha)	24.3	279.7	19.9	18.0	0.0	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	24.3	279.7	19.9	18.0	0.0	0.0
2. Agricultural Area (ha)	254.6	564.1	146.0	193.1	201.1	56.5
a. Annual Crop	254.6	526.0	146.0	124.9	201.1	56.5
b. Fishpond	0.0	38.1	0.0	68.3	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	680.4	7,830.8	556.9	503.1	0.0	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	680.4	7,830.8	556.9	503.1	0.0	0.0
2. Agricultural Area	10.7	25.6	6.1	11.5	8.4	2.4
a. Annual Crop	10.7	22.1	6.1	5.2	8.4	2.4
b. Fishpond	0.0	3.5	0.0	6.3	0.0	0.0
3. Total	691.1	7,856.4	563.0	514.6	8.4	2.4
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	273.7	3,075.4	222.0	207.6	6.6	1.8
(1) Built-up Area	204.1	2,349.2	167.1	150.9	0.0	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	204.1	2,349.2	167.1	150.9	0.0	0.0
(2) Agricultural Area	6.4	16.5	3.7	8.8	5.1	1.4
a. Annual Crop	6.4	13.3	3.7	3.1	5.1	1.4
b. Fishpond	0.0	3.2	0.0	5.7	0.0	0.0
(3) Infrastructure	63.2	709.7	51.2	47.9	1.5	0.4
2. Indirect Damage	54.7	615.1	44.4	41.5	1.3	0.4
3. Total Damage	328.4	3,690.5	266.4	249.1	7.9	2.2
4. Area Adjusted	459.8	5,166.7	373.0	348.7	11.1	3.1
IV. Annual Average Damage	174.7	1,963.3	141.7	132.5	4.2	1.2
V. Time Adjusted Damage (Benefit Index)	594.0	6,675.2	481.8	450.5	14.3	4.1

Item	Selected River Basins					
	31. Kaliwa	32. Tignoan	33. Real2	34. Real1	35. General N.2-b	36.General N.2-a
I. Inundated Property						
1. Built-up Area (ha)	1.3	0.0	0.0	3.2	0.0	0.9
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	1.3	0.0	0.0	3.2	0.0	0.9
2. Agricultural Area (ha)	0.0	0.0	0.7	0.0	26.7	0.0
a. Annual Crop	0.0	0.0	0.7	0.0	26.7	0.0
b. Fishpond	0.0	0.0	0.0	0.0	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	35.3	0.0	0.0	88.2	0.0	24.7
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	35.3	0.0	0.0	88.2	0.0	24.7
2. Agricultural Area	0.0	0.0	0.0	0.0	1.1	0.0
a. Annual Crop	0.0	0.0	0.0	0.0	1.1	0.0
b. Fishpond	0.0	0.0	0.0	0.0	0.0	0.0
3. Total	35.3	0.0	0.0	88.2	1.1	24.7
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	13.8	0.0	0.0	34.5	0.9	9.6
(1) Built-up Area	10.6	0.0	0.0	26.5	0.0	7.4
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	10.6	0.0	0.0	26.5	0.0	7.4
(2) Agricultural Area	0.0	0.0	0.0	0.0	0.7	0.0
a. Annual Crop	0.0	0.0	0.0	0.0	0.7	0.0
b. Fishpond	0.0	0.0	0.0	0.0	0.0	0.0
(3) Infrastructure	3.2	0.0	0.0	8.0	0.2	2.2
2. Indirect Damage	2.8	0.0	0.0	6.9	0.2	1.9
3. Total Damage	16.6	0.0	0.0	41.4	1.1	11.5
4. Area Adjusted	23.2	0.0	0.0	58.0	1.5	16.1
IV. Annual Average Damage	8.8	0.0	0.0	22.0	0.6	6.1
V. Time Adjusted Damage (Benefit Index)	29.9	0.0	0.0	74.8	2.0	20.7

Tab. 4-8 Benefit Index from Flood Control under Future Condition (4/11)

Item	Selected River Basins					
	37. Bicol	38. Legaspi City	39. Donsol	40. Labo	41. Daet-Basud	42. Guinale
I. Inundated Property						
1. Built-up Area (ha)	463.5	129.3	7.5	8.5	41.6	0.9
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	463.5	129.3	7.5	8.5	41.6	0.9
2. Agricultural Area (ha)	25,569.4	176.4	0.0	1,339.2	1,228.0	514.6
a. Annual Crop	25,569.4	176.4	0.0	1,339.2	1,002.7	514.6
b. Fishpond	0.0	0.0	0.0	0.0	225.4	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	12,977.1	3,619.6	209.5	239.0	1,164.8	25.1
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	12,977.1	3,619.6	209.5	239.0	1,164.8	25.1
2. Agricultural Area	1,073.9	7.4	0.0	56.2	62.8	21.6
a. Annual Crop	1,073.9	7.4	0.0	56.2	42.1	21.6
b. Fishpond	0.0	0.0	0.0	0.0	20.7	0.0
3. Total	14,051.0	3,627.0	209.5	295.2	1,227.6	46.7
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	5,898.6	1,417.4	81.6	137.0	511.4	26.7
(1) Built-up Area	3,893.1	1,085.9	62.8	71.7	349.4	7.5
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	3,893.1	1,085.9	62.8	71.7	349.4	7.5
(2) Agricultural Area	644.3	4.4	0.0	33.7	44.0	13.0
a. Annual Crop	644.3	4.4	0.0	33.7	25.3	13.0
b. Fishpond	0.0	0.0	0.0	0.0	18.7	0.0
(3) Infrastructure	1,361.2	327.1	18.8	31.6	118.0	6.2
2. Indirect Damage	1,179.7	283.5	16.3	27.4	102.3	5.3
3. Total Damage	7,078.3	1,700.9	97.9	164.4	613.7	32.0
4. Area Adjusted	9,909.6	2,381.3	137.1	230.2	859.2	44.8
IV. Annual Average Damage	3,765.6	904.9	52.1	87.5	326.5	17.0
V. Time Adjusted Damage (Benefit Index)	12,803.0	3,076.7	177.1	297.5	1,110.1	57.8

Item	Selected River Basins					
	43. Ragay	44. Ilog-Hilabangan	45. Jalaud	46. Panay	47. Bago	48. Aklan
I. Inundated Property						
1. Built-up Area (ha)	4.7	89.1	143.9	274.0	17.6	51.1
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	4.7	89.1	143.9	274.0	17.6	51.1
2. Agricultural Area (ha)	93.7	2,371.1	3,594.9	7,612.2	983.0	0.0
a. Annual Crop	0.0	2,340.6	3,187.6	6,798.0	933.9	0.0
b. Fishpond	93.7	30.5	407.3	814.1	49.1	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	131.0	2,495.1	4,029.2	7,671.3	491.6	1,430.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	131.0	2,495.1	4,029.2	7,671.3	491.6	1,430.0
2. Agricultural Area	8.6	101.1	171.4	360.4	43.7	0.0
a. Annual Crop	0.0	98.3	133.9	285.5	39.2	0.0
b. Fishpond	8.6	2.8	37.5	74.9	4.5	0.0
3. Total	139.6	2,596.2	4,200.6	8,031.7	535.3	1,430.0
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	61.2	1,053.0	1,719.6	3,302.1	227.6	557.7
(1) Built-up Area	39.3	748.5	1,208.8	2,301.4	147.5	429.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	39.3	748.5	1,208.8	2,301.4	147.5	429.0
(2) Agricultural Area	7.8	61.5	114.0	238.7	27.6	0.0
a. Annual Crop	0.0	59.0	80.3	171.3	23.5	0.0
b. Fishpond	7.8	2.5	33.7	67.4	4.1	0.0
(3) Infrastructure	14.1	243.0	396.8	762.0	52.5	128.7
2. Indirect Damage	12.2	210.6	343.9	660.4	45.5	111.5
3. Total Damage	73.4	1,263.6	2,063.5	3,962.5	273.1	669.2
4. Area Adjusted	102.8	1,769.0	2,888.9	5,547.5	382.3	936.9
IV. Annual Average Damage	39.1	672.2	1,097.8	2,108.1	145.3	356.0
V. Time Adjusted Damage (Benefit Index)	132.9	2,285.5	3,732.5	7,167.5	494.0	1,210.4

Tab. 4-8 Benefit Index from Flood Control under Future Condition (5/11)

Item	Selected River Basins					
	49. Bacolod	50. Himocaaan	51. Cebu City	52. Balamban	53. Sapang_Dako	54. Sipocong
I. Inundated Property						
1. Built-up Area (ha)	80.4	14.3	178.2	8.2	0.0	3.4
a. NCR & HUCs	0.0	0.0	178.2	0.0	0.0	0.0
b. Others	80.4	14.3	0.0	8.2	0.0	3.4
2. Agricultural Area (ha)	63.4	442.6	17.2	142.8	37.1	293.4
a. Annual Crop	63.4	423.1	0.0	142.8	37.1	293.4
b. Fishpond	0.0	19.5	17.2	0.0	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	2,252.5	400.9	16,755.3	228.5	0.0	95.2
a. NCR & HUCs	0.0	0.0	16,755.3	0.0	0.0	0.0
b. Others	2,252.5	400.9	0.0	228.5	0.0	95.2
2. Agricultural Area	2.7	19.6	1.6	6.0	1.6	12.3
a. Annual Crop	2.7	17.8	0.0	6.0	1.6	12.3
b. Fishpond	0.0	1.8	1.6	0.0	0.0	0.0
3. Total	2,255.2	420.5	16,756.9	234.5	1.6	107.5
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	880.5	172.4	6,536.4	93.7	1.2	46.8
(1) Built-up Area	675.7	120.3	5,026.6	68.5	0.0	28.6
a. NCR & HUCs	0.0	0.0	5,026.6	0.0	0.0	0.0
b. Others	675.7	120.3	0.0	68.5	0.0	28.6
(2) Agricultural Area	1.6	12.3	1.4	3.6	0.9	7.4
a. Annual Crop	1.6	10.7	0.0	3.6	0.9	7.4
b. Fishpond	0.0	1.6	1.4	0.0	0.0	0.0
(3) Infrastructure	203.2	39.8	1,508.4	21.6	0.3	10.8
2. Indirect Damage	176.1	34.5	1,307.3	18.7	0.2	9.4
3. Total Damage	1,056.6	206.9	7,843.7	112.4	1.4	56.2
4. Area Adjusted	1,479.2	289.7	10,981.2	157.4	2.0	78.7
IV. Annual Average Damage	562.1	110.1	4,172.9	59.8	0.8	29.9
V. Time Adjusted Damage (Benefit Index)	1,911.1	374.3	14,187.9	203.3	2.7	101.7

Item	Selected River Basins					
	55. Catarman	56. Pagbanganan	57. Daguitan-M.	58. Pagsangahan	59. Tumaga	60. Jose Dalman
I. Inundated Property						
1. Built-up Area (ha)	1.1	3.9	4.4	0.0	111.8	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	1.1	3.9	4.4	0.0	111.8	0.0
2. Agricultural Area (ha)	9.3	95.0	495.4	1,495.4	274.3	10.1
a. Annual Crop	0.0	95.0	495.4	1,491.9	149.1	10.1
b. Fishpond	9.3	0.0	0.0	3.5	125.2	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	30.6	109.2	123.6	0.0	3,130.4	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	30.6	109.2	123.6	0.0	3,130.4	0.0
2. Agricultural Area	0.9	4.0	20.8	63.0	17.8	0.4
a. Annual Crop	0.0	4.0	20.8	62.7	6.3	0.4
b. Fishpond	0.9	0.0	0.0	0.3	11.5	0.0
3. Total	31.5	113.2	144.4	63.0	3,148.2	0.4
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	13.0	45.8	64.5	49.3	1,239.3	0.4
(1) Built-up Area	9.2	32.8	37.1	0.0	939.1	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	9.2	32.8	37.1	0.0	939.1	0.0
(2) Agricultural Area	0.8	2.4	12.5	37.9	14.2	0.3
a. Annual Crop	0.0	2.4	12.5	37.6	3.8	0.3
b. Fishpond	0.8	0.0	0.0	0.3	10.4	0.0
(3) Infrastructure	3.0	10.6	14.9	11.4	286.0	0.1
2. Indirect Damage	2.6	9.2	12.9	9.9	247.9	0.1
3. Total Damage	15.6	55.0	77.4	59.2	1,487.2	0.5
4. Area Adjusted	21.8	77.0	108.4	82.9	2,082.1	0.7
IV. Annual Average Damage	8.3	29.3	41.2	31.5	791.2	0.3
V. Time Adjusted Damage (Benefit Index)	28.2	99.6	140.1	107.1	2,690.1	1.0

Tab. 4-8 Benefit Index from Flood Control under Future Condition (6/11)

Item	Selected River Basins					
	61. Sibuguey	62. Mapangi	63. Tagaloan	64. Cagayan D.O.	65. Dinanggasan	66. Maranding
I. Inundated Property						
1. Built-up Area (ha)	19.0	34.6	57.8	35.0	7.5	8.9
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	19.0	34.6	57.8	35.0	7.5	8.9
2. Agricultural Area (ha)	4,057.5	6,396.9	148.5	16.5	0.0	1,350.4
a. Annual Crop	3,451.4	5,300.9	148.5	16.5	0.0	641.0
b. Fishpond	606.1	1,096.1	0.0	0.0	0.0	709.4
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	532.2	968.6	1,619.5	980.0	211.1	249.2
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	532.2	968.6	1,619.5	980.0	211.1	249.2
2. Agricultural Area	200.8	323.4	6.2	0.7	0.0	92.2
a. Annual Crop	145.0	222.6	6.2	0.7	0.0	26.9
b. Fishpond	55.8	100.8	0.0	0.0	0.0	65.3
3. Total	733.0	1,292.0	1,625.7	980.7	211.1	341.4
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	386.0	669.5	636.5	382.7	82.3	194.6
(1) Built-up Area	159.7	290.6	485.9	294.0	63.3	74.8
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	159.7	290.6	485.9	294.0	63.3	74.8
(2) Agricultural Area	137.2	224.4	3.7	0.4	0.0	74.9
a. Annual Crop	87.0	133.6	3.7	0.4	0.0	16.2
b. Fishpond	50.2	90.8	0.0	0.0	0.0	58.7
(3) Infrastructure	89.1	154.5	146.9	88.3	19.0	44.9
2. Indirect Damage	77.2	133.9	127.3	76.5	16.5	38.9
3. Total Damage	463.2	803.4	763.8	459.2	98.8	233.5
4. Area Adjusted	648.5	1,124.8	1,069.3	642.9	138.3	326.9
IV. Annual Average Damage	246.4	427.4	406.3	244.3	52.6	124.2
V. Time Adjusted Damage (Benefit Index)	837.8	1,453.2	1,381.4	830.6	178.8	422.3

Item	Selected River Basins					
	67. Iponon	68. Mandulog	69. Buayan-M.	70. Davao	71. Tagum-L.	72. Padada_Mainit
I. Inundated Property						
1. Built-up Area (ha)	51.3	29.6	23.1	145.2	173.4	4.7
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	51.3	29.6	23.1	145.2	173.4	4.7
2. Agricultural Area (ha)	0.0	660.0	255.6	406.8	3,071.0	211.9
a. Annual Crop	0.0	660.0	198.3	406.8	3,000.0	211.9
b. Fishpond	0.0	0.0	57.3	0.0	71.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	1,436.2	829.8	647.2	4,066.7	4,855.5	132.5
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	1,436.2	829.8	647.2	4,066.7	4,855.5	132.5
2. Agricultural Area	0.0	27.7	13.6	17.1	132.5	8.9
a. Annual Crop	0.0	27.7	8.3	17.1	126.0	8.9
b. Fishpond	0.0	0.0	5.3	0.0	6.5	0.0
3. Total	1,436.2	857.5	660.8	4,083.8	4,988.0	141.4
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	560.2	345.3	265.1	1,599.4	1,999.5	58.5
(1) Built-up Area	430.9	249.0	194.2	1,220.0	1,456.6	39.7
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	430.9	249.0	194.2	1,220.0	1,456.6	39.7
(2) Agricultural Area	0.0	16.6	9.7	10.3	81.5	5.3
a. Annual Crop	0.0	16.6	5.0	10.3	75.6	5.3
b. Fishpond	0.0	0.0	4.7	0.0	5.9	0.0
(3) Infrastructure	129.3	79.7	61.2	369.1	461.4	13.5
2. Indirect Damage	112.0	69.1	53.0	319.9	399.9	11.7
3. Total Damage	672.2	414.4	318.1	1,919.3	2,399.4	70.2
4. Area Adjusted	941.1	580.2	445.3	2,687.0	3,359.2	98.3
IV. Annual Average Damage	357.6	220.5	169.2	1,021.1	1,276.5	37.4
V. Time Adjusted Damage (Benefit Index)	1,215.8	749.7	575.3	3,471.7	4,340.1	127.2

