

*The Study on Comprehensive Disaster Prevention  
around Mayon Volcano*

**SUPPORTING REPORT (2)**

*(Part II: Feasibility Study)*

**XXV : Socio-Economy**

**SUPPORTING REPORT (2) - XXV**  
**SOCIO-ECONOMY**

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## **SUPPORTING REPORT (2) - XXV**

### **SOCIO-ECONOMY**

#### **1. SOCIO-ECONOMY OF THE STUDY AREA**

##### **1.1 The Study Area for Yawa River System Sabo Project**

###### **(1) Population and Number of Houses**

The population of the protected area is 14,282 and the number of households is 2,621 in 1999. This area includes Legazpi City, two municipalities of Daraga and Camalig. Legazpi City occupies 64.9% of total population followed by Daraga municipality(31.8%), and Camalig (3.2%). But the area of Legazpi City is only 36.1% of total protected area, 2,318ha. This is reflected in the population density of Legazpi City which includes highly populated barangays such as Dita (491/ha), Arimbay (32/ha) and San Joaquin (33/ha). These household population is major beneficiaries by protection from mud and debris flow. Furthermore, the agricultural products and commercial and industrial activity will get benefits by disaster prevention from mud and debris flow as well . (See Table XXV 1.1.1)

###### **(2) Family Income and Poverty Level**

According to the People's Intention Survey carried out by the JICA Study Team in September-October 1999, the average income levels of the households of resettlers and candidates resettlers living around Mayon Volcano was estimated as 42,075 pesos per year or 3,506 pesos per month. The protected area of this study is not completely considered to be the same as the area of this survey. But these figures can explain approximately the present situation for income level of the protected area. The level of monthly average income is far below that of Bicol Region at 6,425 pesos.

##### **1.2 The Study Area for Legazpi City Flood Control Project**

###### **(1) Population and Number of Houses**

The flood prone area corresponds to the area of flood return period of ten years. This area includes 31 barangays in Legazpi City. The population of this area is 13,334 and the number of households is 70,390 in 1999. Total area is 1,070ha which is only 5.5% of all area of Legazpi City and the 43.7% of population is concentrated in this narrow area. When big typhoon with heavy rain hits the area, the large-scale damages affect the assets and economic and social activities. After

the implementation of this urban drainage project, it can be expected that the damages of this area will be considerably saved. (See Table XXV 1.2.1).

## (2) Industries

The industry sector classified into mining and manufacturing industries numbered 157 in 1997, a 12% increase from the 1991 figure. According to the interview survey conducted by the JICA Study Team in the second field study in the Philippines, 101 industrial establishments were counted in the flood prone area. As to capital requirement, manufacturing industry and their number are classified as follows:

### a. Micro Industries

Those with capital investment below 150,000 peso fall under this classification, occupying 78% of all industries. The activities mostly involve furniture shop, manufacture of bags, printing press, and retail of coco lumber, bakery, tailoring shop, rice mill and photo studios.

### b. Cottage Industries

Twenty-two percent (22%) are classified as such cottage industries. The capital requirement for this kind of industry is 150,000 to 1.5 million pesos. Woodworks, T-shirt manufacturing, bakery/bakeshop, tailoring, photo developing and hollow block manufacturing.

As of 1998, there is no record as to the number of registered small, medium, and large scale industries simply because there is no declaration as to the capital or gross sales in the application forms of these firms.

## (3) Number of Establishments

According to the interview survey conducted by the JICA Study Team in the second field survey in the Philippines, the number of industrial establishments were counted as 101. Aforementioned and commercial establishments are composed of store, 549(79.2%), business offices, 53(7.6%), restaurants, 32(4.6%), hotel & motel, 18(2.6%) and others, 42(6.1%) as shown in Table XXV 2.1 10.

## 2. PROJECT EVALUATION

### 2.1 Economic Evaluation

#### (1) Basic Conditions

The basic conditions for economic evaluations are as follows:

- 1) Economic Evaluation is carried out by comparison between “With-the-Project” and Without-the-Project with regard to benefit and cost.
- 2) Economic evaluation is conducted for Yawa River System Sabo Project, Legazpi City Urban Drainage Project and Resettlement Site Development Project for Banquerohan and Anislag
- 3) The period for evaluation is assumed to include the period for the implementation period for construction and 50 years including 30 years of project life after construction works.
- 4) The social opportunity cost of capital in the Philippines is considered to be 15%.
- 5) The indicators of economic evaluation are “Economic Internal Rate of Return” (EIRR), “Benefit Cost Ratio”(B/C) and “Net Present Value”(NPV).
- 6) The discount rate of social opportunity cost of capital of 15% is adopted to figure out B/C and NPV.

#### (2) Economic Benefit

##### 1) Yawa River System Sabo Project

###### a. Methodology and Calculation Conditions

In this project, Option 3 is taken into consideration for land use data..

#### Direct Damage

Damageable value is the amount of asset value that will suffer the mud and debris flow. Generally, direct damage in the area can be calculated as follows:

$$[\text{Direct Damage in the Area (Peso)}] = [\text{Area Size (ha)}] \times [\text{Damageable Value (Peso/ha)}]$$

Damageable value is calculated for each asset classification such as (i) agricultural products for main crops such as palay, coconut (copra), corn, banana, and vegetables, (ii) buildings for residence, industry and commerce), including indoor movables, (iii) public facilities including indoor movables and (iv) other agricultural products such as livestock, poultry and fishery

(15% of other assets), is presented below. The values of damageable assets in the existing condition is shown in Table XXV 2.1.1 and the unit values of agricultural products and other assets are shown in Table XXV 2.1.2 and XXV 2.1.3.

### Indirect Damage

Damages caused by business suspension due to the mud flow are estimated using the rate (6%) to the damage to general assets (houses/building and their indoor movables). This rate is applied in accordance with other reports on flood control projects similar to this Study, as well as the "Main Principles on Investigation of River Economy, Ministry of Construction, Japan".

The costs for evacuation, clean-up, detour transportation and drainage of mud and debris are inherent for mud and debris flow. In this study, 20% of direct damage including business suspension is tentatively assumed as indirect damage.

### Development Benefit

In this study, socioeconomic development will be accelerated in the protected area by sabo works. In Option 3, it is assumed that the development of industrial and service sector will be promoted in the protected areas as well as the enhancement of agricultural productivity.

To implement these developments, the cost and benefit are assumed as follows:

- (i) The investment cost including land acquisition, land reclamation and construction of buildings for industrial and service sector is calculated.
- (ii) The production cost including cost for labor and materials by sector are calculated.
- (iii) The production in money terms is counted as the benefit generated from the development. With regard to agricultural sector, the increase of production derived from the enhancement of productivity is estimated as the benefit.

These conditions are shown in Table XII 6.5

b. Estimation of Annual Average Benefit

Sabo Works

Benefit generated by mud and debris flow control is defined as the expected amount of average annual reduction of damages by the designed works, and it can be estimated on the basis of the following assumptions.

- ***It is almost impossible that the damaged assets will be recovered to their existing conditions***

According to the field survey, most assets which were once damaged by mud and debris flow are very difficult to be completely recovered from damages or takes considerable time to be recovered. So, in this Study, it is basically assumed that the damaged assets are not recovered to their existing conditions. This assumption is fundamentally different from the one of flood control plan. Because most assets damaged by flood will be recovered to their existing conditions before damage. Agricultural products will be harvested in the next year or cropping time and buildings and infrastructure are mostly repaired and could be in use after the short period from the flood damage.

- ***Annual output from the land is damaged***

This assumption is based on the concept that the assets to be damaged are the output, which is annually generated from the disaster area. The annual output could be the annual production for the agricultural production and the annual depreciation for the buildings.

- ***The occurrence of damages caused by mud and debris flow of each return period is non-simultaneous during the project life of 30 years.***

This means the damages caused by some return period, for example, 10-year, will not be recovered. Then the damages after occurrence in return period 10-year must be excluded from the assets to be damaged by occurrence of other longer return period. But this assumption is approved only during the project life because there is no assurance of protection of assets from mud and debris flow after 30 years. During the project life, the probability is calculated for damages, which will be happened.

- ***Probability of “not” occurrence of damages caused by mud and debris flow after the project life is assumed after the project life.***

After the project life (30 years), the adverse benefit, “not damaged by mud and debris flow”, is assumed because the parts of assets will be always



economically damaged when mud and debris flow will happen even if the structures for protection could work physically.

The damage rate and damaged value of assets are estimated on the basis of these assumptions.(Refer to Table XII 6.6 and 6.7).

#### Development Benefit

Development benefit per annum for return period of 20-year is estimated in terms of difference or balance between revenue and cost generated from production. In the second field study in the Philippines, the more detailed study was conducted with regard to productivity enhancement agriculture, agro-industry project in the protected area as supporting programs. By referring to this study, the productivity enhancement of agriculture was revised from two times to three times of the present productivity condition and economic benefit of industry and service is expected to be more accelerated and increased.

### 2) Legazpi City Urban Drainage Project

#### a. Methodology and Calculation Conditions

##### Land Use Data

From the economic viewpoint, inundation depth and damaged assets were examined on the basis of field survey conducted by the Study Team during the second field survey in the Philippines for flood prone area. Land use pattern for “Option-1” is basically adopted to the flood control plan. The tables concerning the field survey such as survey sheet, scale of samples, distribution of building in the flood prone area of Legazpi City are shown in Table XXV 2.1.4 to 2.1.10 .

##### Direct Damage

Damageable value is the maximum amount of asset value that will suffer the inundation. Generally, direct damage in the area can be calculated as follows:

$$[\text{Direct Damage in the Area (Peso.)}] = [\text{Area Size (ha)}] \times [\text{Damageable Value (Peso/ha)}] \times [\text{Damage Rate}]$$

Damageable value for each asset classification is the same as the one of mud and debris flow already mentioned above.

As in case of Sabo Plan, the other assets such as livestock, poultry, fish in agricultural sector and public facilities except railway and roads are assumed to be 15% of the direct damages.

The result of field survey with regard to flood damages in the Study Area conducted by the JICA Study Team in the second field survey in the Philippines is summarized as follows.

#### **The Summary of Survey Result of Damages by Type of Building**

(Unit: Million Peso)

Type of Building	No. of Building	Regularly Happened	Typhoon Gardin	Typhoon Loleng	Total	Total Surveyed Samples	Total No. of Buildings in Flood Prone Area
Residential	Damaged Build.	51	116	153	320	340	13,334
	Damaged Value	196	695	1,077	1,968	-	-
Commercial	Damaged Build.	7	16	27	50	78	694
	Damaged Value	782	4,072	5,370	10,224	-	-
Industrial	Damaged Build.	4	6	11	21	37	101
	Damaged Value	55	1,044	1,360	2,459	-	-
Public	Damaged Build.	4	11	20	35	50	47
	Damaged Value	113	1,034	1,284	2,431	-	-
Total	Damaged Build.	66	149	211	426	505	14,176
	Damaged Value	1,146	6,845	9,090	17,082	-	-

The unit value of damageable assets and the values of damageable assets in the flood prone area in Legazpi City is shown in Table XXV 2.1.11 and 2.1.12

#### Indirect Damage

Damages caused by business suspension due to the flood are estimated using the rate (6%) to the damage to general assets (houses/building and their indoor movables). This rate is applied in accordance with other reports on flood control projects similar to this Study, as well as the "Main Principles on Investigation of River Economy, Ministry of Construction, Japan".

In this Study, 10% of direct damage including business suspension and evacuation from flood is tentatively assumed as indirect damage

#### Damage Rate by Inundation Depth and Duration

The damage rates for each item vulnerable to flood damage are determined in accordance with the inundation depth and duration. The field survey conducted by the JICA Study Team in the second field survey in the Philippines and other reports on flood control projects similar to this study,

as well as the "Main Principles on Investigation of River Economy, Ministry of Construction, Japan" are also referred to. (See Table XXV 2.1.13)

b. Estimation of Annual Average Benefit

Flood control benefit is defined as the expected amount of average annual reduction of damages by the designed works, and it can be calculated in the following procedure:

- i. Assume several levels of flood discharge: of 2-, 5-, and 10-year
- ii. Obtain the average annual probability of the discharges between one discharge level and the next (this can be derived from calculation of the excess probability for each discharge level and then, attaining the difference between these probabilities);
- iii. Obtain the average annual amount of damage due to floods at this discharge level, multiplying the average annual probability by the amount of estimated damage at this discharge level; and
- iv. Obtain a cumulative total of these amounts from the minimum discharge to the maximum discharge.

The average annual benefit is calculated using the following formula;

$$B = \sum_{i=1}^n \frac{1}{2} [D(Q_{i-1}) + D(Q_i)] \cdot [P(Q_{i-1}) - P(Q_i)]$$

where;

- $B$  : average annual benefit  
 $D(Q_{i-1}), D(Q_i)$  : flood damage caused by flood with  $Q_{i-1}$  and  $Q_i$  discharge, respectively  
 $P(Q_{i-1}), P(Q_i)$  : probability of occurrence of  $Q_{i-1}$  and  $Q_i$  discharge, respectively  
 $n$  : number of flood applied

The estimates of annual average flood damages by return period according to the procedure mentioned above are shown in Table XXV 2.1.14.

3) Resettlement Site Project

In Resettlement Site Project, the benefit generated from livelihood in resettled area is composed of two sites for resettlements: (i) Banquerohan and (ii) Anislag. The annual benefits generated from the project are considered to be the balance (net benefit) between revenue and cost by production. The revenue and cost were estimated for each industrial sector on the basis of the following factors for

each area of construction works and protected area by the river system of Sabo projects: (i) No. of households, (ii) No. of workers per household, (iii) Revenue and cost per worker, and (iv) Rate of the number of workers by industrial sector. The annual cost and revenue are shown in Table XXV 2.1.15.

### (3) Economic Cost

#### 1) Basic Conditions

##### Conversion Factor

The project cost is converted from financial price to economic price. The basic conditions for conversions are as follows:

- The price level is fixed at constant 1999. So inflation is excluded from financial cost.
- In the Feasibility Study, the project cost is composed of the local currency portion and foreign currency portion. The local currency portion in financial price includes the transfer items such as custom duties for imported materials, sales tax, value added tax, and subsidies, and so on for locally procured materials. These transfer items are eliminated from them.
- The tradable goods in the locally procured materials do not reflect the international market price. So the standard conversion factor (SCF) is applied to it. In this Study, 0.909 is assumed to be SCF, which is based on the international trade statistics of the Philippines during the latest 5 years.
- The cost for unskilled labor does not reflect economic price by being overestimated generally. So the shadow wage rate (SWR) is applied to the cost for unskilled labor. According to project evaluation procedure and guidelines prepared by ICC (Investment Coordinating Committee) of the Philippines government, a SWR of 60% is recommended. In this Study, the labor cost is not yet figured. So the SWR is not applied explicitly.
- In this Study, the conversion factor for construction cost of local currency portion is assumed to be 0.82 by taking account of the factors mentioned above such as SCF, SWR, and many kinds of taxes and duties.
- The land acquisition cost includes usually speculative factor. In this Study, 10% of land acquisition cost is tentatively assumed to include speculative factor. So a conversion factor of 0.9 is applied to the land acquisition cost.

##### Disbursement Schedule and Implementation Period

The project cost is assigned according to disbursement schedule. The disbursement schedule in economic price is shown in Table XXV 2.1.16.

(4) Economic Evaluation

1) Yawa River System Sabo Project

The economic evaluation for the Yawa River System Sabo Project is conducted for return period of 20-year as mentioned already. The indicators of economic evaluation are figured out as follows:

- EIRR : 23.8%
- B/C : 1.57
- NPV : 1,304.6 million peso

The EIRR is over the opportunity cost of capital as 15%. Judging from the indicators acquired, the Yawa River System Sabo Project has a high economic viability. It can be concluded that this project is feasible enough and will contribute not only to protect from the mudflow but also to enhance the productivity of all industrial sectors by being protected from the disasters.

There are many unexpected matters in the future with regard to socioeconomic situation. These matters will naturally influence the project cost and benefit. So the sensitivity analysis is conducted by changing the level of cost and benefit. The following table shows the result of sensitivity analysis.

**Result of Sensitivity Analysis for EIRR**

(Unit : %)

		Benefit		
		-5%	-10%	-15%
Cost	+ 5%	21.62	20.51	19.37
	+10%	20.66	19.58	18.47
	+15%	19.77	18.72	17.63

As shown in the above table, the EIRRs are higher than 15% in every combination of change rate of benefit and cost. The EIRR in the worst condition in combination of +15% for cost and -15% for benefit is 17.6%, which is higher enough than 15%. So this project can cope with the unexpected fluctuation in economic conditions and keep the sustainable economic viability. The economic annual cost-benefit flow is shown in Table XXV 2.1.17.

2) Legazpi City Urban Drainage Project

The economic evaluation for the Legazpi City Urban Drainage Project is conducted for return period of 10-year as mentioned already. The indicators of economic evaluation are figured out as follows:

- EIRR : 21.56%
- B/C : 1.64
- NPV : 213.1 million. peso

The EIRR is over the opportunity cost of capital as 15%. Judging from the indicators acquired, the Legazpi City Urban Drainage Project has a high economic viability. The result of sensitivity analysis is shown in the following table.

**Result of Sensitivity Analysis for EIRR**

(Unit : %)

		Benefit		
		-5%	-10%	-15%
Cost	+ 5%	20.57	19.85	19.11
	+10%	19.95	19.25	18.54
	+15%	19.37	18.69	18.01

According to the sensitivity analysis, the EIRRs of all combinations for cost and benefit indicate the high viability. So it can be concluded that this project would meet with the unexpected economic fluctuation in the future and maintain sustainability and feasibility. The economic annual cost-benefit flow is shown in Table XXV 2.1.18.

### 3) Resettlement Site Development Project

The economic evaluation for the Resettlement Site Development Projects is conducted for two sites: Banquerohan and Anislag. The indicators of economic evaluation of these sites are figured out as follows:

Indicators	Banquerohan	Anislag
EIRR (%)	16.21	15.27
C/B	1.02	1.01
NPV(Mill. Peso)	8.7	1.32

The EIRRs for both resettlement sites of Banquerohan and Anislag are higher than the opportunity cost of capital of 15%. Judging from the indicators acquired, the Resettlement Site Development Project has a high economic viability.

The result of sensitivity analysis is shown in the following table.

**Result of Sensitivity Analysis for EIRR**

[Banquerohan]		(Unit : %)		
		Benefit		
		-5%	-10%	-15%
Cost	+ 5%	10.59	7.46	3.84
	+10%	7.91	4.56	-0.07
	+15%	5.19	1.19	-

**Result of Sensitivity Analysis for EIRR**

[Anislag]		(Unit : %)		
		Benefit		
		-5%	-10%	-15%
Cost	+ 5%	9.94	6.96	3.50
	+10%	7.39	4.19	-0.25
	+15%	4.80	0.96	-

The Resettlement Development Projects for both sites have high sensitivity to changes of cost and benefit. The EIRRs of all combinations for cost and benefit are figured out considerably lower than 15% except in combination of +5% for cost and –5% for benefit. The main causes of these high sensitivity are assumed to come from low difference between cost and benefit in amounts, in other words, net benefit, and even the slight change of cost or benefit will bring the high ratio of change of the net benefit.

The integrated economic evaluation is necessary to be conducted for all priority projects as a package proposed in the Feasibility Study to judge that the packaged project is feasible from the economic viewpoint. Then the benefit for three projects mentioned above and cost for all projects were integrated as one packaged project. The result of economic evaluation is as follows.

- EIRR : 17.8%
- B/C : 1.17
- NPV : 676.9 million peso

The EIRR was figured out to be 17.8%. It can be concluded that this packaged project proposed in the Feasibility Project has quite enough economic viability. Besides if the benefits of all projects could be estimated more accurately, this packaged project will have higher economic viability.

To reserve the viability and sustainability of the Project, it is strongly desired to increase relatively the benefit by productivity enhancement for all industrial sectors. The economic annual cost-benefit flows for both resettlement sites are shown in Table XXV 2.1.19 and 2.1.21.

## 2.2 Social Evaluation

### (1) Yawa River System Sabo Project

The protected area from mudflow corresponding to 20-year return period is 1,455.6ha and the population of 14,282 (2,621 of household) will get the benefit generated by this project. The protection from mudflow by this project will bring the following social impacts on this area.