Tab. 4-8 Benefit Index from Flood Control under Future Condition (7/11)

Item	Selected River Basins					
	73. Hijo	74. Maco	75. Mindanao	76. Tian	77. Polomolok	78. Siquil
I. Inundated Property						
1. Built-up Area (ha)	6.6	0.0	1,410.0	0.0	26.8	3.6
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	6.6	0.0	1,410.0	0.0	26.8	3.6
2. Agricultural Area (ha)	71.6	1.5	31,260.7	563.3	2.6	0.0
a. Annual Crop	40.6	1.5	30,264.0	560.2	2.6	0.0
b. Fishpond	31.0	0.0	996.7	3.1	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	184.9	0.0	39,480.1	0.0	750.4	100.8
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	184.9	0.0	39,480.1	0.0	750.4	100.8
2. Agricultural Area	4.5	0.1	1,362.8	23.8	0.1	0.0
a. Annual Crop	1.7	0.1	1,271.1	23.5	0.1	0.0
b. Fishpond	2.8	0.0	91.7	0.3	0.0	0.0
3. Total	189.4	0.1	40,842.9	23.8	750.5	100.8
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	76.8	0.0	16,496.0	18.7	292.8	39.3
(1) Built-up Area	55.5	0.0	11,844.0	0.0	225.1	30.2
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	55.5	0.0	11,844.0	0.0	225.1	30.2
(2) Agricultural Area	3.6	0.0	845.2	14.4	0.1	0.0
a. Annual Crop	1.0	0.0	762.7	14.1	0.1	0.0
b. Fishpond	2.6	0.0	82.5	0.3	0.0	0.0
(3) Infrastructure	17.7	0.0	3,806.8	4.3	67.6	9.1
2. Indirect Damage	15.4	0.0	3,299.2	3.7	58.6	7.9
3. Total Damage	92.2	0.0	19,795.2	22.4	351.4	47.2
4. Area Adjusted	129.1	0.0	27,713.3	31.4	492.0	66.1
IV. Annual Average Damage	49.1	0.0	10,531.1	11.9	187.0	25.1
V. Time Adjusted Damage (Benefit Index)	166.9	0.0	35,805.7	40.5	635.8	85.3

Item	Selected River Basins					
	79. Surigao	80. Tago	81. Lake Mainit T.	82. Boston	83. Amnay	84. Mag-A. T.
I. Inundated Property						
1. Built-up Area (ha)	5.0	1.3	8.2	0.0	0.0	1.6
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	5.0	1.3	8.2	0.0	0.0	1.6
2. Agricultural Area (ha)	181.3	1,729.0	284.0	24.3	1,188.6	2,144.8
a. Annual Crop	181.3	1,556.3	284.0	24.3	1,188.6	2,144.8
b. Fishpond	0.0	172.8	0.0	0.0	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	138.8	37.2	230.1	0.0	0.0	45.6
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	138.8	37.2	230.1	0.0	0.0	45.6
2. Agricultural Area	7.6	81.3	11.9	1.0	49.9	90.1
a. Annual Crop	7.6	65.4	11.9	1.0	49.9	90.1
b. Fishpond	0.0	15.9	0.0	0.0	0.0	0.0
3. Total	146.4	118.5	242.0	1.0	49.9	135.7
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	60.1	84.1	99.1	0.8	39.0	88.0
(1) Built-up Area	41.6	11.2	69.0	0.0	0.0	13.7
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	41.6	11.2	69.0	0.0	0.0	13.7
(2) Agricultural Area	4.6	53.5	7.2	0.6	30.0	54.0
a. Annual Crop	4.6	39.2	7.2	0.6	30.0	54.0
b. Fishpond	0.0	14.3	0.0	0.0	0.0	0.0
(3) Infrastructure	13.9	19.4	22.9	0.2	9.0	20.3
2. Indirect Damage	12.0	16.8	19.8	0.2	7.8	17.6
3. Total Damage	72.1	100.9	118.9	1.0	46.8	105.6
4. Area Adjusted	100.9	141.3	166.5	1.4	65.5	147.8
IV. Annual Average Damage	38.3	53.7	63.3	0.5	24.9	56.2
V. Time Adjusted Damage (Benefit Index)	130.2	182.6	215.2	1.7	84.7	191.1

Tab. 4-8 Benefit Index from Flood Control under Future Condition (8/11)

Item	Selected River Basins					
	85. Cagaray	86. Balete	87. Bongabon	88. Pula	89. Malaylay-Baco	90. Magbando
I. Inundated Property						
1. Built-up Area (ha)	0.0	16.5	19.7	0.0	0.0	8.6
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	0.0	16.5	19.7	0.0	0.0	8.6
2. Agricultural Area (ha)	417.7	125.0	451.9	537.3	426.0	693.1
a. Annual Crop	335.7	125.0	451.9	537.3	426.0	693.1
b. Fishpond	82.0	0.0	0.0	0.0	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	0.0	462.5	551.9	0.0	0.0	241.9
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	0.0	462.5	551.9	0.0	0.0	241.9
2. Agricultural Area	21.6	5.2	19.0	22.6	17.9	29.1
a. Annual Crop	14.1	5.2	19.0	22.6	17.9	29.1
b. Fishpond	7.5	0.0	0.0	0.0	0.0	0.0
3. Total	21.6	467.7	570.9	22.6	17.9	271.0
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	19.9	184.3	230.1	17.6	13.9	117.1
(1) Built-up Area	0.0	138.7	165.6	0.0	0.0	72.6
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	0.0	138.7	165.6	0.0	0.0	72.6
(2) Agricultural Area	15.3	3.1	11.4	13.5	10.7	17.5
a. Annual Crop	8.5	3.1	11.4	13.5	10.7	17.5
b. Fishpond	6.8	0.0	0.0	0.0	0.0	0.0
(3) Infrastructure	4.6	42.5	53.1	4.1	3.2	27.0
2. Indirect Damage	4.0	36.9	46.0	3.5	2.8	23.4
3. Total Damage	23.9	221.2	276.1	21.1	16.7	140.5
4. Area Adjusted	33.5	309.7	386.5	29.5	23.4	196.7
IV. Annual Average Damage	12.7	117.7	146.9	11.2	8.9	74.7
V. Time Adjusted Damage (Benefit Index)	43.2	400.2	499.5	38.1	30.3	254.0

Item	Selected River Basins					
	91. Baroc	92. Pola	93. Agus	94. Mataling	95. Nituan	96. Mataber
I. Inundated Property						
1. Built-up Area (ha)	4.3	0.0	40.0	0.0	2.7	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	4.3	0.0	40.0	0.0	2.7	0.0
2. Agricultural Area (ha)	326.8	364.5	700.5	36.8	298.4	233.2
a. Annual Crop	324.9	364.5	700.5	36.8	298.4	233.2
b. Fishpond	1.9	0.0	0.0	0.0	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	121.7	0.0	1,120.0	0.0	75.3	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	121.7	0.0	1,120.0	0.0	75.3	0.0
2. Agricultural Area	13.8	15.3	29.4	1.5	12.5	9.8
a. Annual Crop	13.6	15.3	29.4	1.5	12.5	9.8
b. Fishpond	0.2	0.0	0.0	0.0	0.0	0.0
3. Total	135.5	15.3	1,149.4	1.5	87.8	9.8
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	58.4	12.0	459.8	1.2	39.1	7.7
(1) Built-up Area	36.5	0.0	336.0	0.0	22.6	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	36.5	0.0	336.0	0.0	22.6	0.0
(2) Agricultural Area	8.4	9.2	17.7	0.9	7.5	5.9
a. Annual Crop	8.2	9.2	17.7	0.9	7.5	5.9
b. Fishpond	0.2	0.0	0.0	0.0	0.0	0.0
(3) Infrastructure	13.5	2.8	106.1	0.3	9.0	1.8
2. Indirect Damage	11.7	2.4	92.0	0.2	7.8	1.5
3. Total Damage	70.1	14.4	551.8	1.4	46.9	9.2
4. Area Adjusted	98.1	20.2	772.5	2.0	65.7	12.9
IV. Annual Average Damage	37.3	7.7	293.6	0.8	25.0	4.9
V. Time Adjusted Damage (Benefit Index)	126.8	26.2	998.2	2.7	85.0	16.7

Tab. 4-8 Benefit Index from Flood Control under Future Condition (9/11)

Item	Selected River Basins					
	97. Abulug	98. Bauang	99. Upstream of Agno	100. Upstream of Pampanga	101. Meycauayan	102. Upper Marikina
I. Inundated Property						
1. Built-up Area (ha)	132.2	0.1	529.5	775.2	339.1	932.6
a. NCR & HUCs	0.0	0.0	0.0	0.0	150.6	765.0
b. Others	132.2	0.1	529.5	775.2	188.5	167.6
2. Agricultural Area (ha)	7,241.2	167.4	12,315.0	23,528.7	472.0	0.0
a. Annual Crop	7,241.2	167.4	12,315.0	23,528.7	328.4	0.0
b. Fishpond	0.0	0.0	0.0	0.0	143.6	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	3,702.7	2.3	14,825.8	21,705.6	19,435.4	76,605.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	14,157.5	71,912.8
b. Others	3,702.7	2.3	14,825.8	21,705.6	5,277.9	4,692.2
2. Agricultural Area	304.1	7.0	517.2	988.2	27.0	0.0
a. Annual Crop	304.1	7.0	517.2	988.2	13.8	0.0
b. Fishpond	0.0	0.0	0.0	0.0	13.2	0.0
3. Total	4,006.8	9.3	15,343.0	22,693.8	19,462.4	76,605.0
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	1,681.3	6.4	6,185.5	9,236.0	7,606.2	29,876.0
(1) Built-up Area	1,110.8	0.7	4,447.8	6,511.7	5,830.7	22,981.5
a. NCR & HUCs	0.0	0.0	0.0	0.0	4,247.3	21,573.8
b. Others	1,110.8	0.7	4,447.8	6,511.7	1,583.4	1,407.7
(2) Agricultural Area	182.5	4.2	310.3	592.9	20.2	0.0
a. Annual Crop	182.5	4.2	310.3	592.9	8.3	0.0
b. Fishpond	0.0	0.0	0.0	0.0	11.9	0.0
(3) Infrastructure	388.0	1.5	1,427.4	2,131.4	1,755.3	6,894.5
2. Indirect Damage	336.3	1.3	1,237.1	1,847.2	1,521.2	5,975.2
3. Total Damage	2,017.6	7.7	7,422.6	11,083.2	9,127.4	35,851.2
4. Area Adjusted	2,824.6	10.8	10,391.6	15,516.5	12,778.4	50,191.7
IV. Annual Average Damage	1,073.3	4.1	3,948.8	5,896.3	4,855.8	19,072.8
V. Time Adjusted Damage (Benefit Index)	3,649.2	13.9	13,425.9	20,047.4	16,509.7	64,847.5

Item	Selected River Basins					
	103. East Mangahan	104. San Juan	105. Jaro-Aganan	106. Cairawan	107. Sibalom-West	108. Dalanas
I. Inundated Property						
1. Built-up Area (ha)	1,333.5	424.1	24.9	0.0	0.1	0.0
a. NCR & HUCs	85.5	338.0	0.0	0.0	0.0	0.0
b. Others	1,248.0	86.1	24.9	0.0	0.1	0.0
2. Agricultural Area (ha)	269.8	0.0	0.0	55.0	136.8	11.6
a. Annual Crop	269.8	0.0	0.0	55.0	136.8	11.6
b. Fishpond	0.0	0.0	0.0	0.0	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	42,981.0	34,182.8	698.2	0.0	2.4	0.0
a. NCR & HUCs	8,037.0	31,772.0	0.0	0.0	0.0	0.0
b. Others	34,944.0	2,410.8	698.2	0.0	2.4	0.0
2. Agricultural Area	11.3	0.0	0.0	2.3	5.7	0.5
a. Annual Crop	11.3	0.0	0.0	2.3	5.7	0.5
b. Fishpond	0.0	0.0	0.0	0.0	0.0	0.0
3. Total	42,992.3	34,182.8	698.2	2.3	8.1	0.5
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	16,771.4	13,331.2	272.4	1.8	5.3	0.4
(1) Built-up Area	12,894.3	10,254.8	209.5	0.0	0.7	0.0
a. NCR & HUCs	2,411.1	9,531.6	0.0	0.0	0.0	0.0
b. Others	10,483.2	723.2	209.5	0.0	0.7	0.0
(2) Agricultural Area	6.8	0.0	0.0	1.4	3.4	0.3
a. Annual Crop	6.8	0.0	0.0	1.4	3.4	0.3
b. Fishpond	0.0	0.0	0.0	0.0	0.0	0.0
(3) Infrastructure	3,870.3	3,076.4	62.9	0.4	1.2	0.1
2. Indirect Damage	3,354.3	2,666.2	54.5	0.4	1.1	0.1
3. Total Damage	20,125.7	15,997.4	326.9	2.2	6.4	0.5
4. Area Adjusted	20,125.7	15,997.4	457.7	3.1	9.0	0.7
IV. Annual Average Damage	7,647.8	6,079.0	173.9	1.2	3.4	0.3
V. Time Adjusted Damage (Benefit Index)	26,002.5	20,668.6	591.3	4.1	11.6	1.0

Tab. 4-8 Benefit Index from Flood Control under Future Condition (10/11)

Item	Selected River Basins					
	109. Tibiao	110. Sipalay	111. Mananga	112. Guinabasan	113. San-Roque	114. Bugko
I. Inundated Property						
1. Built-up Area (ha)	1.2	18.4	0.9	53.7	0.0	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	1.2	18.4	0.9	53.7	0.0	0.0
2. Agricultural Area (ha)	40.6	390.5	66.1	150.3	37.5	278.2
a. Annual Crop	40.6	390.5	66.1	150.3	37.5	278.2
b. Fishpond	0.0	0.0	0.0	0.0	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	34.4	514.3	26.5	1,504.5	0.0	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	34.4	514.3	26.5	1,504.5	0.0	0.0
2. Agricultural Area	1.7	16.4	2.8	6.3	1.6	11.7
a. Annual Crop	1.7	16.4	2.8	6.3	1.6	11.7
b. Fishpond	0.0	0.0	0.0	0.0	0.0	0.0
3. Total	36.1	530.7	29.3	1,510.8	1.6	11.7
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	14.7	213.3	12.6	591.8	1.2	9.1
(1) Built-up Area	10.3	154.3	8.0	451.4	0.0	0.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	10.3	154.3	8.0	451.4	0.0	0.0
(2) Agricultural Area	1.0	9.8	1.7	3.8	0.9	7.0
a. Annual Crop	1.0	9.8	1.7	3.8	0.9	7.0
b. Fishpond	0.0	0.0	0.0	0.0	0.0	0.0
(3) Infrastructure	3.4	49.2	2.9	136.6	0.3	2.1
2. Indirect Damage	2.9	42.7	2.5	118.4	0.2	1.8
3. Total Damage	17.6	256.0	15.1	710.2	1.4	10.9
4. Area Adjusted	24.6	358.4	21.1	994.3	2.0	15.3
IV. Annual Average Damage	9.3	136.2	8.0	377.8	0.8	5.8
V. Time Adjusted Damage (Benefit Index)	31.6	463.1	27.2	1,284.5	2.7	19.7

Item	Selected River Basins					
	115. Cadacan	116. Balatocan	117. Tuganay	118. Lipadas	119. Talomo	120. Agusan
I. Inundated Property						
1. Built-up Area (ha)	0.0	7.6	137.9	28.4	31.9	108.7
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	0.0	7.6	137.9	28.4	31.9	108.7
2. Agricultural Area (ha)	830.0	101.3	8,634.5	8.1	429.6	3,109.3
a. Annual Crop	830.0	101.3	8,518.6	8.1	429.6	3,109.3
b. Fishpond	0.0	0.0	115.9	0.0	0.0	0.0
II. Inundated Property Value (Million Pesos in Market Prices)						
1. Built-up Area	0.0	212.0	3,860.2	796.1	894.4	3,043.4
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	0.0	212.0	3,860.2	796.1	894.4	3,043.4
2. Agricultural Area	34.9	4.3	368.5	0.3	18.0	130.6
a. Annual Crop	34.9	4.3	357.8	0.3	18.0	130.6
b. Fishpond	0.0	0.0	10.7	0.0	0.0	0.0
3. Total	34.9	216.3	4,228.7	796.4	912.4	3,174.0
III. Flood Damage (Million Pesos in Market Prices)						
1. Direct Damage	27.2	86.1	1,797.0	310.7	362.8	1,288.8
(1) Built-up Area	0.0	63.6	1,158.0	238.8	268.3	913.0
a. NCR & HUCs	0.0	0.0	0.0	0.0	0.0	0.0
b. Others	0.0	63.6	1,158.0	238.8	268.3	913.0
(2) Agricultural Area	20.9	2.6	224.3	0.2	10.8	78.4
a. Annual Crop	20.9	2.6	214.7	0.2	10.8	78.4
b. Fishpond	0.0	0.0	9.6	0.0	0.0	0.0
(3) Infrastructure	6.3	19.9	414.7	71.7	83.7	297.4
2. Indirect Damage	5.4	17.2	359.4	62.1	72.6	257.8
3. Total Damage	32.6	103.3	2,156.4	372.8	435.4	1,546.6
4. Area Adjusted	45.6	144.6	3,019.0	521.9	609.6	2,165.2
IV. Annual Average Damage	17.3	54.9	1,147.2	198.3	231.6	822.8
V. Time Adjusted Damage (Benefit Index)	58.8	186.7	3,900.5	674.2	787.4	2,797.5

Tab. 4-8 Benefit Index from Flood Control under Future Condition (11/11)

Item	Selected River Basins				
	98-2.Ambayawan	98-3.Banila	99-2.Rio Chico		
I. Inundated Property					
1. Built-up Area (ha)	1.8	4.8	184.8		
a. NCR & HUCs	0.0	0.0	0.0		
b. Others	1.8	4.8	184.8		
2. Agricultural Area (ha)	356.4	2,700.9	20,345.1		
a. Annual Crop	356.4	2,700.9	20,345.1		
b. Fishpond	0.0	0.0	0.0		
II. Inundated Property Value (Million Pesos in Market Prices)					
1. Built-up Area	50.7	133.2	5,174.4		
a. NCR & HUCs	0.0	0.0	0.0		
b. Others	50.7	133.2	5,174.4		
2. Agricultural Area	15.0	113.4	854.5		
a. Annual Crop	15.0	113.4	854.5		
b. Fishpond	0.0	0.0	0.0		
3. Total	65.7	246.6	6,028.9		
III. Flood Damage (Million Pesos in Market Prices)					
1. Direct Damage	31.5	140.5	2,684.5		
(1) Built-up Area	15.2	40.0	1,552.3		
a. NCR & HUCs	0.0	0.0	0.0		
b. Others	15.2	40.0	1,552.3		
(2) Agricultural Area	9.0	68.1	512.7		
a. Annual Crop	9.0	68.1	512.7		
b. Fishpond	0.0	0.0	0.0		
(3) Infrastructure	7.3	32.4	619.5		
2. Indirect Damage	6.3	28.1	536.9		
3. Total Damage	37.8	168.6	3,221.4		
4. Area Adjusted	52.9	236.0	4,510.0		
IV. Annual Average Damage	20.1	89.7	1,713.8		
V. Time Adjusted Damage (Benefit Index)	68.3	305.0	5,826.9		

Tab. 4-9 Benefit Index from Sabo Dam under Future Condition

Item	Selected River Basins				
	1. Olongapo	2. Legazpi	3. Guinale	4. Catarman-Is	5. Bucao
I. Inundated Property					
1. Buildings (Nos)	562	439	38	89	51
2. Crop (ha)	0.0	0.0	0.0	0.0	180.0
II. Flood Damage (Million Pesos in Market Prices)					
1. Direct Damage	753.8	588.8	51.0	119.4	79.1
(1) Buildings	538.4	420.6	36.4	85.3	48.9
(2) Crop	0.0	0.0	0.0	0.0	7.6
(3) Infrastructure	215.4	168.2	14.6	34.1	22.6
2. Indirect Damage	150.8	117.8	10.2	23.9	15.8
3. Total Damage	904.6	706.6	61.2	143.3	94.9
III. Annual Average Benefit	343.7	268.5	23.3	54.5	36.1
IV. Total Benefit (Benefit Index)	1,203.0	939.8	81.6	190.8	126.4
Item	Selected River Basins				
	6. Bago (No.1)	7. Bago (No.2)	8. Guagua	9. Santo Tomas	10. Agos
I. Inundated Property					
1. Buildings (Nos)	10	10	141	98	86
2. Agricultural Land (ha)	35.0	35.0	0.0	0.0	300.0
II. Flood Damage (Million Pesos in Market Prices)					
1. Direct Damage	15.5	15.5	189.1	131.5	133.0
(1) Buildings	9.6	9.6	135.1	93.9	82.4
(2) Agricultural Production	1.5	1.5	0.0	0.0	12.6
(3) Infrastructure	4.4	4.4	54.0	37.6	38.0
2. Indirect Damage	3.1	3.1	37.8	26.3	26.6
3. Total Damage	18.6	18.6	226.9	157.8	159.6
III. Annual Average Benefit	7.1	7.1	86.2	60.0	60.6
IV. Total Benefit (Benefit Index)	24.9	8.5	301.7	210.0	212.1

Tab. 4-10 Ranking of Selected 120 River Basins

Ranking by Score	River Name	Basin Area (km ²)	Score				Project Cost (MP)	Total Amount (MP)	Region	Category	Group		
			1st	B-C	B/C	Total							
1	UPPER MARIKINA	515	46	90	85	221	13,469	NCR IV-A	P(D)	u	O	3	
2	EAST MANGAHAN	64	39	90	90	219	2,250	IV-A NCR	P(D)	u	O+H	5	
3	SAN JUAN	90	34	90	90	214	2,280	18,890	NCR	P(D)	u	O	3
4	CEBU/MANDAWE	241	31	90	90	211	2,368	21,257	VII	Q(D)	u	F+O+H	5
5	PATALAN/CAYANGA/ANGALACAN	656	51	90	61	202	2,318	23,575	I CAR	P	g	F+O+B	1
6	YAWA/BASUD/QUIRANGAY(LEGAZPI CITY)	126	36	56	90	182	475	24,050	V	O(D)	g	F+O+H+B+L	6
7	MEYCAUAYAN	201	46	90	30	166	7,180	31,231	III, NCR	O(D)	u	O	3
8	SANTA RITA/KALAKLAN(OLONGAPO CITY)	102	32	36	90	158	479	31,710	III	O(D)	g	F+O+H+B+L	6
9	MANDALAGAN(BAGOLOD CITY)	187	35	32	90	157	214	31,924	VI	O	g	F+O	3
10	MINDANAO	20,673	35	90	29	154	15,870	47,794	XII ARMM	M	g	F+O+H+B	4
11	IMUS	112	35	77	41	153	2,377	50,170	IV-A	P(D)	u	F+O	3
12	TUMAGA	255	22	40	90	152	483	50,653	IX	P(D)	g	F+B	1
13	UPSTREAM of PAMPANGA(include RIO CHICO)	8,122	47	72	6	125	21,856	72,510	III	P(D)	g	F+O+B	1
14	NANGALISAN/BAGGAO-PARED(CAGAYAN)	27,743	53	59	3	115	52,826	255,335	II, CAR	M	g	F+O+B	1
15	AKLAN	1,010	39	16	52	107	366	125,302	VI	P	g	F+B	1
16	DINANGASAN(CATARMAN-1S)	29	52	6	48	106	117	125,819	X	O(D)	g	F+O+H+B+L	6
17	DAVAO	1,992	29	39	35	103	1,369	127,188	XI	M	g	F+O	3
18	IPONAN	412	27	17	54	98	357	127,545	X	P	g	O+B	2
19	LIPADAS	163	27	10	54	91	198	127,744	XI	P(D)	g	F+O+B	1
20	MALUPA-DIAN(AGUANG)	666	36	17	37	90	540	128,284	III	P	g	F+O+H+B	4
21	UPSTREAM of AGNO(include AMBAYAWAN, BANILA)	5,722	47	36	5	88	11,850	140,134	I	P(D)	g	F+O+B	1
22	GUINABASAN	131	27	16	45	88	433	140,567	VII	P(D)	u	F+O	3
23	SINOCALAN/MAROSOY(DAGUPAN)	1,023	53	22	8	83	3,890	144,458	I, CAR	P	g	F+O+B	1
24	KABILUGAN/VELASCO/BATO LAKE(BICOL)	2,999	57	14	3	74	12,095	156,553	V	M	g	F+O+B	1
25	KINANILAMAN(REAL-1)	19	40	2	31	73	32	156,585	IV-A	O	g	F+O+H+B	4
26	ABULUG	2,766	52	13	6	71	2,989	159,574	CAR, II	M	g	F+O+H+B	4
27	UPPER AGUSAN	1,745	46	15	10	71	2,013	161,586	XI	P(D)	g	F+O+B	1
28	DONSOL/MANLATO	413	35	3	27	65	82	161,668	V	P(D)	g	F+B	1
29	PANAY/MAMBUSAO	2,311	38	21	5	64	6,068	167,736	VI	M	g	F+O+B	1
30	ILOG-HILABANGAN	2,162	41	13	10	64	1,638	169,374	VI, VII	M	g	F+O+B	1
31	TALOMO	279	27	9	28	64	359	169,733	XI	P(D)	g	F+B	1
32	TUGANAY	747	25	25	13	63	2,563	172,296	XI	P(D)	g	O+H	5
33	AGOS	483	37	8	14	59	680	172,976	IV-A	P(D)	g	O+B+L	6
34	GUAGUA	1,605	56	1	1	58	31,715	204,691	III	O(D)	u	F+O+H	6
35	BAGO	868	40	6	12	58	595	205,287	VI	P	g	F+O+H+B	4
36	AMBURAYAN	1,307	55	1	1	57	676	205,963	I, CAR	P(D)	g	O+B	2
37	BALETE	132	40	4	13	57	259	206,222	IV-B	P	g	F+O+H+B	4
38	TAGIM-LIBUGANON	2,434	32	16	7	55	3,517	209,739	VI	P	g	O+H	5
39	ABRA	4,951	52	1	1	54	2,984	212,723	I, CAR	M	g	O+B	2
40	ANGAT	917	51	1	1	53	9,014	221,737	III	P	u	F+O+H	5
41	ARINGAY	421	51	1	1	53	822	222,560	I, CAR	P	g	F+O+H+B	4
42	JALAU	1,534	37	10	5	52	3,249	225,809	VI	M	g	O	3
43	BAUANG	510	49	1	1	51	358	226,167	CAR, I	P	g	F+O+H+B	4
44	TAGOLOAN	1,762	30	9	11	50	980	227,147	X	M	g	O+B	2
45	AGUS/BUAYAN	1,898	31	7	12	50	681	227,828	ARMM, X	M	g	O	3
46	SILWAY-POPONG-SINAUAL(POLOMOLOK)	577	29	6	14	49	406	228,234	XII	O	g	F+O	3
47	DUNGCAAN(PAGBANGANAN)	176	43	2	4	49	89	228,323	VIII	P	g	O+B	2
48	UMRAY	629	46	1	1	48	92	228,515	IV-A	P	g	F+O+H+B	4
49	DAET-BASUD	2,777	35	5	7	47	887	229,402	V	P	g	O	3
50	CAGURAY	361	45	1	1	47	794	230,196	IV-B	P	g	F	3
51	GENERAL NAKAR-2-(a)	37	38	2	7	47	17	230,213	IV-A	O	g	F+O+H	5
52	KALIWA	468	44	1	1	46	1,003	231,216	IV-A	P	u	O+B	2
53	TRAN	808	40	1	1	42	641	231,858	XII ARMM	P	g	O	3
54	LALAVINAN(REAL-2)	46	40	1	1	42	20	231,876	IV-A	O	g	F	3
55	BONGABONG	574	39	1	1	41	523	232,399	IV-B	P	g	O+B	2
56	GENERAL NAKAR-2-(b)	17	39	1	1	41	50	232,450	IV-A	O	g	F+O+H+B	4
57	HIMOCAAN	462	36	2	2	40	374	232,824	VI	P	g	O+B	2
58	LABO	931	37	1	1	39	1,715	234,538	V, IV-A	P	g	F+B	1
59	SIBALAY	336	30	3	6	38	319	234,917	IV-B	P(D)	g	F+O+H+B	4
60	BARARO	192	37	1	1	38	319	235,236	I	P	g	O	3
61	PAMPLONA	698	37	1	1	39	280	235,516	II, CAR	P	g	F+B	1
62	TIGNOAN	87	37	1	1	39	28	235,544	IV-A	P	g	F+O+H+B	4
63	PALANAN-PINACANAUAN	755	36	1	1	38	1,447	236,991	II	P	g	F+O+H+B	4
64	BALINGCUGUIN/MABINI PANGSINAN	378	36	1	1	38	717	237,707	I	P	g	F+O+B	1
65	BACARRA-VINTAR	627	36	1	1	38	556	238,264	I	P	g	O+B	2
66	BANURBOUR(LAL-LO1)	511	36	1	1	38	328	238,592	II	O	g	O	3
67	DAGUITAN-MARABONG	292	36	1	1	38	308	238,901	VIII	P	g	F+O	3
68	CAGAYAN DE ORO	1,365	29	3	5	37	728	239,629	X	M	g	F+O+B	1
69	PULA	245	35	1	1	37	610	240,239	IV-B	P	g	O+B	2
70	SANTO TOMAS-GABOR	334	31	2	4	37	434	240,557	III	P(D)	g	F+O+H	6
71	SILAG-SANTA MARIA	310	35	1	1	37	355	241,012	I, CAR	P	g	F+O	3
72	TAGO	1,370	34	1	1	36	2,169	243,181	XIII	P	g	F+O+B	1
73	PAGSANGA-AN	511	34	1	1	36	879	244,060	VIII	P	g	O+B	2
74	BUAYAN-MALUNGUN	1,400	31	2	3	36	527	244,587	XI, XII	M	g	O	3
75	LAKE MAINIT-TUBAY	473	32	2	2	36	214	244,801	XIII	P	g	O	3
76	ALAG(MALAYLAY-BACO)	505	33	1	1	35	734	245,535	IV-B	P	g	O+B	2
77	MAGBANDO/BUSWANGA	466	33	1	1	35	632	246,167	IV-B	P	g	F+O+B	1
78	CLAVERIA(CABICUNGAN)	270	33	1	1	35	586	246,753	II, CAR	P	g	O	3
79	BUAYA	246	33	1	1	35	494	247,247	I	P	g	F+O+B	1
80	QUINALE-B	182	33	1	1	35	447	247,694	V	P	g	F+O+H+B+L	6
81	BAUA	118	33	1	1	35	325	248,018	II	P	g	F+H+B	5
82	POLA	140	33	1	1	35	306	248,325	IV-B	P	g	O	3
83	BAROC	162	33	1	1	35	225	248,550	IV-B	P	g	F+O+B	1
84	RAGAY	176	33	1	1	35	180	248,730	V	P	g	F	3
85	ALAMINOS/TAGOONG	221	32	1	1	34	998	249,728	I	P	g	F+O	3
86	JARO-AGANAN	464	32	1	1	34	755	250,484	VI	P(D)	u	O+B	2
87	SIBALOM	690	32	1	1	34	265	250,748	VI	P(D)	g	F+O+H+B	4
88	BOSTON	43	32	1	1	34	44	250,792	XIII, XI	O	g	O+B	2
89	CALUMPANG(KAPUMPONG)	446	31	1	1	33	3,693	254,485	IV-A	P(D)	u	O+H	5
90	COMBADO(BALAMBAN)	237	31	1	1	33	812	255,297	VII	P	u	O+B	2
91	BUCAO	664	31	1	1	33	508	255,805	III	P(D)	g	F+O+H+B+L	6
92	NAYUM	229	31	1	1	33	481	256,286	III, I	P	g	O	3
93	SAPANG DAKO	169	31	1	1	33	324	256,511	VII	P	u	F+O	3
94	CATARMAN	632	31	1	1	33	36	256,666	VIII	P(D)	g	O+B	2
95	AMNAY	495	30	1	1	32	1,149	257,816	IV-B	P(D)	g	O	3
96	IYAM/LUCENA	158	30	1	1	32	670	258,485	IV-A	P(D)	g	F	3
97	HJO	642	30	1	1	32	566	259,052	XI	P	g	F+O+B	1
98	PADADA MAINIT	1,216	30	1	1	32	480	259,532	XI, XII	P	g	O+B	2
99	CADAC-AN	523	30	1	1	32	461	259,993	VIII	P(D)	g	F+O+B	1
100	SURIGAO	170	30	1	1	32	318	260,311	XIII	P(D)	g	O	3
101	DALE	169	30	1	1	32	134	260,445	VIII	P(D)	g	O	3
102	DISACAN-MANUKAN(JOSE DALMAN PONOT I)	274	30	1	1	32	70	260,515	IX	O	g	F+H	5
103	MACO	30	30	1	1	32	12	260,527	XI	O	g	F+O+B	1
104	SIBURUYEY	984	29	1	1	31	2,493	263,020	IX	P	g	F+H+B	5
105	DOMACAN/TAMBAK(TAYABAS)	45	29	1	1	31	269	263,289	IV-A	O(D)	g	F+O+H	5
106	BALATUKAN	221	25	2	4	31	165	263,454	X	P(D)	g	F	3
107	MANANGA	86	29	1	1	31	165	263,619	VII	P(D)	u	F+O	3
108	MATALING	420	29	1	1	31	109	263,729	ARMM	P	g	O+B	2
109	SIGUEL	358	27	2	2	31	83	263,812	XII	P	g	F+O	3
110	BANTAYAN	89	29	1	1	31	48	263,860	VIII	O(D)	g	F+O	3
111	MAPANGI	1,306	28	1	1	30	2,717	266,576	IX, X	P	g	O+B	2
112	MAG-ASAWANG TUBIG	443	28	1	1	30	1,048	267,625	IV-B	P(D)			