#### 1) Activation of socio-economic activity by disaster prevention

The impact of the realization of disaster free society by prevention of mud and debris flow immeasurable influence on many aspects of settlers in the hazard area. The initial and direct impact is the sense of security of residents. The activation of socio-economic activity is originated from this sense. They will be relieved from stress for being attacked unexpectedly by disaster and can live their lives actively and confidently. They do not need to expend much from their income to protect their lives and assets from the disaster.

#### 2) Mitigation of social anxiety and disorder

The social anxiety and disorder by fear of disaster will generally happen in a manner of mental disease as neurosis, increase of crime such a theft or robbery, vagabond and orphan caused by vicious circle of poverty generated from disaster that happen repeatedly. These kinds of anxieties and disorder will be mitigated by disaster prevention

#### 3) Cutting off vicious circle of poverty by rising up of income level by economic development projects

The disaster prevention will bring the active socio-economic behaviors, accelerate the economic development and lead to rapid growth of production. The settlers can afford to pay more the tax to prevent disaster and synergy effects will develop the economy.

#### 4) Improvement of fixation and concentration of population (especially labor force)

The economic growth and new business opportunity will be expected in the future. So the flow-out of people especially labor force will be suspended and they will stay at their hometown during the rest of their lives.

#### 5) Improvement of welfare supported by the improvement of financial affordability of the local government

The rising up of income level will bring more affordability to pay tax to their LGUs. The LGUs can distribute to the budget of people's welfare such as



health care for aged people, the facilities for physically and mentally handicapped people and so on.

- 6) The social benefit for relocating people from construction sites for sabo dike. The resettlers have many handicaps with regard to the living conditions in the new resettlement sites. The compensations should be satisfactory level for them. There is much negative and positive benefit. The social net benefit of relocating people depends on difference between the positive benefit and negative benefit.

## (2) Legazpi City Urban Drainage Project

The protected area from flood corresponding to 10-year return period is 1,070.1ha and the population of 70,309 (13,334 of household) will get the benefit generated by this project. The protection from flood by this project will bring the following social impacts on this area.

- 1) Activation of urban socio-economic activities such as transportation of commuter, business such as trade and commercial activities  
The people living in the flood prone will be able to work actively without any fear or anxiety of inundation of their asset, not only of their homes but their offices. The tremendous benefits will be brought on their society by refrain from suspension of their business activities, for example, time saving of travel for commuting and transport for their products.
- 2) Improvement of sanitation by protecting from the decomposition of inundated foods by flood  
To be healthy is the most basic living condition for settlers. The people will be able to eat foods without any fear for decomposition by flood and to live comfortable life by improvement of sanitary condition.
- 3) Improvement of fixation and concentration of population (especially labor force)  
This impact is almost the same as of the Yawa River System Sabo Project.
- 4) Improvement of welfare supported by the improvement of financial affordability of the local government  
This impact is also almost the same as of the Yawa River System Sabo Project. The social benefit for relocating people from construction sites for river improvement depends on the difference between the positive benefit and negative benefit. The benefit generation condition is the same as of the of the Yawa River System Sabo Project.

### (3) Resettlement Development Project

The beneficiaries of the Resettlement Site Development Project are as follows:

**Beneficiaries of Resettlement Site**

Indicators	Banquerohan	Anislag	Total
Area (ha <sup>2</sup> )	45	22	67
No. of Population	5,618	3,366	8,934
No. of Household	1,060	635	1,695

The Resettlement Site Development Project is expected to realize the following social impacts.

- 1) Improvement of living conditions including space of house lot, water, electricity and transportation

The living conditions in the new settlement sites are the fatal matters for the new resettles. They will not relocate positively unless there is enough space of house, water with good quality and enough quantity, electricity without suspension and convenient and frequent transportation provided.

- 2) The minimum friction or reconciliation for social customs among the new settlers, the aboriginal residents and the people surrounding area of the resettlement area.

The harmonious and comfortable lives are also indispensable condition for resettlers. The continuous discussion and communication for mutual understanding are very important to minimize the friction and reconciliation among the new settlers, the aboriginal residents and the people in the surrounding area of the resettlement area.

- 3) Improvement of housing environment (security) by elimination of vulnerability  
When the disaster will be prevented and the income level will be raised up by the accelerated economic development, the vulnerability of residents' houses will be eliminated and they can enjoy their lives comfortably and they can afford to pay not for the protection of their assets but for the raise of lives quality.

- 4) Improvement the sanitary environment by sewerage facilitation and proper garbage disposal

The fulfillment of social infrastructure like sewerage and garbage disposal is fundamental condition for comfortable lives of resettles. The facilitation will be more important as the population will increase by concentration to urban center of Legazpi City.

**Table XXV 1.1.1 Population, Households, Land Area and Population Density  
in Protected Area of Yawa River System Sabo Project**

Municipality/City	No.	Barangay	1999 #			Protected Land Area (ha.)	Pop. Density in 1999 (pers./ha.)
			Total Population	No. of Households	Average No. of Family Members		
Legazpi City	1.	Arimbay	2,366	435	5.44	75.00	32
	2.	Bagong Abre	1,047	192	5.46	135.24	8
	3.	Bogña	872	162	5.38	213.00	4
	4.	Buyuan	-	-	-	17.00	-
	5.	Dita	1,158	202	5.73	2.36	491
	6.	Mabinit	133	25	5.33	37.00	4
	7.	Matanag	1,349	245	5.51	67.00	20
	8.	Pawa	418	77	5.42	207.60	2
	9.	San Joaquin	1,780	317	5.62	54.67	33
	10.	Tamaoyan	148	26	5.68	28.00	5
			Subtotal	9,270	1,681	5.52	836.87
Daraga	1.	Alcara	1,034	201	5.15	184.26	6
	2.	Banadero	842	159	5.30	228.84	4
	3.	Budiao	187	36	5.20	183.30	1
	4.	Busay	145	28	5.19	108.44	1
	5.	Kilicao	903	167	5.41	163.49	6
	6.	Malabog	198	37	5.35	61.61	3
	7.	Matnog	567	97	5.84	141.32	4
	8.	Mi-isi	116	23	5.03	124.00	1
	9.	Salvacion	556	107	5.20	130.00	4
			Subtotal	4,548	855	5.32	1,325.27
Camalig	1.	Cabangan	387	71	5.45	89.98	4
	2.	Sumulang	76	14	5.45	65.52	1
		Subtotal	463	85	5.45	155.50	3
<b>Grand Total</b>			<b>14,282</b>	<b>2,621</b>	<b>5.45</b>	<b>2,317.64</b>	<b>6</b>

Note : 1. Population was estimated by the JICA Study Team on the basis of NSO Census, September 1995 by the assumption of the average annual growth rate of 3.22% (1990-1995).

2. Population of Barangay of which area partially belongs to hazard area was estimated by taking account of (i) area ratio and (ii) population density between the hazard area and other area and

Source : (1) NSO Census of Population, September 1995 and JICA Study Team Estimates

(2) Aerial photograph on the hazard area conducted by the JICA Study Team.

(3) Tax map of Lagazpi City and Daraga Municipality provided by Assessor's Office.

**Table XXV 1.2.1 Population, Households, Land Area and Population Density  
in Flood Prone Area of Legazpi City for Urban Drainage Project**

No.	Barangay	1999			Land Area (km <sup>2</sup> )	Pop. Density in 1999 (pers./km <sup>2</sup> )
		Total Population	No. of Households	Average No. of Family Members		
1.	Bagumbayan	3,967	818	4.85	36.57	108
2.	Bañadero	1,181	234	5.05	37.56	31
3.	Binanuahan East	1,295	242	5.36	16.95	76
4.	Binanuahan West	974	174	5.61	7.90	123
5.	Bitano	5,638	1,048	5.38	63.80	88
6.	Bonot	3,592	702	5.12	57.23	63
7.	Cabagñan	1,427	264	5.39	14.41	99
8.	Cabagñan East	778	135	5.76	17.20	45
9.	Cabagñan West	3,630	695	5.23	56.61	64
10.	Centro-Baybay	1,216	210	5.79	19.11	64
11.	Cruzada	4,028	757	5.32	139.77	29
12.	Dinagaan	939	159	5.91	13.05	72
13.	Gogon	5,030	963	5.23	146.31	34
14.	Ilawod	876	167	5.25	8.93	98
15.	Ilawod East	1,900	351	5.42	35.80	53
16.	Ilawod West	1,044	175	5.97	8.51	123
17.	Imperial Court Subd.	686	128	5.35	11.76	58
18.	Kapantawan	588	119	4.93	71.92	8
19.	Kawit-East Wash. Dr.	5,357	1,019	5.26	73.90	72
20.	Lapu-Lapu	1,110	221	5.02	17.44	64
21.	Oro Site-Magallanes	2,500	463	5.40	9.84	254
22.	Pigcale	2,315	452	5.12	8.70	266
23.	PNR-Peñaranda-Iraya	2,672	570	4.69	30.90	86
24.	Rizal St.-Ilawod	1,443	286	5.04	61.92	23
25.	Rizal Street	2,066	279	7.40	13.34	155
26.	Sabang	1,512	300	5.05	10.22	148
27.	San Roque	5,654	1,111	5.09	38.25	148
28.	Tinago	858	169	5.07	6.90	124
29.	Tula-Tula	2,728	499	5.46	12.39	220
30.	Victory Vill. North	2,234	413	5.41	12.93	173
31.	Victory Vill. South	1,153	210	5.49	10.01	115
<b>Total</b>		<b>70,390</b>	<b>13,334</b>	<b>5.28</b>	<b>1,070.13</b>	<b>66</b>

Note : 1. Population was estimated by the JICA Study Team on the basis of NSO Census, September 1995.