Tab. 4-11 Result of Sensitivity Analysis

	Case1	Case2	Case3
Rank	Analysis with 45 Points	Analysis with 70 Points	Analysis with 90 Points
1	UPPER MARIKINA	UPPER MARIKINA	UPPER MARIKINA
2	EAST MANGAHAN	EAST MANGAHAN	EAST MANGAHAN
3	PATALAN/CAYANGA/ANGALACAN	SAN JUAN	SAN JUAN
4	SAN JUAN	CEBU/MANDAWA	CEBU/MANDAWA
5	CEBU/MANDAWA	PATALAN/CAYANGA/ANGALACAN	PATALAN/CAYANGA/ANGALACAN
6	YAWA/BASUD/QUIRANGAY(LEGAZPI CITY)	YAWA/BASUD/QUIRANGAY(LEGAZPI CITY)	YAWA/BASUD/QUIRANGAY(LEGAZPI CITY)
7	MEYCAUAYAN	MEYCAUAYAN	MEYCAUAYAN
8	MANDALAGAN(BACOLOD CITY)	SANTA RITA/KALAKLAN(OLONGAPO CITY)	SANTA RITA/KALAKLAN(OLONGAPO CITY)
9	SANTA RITA/KALAKLAN(OLONGAPO CITY)	MANDALAGAN(BACOLOD CITY)	MANDALAGAN(BACOLOD CITY)
10	MINDANAO	MINDANAO	MINDANAO
11	IMUS	IMUS	IMUS
12	TUMAGA	TUMAGA	TUMAGA
13	UPSTREAM of PAMPANGA(include RIO CHICO)	UPSTREAM of PAMPANGA(include RIO CHICO)	UPSTREAM of PAMPANGA(include RIO CHICO)
14	NANGALISAN/BAGGAO-PAREDI(CAGAYAN)	NANGALISAN/BAGGAO-PAREDI(CAGAYAN)	NANGALISAN/BAGGAO-PAREDI(CAGAYAN)
15	DINANGGASAN(CATARMAN-1S)	DINANGGASAN(CATARMAN-1S)	AKLAN
16	AKLAN	AKLAN	DINANGGASAN(CATARMAN-1S)
17	SINOCALAN/MAROSOY(DAGUPAN)	DAVAO	DAVAO
18	UPSTREAM of AGNO(include AMBAYAWAN)	IPONAN	IPONAN
19	KABILUGAN/VELASCO/BATO LAKE(BICOL)	UPSTREAM of AGNO(include AMBAYAWAN)	LIPADAS
20	DAVAO	MALLUPA-DIAN(AGUANG)	MALLUPA-DIAN(AGUANG)
21	MALLUPA-DIAN(AGUANG)	SINOCALAN/MAROSOY(DAGUPAN)	UPSTREAM of AGNO(include AMBAYAWAN, BANILA)
22	IPONAN	LIPADAS	GUINABASAN
23	ABULUG	GUINABASAN	SINOCALAN/MAROSOY(DAGUPAN)
24	LIPADAS	KABILUGAN/VELASCO/BATO LAKE(BICOL)	KABILUGAN/VELASCO/BATO LAKE(BICOL)
25	UPPER AGUSAN	ABULUG	KINANLIMAN(REAL-1)
26	GUINABASAN	KINANLIMAN(REAL-1)	ABULUG
27	GUAGUA	UPPER AGUSAN	UPPER AGUSAN
28	KINANLIMAN(REAL-1)	DONSOL/MANLATO	DONSOL/MANLATO
29	AMBURAYAN	ILOG-HILABANGAN	PANAY/MAMBUSAO
30	ABRA	PANAY/MAMBUSAO	ILOG-HILABANGAN
31	ILOG-HILABANGAN	GUAGUA	TALOMO
32	ARINGAY	AMBURAYAN	TUGANAY
33	ANGAT	TALOMO	AGOS
34	PANAY/MAMBUSAO	AGOS	GUAGUA
35	DONSOL/MANLATO	BAGO	BAGO
36	BAGO	TUGANAY	AMBURAYAN
37	BAUANG	ABRA	BALETE
38	BALETE	BALETE	TAGUM-LIBUGANON
39	AGOS	ARINGAY	ABRA
40	UMIRAY	ANGAT	ANGAT
41	DUNGGAAAN(PAGBANGANAN)	BAUANG	ARINGAY
42	CAGURAY	TAGUM-LIBUGANON	JALAUUR
43	KALIWA	JALAUUR	BAUANG
44	JALAUUR	UMIRAY	TAGOLOAN
45	TALOMO	DUNGGAAAN(PAGBANGANAN)	AGUS BUAYAN
46	TAGUM-LIBUGANON	CAGURAY	SILWAY-POPONG-SINAUAL(POLOMOLOK)
47	TUGANAY	KALIWA	DUNGGAAAN(PAGBANGANAN)
48	GENERAL NAKAR-2-(a)	DAET-BASUD	UMIRAY
49	LALAVINAN(REAL-2)	AGUS/BUAYAN	DAET-BASUD
50	DAET-BASUD	GENERAL NAKAR-2-(a)	CAGURAY
51	TRAN	TAGOLOAN	GENERAL NAKAR-2-(a)
52	AGUS BUAYAN	SILWAY-POPONG-SINAUAL(POLOMOLOK)	KALIWA
53	GENERAL NAKAR-2-(b)	LALAVINAN(REAL-2)	TRAN
54	TAGOLOAN	TRAN	LALAVINAN(REAL-2)
55	BONGABONG	GENERAL NAKAR-2-(b)	BONGABONG
56	HIMOCAAN	BONGABONG	GENERAL NAKAR-2-(b)
57	SILWAY-POPONG-SINAUAL(POLOMOLOK)	BARARO	HIMOCAAN
58	BARARO	PAMPLONA	LABO
59	PAMPLONA	TIGNOAN	SIPALAY
60	TIGNOAN	LABO	BARARO

Tab. 4-12 Medium-Term Investment Program (1/2)

(mil. Pesos)

Project	Proposed Allocation (in thousand Pesos)						Total (1999-2004)
	1999	2000	2001	2002	2003	2004	
National Roads	24,273	22,951	28,161	29,063	39,983	41,640	186,071
Flood Control	4,384	4,791	6,089	8,285	9,641	10,773	43,963
Other Local Fund	581	2,147	458	719	905	1,950	6,760
Total	29,238	29,889	34,708	38,067	50,529	54,363	236,794

Tab. 4-12 Medium-Term Investment Program (2/2)

(mil. Pesos)

Project	Total Cost	Previous Year	Proposed Allocation (in thousand Pesos)							Total (2005-2010)	Later Years
			2005	2006	2007	2008	2009	2010			
National Roads											
Foreign-Assisted Project	353,770*	52,376	17,122	24,270	18,834	18,819	34,014	42,163	155,222	146,676	
Locally Funded Project	142,522	1,353	9,081	11,285	18,454	37,841	30,681	33,827	141,169		
Total	496,293*	53,729	26,203	35,555	37,288	56,660	64,695	75,990	296,391		
Flood Control											
Foreign-Assisted Project	93,422	17,414	5,285	4,784	6,532	4,014	10,966	12,642	44,223	31,785	
Locally Funded Project	4,900	-	-	-	1,500	1,500	900	1,000	4,900	-	
Total	98,322	17,414	5,285	4,784	8,032	5,514	11,866	13,642	49,123	31,785	
Other Locally Funded Project	70,650	-	7,232	7,380	17,342	12,132	8,892	8,640	61,618	9,032	
Grand Total	665,265	71,143	38,720	47,719	62,662	74,306	85,453	98,272	407,132		

Note: (*) as shown in MTPIP

Tab. 4-13 Actual Investment Amount

(mil. Pesos)

Project	1999	2000	2001	2002	2003	2004	2005	2006	Total (1999-2006)
National Roads	21,878	22,950	21,878	13,059	18,328	18,898	24,313	28,642	169,946
Flood Control	5,346	4,791	5,346	4,969	4,347	4,270	5,085	6,318	40,472
Other Local Fund	9,513	17,146	9,512	22,115	17,668	14,220	9,391	12,754	112,319
Total	36,737	44,887	36,736	40,143	40,343	37,388	38,789	47,714	322,737

Tab. 4-14 Selected 56 River Basins by the Second Screening

No.	Ranking by Score	River Name	Basin Area (km ²)	Score				Project Cost (MP)	Total Amount (MP)	Region	Category	Group		
				1st	B-C	B/C	Total							
1	1	UPPER MARIKINA	515	46	90	85	221	13,469		NCR, IV-A	P(D)	u	O	3
2	2	EAST MANGAHAN	84	39	90	90	219	3,161	16,630	IV-A, NCR	P(D)	u	O+I	5
3	3	SAN JUAN	90	34	90	90	214	2,260	18,890	NCR	P(D)	u	O	3
4	4	CEBU/MANDAWA	241	31	90	90	211	2,368	21,257	VII	O(D)	u	F+O+I	5
5	5	PATALAN/CAYANGA/ANGALACAN	656	51	90	61	202	2,318	23,575	I, CAR	P	g	F+O+B	1
6	6	YAWA/BASUD/QUIRANGAY(LEGAZPI CITY)	126	36	56	90	182	475	24,050	V	O(D)	u	F+O+H+B+L	6
7	7	MEYCAUJAYAN	201	46	90	30	166	7,180	31,231	III, NCR	O(D)	u	O	3
8	8	SANTA RITA/KALAKLAN(OLONGAPO CITY)	102	32	36	90	158	479	31,710	III	O(D)	g	F+O+H+B+L	6
9	9	MANDALAGAN(BACOLOD CITY)	187	35	32	90	157	214	31,924	VI	O	g	F+O	3
10	10	MINDANAO	20,673	35	90	29	154	15,870	47,794	XII, ARMM	M	g	F+O+H+B	4
11	11	IMUS	112	35	77	41	153	2,377	50,170	IV-A	P(D)	u	F+O	3
12	12	TUMAGA	255	22	40	90	152	483	50,653	IX	P(D)	g	F+B	1
13	13	UPSTREAM of PAMPANGA(include RIO CHICO)	8,122	47	72	6	125	21,856	72,510	III	P(D)	g	F+O+B	1
14	14	NANGALISAN/BAGGAO-PARED(CAGAYAN)	27,743	53	59	3	115	52,826	125,335	II, CAR	M	g	F+O+B	1
15	15	AKLAN	1,010	39	16	52	107	366	125,702	VI	P	g	F+B	1
16	16	DINANGGASAN(CATARMAN-1S)	29	52	6	48	106	117	125,819	X	O(D)	g	F+O+H+B+L	6
17	17	DAVAO	1,992	29	39	35	103	1,369	127,188	XI	M	g	F+O	3
18	18	IPONAN	412	27	17	54	98	357	127,545	X	P	g	O+H	2
19	19	LIPADAS	163	27	10	54	91	198	127,744	XI	P(D)	g	F+O+B	1
20	20	MALUPA-DIAN(AGUANG)	666	36	17	37	90	540	128,284	III	P	g	F+O+H+B	4
21	21	UPSTREAM of AGNO(include AMBAYAWAN, BANILA)	5,722	47	36	5	88	11,850	140,134	I	P(D)	g	F+O+B	1
22	22	GUINABASAN	131	27	16	45	88	433	140,567	VII	P(D)	u	F+O+B	3
23	23	SINOGALAN/MAROSOY(DAGUPAN)	1,023	53	22	8	83	3,890	144,458	I, CAR	P	g	F+O+B	1
24	24	KABILUGAN/VELASCO/BATO LAKE(BICOL)	2,999	57	14	3	74	12,095	156,553	V	M	g	F+O+B	1
25	25	KINANLIMAN-REAL-1)	10	40	2	31	73	32	156,585	IV-A	O	g	F+O+H+B	4
26	26	ABULUG	2,766	52	13	6	71	2,989	159,574	CAR, II	M	g	F+O+H+B	4
27	27	UPPER AGUSAN	1,745	46	15	10	71	2,013	161,586	XI	P(D)	g	F+O+B	1
28	28	DONSOL/MANLATO	413	35	3	27	65	82	161,688	V	P(D)	g	F+B	1
29	29	PANAY/MAMBUSAO	2,311	38	21	5	64	6,068	167,736	VI	M	g	F+O+B	1
30	30	ILOG-HILABANGAN	2,162	41	13	10	64	1,638	169,374	VI, VII	M	g	F+O+B	1
31	31	TALOMO	279	27	9	28	64	359	169,733	XI	P(D)	g	F+B	1
32	32	TUGANAY	747	25	25	13	63	2,563	172,296	XI	P(D)	g	O+H	5
33	33	AGOS	483	37	8	14	59	680	172,976	IV-A	P(D)	g	O+H+B+L	6
34	34	GUAGUA	1,605	56	1	1	58	31,715	204,691	III	O(D)	u	F+O+L	6
35	35	BAGO	868	40	6	12	58	595	205,287	VI	P	g	F+O+H+B+L	6
36	36	AMBURAYAN	1,307	55	1	1	57	676	205,963	I, CAR	P(D)	g	O+H	2
37	37	BALETE	132	40	4	13	57	259	206,222	IV-B	P	g	O	3
38	38	TAGUM-LIBUGANON	2,434	32	16	7	55	3,517	209,739	XI	M	g	O+I	5
39	39	ABRA	4,951	52	1	1	54	2,984	212,723	I, CAR	M	g	O+H	2
40	40	ANGAT	917	51	1	1	53	9,014	221,737	III	P	u	F+O+I	5
41	41	ARINGAY	421	51	1	1	53	822	222,560	I, CAR	P	g	F+O+H+B	4
42	42	JALAU	1,534	37	10	5	52	3,249	225,809	VI	M	g	O	3
43	43	BAUANG	510	49	1	1	51	358	226,167	CAR, I	P	g	F+O+H+B	4
44	44	TAGOLAN	1,762	30	9	11	50	980	227,147	X	M	g	O+H	2
45	45	AGUS/BUAYAN	1,898	31	7	12	50	681	227,828	ARMM, X	M	g	O	3
46	46	SILWAY-POPONG-SINAUAL(POLOMOLOK)	577	29	6	14	49	406	228,234	XII	O	g	F+O	3
47	47	DUNGAAN(PAGBANGANAN)	176	43	2	4	49	89	228,323	VIII	P	g	O+H	2
48	50	CAGURAY	361	45	1	1	47	794	229,116	IV-B	P	g	F	3
49	61	PAMPLONA	698	37	1	1	39	280	229,397	II, CAR	P	g	F+B	1
50	67	DAGUITAN-MARABONG	292	36	1	1	38	308	229,705	VIII	P	g	F+O	3
51	68	CAGAYAN DE ORO	1,365	29	3	5	37	728	230,433	X	M	g	F+O+B	1
52	72	TAGO	1,370	34	1	1	36	2,169	232,602	XIII	P	g	F+O+B	1
53	74	BUAYAN-MALUNGUN	1,400	31	2	3	36	527	233,129	XI, XII	M	g	O	3
54	75	LAKE MAINIT-TUBAY	473	32	2	2	36	214	233,344	XIII	P	g	O	3
55	104	SIBUGUEY	994	29	1	1	31	2,493	235,837	IX	P	g	F+H+B	5
56	108	MATALING	420	29	1	1	31	109	235,946	ARMM	P	g	O+H	2