**Table XXV 2.1.1 Value of Damageable Assets by Mud Flow in the Protected Area of the Yawa River System Sabo Project for 20-Year Return Period**

(Unit : Million Pesos)

Location	Total Protected Area in Hectares	Agricultural Lands											Rural/(Built-Up Area) Land						Road			Grand Total										
		Paddy		Coco Land	Corn & Legumes	Banana & Fruits	Vegetables & Rootcrops	Hort or Mix Crops	Industrial Crops		Total	Residential	Commercial	Industrial	Educational	Religious	Institutional	Total	National	Brangay	Railway		Total									
		Non-Irr.	Irr.						Abaca	Pili																						
City of Legazpi																																
1	ARMBAY	75.00	0.10	0.73	0.16		0.08	0.22	0.43									1.73	47.54	2.42	18.90	3.36					72.22	4.31			0.70	74.65
2	BAGONG ABBE	135.24	0.19	2.42	0.38		0.35											3.34	20.98	1.94	18.90						41.82				45.16	
3	BONGNA	215.00	0.04	0.97	0.56	0.10	0.26	0.59		0.17								2.68	17.70			3.36					21.06		2.46		0.60	24.34
4	BUYUAN	17.00	0.01	0.03	0.03				0.02									0.09									0.00				0.09	
5	DITA	51.09	0.52	0.31	0.14	4.50		0.30										5.38	22.08		14.18	3.36					39.61	1.60			0.36	45.35
6	MABINIT	37.00	0.02	0.31	0.14		0.13											0.60	2.73		14.18	3.36					2.73	1.11			0.27	3.60
7	MATANAG	67.00	0.25	0.29	0.12	7.75	0.09	0.51										9.01	26.78		14.18	3.36					44.31	1.72			0.42	53.74
8	PAWA	207.61	3.20	0.22	12.00		0.05	0.41	0.68									16.57	8.42		14.18	3.36					25.95	7.63			1.86	44.38
9	SAN JOAQUIN	54.67	0.64	0.04			0.03											0.72	34.64		4.73	3.36					42.73	1.35			0.33	43.77
10	TAMAYAN	28.00	0.06	0.01														0.07	2.84								2.84	0.98			0.24	3.15
SUBTOTAL		885.61	0.60	9.17	1.72	24.35	0.52	2.51	1.13	0.17	0.00	40.17	183.71	4.36	0.00	85.05	20.16	0.00	293.29	4.31	16.85	0.00									4.78	338.23
Mun. of Daraga																																
1	ALCALA	184.26		3.10	0.00	0.01		0.81										3.92	21.97		28.35						63.76	3.44			0.84	68.52
2	BANADERO	228.84		1.93	1.08		0.25											3.26	17.38	0.48	23.63	3.36					58.29	2.71			0.66	62.20
3	BUDIAO	183.30	0.02	0.92	1.04		0.51											2.49	3.93		4.73	6.72					28.82	4.67			1.14	32.45
4	BUSAY	108.44		1.43	0.07		0.25											1.75	3.06		4.73						9.26				11.01	
5	KILICAO	163.49		1.27	0.11	0.00	0.20											1.58	18.25	0.48	22.16						87.94	9.84			2.40	91.92
6	MALABOG	61.61		1.27	0.11	0.09	0.40											1.87	4.04								4.04	1.85			1.08	6.99
7	MATNIG	141.32		0.67	0.18	0.01	0.30											1.16	10.60		4.73						40.32	6.15			1.50	58.30
8	MI-ISI	124.00		0.00	1.62		0.05											1.66	2.51		4.73						7.24				8.90	
9	SALYACION	130.00		0.69	0.27		0.05											1.01	11.69	1.45	4.73						31.31	5.54			2.70	35.03
SUBTOTAL		1,325.27	0.02	11.28	4.47	0.11	0.00	2.83	0.00	0.00	0.00	18.70	93.44	2.42	23.64	75.60	16.80	0.00	346.30	7.38	36.16	4.92									10.32	375.33
Mun. of Camalig																																
1	CABANGAN	89.98	0.03	0.02	0.94		0.01		0.05									1.05	7.76								228.48	6.15	5.41		2.98	240.27
2	SUMILANG	65.52		0.29	0.19		0.07											0.91	1.53								1.53				0.60	3.04
SUBTOTAL		155.50	0.03	0.31	1.13	0.00	0.08	0.00	0.05	0.00	0.00	1.96	9.29	0.00	0.00	0.00	0.00	0.00	228.48	6.15	5.41	25.83									3.58	243.31
TOTAL		2,366.38	0.65	20.76	7.32	24.46	0.60	5.34	1.18	0.53	0.00	60.83	286.44	6.78	23.64	160.65	36.96	0.00	877.36	17.84	58.43	30.75									18.68	956.87

Source : 1 Engineering office of Legazpi City and Municipalities and JICA Study Team

Note : Assets of buildings include indoor movables.

**Table XXV 2.1.2 Unit Value of Damageable Assets for Sabo Project**

(Price at 1999)

Kinds of Assets		Unit	Financial Price	Economic Price	
Building	Residential House	Peso/Household	88,852	72,859	
		Milli.Peso/Ha.	11.8	9.7	
	Industrial Building	Peso/Building	1,001,000	820,820	
		Milli.Peso/Ha.	57.2	46.9	
	Commercial Building	Peso/Building	307,808	252,402	
		Milli.Peso/Ha.	66.0	54.1	
	Public Facilities	Peso/Building	277,027	227,162	
		Milli.Peso/Ha.	59.4	48.7	
	Indoor Movables	Residencial House	Peso/Building	44,426	36,429
			Milli.Peso/Ha.	5.9	4.9
Industrial Building		Peso/Building	800,800	656,656	
		Milli.Peso/Ha.	45.8	37.5	
Commercial Building		Peso/Building	430,931	353,363	
		Milli.Peso/Ha.	92.3	75.7	
Public Facilities		Peso/Building	304,729	249,878	
		Milli.Peso/Ha.	65.3	53.5	
Roads					
Major Road		Milli.Peso/km	7.5	6.2	
Barangay Road		Milli.Peso/km	3.0	2.5	
Railway		Milli.Peso/km	15.0	12.3	
Bridges		Milli.Peso/km	11.3	9.2	
Agricultural Products	Rice	Peso/Ha.	44,097	38,541	
	Coconut	Peso/Ha.	20,541	17,953	
	Corn	Peso/Ha.	13,768	12,033	
	Banana	Peso/Ha.	35,044	30,628	
	Abaca	Peso/Ha.	39,314	34,360	
	Root Crops	Peso/Ha.	50,215	43,888	
	Vegetables	Peso/Ha.	57,839	50,552	
	Industrial Crops	Peso/Ha.	397,764	347,645	
	Other Crops	Peso/Ha.	77,638	67,856	

Source : 1. "Shedule of Bulding Cost Per Square Meter(Revision 1999)", Planning Division of City Hall of Legazpi City.

2. "Manual of Economic Evaluation for Flood Control Project", Ministry of Construction of Japan.

3. Result of Field Survey

**Table XXV 2.1.3 Farmgate Price for Main Agricultural Products**

Items	Unit	Coconut (Copra)	Rice	Corn	Abaca	Banana	Rootcrops	Vegetables	Industrials Crops	Other Crops
International Market Price										
Exchange rate	US\$/ton	433	328			200				
	Peso/US\$	37.5	37.5			37.5				
	Peso/ton	16,229	12,286			7,509				
Transportation Cost & Warehouse(30%)										
Farm Gate Price		4,869	3,686			2,253				
Financial Price	Peso/ton	11,360	8,600	5,500	17,000	5,257	3,700	10,000	50,000	8,000
Production Cost										
Cost	Peso/ton	7,952	6,020	3,850	11,900	3,680	2,590	7,000	35,000	5,600
Net Income	Peso/ton	3,408	2,580	1,650	5,100	1,577	1,110	3,000	15,000	2,400
Economic Price	Peso/ton	9,929	7,517	4,807	14,858	4,594	3,234	8,740	43,700	6,992
Production Cost										
Conversion Factor(82%)		0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Cost	Peso/ton	6,521	4,937	3,157	9,758	3,017	2,124	5,740	28,700	4,592
Net Income	Peso/ton	3,408	2,580	1,650	5,100	1,577	1,110	3,000	15,000	2,400
Production/Ha.	Ton/ha.	1.81	5.13	2.82	2.31	6.67	13.57	5.78	7.96	9.70
Financial Price	Peso/ha.	20,541	44,097	15,491	39,314	35,044	50,215	57,839	397,764	77,638
Economic Price	Peso/ha.	17,953	38,541	13,539	34,360	30,628	43,888	50,552	347,645	67,856

Note: Farmgate price for copra, rice and banana are based in international market price by referring to "Commodity Markets and Development Countries" A World Bank Business Quarterly, Nov. 1998.

**Table XXV 2.1.4**

**THE STUDY ON COMPREHENSIVE DISASTER PREVENTION AROUND  
MAYON VOLCANO IN THE REPUBLIC OF THE PHILIPPINES  
CONDUCTED BY JICA AND DPWH**

**SURVEY SHEET FOR FLOOD DAMAGES  
TO RESIDENTIAL BUILDING IN LEGAZPI CITY  
FOR URBAN DRAINAGE PROJECT**

Date: _____			
Name of Interviewer _____			
Address: Name of Barangay: _____ ; _____			
1. Type of Building:		1. One Family Residence 2. Two Family/Duplex 3. Accesoria/Row House 4. Apartment/Boarding Hse. 5. Condominium 6. Other Type	
2. Category of Building : A B 3. No. of Stories : 1. 2. 3. 4. 5. More than 5			
4. Area Occupied by Building: Frontage _____ m		Depth _____ m	
Total _____ m <sup>2</sup>			
5. Cost of Building/m <sup>2</sup> (exc. land price) : _____ Peso		Total Cost _____ Peso	
6. Value of Household Effects (roughly estimated) : _____ Peso in Total(6.1+6.2+6.3)			
6.1 Household Appliances :		_____ Peso	
a. TV b. radio c. washing machine d. vacume cleaner e. electric polishers f. cooking range			
6.2 Furniture & Fixture :		_____ Peso	
a. cabinet b. dining set c. chelves d. chandelier e. bedding f. lamps g. sala set			
6.3 Others :		_____ Peso	
a. cars b. motorcycle c. garage			
7. Flood Damages			
Items	Date of Flood		
	Regularly happened	Occasionally happened	Rarely happened
		Typhoon Garding	Typhoon Loleng
	Date :	Date :Jan. 1994	Date :Oct. 1998
(1) Duration:(days)			
(2) Inundation depth from ground (cm):			
(3) Inundation depth from ground floor(cm):			
(4) Cost for repair/replacement (roughly estimated)			
1) Building (peso):			
2) Household Effects(peso):			

**Unit Price of Building by Type & Category(Peso/m<sup>2</sup>)**

1. One Family Resi	2. Two Family/Duplex	3. Accesoria/Row House	4. Apartment/Boarding hs
A- 10,000	A- 7,000	A- 7,000	A- 8,000
B- 8,000	B- 6,000	B- 5,000	B- 7,000
C- 6000	C- 4,000	C- 4,000	C- 5,000
5. Condominium			
A- 10,000			
B- 8,000			
C- 6,000			