Note: M: Major River Basin, P: Principal River Basin, O: Other River Basin, (D): Dangerous River Basin

Tab. 4-15 Additional 7 River Basins

Region	River Basin	Project Cost(Mil. Peso)
IV-B	CAGURAY	794
II, CAR	PAMPLONA	280
VIII	DAGUITAN-MARABONG	308
XIII	TAGO	2,169
XIII	LAKE MAINIT-TUBAY	214
IX	SIBUGUEY	2,493
ARMM	MATALING	109
Total		6,367

Tab. 4-16 Classification of River Basins (L: Luzon, V: Visayas, M: Mindanao)

Fund Type	Ranking by score	River Name	Basin Area (km ²)	Project Cost (MP)	Total Amount (MP)	Region	Area
Foreign Assisted Project	1	UPPER MARIKINA	515	13,469	13,469	NCR, IV-A	L
	2	EAST MANGAHAN	84	3,161	16,630	IV-A, NCR	L
	3	SAN JUAN	90	2,260	18,890	NCR	L
	4	CEBU/MANDAWA	241	2,368	21,257	VII	V
	5	PATALAN/CAYANGA/ANGALACAN	656	2,318	23,575	I, CAR	L
	7	MEYCAUAYAN	201	7,180	30,755	III, NCR	L
	10	MINDANAO	20,673	15,870	46,625	XII, ARMM	M
	11	IMUS	112	2,377	49,002	IV-A	L
	13	UPSTREAM of PAMPANGA(include RIO CHICO)	8,122	21,856	70,858	III	L
	14	NANGALISAN/BAGGAO-PARED(CAGAYAN)	27,743	52,826	123,684	II, CAR	L
	17	DAVAO	1,992	1,369	125,054	XI	M
	21	UPSTREAM of AGNO(include AMBAYAWAN, BANILA)	5,722	11,850	136,904	I	L
	23	SINOCALAN/MAROSOY(DAGUPAN)	1,023	3,890	140,794	I, CAR	L
	24	KABILUGAN/VELASCO/BATO LAKE(BICOL)	2,999	12,095	152,890	V	L
	26	ABULUG	2,766	2,989	155,878	CAR, II	L
	27	UPPER AGUSAN	1,745	2,013	157,891	XI	M
	29	PANAY/MAMBUSAO	2,311	6,068	163,959	VI	V
	30	ILOG-HILABANGAN	2,162	1,638	165,597	VI, VII	V
	32	TUGANAY	747	2,563	168,160	XI	M
	34	GUAGUA	1,605	31,715	199,875	III	L
38	TAGUM-LIBUGANON	2,434	3,517	203,392	XI	M	
39	ABRA	4,951	2,984	206,376	I, CAR	L	
40	ANGAT	917	9,014	215,390	III	L	
42	JALAU	1,534	3,249	218,640	VI	V	
72	TAGO	1,370	2,169	220,808	XIII	M	
104	SIBUGUEY	994	2,493	223,301	IX	M	
Locally Funded Project	6	YAWA/BASUD/QUIRANGAY(LEGAZPI CITY)	126	475	475	V	L
	8	SANTA RITA/KALAKLAN(OLONGAPO CITY)	102	479	954	III	L
	9	MANDALAGAN(BACOLOD CITY)	187	214	1,168	VI	V
	12	TUMAGA	255	483	1,651	IX	M
	15	AKLAN	1,010	366	2,018	VI	V
	16	DINANGGASAN(CATARMAN-1S)	29	117	2,134	X	M
	18	IPONAN	412	357	2,492	X	M
	19	LIPADAS	163	198	2,690	XI	M
	20	MALUPA-DIAN(AGUANG)	666	540	3,230	III	L
	22	GUINABASAN	131	433	3,663	VII	V
	25	KINANLIMAN(REAL-1)	10	32	3,695	IV-A	L
	28	DONSOL/MANLATO	413	82	3,777	V	L
	31	TALOMO	279	359	4,136	XI	M
	33	AGOS	483	680	4,816	IV-A	L
	35	BAGO	868	595	5,411	VI	V
	36	AMBURAYAN	1,307	676	6,088	I, CAR	L
	37	BALETE	132	259	6,347	IV-B	L
	41	ARINGAY	421	822	7,169	I, CAR	L
	43	BAUANG	510	358	7,527	CAR, I	L
	44	TAGOLOAN	1,762	980	8,507	X	M
	45	AGUS/BUAYAN	1,898	681	9,188	ARMM, X	M
	46	SILWAY-POPONG-SINAUAL(POLOMOLOK)	577	406	9,594	XII	M
	47	DUNGAAN(PAGBANGANAN)	176	89	9,683	VIII	V
	50	CAGURAY	361	794	10,477	IV-B	L
	61	PAMPLONA	698	280	10,757	II, CAR	L
	67	DAGUITAN-MARABONG	292	308	11,065	VIII	V
	68	CAGAYAN DE ORO	1,365	728	11,794	X	M
	74	BUAYAN-MALUNGUN	1,400	527	12,321	XI, XII	M
75	LAKE MAINIT-TUBAY	473	214	12,535	XIII	M	
108	MATALING	420	109	12,645	ARMM	M	

Note: Shaded row shows river basins in the list of request for foreign assisted project in DPWH Medium-Term Public Investment Program

Tab. 4-17 Regional Distribution of River Basins (L: Luzon, V: Visayas, M: Mindanao)

Fund Type	Ranking by score	River Name	Basin Area (km ²)	Project Cost (MP)	Total Amount (MP)	Region	Area	Nos.
Foreign Assisted Project	1	UPPER MARIKINA	515	13,469	13,469	NCR, IV-A	L	Luzon: 15 River Basins
	2	EAST MANGAHAN	84	3,161	16,630	IV-A, NCR	L	
	3	SAN JUAN	90	2,260	18,890	NCR	L	
	5	PATALAN/CAYANGA/ANGALACAN	656	2,318	21,208	I, CAR	L	
	7	MEYCAUAYAN	201	7,180	28,388	III, NCR	L	
	11	IMUS	112	2,377	30,765	IV-A	L	
	13	UPSTREAM of PAMPANGA(include RIO CHICO)	8,122	21,856	52,621	III	L	
	14	NANGALISAN/BAGGAAO-PARED(CAGAYAN)	27,743	52,826	52,826	II, CAR	L	
	21	UPSTREAM of AGNO(include AMBAYAWAN, BANILA)	5,722	11,850	64,676	I	L	
	23	SINOCALAN/MAROSOY(DAGUPAN)	1,023	3,890	68,566	I, CAR	L	
	24	KABILUGAN/VELASCO/BATO LAKE(BICOL)	2,999	12,095	80,662	V	L	
	26	ABULUG	2,766	2,989	83,650	CAR, II	L	
	34	GUAGUA	1,605	31,715	115,366	III	L	
	39	ABRA	4,951	2,984	118,350	I, CAR	L	
	40	ANGAT	917	9,014	127,364	III	L	
Foreign Assisted Project	4	CEBU/MANDAWE	241	2,368	129,732	VII	V	Visayas: 4 River Basins
	29	PANAY/MAMBUSAO	2,311	6,068	135,800	VI	V	
	30	ILOG-HILABANGAN	2,162	1,638	137,438	VI, VII	V	
	42	JALAU	1,534	3,249	140,687	VI	V	
Foreign Assisted Project	10	MINDANAO	20,673	15,870	156,557	XII, ARMM	M	Mindanao: 7 River Basins
	17	DAVAO	1,992	1,369	157,926	XI	M	
	27	UPPER AGUSAN	1,745	2,013	159,939	XI	M	
	32	TUGANAY	747	2,563	162,502	XI	M	
	38	TAGUM-LIBUGANON	2,434	3,517	166,019	XI	M	
	72	TAGO	1,370	2,169	168,187	XIII	M	
104	SIBUGUEY	994	2,493	170,680	IX	M		
Locally Funded Project	6	YAWA/BASUD/QUIRANGAY(LEGAZPI CITY)	126	475	475	V	L	Luzon: 12 River Basins
	8	SANTA RITA/KALAKLAN(OLONGAPO CITY)	102	479	954	III	L	
	20	MALUPA-DIAN(AGUANG)	666	540	1,495	III	L	
	25	KINANLIMAN(REAL-1)	10	32	1,527	IV-A	L	
	28	DONSOL/MANLATO	413	82	1,608	V	L	
	33	AGOS	483	680	2,288	IV-A	L	
	36	AMBURAYAN	1,307	676	2,964	I, CAR	L	
	37	BALETE	132	259	3,224	IV-B	L	
	41	ARINGAY	421	822	4,046	I, CAR	L	
	43	BAUANG	510	358	4,404	CAR, I	L	
	50	CAGURAY	361	794	5,198	IV-B	L	
	61	PAMPLONA	698	280	5,478	II, CAR	L	
Locally Funded Project	9	MANDALAGAN(BACOLOD CITY)	187	214	5,692	VI	V	Visayas: 6 River Basins
	15	AKLAN	1,010	366	6,058	VI	V	
	22	GUINABASAN	131	433	6,491	VII	V	
	35	BAGO	868	595	7,087	VI	V	
	47	DUNGAAN(PAGBANGANAN)	176	89	7,176	VIII	V	
	67	DAGUITAN-MARABONG	292	308	7,484	VIII	V	
Locally Funded Project	12	TUMAGA	255	483	7,967	IX	M	Mindanao: 12 River Basins
	16	DINANGGASAN(CATARMAN-1S)	29	117	8,084	X	M	
	18	IPONAN	412	357	8,441	X	M	
	19	LIPADAS	163	198	9,719	XI	M	
	31	TALOMO	279	359	15,118	XI	M	
	44	TAGOLOAN	1,762	980	980	X	M	
	45	AGUS/BUAYAN	1,898	681	1,661	ARMM, X	M	
	46	SILWAY-POPONG-SINAUAL(POLOMOLOK)	577	406	3,450	XII	M	
	68	CAGAYAN DE ORO	1,365	728	5,057	X	M	
	74	BUAYAN-MALUNGUN	1,400	527	5,584	XI, XII	M	
75	LAKE MAINIT-TUBAY	473	214	21,524	XIII	M		
108	MATALING	420	109	22,233	ARMM	M		

Note: Shaded row shows river basins in the list of request for foreign assisted project in DPWH Medium-Term Public Investment Program

Tab. 4-18 Regional Arrangement (L: Luzon, V: Visayas, M: Mindanao)

Fund Type	Ranking by score	River Name	Basin Area (km ²)	Project Cost (MP)	Total Amount (MP)	Region	Area
Foreign Assisted Project	1	UPPER MARIKINA	515	13,469	13,469	NCR, IV-A	L
	2	EAST MANGAHAN	84	3,161	16,630	IV-A, NCR	L
	4	CEBU/MANDAWA	241	2,368	18,998	VII	V
	10	MINDANAO	20,673	15,870	34,868	XII, ARMM	M
	3	SAN JUAN	90	2,260	37,127	NCR	L
	5	PATALAN/CAYANGA/ANGALACAN	656	2,318	39,445	I, CAR	L
	29	PANAY/MAMBUSAO	2,311	6,068	45,513	VI	V
	17	DAVAO	1,992	1,369	46,883	XI	M
	7	MEYCAUAYAN	201	7,180	54,063	III, NCR	L
	11	IMUS	112	2,377	56,440	IV-A	L
	30	ILOG-HILABANGAN	2,162	1,638	58,077	VI, VII	V
	27	UPPER AGUSAN	1,745	2,013	60,090	XI	M
	13	UPSTREAM of PAMPANGA(include RIO CHICO)	8,122	21,856	81,946	III	L
	14	NANGALISAN/BAGGAO-PARED(CAGAYAN)	27,743	52,826	134,772	II, CAR	L
	42	JALAUUR	1,534	3,249	138,022	VI	V
	32	TUGANAY	747	2,563	140,585	XI	M
	21	UPSTREAM of AGNO(include AMBAYAWAN, BANILA)	5,722	11,850	152,435	I	L
	23	SINOCALAN/MAROSOY(DAGUPAN)	1,023	3,890	156,325	I, CAR	L
	38	TAGUM-LIBUGANON	2,434	3,517	159,842	XI	M
	24	KABILUGAN/VELASCO/BATO LAKE(BICOL)	2,999	12,095	171,938	V	L
26	ABULUG	2,766	2,989	174,926	CAR, II	L	
72	TAGO	1,370	2,169	177,095	XIII	M	
34	GUAGUA	1,605	31,715	208,810	III	L	
39	ABRA	4,951	2,984	211,794	I, CAR	L	
104	SIBUGUEY	994	2,493	214,287	IX	M	
40	ANGAT	917	9,014	223,301	III	L	
Locally Funded Project	6	YAWA/BASUD/QUIRANGAY(LEGAZPI CITY)	126	475	475	V	L
	8	SANTA RITA/KALAKLAN(OLONGAPO CITY)	102	479	954	III	L
	9	MANDALAGAN(BACOLOD CITY)	187	214	1,168	VI	V
	12	TUMAGA	255	483	1,651	IX	M
	16	DINANGGASAN(CATARMAN-1S)	29	117	1,768	X	M
	20	MALUPA-DIAN(AGUANG)	666	540	2,308	III	L
	25	KINANLIMAN(REAL-1)	10	32	2,340	IV-A	L
	15	AKLAN	1,010	366	2,706	VI	V
	18	IPONAN	412	357	3,064	X	M
	19	LIPADAS	163	198	3,262	XI	M
	28	DONSOL/MANLATO	413	82	3,344	V	L
	33	AGOS	483	680	4,024	IV-A	L
	22	GUINABASAN	131	433	4,457	VII	V
	31	TALOMO	279	359	4,816	XI	M
	44	TAGOLOAN	1,762	980	5,796	X	M
	36	AMBURAYAN	1,307	676	6,472	I, CAR	L
	37	BALETE	132	259	6,731	IV-B	L
	35	BAGO	868	595	7,327	VI	V
	45	AGUS/BUAYAN	1,898	681	8,008	ARMM, X	M
	46	SILWAY-POPONG-SINAUAL(POLOMOLOK)	577	406	8,414	XII	M
41	ARINGAY	421	822	9,236	I, CAR	L	
43	BAUANG	510	358	9,594	CAR, I	L	
47	DUNGCAAN(PAGBANGANAN)	176	89	9,683	VIII	V	
68	CAGAYAN DE ORO	1,365	728	10,411	X	M	
74	BUAYAN-MALUNGUN	1,400	527	10,939	XI, XII	M	
50	CAGURAY	361	794	11,732	IV-B	L	
61	PAMPLONA	698	280	12,013	II, CAR	L	
67	DAGUITAN-MARABONG	292	308	12,321	VIII	V	
75	LAKE MAINIT-TUBAY	473	214	12,535	XIII	M	
108	MATALING	420	109	12,645	ARMM	M	

Note: Shaded row shows river basins in the list of request for foreign assisted project in DPWH Medium-Term Public Investment Program

Tab. 4-19 Proposed Project (DPWH Medium-Term Public Investment Program (2005-2010))