**Table XXV 2.1.5**

**THE STUDY ON COMPREHENSIVE DISASTER PREVENTION AROUND  
MAYON VOLCANO IN THE REPUBLIC OF THE PHILIPPINES  
CONDUCTED BY JICA AND DPWH**

**SURVEY SHEET FOR FLOOD DAMAGES  
TO COMMERCIAL BUILDING IN LEGAZPI CITY  
FOR URBAN DRAINAGE PROJECT**

Date:			
Name of Interviewer			
Name of Establishment :			
Address: Name of Barangay: _____ ;			
1. Type of Building: _____ 1. Store 2. Business Office 3. Shopping Center 4. Restaurant 5.			
2. Category of Building : A B C 3. No. of Stories : 1. 2. 3. 4. 5. More than 5			
4. Area Occupied by Building: Frontage _____ m Depth _____ m			
Total _____ m <sup>2</sup>			
5. Cost of Building/m <sup>2</sup> (exc. land price) : _____ Peso Total Cost _____ Peso			
6. Value of Equipment (roughly estimated) : _____ Peso			
7. Value of Inventory (roughly estimated) : _____ Peso			
8. Flood Damages			
Items	Date of Flood		
	Regularly happened	Occasionally happened	Rarely happened
		Typhoon Garding	Typhoon Loleng
	Date : 1994	Date :Oct. 1998	
(1) Duration:(days)			
(2) Inundation depth from ground (cm):			
(3) Inundation depth from ground floor(cm):			
(4) Cost for repair/replacement (roughly estimated)			
1) Building (peso):			
2) Equipment(peso):			
3) Inventory(peso):			
(5) Suspended hours or days of working by flood (hour/day):			
(6) Damages by suspension of working in peso:			

**Unit Price of Building by Type & Category(Peso/m<sup>2</sup>)**

1. Store	2. Business Office	3. Shopping Center	4. Rrestaurant	5. Hotel	6. Motel
A- 8,000	A- 8,000	A- 10,000	A- 10,000	A- 8,000	A- 8,000
B- 6,000	B- 6,000	B- 8,000	B- 8,000	B- 7,000	B- 7,000
C- 4,000	C- 4,000	C- 6,000	C- 6,000	C- 5,000	C- 6,000

**Table XXV 2.1.6**

**THE STUDY ON COMPREHENSIVE DISASTER PREVENTION AROUND  
MAYON VOLCANO IN THE REPUBLIC OF THE PHILIPPINES  
CONDUCTED BY JICA AND DPWH**

**SURVEY SHEET FOR FLOOD DAMAGES  
TO INDUSTRIAL BUILDING IN LEGAZPI CITY  
FOR URBAN DRAINAGE PROJECT**

Date: _____			
Name of Interviewer _____			
Name of Establishment : _____			
Address: Name of Barangay _____ ; _____			
1. Category of Building : A    B    C		2. No. of Stories : 1.    2.    3.    4.    5.    More than 5	
3. Area Occupied by Building: Frontage _____ m		Depth _____ m	
Total _____ m <sup>2</sup>			
4. Cost of Building/m <sup>2</sup> (exc. land price) : _____ Peso		Total Cost _____ Peso	
5. Value of Equipment (roughly estimated) : _____ Peso			
6. Value of Inventory (roughly estimated) : _____ Peso			
7. Flood Damages			
Items	Date of Flood		
	Regularly happened	Occasionally happened	Rarely happened
		Typhoon Garding	Typhoon Loleng
	Date : 1994	Date :Oct. 1998	
(1) Duration:(days)			
(2) Inundation depth from ground (cm):			
(3) Inundation depth from ground floor(cm):			
(4) Cost for repair/replacement (roughly estimated)			
1) Building (peso):			
2) Equipment(peso):			
3) Inventory(peso):			
(5) Suspended hours or days of working by flood (hour/day):			
(6) Damages by suspension of working in peso:			

**Unit Price of Building by Type & Category(Peso/m<sup>2</sup>)**

- A-            P. 7,000
- B-            6,000
- C-            5000

**Table XXV 2.1.7**

**THE STUDY ON COMPREHENSIVE DISASTER PREVENTION AROUND  
MAYON VOLCANO IN THE REPUBLIC OF THE PHILIPPINES  
CONDUCTED BY JICA AND DPWH**

**SURVEY SHEET FOR FLOOD DAMAGES  
TO PUBLIC BUILDING IN LEGAZPI CITY  
FOR URBAN DRAINAGE PROJECT**

Date: _____			
Name of Interviewer _____			
Address: Name of Barangay: _____ ;			
1. Type of Building:	1. School Office	2. Hospital	3. Clinic 7. Other( )
2. Category of Building : A	3. No. of Stories : 1.	2.	3. 4. 5. More than 5
4. Area Occupied by Building:	Frontage _____ m	Depth _____ m	
	Total _____ m <sup>2</sup>		
5. Cost of Building/m <sup>2</sup> (ex.. land price) :	_____ Peso	Total Cost _____	Peso
6. Value of Indoor Movables (roughly estimated) :	_____ Peso		
<b>7. Flood Damages</b>			
Items	Date of Flood		
	Regularly happened	Occasionally happened	Rarely happened
		Typhoon Garding	Typhoon Loleng
	Date :	Date :Jan. 1994	Date :Oct. 1998
(1) Duration:(days)			
(2) Inundation depth from ground (cm):			
(3) Inundation depth from ground floor(cm):			
(4) Cost for repair/replacement (roughly estimated)			
1) Building (peso):			
2) Equipment(peso):			
3) Indoor Movables(peso):			

**Unit Price of Building by Type & Category(Peso/m<sup>2</sup>)**

1. School	2. Hospital	3. Clinics	4. Church	5. Chapel	6. Government Office
A- 6,000	A- 10,000	A- 8,000	A- 11,000	A- 7,000	A- 8,000
B- 5,000	B- 8,000	B- 6,000	B- 8,000	B- 6,000	B- 7,000
C- 4,000	C- 7,000	C- 4,000	C- 6,000	C- 5,000	C- 6,000

**Table XXV 2.1.8**

[Date of Survey: ]

[Name of Surveyor: ]

**SURVEY SHEET FOR COUNTING TOTAL NUMBER OF BUILDING BY TYPE  
IN THE FLOOD PRONE AREA IN LEGAZPI CITY**

No.	Code No. of Barangay	Name of Barangay	Commercial							Industrial	Public				Total	
			Store	Business Office	Shopping	Restaurant	Hotel	Motel	Others		Sub-Total	School	Hospital/Clinics	Church/Chapel		Government Office
1	8	Bagumbayan														
2	6	Banadero														
3	7	Binanuhan East														
4	8	Binanuhan West														
5	9	Bitano														
6	10	Bonot														
7	11	Cabagnan														
8	12	Cabagnan East														
9	18	Cabagnan West														
10	19	Centro-Baybay														
11	20	Cruzada														
12	21	Dinagaan														
13	22	Gogon														
14	15	Ilawod														
15	14	Ilawod East														
16	13	Ilawod West														
17	14	Imperial Crt. Subd														
18	15	Kapantawan														
19	16	Kawit-East Wash														
20	17	Lapu-Lapu														
21	18	Oro Site														
22	19	Pigcale														
23	20	PNR-Penaranda														
24	21	Rizal St.														
25	17	Rizal St.-Ilawood														
26	18	Sabang														
27	19	San Roque														
28	20	Tinago														
29	12	Tula-Tula														
30	13	Victory Vill North														
31	14	Victory Vill South														
		<b>Total</b>														

**Table XXV 2.1.9 Distribution of Samples for Buildings in the Flood Prone Area in Legazpi City**

No.	No. of Barangay	Name of Barangay	Residential	Commercial	Industrial	Public				Total
						School	Hospital	Church	Government	
1	6	Banadero	6			1	1	1	1	10
2	8	Bagumbayan	21							21
3	12	Tula-Tula	13			1	1	1	1	17
4	13	Ilawod West	4							4
5	14	Ilawod East	4			1	1	1	1	8
6	15	Ilawod	9							9
7	16	Kawit-East Wash	26			1	1	1	1	30
8	17	Rizal St.-Ilawood	7							7
9	18	Cabagnan West	18			1	1	1	1	22
10	19	Cabagnan	7	9						16
11	20	Cabagnan East	3	9	4	1	1	1	1	20
12	21	Binanuhan West	4	9						13
13	22	Binanuhan East	6	9		1	1	1	1	19
14	23	Imperial Crt. Subd	3	9						12
15	24	Rizal St.	10	9		1	1	1	1	23
16	25	Lapu-Lapu	6							6
17	26	Dinagaan	4			1	1	1	1	8
18	27	Victory Vill South	5							5
19	28	Victory Vill North	10			1	1	1	1	14
20	29	Sabang	8		8					16
21	30	Pigcale	11		8	1	1	1	1	23
22	31	Centro-Baybay	5		8					13
23	32	San Roque	28			1	1	1	1	32
24	33	PNR-Penaranda	14							14
25	34	Oro Site	14			1	1	1	1	18
26	35	Tinago	4	9						13
27	36	Kapantawan	3	9	8	1	1	1	1	24
28	37	Bitano	26	8	4					38
29	38	Gogon	24			1	1	1	1	28
30	39	Bonot	18							18
31	40	Cruzada	19							19
Total			340	80	40	10	15	15	10	510