Fund	Name of River Basin	JBIC loan applied	Budget Allocation	Implementation schedule	Ranking	Remarks (Present Status)
Foreign-Assisted Project	Mt Pinatubo (Phase III)	27th	2006	2008-2010	-	
	Pasig-Marikina (Phase II)	27th	2007	2007-2013	-	accepted
	Cagayan	27th	2006	2009-2011	39	
	Panay (1st Stage)	27th	2008	2009-2014	17	
	Bicol	-	2006	2008-2012	21	
	Agno & allied (Phase-III)	-	2008	2009-	27	
	VOM (Meycauayan)	-	2008	2009-2013	6	
	Mayon volcano	-	2008	2009-	7	
	Lower Cotabato	-	2008	2009-2011	11	
	Davao urban drainage	-	2008	2009-2010	14	
	Tagaloan	-	2008	2009-2010	40	
	Upper Agusan	-	2008	2008-2011	33	
	Tagum-Libuganon	-	2008	2009-2011	45	
	Agus	-	2008	2009-2011	48	
	Buayan-Malungun	-	2008	2009-2011	44	
	Tarlac	-	2008	2009-2013	27	
	Iloilo (Phase-II)	-	2008	2009-2014	-	
	Ilog-Hilabangan	-	2008	2009-2010	28	
East-Mangahan	-	2009	2009-2014	2		
Locally Funded Project	Kinanliman*	-	2008		25	Implementation will be started soon
	Yawa	-	2008		6	Updating of M/P and F/S is requested
	Agos*	-	2008		33	Detailed design is requested
	Dinalupihan-Hermosa-Lubao*	-	2008		-	Not included in 56 river basins

*: Not listed in the DPWH Medium-Term Public Investment Program (2005-2010)

Tab. 4-20 Prioritization of River Basins

Fund Type	Prioritization	Ranking by score	River Name	Basin Area (km ²)	Project Cost (MP)	Total Amount (MP)	Region	Area
Foreign Assisted Project	1	2	EAST MANGAHAN	84	3,161	16,630	IV-A, NCR	L
	2	7	MEYCAUAYAN	201	7,180	54,063	III, NCR	L
	3	29	PANAY/MAMBUSAO	2,311	6,068	45,513	VI	V
	4	10	MINDANAO	20,673	15,870	34,868	XII, ARMM	M
	5	14	NANGALISAN/BAGGAO-PARED(CAGAYAN)	27,743	52,826	134,772	II, CAR	L
	6	21	UPSTREAM of AGNO(include AMBAYAWAN, BANILA)	5,722	11,850	152,435	I	L
	7	30	ILOG-HILABANGAN	2,162	1,638	58,077	VI, VII	V
	8	17	DAVAO	1,992	1,369	46,883	XI	M
	9	24	KABILUGAN/VELASCO/BATO LAKE(BICOL)	2,999	12,095	171,938	V	L
	10	34	GUAGUA	1,605	31,715	208,810	III	L
	11	4	CEBU/MANDAWÉ	241	2,368	18,998	VII	V
	12	27	UPPER AGUSAN	1,745	2,013	60,090	XI	M
	13	1	UPPER MARIKINA	515	13,469	13,469	NCR, IV-A	L
	14	3	SAN JUAN	90	2,260	37,127	NCR	L
	15	42	JALAU	1,534	3,249	138,022	VI	V
	16	38	TAGUM-LIBUGANON	2,434	3,517	159,842	XI	M
	17	5	PATALAN/CAYANGA/ANGALACAN	656	2,318	39,445	I, CAR	L
	18	11	IMUS	112	2,377	56,440	IV-A	L
	19	32	TUGANAY	747	2,563	140,585	XI	M
	20	13	UPSTREAM of PAMPANGA(include RIO CHICO)	8,122	21,856	81,946	III	L
	21	23	SINOCALAN/MAROSOY(DAGUPAN)	1,023	3,890	156,325	I, CAR	L
	22	72	TAGO	1,370	2,169	177,095	XIII	M
	23	26	ABULUG	2,766	2,989	174,926	CAR, II	L
	24	39	ABRA	4,951	2,984	211,794	I, CAR	L
	25	104	SIBUGUEY	994	2,493	214,287	IX	M
	26	40	ANGAT	917	9,014	223,301	III	L
Locally Funded Project	1	6	YAWA/BASUD/QUIRANGAY(LEGAZPI CITY)	126	475	475	V	L
	2	25	KINANLIMAN(REAL-1)	10	32	2,340	IV-A	L
	3	9	MANDALAGAN(BACOLOD CITY)	187	214	1,168	VI	V
	4	44	TAGOLOAN	1,762	980	5,796	X	M
	5	45	AGUS/BUAYAN	1,898	681	8,008	ARMM, X	M
	6	33	AGOS	483	680	4,024	IV-A	L
	7	8	SANTA RITA/KALAKLAN(OLONGAPO CITY)	102	479	954	III	L
	8	15	AKLAN	1,010	366	2,706	VI	V
	9	74	BUAYAN-MALUNGUN	1,400	527	10,939	XI, XII	M
	10	12	TUMAGA	255	483	1,651	IX	M
	11	20	MALUPA-DIAN(AGUANG)	666	540	2,308	III	L
	12	28	DONSOL/MANLATO	413	82	3,344	V	L
	13	22	GUINABASAN	131	433	4,457	VII	V
	14	16	DINANGGASAN(CATARMAN-IS)	29	117	1,768	X	M
	15	18	IPONAN	412	357	3,064	X	M
	16	36	AMBURAYAN	1,307	676	6,472	I, CAR	L
	17	37	BALETE	132	259	6,731	IV-B	L
	18	35	BAGO	868	595	7,327	VI	V
	19	19	LIPADAS	163	198	3,262	XI	M
	20	31	TALOMO	279	359	4,816	XI	M
	21	41	ARINGAY	421	822	9,236	I, CAR	L
	22	43	BAUANG	510	358	9,594	CAR, I	L
	23	47	DUNGCAAN(PAGBANGANAN)	176	89	9,683	VIII	V
	24	46	SILWAY-POPONG-SINAUAL(POLOMOLOK)	577	406	8,414	XII	M
	25	68	CAGAYAN DE ORO	1,365	728	10,411	X	M
	26	50	CAGURAY	361	794	11,732	IV-B	L
	27	61	PAMPLONA	698	280	12,013	II, CAR	L
	28	67	DAGUITAN-MARABONG	292	308	12,321	VIII	V
	29	75	LAKE MAINIT-TUBAY	473	214	12,535	XIII	M
	30	108	MATALING	420	109	12,645	ARMM	M

Note: Shaded row shows river basins in the list of request for foreign assisted project in DPWH Medium-Term Public Investment Program

Tab. 4-21 Selected Model River Basins

Group No.	Grouping	Luzon			Visayas			Mindanao			Total Number
		Rank	Region	River name	Rank	Region	River name	Rank	Region	River name	
1	F+O+B/F+B	5	I,CAR	PATALAN/CAYANGA/ANGALACAN	15	VI	AKLAN	12	IX	TUMAGA	17
		13	III	UPSTREAM of PAMPANGA(include RIO CHICO)	29	VI	PANAY/MAMBUSAO(Major River Basin)	19	XI	LIPADAS	
		14	II,CAR	CAGAYAN(Major River Basin)	30	VI,VII	ILOG-HILABANGAN(Major River Basin)	27	XI	UPPER AGUSAN	
		21	I	UPSTREAM of AGNO(include AMBAYAWAN,BANILA)				31	XI	TALOMO	
		23	I,CAR	SINOCALAN/MAROSOY(DAGUPAN)				68	X	CAGAYAN DE ORO(Major River Basin)	
		24	V	BICOL(Major River Basin)				72	XIII	TAGO	
		28	V	DONSOL/MANLATO							
		61	II,CAR	PAMPLONA							
2	O+B	36	I,CAR	AMBURAYAN	47	VIII	DUNGAAN(PAGBANGANAN)	18	X	IPONAN	6
		39	I,CAR	ABRA(Major River Basin)				44	X	TAGOLOAN(Major River Basin)	
								108	ARMM	MATALING	
3	F+O/O/F	1	NCR,IV-A	UPPER MARIKINA	9	VI	MANDALAGAN(BACOLOD CITY)	17	XI	DAVAO(Major River Basin)	15
		3	NCR	SAN JUAN	22	VII	GUINABASAN	45	ARMM,X	AGUS/BUAYAN(Major River Basin)	
		7	III,NCR	MEYCAUAYAN	42	VI	JALAU(Major River Basin)	46	XII	SILWAY-POPONG-SINAUAL(POLOMOLOK)	
		11	IV-A	IMUS	67	VIII	DAGUITAN-MARABONG	74	XI,XII	BUAYAN-MALUNGUN(Major River Basin)	
		37	IV-B	BALETE				75	XIII	LAKE MAINIT-TUBAY	
		50	IV-B	CAGURAY							
4	F+O+B+I	20	III	MALUPA-DIAN(DAGUPAN)				10	XI,ARMM	MINDANAO(Major River Basin)	6
		25	IV-A	KINANLIMAN(REAL-1)							
		26	CAR,II	ABULUG(Major River Basin)							
		41	I,CAR	ARINGAY							
43	CAR,I	BAUANG									
5	F+O+I/F+B+I/F+I/O+I	2	IV-ANCR	EAST MANGAHAN	4	VII	CEBU/MANDAWE	32	XI	TUGANAY	6
		40	III	ANGAT				38	XI	TAGUM-LIBUGANON(Major River Basin)	
							104	IX	SIBUGUEY		
6	F+O+B+I+L/F+O+B+L F+O+L/O+B+L	6	V	YAWA/BASUD/QUIRANGAY(LEGAZPI CITY)	35	VI	BAGO	16	X	DINANGGASAN(CATARMAN-IS)	6
		8	III	SANTA RITA/KALAKLAN(OLONGAPO CITY)							
		33	IV-A	AGOS							
		34	III	GUAGUA							
Total Number				27			10			19	56

Note: Shaded row shows the selected model river basins

Tab.5-1 Economic Cost and Benefit Stream of the Ilog-Hilabangan River Basin

No of Year	Year	Cost (Million Pesos)				Benefit (Million Pesos)	Balance
		D/D & Construction	O/M	Replacement	Total		
1	2009	56.5			56.5	0.0	-56.5
2	2010	56.5			56.5	0.0	-56.5
3	2011	284.8			284.8	0.0	-284.8
4	2012	284.8			284.8	50.6	-234.2
5	2013	284.8			284.8	104.7	-180.2
6	2014	284.8			284.8	162.3	-122.6
7	2015	284.8			284.8	223.6	-61.2
8	2016		22.58		22.6	288.9	266.3
9	2017		22.58		22.6	298.6	276.0
10	2018		22.58		22.6	308.6	286.0
11	2019		22.58		22.6	318.9	296.3
12	2020		22.58		22.6	329.6	307.0
13	2021		22.58		22.6	340.6	318.1
14	2022		22.58		22.6	352.1	329.5
15	2023		22.58		22.6	363.9	341.3
16	2024		22.58		22.6	376.0	353.5
17	2025		22.58		22.6	388.6	366.1
18	2026		22.58		22.6	401.7	379.1
19	2027		22.58		22.6	415.1	392.5
20	2028		22.58		22.6	429.0	406.4
21	2029		22.58		22.6	443.4	420.8
22	2030		22.58	0.2	22.8	458.2	435.5
23	2031		22.58		22.6	473.6	451.0
24	2032		22.58		22.6	489.5	466.9
25	2033		22.58		22.6	505.9	483.3
26	2034		22.58		22.6	522.8	500.2
27	2035		22.58		22.6	540.3	517.7
28	2036		22.58		22.6	540.3	517.7
29	2037		22.58		22.6	540.3	517.7
30	2038		22.58		22.6	540.3	517.7
31	2039		22.58		22.6	540.3	517.7
32	2040		22.58		22.6	540.3	517.7
33	2041		22.58		22.6	540.3	517.7
34	2042		22.58		22.6	540.3	517.7
35	2043		22.58		22.6	540.3	517.7
36	2044		22.58		22.6	540.3	517.7
37	2045		22.58	0.2	22.8	540.3	517.5
38	2046		22.58		22.6	540.3	517.7
39	2047		22.58		22.6	540.3	517.7
40	2048		22.58		22.6	540.3	517.7
41	2049		22.58		22.6	540.3	517.7
42	2050		22.58		22.6	540.3	517.7
43	2051		22.58		22.6	540.3	517.7
44	2052		22.58		22.6	540.3	517.7
45	2053		22.58		22.6	540.3	517.7
46	2054		22.58		22.6	540.3	517.7
47	2055		22.58		22.6	540.3	517.7
48	2056		22.58		22.6	540.3	517.7
49	2057		22.58		22.6	540.3	517.7
50	2058		22.58		22.6	540.3	517.7
51	2059		22.58		22.6	540.3	517.7
52	2060		22.58	0.2	22.8	540.3	517.5
53	2061		22.58		22.6	540.3	517.7
54	2062		22.58		22.6	540.3	517.7
55	2063		22.58		22.6	540.3	517.7
56	2064		22.58		22.6	540.3	517.7
57	2065		22.58		22.6	540.3	517.7
Total		1,537.1					

B/C: 1.31
 NPV: 268.6 Million Pesos
 EIRR: 18.9%

Tab.5-2 Socio-Environmental Evaluation for the Ilog-Hilabangan River Basin

Project Details		Land Features and Uses			Species and Ecosystem			Air and Water			Socioeconomic Consideration											
		Land Use	Topography/Physiographic	Geology/Soils	Aesthetics	Terrestrial Fauna	Terrestrial Flora	Aquatic Fauna	Air Quality	Surface Water Quality	Ground Water Quality	Noise	Vibration	Population/Settlement	Employment/Livelihood	Health	Hazardous Elements	Solid Waste	Transportation	Cultural and Historical Value	Resource use Completion	Accessibility/Infra
Case 1 - River Improvement and Enhancement of Flow Along the Main Channel																						
Resettlement of Project Affected Persons/Families (Temporary displacement of approximately 30 families whose houses are located in either the right or left bank of the river)	Pre-construction																				B-	
	Construction																					C-
	O & M																					B-
Land Acquisition	Pre-construction																					C-
	Construction																					A-
	O & M																					
Project Mobilization	Pre-construction																					
	Construction																					
	O & M																					
Construction of Earth Dike	Pre-construction																					
	Construction					A-			B-													C-
	O & M																					
Installation/Construction of Sluice Gates	Pre-construction																					
	Construction					A-			B-	A+												
	O & M																					
Bank Erosion Protection Work (Revetment)	Pre-construction																					
	Construction																					C-
	O & M																					
Channel Widening Along Ilog River	Pre-construction																					
	Construction								B-	A-							C-		C-			C-
	O & M																					
Dredging and Excavation	Pre-construction																					
	Construction						A-															
	O & M																					
Watershed Management	Pre-construction																					
	Construction								A+		A+											
	O & M																					
Installation of Flood Warning System	Pre-construction																					
	Construction																					
	O & M																					A+ A+
Case 2 - River Improvement and Enhancement of Flow Along the Diversion Channel																						
Resettlement of Project Affected Persons/Families (Temporary displacement of approximately 30 families whose houses are located in either the right or left bank of the river)	Pre-construction																					B-
	Construction																					
	O & M																					
Land Acquisition	Pre-construction																					A-
	Construction																					
	O & M																					
Project Mobilization	Pre-construction																					
	Construction																					
	O & M																					
Construction of Earth Dike	Pre-construction																					
	Construction						A-			B-												C-
	O & M																					
Installation/Construction of Sluice Gates	Pre-construction																					
	Construction						A-			B-												A+
	O & M																					
Bank Erosion Protection Work (Revetment)	Pre-construction																					
	Construction																					C-
	O & M																					
Widening Along Cut-off Channel	Pre-construction																					
	Construction																					B-
	O & M																					
Dredging and Excavation	Pre-construction																					
	Construction							A-														C-
	O & M																					
Watershed Management	Pre-construction																					
	Construction																					
	O & M									B+												A+
Installation of Flood Warning System	Pre-construction																					
	Construction																					
	O & M																					A+ A+

Environmental Impact Score:

A+: Significant positive impact
 B+: Moderate positive impact
 C+: Negligible positive impact
 ?: Unclear
 A-: Significant negative impact
 B-: Moderate negative impact
 C-: Negligible negative impact
 Blank: No negative and positive impact caused by project activity