**Table XXV 2.1.10 Total Number of Building by Type in the Flood Prone Area in Legazpi City**

No.	Code No. of Bgy	Name of Barangay	Residential	Commercial										Industrial				Public				Total
				Store	Bus. Off.	Shop. Center	Rest.	Hotel	Motel	Others	Sub-total	School	Hospital/Clinics	Church/Chapel	Govt. Off.	Sub-Total	School	Hospital/Clinics	Church/Chapel	Govt. Off.	Sub-Total	
1	8	Bagumbayan	818	8	2	-	-	-	1	-	-	11	1	9	-	-	1	1	1	11	841	
2	6	Bafadero	234	9	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	243	
3	7	Binanuahan East	242	6	-	-	-	-	-	-	6	3	1	2	-	-	2	-	-	3	254	
4	8	Binanuahan West	174	9	1	-	-	-	-	-	11	2	-	-	-	-	2	1	1	3	190	
5	9	Bitano	1,048	6	-	-	-	-	-	-	6	4	1	-	-	-	1	1	1	3	1,061	
6	10	Bonot	702	12	1	-	5	-	1	1	20	5	2	1	1	1	1	1	1	5	732	
7	11	Cabagnan	264	8	3	-	-	-	-	-	11	7	1	-	-	-	-	-	-	2	284	
8	12	Cabagnan East	135	6	4	-	-	-	-	-	10	5	4	-	-	-	1	1	1	6	156	
9	18	Cabagnan West	695	15	4	-	1	-	-	-	22	2	1	-	-	-	1	-	-	3	722	
10	19	Centro-Baybay	210	9	1	1	4	2	-	3	20	8	4	1	1	-	-	-	6	244		
11	20	Cruzada	757	19	1	-	1	1	1	-	23	10	2	1	3	1	1	-	7	797		
12	21	Dinagaan	159	5	1	1	1	-	-	2	10	-	-	-	1	2	1	6	9	178		
13	22	Gogon	963	23	-	-	1	-	-	-	24	9	10	-	-	-	-	-	11	1,007		
14	15	Ilawod	167	17	1	-	4	-	-	2	24	-	1	-	-	-	1	1	3	194		
15	14	Ilawod East	351	20	2	1	-	1	1	1	26	4	1	3	2	2	2	2	8	389		
16	13	Ilawod West	175	7	1	-	-	-	-	-	8	1	2	-	-	-	-	-	7	191		
17	14	Imperial Court Subd.	128	4	1	-	-	-	-	-	6	2	-	-	-	-	-	-	1	137		
18	15	Capantawan	119	13	3	3	1	-	-	-	20	3	5	-	-	-	-	2	7	149		
19	16	Kawit-East Wash.	1,019	16	2	-	1	-	1	1	21	1	1	1	2	5	2	5	8	1,049		
20	17	Lapu-Lapu	221	23	3	-	2	-	1	4	33	1	1	1	3	1	4	9	9	264		
21	18	Oro-Site	463	48	5	1	4	2	-	2	62	-	6	1	1	-	-	-	8	533		
22	19	Pigcale	452	19	2	-	3	-	1	1	26	8	1	1	1	-	-	1	3	489		
23	20	PNR-Peñaranda	570	11	-	-	1	2	-	4	18	1	1	-	-	-	-	4	5	594		
24	21	Rizal Street	286	12	1	-	1	-	1	4	19	3	2	1	1	1	1	1	5	313		
25	17	Rizal St. -Ilawod	279	26	8	-	-	-	-	-	34	4	7	1	-	-	-	-	8	325		
26	18	Sabang	300	26	2	-	2	-	2	-	32	8	1	-	-	1	3	5	5	345		
27	19	San Roque	1,111	47	2	-	-	-	-	-	50	5	7	-	-	3	1	11	1,177			
28	20	Tinago	169	18	2	-	-	-	-	-	25	2	-	-	1	1	2	4	200			
29	12	Tula-Tula	499	13	-	-	-	-	-	-	13	2	1	1	1	-	-	3	517			
30	13	Victory Vill. North	413	54	-	-	-	-	-	-	54	-	3	-	-	2	-	-	5	472		
31	14	Victory Vill. South	210	40	-	-	-	-	-	-	40	-	1	-	-	-	-	-	2	252		
TOTALS			13,334	549	53	7	32	8	10	35	694	101	75	21	28	47	171	14,300				

**Table XXV 2.1.11 Unit Value of Damageable Assets  
for Urban Drainage Plan**

(Price at 1999)

Kinds of Assets		Unit	Financial Price	Economic Price
Building	Residential House	Peso/Household	551,840	452,509.0
		Milli.Peso/Ha.	73.6	60.3
	Industrial Building	Peso/Building	875,311	717,754.9
		Milli.Peso/Ha.	50.0	41.0
	Commercial Building	Peso/Building	1,514,669	1,242,028.3
		Milli.Peso/Ha.	324.6	266.1
	Public Facilities	Peso/Building	4,637,852	3,803,038.6
		Milli.Peso/Ha.	993.8	814.9
Indoor Movables	Residencial House	Peso/Building	88,531	72,595.4
		Milli.Peso/Ha.	1.0	0.8
	Industrial Building	Peso/Building	1,349,392	1,106,501.4
		Milli.Peso/Ha.	70.5	57.8
	Commercial Building	Peso/Building	1,419,009	1,163,587.4
		Milli.Peso/Ha.	86.5	70.9
	Public Facilities	Peso/Building	556,550	456,371.0
		Milli.Peso/Ha.	7.8	6.4
Roads				
Major Road		Milli.Peso/km	7.5	6.2
Barangay Road		Milli.Peso/km	3.0	2.5
Railway		Milli.Peso/km	15.0	12.3
Bridges		Milli.Peso/km	11.3	9.2

Source : 1. Result of Field Survey conducted by JICA Study Team in the Second Field Study in Legazpi City of the Philippines.

2. "Manual of Economic Evaluation for Flood Control Project", Ministry of Construction of Japan

**Table XXV 2.1.12 The Value of Damageable Assets by Type in the Flood Prone Area in Legazpi City**

(Unit : Million Peso)

No.	Code No. of Bgy	Name of Barangay	Residential	Commercial										Industrial	Public				Total	
				Store	Bus. Off.	Shop. Center	Rest.	Hotel	Motel	Others	Sub-total	School	Hospital/Clinics		Church/Chapel	Govt. Off.	Sub-Total			
1	8	Bagumbayan	430	19	5	-	-	-	-	-	2	-	26	38	-	-	4	4	47	505
2	6	Bañadero	123	22	-	-	-	-	-	-	-	22	-	-	-	-	-	-	-	144
3	7	Binanuahan East	127	14	-	-	-	-	-	-	-	14	5	4	-	-	-	-	13	160
4	8	Binanuahan West	91	22	2	-	-	-	-	-	2	26	4	-	-	9	4	13	134	
5	9	Bitano	550	14	-	-	-	-	-	-	-	14	7	4	-	4	4	13	585	
6	10	Bonot	368	29	2	-	12	-	-	2	2	48	9	9	4	4	4	21	447	
7	11	Cabagnan	139	19	7	-	-	-	-	-	-	26	13	4	-	-	4	9	187	
8	12	Cabagnan East	71	14	10	-	-	-	-	-	-	24	9	17	-	4	4	26	130	
9	18	Cabagnan West	365	36	10	-	2	-	-	-	5	53	4	4	4	-	4	13	434	
10	19	Centro-Baybay	110	22	2	2	10	5	-	7	7	48	15	17	4	4	-	26	199	
11	20	Cruzada	398	46	2	-	2	2	2	-	-	55	18	9	4	13	4	30	501	
12	21	Dinagaan	83	12	2	2	2	-	-	-	5	24	-	-	9	4	26	38	146	
13	22	Gogon	505	55	-	-	2	-	-	-	-	58	16	43	-	-	4	47	626	
14	15	Ilawod	88	41	2	-	10	-	-	-	5	58	-	4	-	4	4	13	158	
15	14	Ilawod East	184	48	5	2	-	2	2	2	2	63	7	4	13	9	9	34	288	
16	13	Ilawod West	92	17	2	-	-	-	-	-	-	19	2	9	-	-	21	30	143	
17	14	Imperial Court Subd.	67	10	2	-	-	-	-	-	2	14	4	-	-	-	4	4	90	
18	15	Capantawan	63	31	7	7	2	-	-	-	-	48	5	21	-	-	9	30	146	
19	16	Kawit-East Wash.	535	38	5	-	2	-	-	2	2	51	2	4	4	9	21	34	622	
20	17	Lapu-Lapu	116	55	7	-	5	-	-	2	10	79	2	4	13	4	17	38	236	
21	18	Oro-Site	243	115	12	2	10	5	-	5	5	149	-	26	4	4	-	34	426	
22	19	Pigcale	237	46	5	-	7	-	2	2	2	63	15	4	4	-	4	13	327	
23	20	PNR-Peraranda	299	26	-	-	2	5	-	-	10	43	2	4	-	-	17	21	366	
24	21	Rizal Street	150	29	1	-	2	-	2	2	10	44	5	9	4	4	4	21	221	
25	17	Rizal St.-Ilawod	147	63	8	-	-	-	-	-	-	71	7	30	4	-	-	34	259	
26	18	Sabang	157	63	2	-	5	-	-	5	-	74	15	4	-	4	13	21	267	
27	19	San Roque	584	113	2	-	-	-	-	-	2	117	9	30	-	13	4	47	757	
28	20	Tinago	89	43	2	-	-	-	-	-	12	57	4	-	4	4	9	17	167	
29	12	Tula-Tula	262	31	-	-	-	-	-	-	-	31	4	4	4	-	-	13	310	
30	13	Victory Vill. North	217	130	-	-	-	-	-	-	-	130	-	13	-	9	-	21	368	
31	14	Victory Vill. South	110	96	-	-	-	-	-	-	-	96	-	4	-	4	-	9	215	
TOTALS			7,001	1,321	106	17	77	19	24	84	84	1,648	184	319	89	119	200	728	9,563	



Table XXV 2.1.13 Damage Rate for Assets in the Flood Prone Area in Legazpi City

Inundation Depth from Floor (m)	Building					Indoor Movables				
	Residence	Industry	Commerce	Service	Public Facilities	Residence	Industry	Commerce	Service	Public Facilities
0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.01	0.003	0.003	0.003	0.003	0.001	0.003	0.013	0.024	0.024	0.007
0.06	0.004	0.007	0.007	0.007	0.002	0.005	0.015	0.027	0.027	0.009
0.11	0.006	0.011	0.011	0.011	0.003	0.007	0.017	0.029	0.029	0.012
0.16	0.008	0.015	0.015	0.015	0.005	0.009	0.019	0.032	0.032	0.014
0.21	0.010	0.020	0.020	0.020	0.006	0.011	0.021	0.035	0.035	0.016
0.26	0.011	0.024	0.024	0.024	0.007	0.013	0.023	0.038	0.038	0.018
0.30	0.013	0.028	0.028	0.028	0.008	0.015	0.025	0.041	0.041	0.020
0.35	0.015	0.032	0.032	0.032	0.010	0.017	0.027	0.044	0.044	0.022
0.40	0.017	0.037	0.037	0.037	0.011	0.019	0.029	0.047	0.047	0.024
0.45	0.018	0.041	0.041	0.041	0.012	0.021	0.031	0.050	0.050	0.026
0.50	0.020	0.045	0.045	0.045	0.014	0.023	0.033	0.053	0.053	0.028
0.55	0.021	0.048	0.048	0.048	0.014	0.025	0.035	0.053	0.053	0.030
0.60	0.023	0.052	0.052	0.052	0.015	0.028	0.037	0.053	0.053	0.032
0.65	0.024	0.055	0.055	0.055	0.016	0.031	0.039	0.053	0.053	0.035
0.70	0.025	0.058	0.058	0.058	0.017	0.034	0.041	0.053	0.053	0.037
0.75	0.026	0.061	0.061	0.061	0.018	0.036	0.043	0.053	0.053	0.040
0.80	0.028	0.065	0.065	0.065	0.019	0.039	0.046	0.054	0.054	0.042
0.85	0.029	0.068	0.068	0.068	0.020	0.042	0.048	0.054	0.054	0.045
0.90	0.030	0.071	0.071	0.071	0.021	0.045	0.050	0.054	0.054	0.047
0.95	0.031	0.074	0.074	0.074	0.022	0.047	0.052	0.054	0.054	0.050
1.00	0.033	0.078	0.078	0.078	0.023	0.050	0.054	0.054	0.054	0.052
1.05	0.034	0.080	0.080	0.080	0.024	0.052	0.058	0.058	0.058	0.055
1.10	0.035	0.083	0.083	0.083	0.025	0.054	0.062	0.062	0.062	0.058
1.15	0.036	0.086	0.086	0.086	0.026	0.055	0.066	0.066	0.066	0.061
1.20	0.038	0.089	0.089	0.089	0.027	0.057	0.071	0.071	0.071	0.064
1.25	0.039	0.091	0.091	0.091	0.028	0.059	0.075	0.075	0.075	0.067
1.30	0.040	0.094	0.094	0.094	0.029	0.061	0.079	0.079	0.079	0.070
1.35	0.041	0.097	0.097	0.097	0.030	0.062	0.083	0.083	0.083	0.073
1.40	0.043	0.100	0.100	0.100	0.031	0.064	0.087	0.087	0.087	0.075
1.45	0.044	0.102	0.102	0.102	0.032	0.066	0.091	0.091	0.091	0.078
1.50	0.045	0.105	0.105	0.105	0.033	0.068	0.095	0.095	0.095	0.081
1.55	0.047	0.108	0.108	0.108	0.034	0.074	0.098	0.098	0.098	0.086
1.60	0.050	0.111	0.111	0.111	0.035	0.080	0.100	0.100	0.100	0.090
1.65	0.052	0.114	0.114	0.114	0.036	0.086	0.103	0.103	0.103	0.094
1.70	0.054	0.117	0.117	0.117	0.037	0.092	0.105	0.105	0.105	0.098
1.75	0.056	0.120	0.120	0.120	0.038	0.098	0.108	0.108	0.108	0.103
1.80	0.059	0.123	0.123	0.123	0.039	0.104	0.110	0.110	0.110	0.107
1.85	0.061	0.126	0.126	0.126	0.040	0.110	0.113	0.113	0.113	0.111
1.90	0.063	0.129	0.129	0.129	0.041	0.116	0.115	0.115	0.115	0.115
1.95	0.065	0.132	0.132	0.132	0.042	0.122	0.118	0.118	0.118	0.120
2.00	0.068	0.135	0.135	0.135	0.043	0.128	0.120	0.120	0.120	0.124
2.05	0.071	0.138	0.138	0.138	0.044	0.134	0.133	0.122	0.122	0.125
2.10	0.074	0.141	0.141	0.141	0.045	0.140	0.136	0.123	0.123	0.126
2.15	0.077	0.144	0.144	0.144	0.046	0.146	0.139	0.125	0.125	0.128
2.20	0.080	0.147	0.147	0.147	0.047	0.152	0.142	0.127	0.127	0.129
2.25	0.083	0.150	0.150	0.150	0.048	0.158	0.145	0.129	0.129	0.130
2.30	0.086	0.153	0.153	0.153	0.049	0.164	0.148	0.130	0.130	0.132
2.35	0.089	0.156	0.156	0.156	0.050	0.170	0.151	0.132	0.132	0.133
2.40	0.092	0.159	0.159	0.159	0.051	0.176	0.154	0.134	0.134	0.135
2.45	0.095	0.162	0.162	0.162	0.052	0.182	0.157	0.136	0.136	0.136
2.50	0.098	0.165	0.165	0.165	0.053	0.188	0.160	0.137	0.137	0.137

Source : Field Survey conducted by the JICA Study Team.

**Table XXV 2.1.14 Calculation of Average Annual Flood Damages  
Urban Drainage Project of Legazpi City**

Return Period (Year)	Probability of Occurrence	Flood Damage (Mil.Peso)	Average Damage (Mil.Peso)	Probable Damage (Mil.Peso)	Average Annual Damage (Mil.Peso)
1	----- 1-(1/2)	0.0	14.2	7.1	7.1
2	----- (1/2)-(1/5)	28.5	70.5	21.1	28.3
5	----- (1/5)-(1/10)	112.5	697.3	69.7	98.0
10	-----	1,282.0			

**Table XXV 2.1.15 Production Cost and Revenue for Resettlement Site Development Project  
in Economic Price**

(Unit : 1,000 Pesos)

Resettlement Site	Annual Production Cost				Annual Production Revenue		
	Industrial Sector	Cost Item	Financial Price	Economic Price	Revenue Item	Financial Price	Economic Price
Banquerohan	Industry	Labor	53,424	42,739	Wages for Employment	80,136	64,109
		Materilas	7,775	6,375			
		Subtotal	61,199	49,114			
	Service	Labor	35,616	28,493	Wages for Employment	53,424	42,739
		Materilas	2,102	1,724			
		Subtotal	37,718	30,217			
Anislag	Total		98,917	79,331	Total	133,560	106,848
	Industry	Labor	32,004	25,603	Wages for Employment	48,006	38,405
		Materilas	4,658	3,819			
		Total	36,662	29,422			
	Service	Labor	21,336	17,069	Wages for Employment	32,004	25,603
		Materilas	1,259	1,033			
		Subtotal	22,595	18,101			
Total		59,257	47,524	Total	80,010	64,008	

**Table XXV 2.1.16 Annual Disbursement Schedule of Priority Projects in Economic Price**

Cost Items by Project	(Unit: Million PHP)																		
	Foreign Currency Portion						Local Currency Portion						Total (F.C. + L.C.)						
	2001	2002	2003	2004	2005	Total	2001	2002	2003	2004	2005	Total	2001	2002	2003	2004	2005	Total	
<b>Yawa River System Sabo Project</b>																			
1. Construction Cost	0.0	0.0	32.9	65.8	65.8	164.4	0.0	0.0	89.9	179.7	179.7	449.3	0.0	0.0	122.7	245.5	245.5	613.7	
2. Government Administration Cost	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.7	2.7	2.7	2.7	12.7	2.0	2.7	2.7	2.7	2.7	12.7	
3. Engineering Services Cost	41.9	27.4	14.4	30.3	30.3	144.4	3.2	2.1	1.1	2.3	2.3	10.9	45.0	29.5	15.5	32.6	32.6	155.3	
4. Land Acquisition	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.9	15.9	15.9	31.8	0.0	0.0	15.9	15.9	0.0	31.8	
5. Physical Contingency	4.2	2.7	4.7	9.6	9.6	30.9	0.5	0.5	11.0	20.1	18.5	50.5	4.7	3.2	15.7	29.7	28.1	81.3	
6. Price Contingency	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>Total</b>	<b>46.1</b>	<b>30.2</b>	<b>52.1</b>	<b>105.7</b>	<b>105.7</b>	<b>339.7</b>	<b>5.7</b>	<b>5.2</b>	<b>120.5</b>	<b>220.6</b>	<b>203.1</b>	<b>555.1</b>	<b>51.8</b>	<b>35.4</b>	<b>172.5</b>	<b>326.3</b>	<b>308.8</b>	<b>894.8</b>	
<b>Legazpi City Urban Drainage Project</b>																			
1. Construction Cost			41.1	82.2	82.2	205.6	0.0	0.0	21.2	42.3	42.3	105.9	0.0	0.0	62.3	124.6	124.6	311.5	
2. Government Administration Cost			0.0	0.0	0.0	0.0	1.4	1.8	1.8	1.8	1.8	8.7	1.4	1.8	1.8	1.8	1.8	8.7	
3. Engineering Services Cost	18.0	11.8	6.2	13.1	13.1	62.2	2.1	1.4	0.7	1.5	1.5	7.1	20.1	13.2	6.9	14.6	14.6	69.3	
4. Land Acquisition	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.1	7.1	0.0	14.1	0.0	0.0	7.1	7.1	0.0	14.1	
5. Physical Contingency	1.8	1.2	4.7	9.5	9.5	26.8	0.3	0.3	3.1	5.3	4.6	13.6	2.1	1.5	7.8	14.8	14.1	40.4	
<b>Total</b>	<b>19.8</b>	<b>13.0</b>	<b>52.1</b>	<b>104.8</b>	<b>104.8</b>	<b>294.6</b>	<b>3.8</b>	<b>3.5</b>	<b>33.9</b>	<b>58.0</b>	<b>50.2</b>	<b>149.4</b>	<b>23.6</b>	<b>16.5</b>	<b>85.9</b>	<b>162.8</b>	<b>155.1</b>	<b>444.0</b>	
<b>Resettlement Site Development Project</b>																			
<b>A . Banquerohan</b>																			
1. Construction Cost		0.4	1.5	1.2	0.0	3.1		12.5	47.2	36.6	0.0	96.3	0.0	12.9	48.7	37.8	0.0	99.4	
2. Government Administration Cost		0.0	0.0	0.0	0.0	0.0	1.0	1.2	1.2	1.0	0.0	4.3	1.0	1.2	1.2	1.0	0.0	4.3	
3. Engineering Services Cost	6.8	4.1	7.5	5.8	0.0	24.3	0.8	0.5	0.9	0.7	0.0	3.0	7.6	4.6	8.5	6.6	0.0	27.3	
4. Physical Contingency	0.7	0.5	0.9	0.7	0.0	2.7	0.2	1.4	4.9	3.8	0.0	10.4	0.9	1.9	5.8	4.5	0.0	13.1	
<b>Total</b>	<b>7.5</b>	<b>5.0</b>	<b>9.9</b>	<b>7.7</b>	<b>0.0</b>	<b>30.1</b>	<b>2.0</b>	<b>15.7</b>	<b>54.3</b>	<b>42.1</b>	<b>0.0</b>	<b>114.0</b>	<b>9.5</b>	<b>20.6</b>	<b>64.2</b>	<b>49.8</b>	<b>0.0</b>	<b>144.1</b>	
<b>B. Anislag</b>																			
1. Construction Cost	0.0	0.2	0.8	0.6	0.0	1.6	0.0	9.1	34.2	26.5	0.0	69.8	0.0	9.3	35.0	27.1	0.0	71.4	
2. Government Administration Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.9	0.9	0.7	0.0	3.1	0.7	0.9	0.9	0.7	0.0	3.1	
3. Engineering Services Cost	3.6	2.2	4.0	3.1	0.0	13.0	0.6	0.4	0.7	0.5	0.0	2.2	4.2	2.6	4.7	3.6	0.0	15.2	
4. Physical Contingency	0.4	0.2	0.5	0.4	0.0	1.5	0.1	1.0	3.6	2.8	0.0	7.5	0.5	1.3	4.1	3.1	0.0	9.0	
<b>Total</b>	<b>4.0</b>	<b>2.7</b>	<b>5.3</b>	<b>4.1</b>	<b>0.0</b>	<b>16.1</b>	<b>1.4</b>	<b>11.3</b>	<b>39.3</b>	<b>30.5</b>	<b>0.0</b>	<b>82.6</b>	<b>5.4</b>	<b>14.0</b>	<b>44.6</b>	<b>34.6</b>	<b>0.0</b>	<b>98.6</b>	
<b>Grand Total</b>	<b>77.4</b>	<b>50.8</b>	<b>119.4</b>	<b>222.3</b>	<b>210.5</b>	<b>680.4</b>	<b>12.9</b>	<b>35.7</b>	<b>247.9</b>	<b>351.2</b>	<b>253.4</b>	<b>901.1</b>	<b>90.3</b>	<b>86.5</b>	<b>367.2</b>	<b>573.5</b>	<b>463.9</b>	<b>1,581.5</b>	