Tab.5-3 Economic Cost and Benefit Stream of the Dungcaan River Basin

No of Year	Year	Cost (Million Pesos)				Benefit (Million Pesos)	Balance
		D/D & Consruction	O/M	Replacement	Total		
1	2009	5.9			5.9	0.0	-5.9
2	2010	5.9			5.9	0.0	-5.9
3	2011	28.5			28.5	0.0	-28.5
4	2012	28.5			28.5	5.1	-23.3
5	2013	28.5			28.5	10.6	-17.9
6	2014	28.5			28.5	16.5	-12.0
7	2015	28.5			28.5	22.7	-5.8
8	2016		2.34		2.3	29.3	27.0
9	2017		2.34		2.3	30.3	28.0
10	2018		2.34		2.3	31.3	29.0
11	2019		2.34		2.3	32.4	30.0
12	2020		2.34		2.3	33.5	31.1
13	2021		2.34		2.3	34.6	32.2
14	2022		2.34		2.3	35.7	33.4
15	2023		2.34		2.3	36.9	34.6
16	2024		2.34		2.3	38.2	35.8
17	2025		2.34		2.3	39.5	37.1
18	2026		2.34		2.3	40.8	38.4
19	2027		2.34		2.3	42.2	39.8
20	2028		2.34		2.3	43.6	41.2
21	2029		2.34		2.3	45.0	42.7
22	2030		2.34	37.2	39.5	46.5	7.0
23	2031		2.34		2.3	48.1	45.7
24	2032		2.34		2.3	49.7	47.4
25	2033		2.34		2.3	51.4	49.0
26	2034		2.34		2.3	53.1	50.7
27	2035		2.34		2.3	54.9	52.5
28	2036		2.34		2.3	54.9	52.5
29	2037		2.34		2.3	54.9	52.5
30	2038		2.34		2.3	54.9	52.5
31	2039		2.34		2.3	54.9	52.5
32	2040		2.34		2.3	54.9	52.5
33	2041		2.34		2.3	54.9	52.5
34	2042		2.34		2.3	54.9	52.5
35	2043		2.34		2.3	54.9	52.5
36	2044		2.34		2.3	54.9	52.5
37	2045		2.34	37.2	39.5	54.9	15.3
38	2046		2.34		2.3	54.9	52.5
39	2047		2.34		2.3	54.9	52.5
40	2048		2.34		2.3	54.9	52.5
41	2049		2.34		2.3	54.9	52.5
42	2050		2.34		2.3	54.9	52.5
43	2051		2.34		2.3	54.9	52.5
44	2052		2.34		2.3	54.9	52.5
45	2053		2.34		2.3	54.9	52.5
46	2054		2.34		2.3	54.9	52.5
47	2055		2.34		2.3	54.9	52.5
48	2056		2.34		2.3	54.9	52.5
49	2057		2.34		2.3	54.9	52.5
50	2058		2.34		2.3	54.9	52.5
51	2059		2.34		2.3	54.9	52.5
52	2060		2.34	37.2	39.5	54.9	15.3
53	2061		2.34		2.3	54.9	52.5
54	2062		2.34		2.3	54.9	52.5
55	2063		2.34		2.3	54.9	52.5
56	2064		2.34		2.3	54.9	52.5
57	2065		2.34		2.3	54.9	52.5
Total		154.2					

B/C: 1.29
 NPV: 26 Million Pesos
 EIRR: 18.8%

Tab.5-4 Socio-Environmental Evaluation for the Dungcaan River Basin

Project Details		Land Features and Uses		Species and Ecosystem				Air and Water			Socioeconomic Consideration											
		Land Use	Topography/Physiographic	Geology /Soils	Aesthetics	Terrestrial Fauna	Terrestrial Flora	Aquatic Fauna	Aquatic Flora	Air Quality	Surface Water Quality	Ground Water Quality	Noise	Vibration	Population/ Settlement	Employment /Livelihood	Health	Hazardous Elements	Solid Waste	Transportation	Cultural and Historical Value	Resource use Completion
Case 1 - River Improvement Works Along Main Stream of Dungcaan River including Secondary Channel																						
Resettlement of Project Affected Persons/Families (some 114 families in Sitio Brandy Island and more than 20 families in Barangay Sto. Rosario)	Pre-construction																				B-	B-
	Construction																					
	O & M																					
Land Acquisition	Pre-construction	B-						C-														
	Construction																					
	O & M																					
Project Mobilization	Pre-construction																					
	Construction																					
	O & M																					
Construction of Concrete Dike with Access Road	Pre-construction				A-			B-	B-	C-												
	Construction																					B+
	O & M																					
Construction of Spur Dike	Pre-construction							B-													C+	
	Construction																					
	O & M																					
Bank Erosion Protection Work (Revetment)	Pre-construction							B-														
	Construction																					C-
	O & M																					
Construction of Small Bridge and Mini Park within the Mangrove/Wetland Area	Pre-construction																					
	Construction																					
	O & M																					
Dredging and Excavation	Pre-construction							A-														
	Construction							B-														C-
	O & M																					C-
Watershed Management	Pre-construction																					
	Construction							A+		A+	A+											
	O & M																					
Installation of Flood Warning System	Pre-construction																					
	Construction																					
	O & M																					A+ A+
Case 2 - River Improvement Works Along Main Stream of Dungcaan River Only																						
Resettlement of Project Affected Persons/Families (some 114 families in Sitio Brandy Island and more than 20 families in Barangay	Pre-construction																					B- C-
	Construction																					
	O & M																					
Land Acquisition	Pre-construction	B-																				C-
	Construction																					
	O & M																					
Project Mobilization	Pre-construction																					
	Construction																					
	O & M																					
Construction of Concrete Dike with Access Road	Pre-construction							A-														A+
	Construction																					B+
	O & M																					
Construction of Spur Dike	Pre-construction																					
	Construction							B+	B-													A+
	O & M																					
Bank Erosion Protection Work (Revetment)	Pre-construction																					
	Construction																					C-
	O & M																					
Construction of Small Bridge and Mini Park within the Mangrove/Wetland Area	Pre-construction																					
	Construction																					
	O & M																					
Dredging and Excavation	Pre-construction																					
	Construction							B-														B-
	O & M																					
Watershed Management	Pre-construction																					
	Construction																					
	O & M							B+		B+												A+
Installation of Flood Warning System	Pre-construction																					
	Construction																					
	O & M																					A+ A+ A+
Case 3 - River Improvement and Construction of Multi-Purpose Reservoir																						
Resettlement of Project Affected Persons/Families (20 families in the site for dam construction, some 114 families in Sitio Brandy Island	Pre-construction																					B- B-
	Construction																					
	O & M																					
Land Acquisition	Pre-construction																					
	Construction																					
	O & M																					
Project Mobilization	Pre-construction																					
	Construction																					
	O & M																					
Construction of Concrete Dike with Access Road	Pre-construction																					
	Construction							A-														B+
	O & M																					
Construction of Spur Dike	Pre-construction																					
	Construction							B+	A-													A+
	O & M																					
Bank Erosion Protection Work (Revetment)	Pre-construction																					
	Construction							B+	B-													C-
	O & M																					
Construction of the Multi-Purpose Reservoir	Pre-construction																					
	Construction							A-	A-	A-												B+
	O & M																					
Construction of Small Bridge and Mini Park within the Mangrove/Wetland Area	Pre-construction																					
	Construction																					
	O & M																					
Dredging and Excavation	Pre-construction																					
	Construction																					
	O & M																					
Watershed Management	Pre-construction																					
	Construction																					
	O & M							B+		A+												A+
Installation of Flood Warning System	Pre-construction																					
	Construction																					
	O & M																					A+ A+

Environmental Impact Score:

A+: Significant positive impact
 B+: Moderate positive impact
 C+: Negligible positive impact
 ?: Unclear

A-: Significant negative impact
 B-: Moderate negative impact
 C-: Negligible negative impact

Blank: No negative and positive impact caused by project activity

Tab.5-5 Economic Cost and Benefit Stream of the Meycauayan River Basin

No of Year	Year	Cost (Million Pesos)				Benefit (Million Pesos)	Balance
		D/D & Consruction	O/M	Replacement	Total		
1	2009	165.3			165.3	0.0	-165.3
2	2010	165.3			165.3	0.0	-165.3
3	2011	930.8			930.8	0.0	-930.8
4	2012	930.8			930.8	207.2	-723.6
5	2013	930.8			930.8	428.2	-502.6
6	2014	930.8			930.8	663.8	-267.0
7	2015	930.8			930.8	914.8	-16.0
8	2016		49.59		49.6	1,181.7	1,132.2
9	2017		49.59		49.6	1,221.3	1,171.7
10	2018		49.59		49.6	1,262.2	1,212.7
11	2019		49.59		49.6	1,304.5	1,254.9
12	2020		49.59		49.6	1,348.2	1,298.6
13	2021		49.59		49.6	1,393.4	1,343.8
14	2022		49.59		49.6	1,440.1	1,390.5
15	2023		49.59		49.6	1,488.3	1,438.7
16	2024		49.59		49.6	1,538.2	1,488.6
17	2025		49.59		49.6	1,589.7	1,540.1
18	2026		49.59		49.6	1,643.0	1,593.4
19	2027		49.59		49.6	1,698.0	1,648.4
20	2028		49.59		49.6	1,754.9	1,705.3
21	2029		49.59		49.6	1,813.7	1,764.1
22	2030		49.59	605.6	655.2	1,874.4	1,219.2
23	2031		49.59		49.6	1,937.2	1,887.6
24	2032		49.59		49.6	2,002.1	1,952.5
25	2033		49.59		49.6	2,069.2	2,019.6
26	2034		49.59		49.6	2,138.5	2,088.9
27	2035		49.59		49.6	2,210.2	2,160.6
28	2036		49.59		49.6	2,210.2	2,160.6
29	2037		49.59		49.6	2,210.2	2,160.6
30	2038		49.59		49.6	2,210.2	2,160.6
31	2039		49.59		49.6	2,210.2	2,160.6
32	2040		49.59		49.6	2,210.2	2,160.6
33	2041		49.59		49.6	2,210.2	2,160.6
34	2042		49.59		49.6	2,210.2	2,160.6
35	2043		49.59		49.6	2,210.2	2,160.6
36	2044		49.59		49.6	2,210.2	2,160.6
37	2045		49.59	605.6	655.2	2,210.2	1,554.9
38	2046		49.59		49.6	2,210.2	2,160.6
39	2047		49.59		49.6	2,210.2	2,160.6
40	2048		49.59		49.6	2,210.2	2,160.6
41	2049		49.59		49.6	2,210.2	2,160.6
42	2050		49.59		49.6	2,210.2	2,160.6
43	2051		49.59		49.6	2,210.2	2,160.6
44	2052		49.59		49.6	2,210.2	2,160.6
45	2053		49.59		49.6	2,210.2	2,160.6
46	2054		49.59		49.6	2,210.2	2,160.6
47	2055		49.59		49.6	2,210.2	2,160.6
48	2056		49.59		49.6	2,210.2	2,160.6
49	2057		49.59		49.6	2,210.2	2,160.6
50	2058		49.59		49.6	2,210.2	2,160.6
51	2059		49.59		49.6	2,210.2	2,160.6
52	2060		49.59	605.6	655.2	2,210.2	1,554.9
53	2061		49.59		49.6	2,210.2	2,160.6
54	2062		49.59		49.6	2,210.2	2,160.6
55	2063		49.59		49.6	2,210.2	2,160.6
56	2064		49.59		49.6	2,210.2	2,160.6
57	2065		49.59		49.6	2,210.2	2,160.6
Total		4,984.5					

B/C: 1.67
 NPV: 1874.6 Million Pesos
 EIRR: 23.3%

Tab.5-6 Socio-Economic Evaluation for the Meycauayan River Basin

Project Details		Land Features and Uses				Species and Ecosystem				Air and Water				Socioeconomic Consideration								
		Land Use	Topography/Physiographic	Geology/Soils	Aesthetics	Terrestrial Fauna	Terrestrial Flora	Aquatic Fauna	Aquatic Flora	Air Quality	Surface Water Quality	Ground Water Quality	Noise	Vibration	Population/ Settlement	Employment/ Livelihood	Health	Hazardous Elements	Solid Waste	Transportation	Cultural and Historical Value	Resource use Completion
Case 1 - River and Drainage Improvement																						
Resettlement of Project Affected Persons/Families (Displacement of not less than 90 families in Meycauayan and nearly 90 families in Marilao)	Pre-construction														B-	C-						
	Construction																					
	O & M																					
Land Acquisition	Pre-construction	B-																				
	Construction																					
	O & M																					
Project Mobilization	Pre-construction															C+						
	Construction																					
	O & M																					
Construction of Dike and Increasing the Elevation of Existing Road Surface	Pre-construction																					
	Construction					B-			C-	C-		C-	C-				C-	C-	B-			C-
	O & M																					
Installation/Construction of Gates and Drainage Facility	Pre-construction																					
	Construction				C-				C-		C-											
	O & M									B+						B+						
Construction of Revetment	Pre-construction																					
	Construction										C-											
	O & M															B+						
Dredging and Excavation	Pre-construction																					
	Construction				C-																	B-
	O & M																					
Reconstruction of Existing Bridge Structures	Pre-construction																					
	Construction				C-				C-		C-								C-			
	O & M																					
Structures of VOM Flood Control Project Component	Pre-construction																					
	Construction								C-					C-								B-
	O & M																					
Dredging and Excavation	Pre-construction																					
	Construction																					
	O & M									A+						A+						
Watershed Management	Pre-construction																					
	Construction																					
	O & M									A+												
Installation of Flood Warning/Disaster Management System	Pre-construction																					
	Construction																					
	O & M																A+					

Environmental Impact Score:

A+: Significant positive impact

A-: Significant negative impact

B+: Moderate positive impact

B-: Moderate negative impact

C+: Negligible positive impact

C-: Negligible negative impact

?: Unclear

Blank: No negative and positive impact caused by project activity

Tab. 5-7 Economic Cost and Benefit Stream of the Kinanliman River Basin

No of Year	Year	Cost (Million Pesos)				Benefit (Million Pesos)	Balance
		D/D & Consruction	O/M	Replacement	Total		
1	2009	4.1			4.1	0.0	-4.1
2	2010	4.1			4.1	0.0	-4.1
3	2011	19.7			19.7	0.0	-19.7
4	2012	19.7			19.7	3.1	-16.6
5	2013	19.7			19.7	6.5	-13.2
6	2014	19.7			19.7	10.1	-9.7
7	2015	19.7			19.7	13.9	-5.9
8	2016		1.22		1.2	17.9	16.7
9	2017		1.22		1.2	18.5	17.3
10	2018		1.22		1.2	19.2	17.9
11	2019		1.22		1.2	19.8	18.6
12	2020		1.22		1.2	20.5	19.2
13	2021		1.22		1.2	21.1	19.9
14	2022		1.22		1.2	21.9	20.6
15	2023		1.22		1.2	22.6	21.4
16	2024		1.22		1.2	23.3	22.1
17	2025		1.22		1.2	24.1	22.9
18	2026		1.22		1.2	24.9	23.7
19	2027		1.22		1.2	25.8	24.5
20	2028		1.22		1.2	26.6	25.4
21	2029		1.22		1.2	27.5	26.3
22	2030		1.22	0.7	1.9	28.4	26.5
23	2031		1.22		1.2	29.4	28.2
24	2032		1.22		1.2	30.4	29.2
25	2033		1.22		1.2	31.4	30.2
26	2034		1.22		1.2	32.5	31.2
27	2035		1.22		1.2	33.5	32.3
28	2036		1.22		1.2	33.5	32.3
29	2037		1.22		1.2	33.5	32.3
30	2038		1.22		1.2	33.5	32.3
31	2039		1.22		1.2	33.5	32.3
32	2040		1.22		1.2	33.5	32.3
33	2041		1.22		1.2	33.5	32.3
34	2042		1.22		1.2	33.5	32.3
35	2043		1.22		1.2	33.5	32.3
36	2044		1.22		1.2	33.5	32.3
37	2045		1.22	0.7	1.9	33.5	31.6
38	2046		1.22		1.2	33.5	32.3
39	2047		1.22		1.2	33.5	32.3
40	2048		1.22		1.2	33.5	32.3
41	2049		1.22		1.2	33.5	32.3
42	2050		1.22		1.2	33.5	32.3
43	2051		1.22		1.2	33.5	32.3
44	2052		1.22		1.2	33.5	32.3
45	2053		1.22		1.2	33.5	32.3
46	2054		1.22		1.2	33.5	32.3
47	2055		1.22		1.2	33.5	32.3
48	2056		1.22		1.2	33.5	32.3
49	2057		1.22		1.2	33.5	32.3
50	2058		1.22		1.2	33.5	32.3
51	2059		1.22		1.2	33.5	32.3
52	2060		1.22	0.7	1.9	33.5	31.6
53	2061		1.22		1.2	33.5	32.3
54	2062		1.22		1.2	33.5	32.3
55	2063		1.22		1.2	33.5	32.3
56	2064		1.22		1.2	33.5	32.3
57	2065		1.22		1.2	33.5	32.3
Total		106.9					

B/C: 1.18
 NPV: 10.9 Million Pesos
 EIRR: 17.3%

Tab.5-8 Socio-Environmental Evaluation for the Kinanliman River Basin

Project Details		Land Features and Uses				Species and Ecosystem				Air and Water				Socioeconomic Consideration								
		Land Use	Topography/Physiographic	Geology/Soils	Aesthetics	Terrestrial Fauna	Terrestrial Flora	Aquatic Fauna	Aquatic Flora	Air Quality	Surface Water Quality	Ground Water Quality	Noise	Vibration	Population/ Settlement	Employment/ Livelihood	Health	Hazardous Elements	Solid Waste	Transportation	Cultural and Historical Value	Resource use Completion
Case 1 - River Improvement and Sabo Dam Construction																						
Resettlement of Project Affected Persons/Families	Pre-construction																					
	Construction																					
	O & M																					
Land Acquisition	Pre-construction																					B-
	Construction																					
	O & M																					
Project Mobilization	Pre-construction																					
	Construction																					
	O & M																					
Construction of Concrete and FCSEC Pilot Dike	Pre-construction																					
	Construction				B-		C-															
	O & M																					
Installation/Construction of Gate	Pre-construction																					
	Construction				C-		B-										B+					
	O & M																					
Construction of Sabo Dam	Pre-construction																					
	Construction		A-	B-	B-		A-															
	O & M																					
Construction of Spur Dike	Pre-construction																					
	Construction				B-		C-									B+	A+					
	O & M																					
Widening of Kinanliman River beginning at the section of Kinanlimna Bridge towards the river mouth	Pre-construction																					
	Construction						B-										C-		C-			
	O & M																					
Dredging and Excavation	Pre-construction																					
	Construction																					
	O & M						B-															
Watershed Management	Pre-construction																					
	Construction																					
	O & M		B+				B+			A+												
Installation of Flood Warning System	Pre-construction																					
	Construction																					
	O & M																A+	A+				

Environmental Impact Score:

A+: Significant positive impact

A-: Significant negative impact

B+: Moderate positive impact

B-: Moderate negative impact

C+: Negligible positive impact

C-: Negligible negative impact

?: Unclear

Blank: No negative and positive impact caused by project activities

Tab.5-9 Economic Cost and Benefit Stream of the Tuganay River Basin

No of Year	Year	Cost (Million Pesos)				Benefit (Million Pesos)	Balance
		D/D & Construction	O/M	Replacement	Total		
1	2009	73.7			73.7	0.0	-73.7
2	2010	73.7			73.7	0.0	-73.7
3	2011	360.2			360.2	0.0	-360.2
4	2012	360.2			360.2	64.9	-295.3
5	2013	360.2			360.2	134.2	-226.1
6	2014	360.2			360.2	208.0	-152.2
7	2015	360.2			360.2	286.6	-73.6
8	2016		22.10		22.1	370.2	348.1
9	2017		22.10		22.1	382.6	360.5
10	2018		22.10		22.1	395.5	373.4
11	2019		22.10		22.1	408.7	386.6
12	2020		22.10		22.1	422.4	400.3
13	2021		22.10		22.1	436.5	414.4
14	2022		22.10		22.1	451.2	429.1
15	2023		22.10		22.1	466.3	444.2
16	2024		22.10		22.1	481.9	459.8
17	2025		22.10		22.1	498.0	476.0
18	2026		22.10		22.1	514.7	492.6
19	2027		22.10		22.1	532.0	509.9
20	2028		22.10		22.1	549.8	527.7
21	2029		22.10		22.1	568.2	546.1
22	2030		22.10	146.2	168.3	587.2	419.0
23	2031		22.10		22.1	606.9	584.8
24	2032		22.10		22.1	627.3	605.2
25	2033		22.10		22.1	648.3	626.2
26	2034		22.10		22.1	670.0	647.9
27	2035		22.10		22.1	692.4	670.3
28	2036		22.10		22.1	692.4	670.3
29	2037		22.10		22.1	692.4	670.3
30	2038		22.10		22.1	692.4	670.3
31	2039		22.10		22.1	692.4	670.3
32	2040		22.10		22.1	692.4	670.3
33	2041		22.10		22.1	692.4	670.3
34	2042		22.10		22.1	692.4	670.3
35	2043		22.10		22.1	692.4	670.3
36	2044		22.10		22.1	692.4	670.3
37	2045		22.10	146.2	168.3	692.4	524.2
38	2046		22.10		22.1	692.4	670.3
39	2047		22.10		22.1	692.4	670.3
40	2048		22.10		22.1	692.4	670.3
41	2049		22.10		22.1	692.4	670.3
42	2050		22.10		22.1	692.4	670.3
43	2051		22.10		22.1	692.4	670.3
44	2052		22.10		22.1	692.4	670.3
45	2053		22.10		22.1	692.4	670.3
46	2054		22.10		22.1	692.4	670.3
47	2055		22.10		22.1	692.4	670.3
48	2056		22.10		22.1	692.4	670.3
49	2057		22.10		22.1	692.4	670.3
50	2058		22.10		22.1	692.4	670.3
51	2059		22.10		22.1	692.4	670.3
52	2060		22.10	146.2	168.3	692.4	524.2
53	2061		22.10		22.1	692.4	670.3
54	2062		22.10		22.1	692.4	670.3
55	2063		22.10		22.1	692.4	670.3
56	2064		22.10		22.1	692.4	670.3
57	2065		22.10		22.1	692.4	670.3
Total		1,948.4					

B/C: 1.33
 NPV: 363.7 Million Pesos
 EIRR: 19.1%

Tab.5-10 Socio-Environmental Evaluation for the Tuganay River Basin

Project Details		Land Features and Uses				Species and Ecosystem				Air and Water				Socioeconomic Consideration								
		Land Use	Topography/Physiographic	Geology /Soils	Aesthetics	Terrestrial Fauna	Terrestrial Flora	Aquatic Fauna	Aquatic Flora	Air Quality	Surface Water Quality	Ground Water Quality	Noise	Vibration	Population/ Settlement	Employment/ Livelihood	Health	Hazardous Elements	Solid Waste	Transportation	Cultural and Historical Value	Resource use Completion
Case T-1 - River Improvement Only																						
Resettlement of Project Affected Persons/Families (15 houses in a contiguous cluster and a sports complex near Anibongan Bridge)	Pre-construction																					
	Construction																					
	O & M																					
Land Acquisition	Pre-construction	C-																				
	Construction																					
	O & M																				B-	
Project Mobilization	Pre-construction																					
	Construction																					
	O & M																					
Reconstruction of Existing Dike	Pre-construction																					
	Construction			A-		A-			C-													
	O & M									B+												
Upgrading/Reconstruction of Bridges (Approx. = 10)	Pre-construction																					
	Construction			A-																	C-	C-
	O & M																					
Installation/Construction of Gates and Drainage Facility	Pre-construction																					
	Construction								C-				C-									
	O & M											C+										
Construction of Diversion Channel	Pre-construction																					
	Construction			A-		C-			C-		C-											
	O & M																				C+	
Dredging and Excavation	Pre-construction																					
	Construction																					
	O & M					B-					A+											
Case T-2 - River Improvement and Construction of Three (3) Retarding Basins																						
Resettlement of Project Affected Persons/Families (Temporary displacement of 34 families whose houses are located within the proposed retarding basin)	Pre-construction																				B-	C-
	Construction																					
	O & M																					
Land Acquisition	Pre-construction																					
	Construction	B-																				C-
	O & M																					
Project Mobilization	Pre-construction																					
	Construction																					C+
	O & M																					
Reconstruction of Existing Dike	Pre-construction																					
	Construction			A-		A-			C-	C-		C-	C-									
	O & M																				C+	A+
Upgrading/Reconstruction of Bridges (Approx. = 10)	Pre-construction																					
	Construction			A-																		C-
	O & M																					C-
Installation/Construction of Gates and Drainage Facility	Pre-construction																					
	Construction								B-				C-									
	O & M											B+										
Construction of Diversion Channel	Pre-construction																					
	Construction			A-		C-			C-		C-											
	O & M																					A+
Dredging and Excavation	Pre-construction																					
	Construction																					
	O & M					B-					C-											A+
Construction of Retarding Basin	Pre-construction																					
	Construction										C-	C-	C-	C-								
	O & M																					C+ A+

Environmental Impact Score:

A+: Significant positive impact

A-: Significant negative impact

B+: Moderate positive impact

B-: Moderate negative impact

C+: Negligible positive impact

C-: Negligible negative impact

?: Unclear

Blank: No negative and positive impact caused by project activities

Tab.5-11 Economic Cost and Benefit Stream of the Dinanggasan River Basin

No of Year	Year	Cost (Million Pesos)				Benefit (Million Pesos)	Balance
		D/D & Consruction	O/M	Replacement	Total		
1	2009	4.1			4.1	0.0	-4.1
2	2010	4.1			4.1	0.0	-4.1
3	2011	19.9			19.9	0.0	-19.9
4	2012	19.9			19.9	2.9	-17.0
5	2013	19.9			19.9	5.9	-13.9
6	2014	19.9			19.9	9.2	-10.7
7	2015	19.9			19.9	12.7	-7.2
8	2016		1.65		1.6	16.4	14.8
9	2017		1.65		1.6	17.0	15.3
10	2018		1.65		1.6	17.5	15.9
11	2019		1.65		1.6	18.1	16.5
12	2020		1.65		1.6	18.7	17.1
13	2021		1.65		1.6	19.3	17.7
14	2022		1.65		1.6	20.0	18.3
15	2023		1.65		1.6	20.7	19.0
16	2024		1.65		1.6	21.4	19.7
17	2025		1.65		1.6	22.1	20.4
18	2026		1.65		1.6	22.8	21.2
19	2027		1.65		1.6	23.6	21.9
20	2028		1.65		1.6	24.4	22.7
21	2029		1.65		1.6	25.2	23.5
22	2030		1.65	0.0	1.6	26.0	24.4
23	2031		1.65		1.6	26.9	25.2
24	2032		1.65		1.6	27.8	26.1
25	2033		1.65		1.6	28.7	27.1
26	2034		1.65		1.6	29.7	28.0
27	2035		1.65		1.6	30.7	29.0
28	2036		1.65		1.6	30.7	29.0
29	2037		1.65		1.6	30.7	29.0
30	2038		1.65		1.6	30.7	29.0
31	2039		1.65		1.6	30.7	29.0
32	2040		1.65		1.6	30.7	29.0
33	2041		1.65		1.6	30.7	29.0
34	2042		1.65		1.6	30.7	29.0
35	2043		1.65		1.6	30.7	29.0
36	2044		1.65		1.6	30.7	29.0
37	2045		1.65	0.0	1.6	30.7	29.0
38	2046		1.65		1.6	30.7	29.0
39	2047		1.65		1.6	30.7	29.0
40	2048		1.65		1.6	30.7	29.0
41	2049		1.65		1.6	30.7	29.0
42	2050		1.65		1.6	30.7	29.0
43	2051		1.65		1.6	30.7	29.0
44	2052		1.65		1.6	30.7	29.0
45	2053		1.65		1.6	30.7	29.0
46	2054		1.65		1.6	30.7	29.0
47	2055		1.65		1.6	30.7	29.0
48	2056		1.65		1.6	30.7	29.0
49	2057		1.65		1.6	30.7	29.0
50	2058		1.65		1.6	30.7	29.0
51	2059		1.65		1.6	30.7	29.0
52	2060		1.65	0.0	1.6	30.7	29.0
53	2061		1.65		1.6	30.7	29.0
54	2062		1.65		1.6	30.7	29.0
55	2063		1.65		1.6	30.7	29.0
56	2064		1.65		1.6	30.7	29.0
57	2065		1.65		1.6	30.7	29.0
Total		107.6					

B/C: 1.06
 NPV: 3.5 Million Pesos
 EIRR: 15.7%

Tab.5-12 Socio-Environmental Evaluation for the Dinanggasan River Basin

Project Details		Land Features and Uses				Species and Ecosystem				Air and Water				Socioeconomic Consideration								
		Land Use	Topography/Physiographic	Geology/Soils	Aesthetics	Terrestrial Fauna	Terrestrial Flora	Aquatic Fauna	Aquatic Flora	Air Quality	Surface Water Quality	Ground Water Quality	Noise	Vibration	Population/Settlement	Employment/Livelihood	Health	Hazardous Elements	Solid Waste	Transportation	Cultural and Historical Value	Resource use Completion
Case 1 - River Improvement of Dinanggasan River and Tag-Ibo River with Construction of Sabo Dam and Sand Pocket Connecting Compol River to Dinanggasan River																						
Resettlement of Project Affected Persons/Families	Pre-construction																					
	Construction																					
	O & M																					
Land Acquisition	Pre-construction																					B-
	Construction																					
	O & M																					
Project Mobilization	Pre-construction																C+					
	Construction																					
	O & M																					
Demolition of Tag-ibo Bridge and Reconstruction of a New Bridge	Pre-construction																					
	Construction				A-																	C-
	O & M																					
Construction of Concrete Dike and Foot Protection Groin Along the Left and Right Bank of Dinanggasan River (Lower Stream)	Pre-construction																					
	Construction																					
	O & M																					
Construction of Sabo Dam	Pre-construction																					
	Construction		B-	C-	A-																	
	O & M																					
Bank Erosion Protection Work (Revetment and Foot Protection) Along Tag-ibo River	Pre-construction																					
	Construction																C+					
	O & M																					
Construction of Sand Pocket	Pre-construction																					
	Construction				C-		A-															
	O & M																					
Dredging and Excavation	Pre-construction																					
	Construction																					
	O & M																					
Watershed Management	Pre-construction																					
	Construction																					
	O & M				C+		B+															
Installation of Flood Warning System	Pre-construction																					
	Construction																					
	O & M																					B+
Case 2 - River Improvement Works of Dinaggasan River, Tag-ibo River and Compol River With Construction of Sabo Dam Separating Compol River from Dinanggasan River																						
Resettlement of Project Affected Persons/Families (Temporary displacement of roughly 18 families of informal settlers along	Pre-construction																					
	Construction																					C-, C-
	O & M																					
Land Acquisition	Pre-construction																					
	Construction																					C-
	O & M																					
Project Mobilization	Pre-construction																					
	Construction																					
	O & M																					
Demolition of Tag-ibo Bridge and Reconstruction of a New Bridge	Pre-construction																					
	Construction																					C-
	O & M																					
Construction of Concrete Dike and Foot Protection Groin Along the Left and Right Bank of Dinanggasan River (Lower Stream)	Pre-construction																					
	Construction																					
	O & M																					
Construction of Sabo Dam	Pre-construction																					
	Construction				A-		C-		B-													
	O & M																					
Bank Erosion Protection Work (Revetment and Foot Protection) Along Tag-ibo River	Pre-construction																					
	Construction																					
	O & M																					
Excavation of Compol River and Construction of Embankment	Pre-construction																					
	Construction																					B+
	O & M																					
Construction of Additional Embankment at the upper reach (right side) of Dinanggasan River	Pre-construction																					
	Construction																					C-
	O & M																					
Construction of Sand Pocket	Pre-construction																					
	Construction																					
	O & M																					
Dredging and Excavation	Pre-construction																					
	Construction																					
	O & M																					
Watershed Management	Pre-construction																					
	Construction																					
	O & M																					
Installation of Flood Warning System	Pre-construction																					
	Construction																					
	O & M																					A+, A+

Environmental Impact Score:

A+: Significant positive impact A-: Significant negative impact
 B+: Moderate positive impact B-: Moderate negative impact
 C+: Negligible positive impact C-: Negligible negative impact
 ?: Unclear Blank: No negative and positive impact caused by project acti