**Table XXV 2.1.17 Cash Flow of Economic and Benefit for Yawa River in Sabo Plan(Return Period: 20Year;Land Use Plan:Option 3)**

(Unit : Milli. Peso)

No.	Year	Cost										Benefit				Net Benefit		
		Sabo Works					Development					Total	Sabo	Developme nt	Total			
		Constructi on Cost	Administ ration	Engineerin g Service	Land Acquisition	Physical Contingen cy	O&M Cost	Dredging	Sub- Total	Investme nt	Production Cost						Sub-Total	
-5	2001		2.0	45.0		4.7				51.8			51.8				0.0	-51.8
-4	2002		2.7	29.5		3.2				35.4			35.4				0.0	-35.4
-3	2003	122.7	2.7	15.5	15.9	15.7				172.5	431.8		431.8	604.3			0.0	-604.3
-2	2004	245.5	2.7	32.6	15.9	29.7				326.3	431.8		431.8	758.1			0.0	-758.1
-1	2005	245.5	2.7	32.6		28.1				308.8	431.8		431.8	740.6			0.0	-740.6
1	2006						6.4	12.4		18.8		89.1	89.1	108.0	480.2	269.9	750.1	642.1
2	2007						6.4	12.4		18.8		98.4	98.4	117.2	381.2	297.9	679.2	561.9
3	2008						6.4	12.4		18.8		108.7	108.7	127.5	392.1	329.0	721.1	593.6
4	2009						6.4	12.4		18.8		120.0	120.0	138.8	418.0	363.2	781.2	642.4
5	2010						6.4	12.4		18.8	431.8	132.4	564.3	583.1	448.4	401.0	849.4	266.3
6	2011						6.4	12.4		18.8	431.8	146.2	578.0	596.9	480.8	442.7	923.5	326.7
7	2012						6.4	12.4		18.8	431.8	161.5	593.3	612.1	514.8	488.8	1,003.6	391.5
8	2013						6.4	12.4		18.8		178.3	178.3	197.1	550.5	539.7	1,090.2	893.1
9	2014						6.4	12.4		18.8		196.8	196.8	215.6	587.9	595.9	1,183.8	968.2
10	2015						6.4	12.4		18.8		217.3	217.3	236.1	627.3	657.9	1,285.3	1,049.1
11	2016						6.4	12.4		18.8		239.9	239.9	258.8	668.9	726.4	1,395.3	1,136.6
12	2017						6.4	12.4		18.8	431.8	264.9	696.7	715.5	712.9	802.0	1,514.9	799.3
13	2018						6.4	12.4		18.8	431.8	292.5	724.3	743.1	759.3	885.5	1,644.8	901.7
14	2019						6.4	12.4		18.8	431.8	322.9	754.7	773.6	808.5	977.7	1,786.1	1,012.6
15	2020						6.4	12.4		18.8		356.5	356.5	375.4	860.6	1,079.4	1,940.0	1,564.6
16	2021						6.4	12.4		18.8		356.5	356.5	375.4	870.3	1,079.4	1,949.7	1,574.4
17	2022						6.4	12.4		18.8		356.5	356.5	375.4	879.3	1,079.4	1,958.7	1,583.3
18	2023						6.4	12.4		18.8		356.5	356.5	375.4	887.5	1,079.4	1,966.9	1,591.5
19	2024						6.4	12.4		18.8		356.5	356.5	375.4	895.0	1,079.4	1,974.5	1,599.1
20	2025						6.4	12.4		18.8		356.5	356.5	375.4	902.0	1,079.4	1,981.4	1,606.1
21	2026						6.4	12.4		18.8		356.5	356.5	375.4	908.4	1,079.4	1,987.8	1,612.5
22	2027						6.4	12.4		18.8		356.5	356.5	375.4	914.4	1,079.4	1,993.8	1,618.4
23	2028						6.4	12.4		18.8		356.5	356.5	375.4	919.8	1,079.4	1,999.3	1,623.9
24	2029						6.4	12.4		18.8		356.5	356.5	375.4	924.9	1,079.4	2,004.3	1,629.0
25	2030						6.4	12.4		18.8		356.5	356.5	375.4	929.6	1,079.4	2,009.0	1,633.7
26	2031						6.4	12.4		18.8		356.5	356.5	375.4	933.9	1,079.4	2,013.4	1,638.0
27	2032						6.4	12.4		18.8		356.5	356.5	375.4	938.0	1,079.4	2,017.4	1,642.0
28	2033						6.4	12.4		18.8		356.5	356.5	375.4	941.7	1,079.4	2,021.1	1,645.8
29	2034						6.4	12.4		18.8		356.5	356.5	375.4	945.2	1,079.4	2,024.6	1,649.2
30	2035						6.4	12.4		18.8		356.5	356.5	375.4	948.4	1,079.4	2,027.8	1,652.5
31	2036						6.4	12.4		18.8		356.5	356.5	375.4	1,950.6	1,079.4	3,030.1	2,654.7
32	2037						6.4	12.4		18.8		356.5	356.5	375.4	1,518.2	1,079.4	2,597.6	2,222.3
33	2038						6.4	12.4		18.8		356.5	356.5	375.4	1,254.4	1,079.4	2,333.8	1,958.4
34	2039						6.4	12.4		18.8		356.5	356.5	375.4	1,067.4	1,079.4	2,146.9	1,771.5
35	2040						6.4	12.4		18.8		356.5	356.5	375.4	924.3	1,079.4	2,003.8	1,628.4
36	2041						6.4	12.4		18.8		356.5	356.5	375.4	810.2	1,079.4	1,889.6	1,514.3
37	2042						6.4	12.4		18.8		356.5	356.5	375.4	717.1	1,079.4	1,796.5	1,421.2
38	2043						6.4	12.4		18.8		356.5	356.5	375.4	640.0	1,079.4	1,719.4	1,344.1
39	2044						6.4	12.4		18.8		356.5	356.5	375.4	575.5	1,079.4	1,654.9	1,279.6
40	2045						6.4	12.4		18.8		356.5	356.5	375.4	521.2	1,079.4	1,600.6	1,225.3
41	2046						6.4	12.4		18.8		356.5	356.5	375.4	475.2	1,079.4	1,554.6	1,179.3
42	2047						6.4	12.4		18.8		356.5	356.5	375.4	436.1	1,079.4	1,515.5	1,140.1
43	2048						6.4	12.4		18.8		356.5	356.5	375.4	402.6	1,079.4	1,482.0	1,106.7
44	2049						6.4	12.4		18.8		356.5	356.5	375.4	373.9	1,079.4	1,453.3	1,078.0
45	2050						6.4	12.4		18.8		356.5	356.5	375.4	349.2	1,079.4	1,428.6	1,053.3
46	2051						6.4	12.4		18.8		356.5	356.5	375.4	327.9	1,079.4	1,407.3	1,031.9
47	2052						6.4	12.4		18.8		356.5	356.5	375.4	309.4	1,079.4	1,388.8	1,013.4
48	2053						6.4	12.4		18.8		356.5	356.5	375.4	293.3	1,079.4	1,372.7	997.4
49	2054						6.4	12.4		18.8		356.5	356.5	375.4	279.3	1,079.4	1,358.7	983.3
50	2055						6.4	12.4		18.8		356.5	356.5	375.4	267.0	1,079.4	1,346.4	971.1
<b>Total</b>		<b>613.7</b>	<b>12.7</b>	<b>155.3</b>	<b>31.8</b>	<b>81.3</b>	<b>322.3</b>	<b>619.2</b>	<b>1,836.3</b>	<b>3,886.3</b>	<b>15,403.6</b>	<b>19,289.9</b>	<b>21,126.3</b>	<b>35,922.7</b>	<b>46,636.7</b>	<b>82,559.4</b>	<b>61,433.1</b>	

EIRR = 23.75%  
 ( Discount Rate 15%)  
 B/C = 1.57  
 NPV = 1,304.6

**Table XXV 2.1.18 Cash Flow of Economic Cost and Benefit for Legazpi City Urban Drainage Project**

[Return Period: 10Year] (Unit : Milli. Peso)

No.	Year	Cost					O&M Cost	Total	Benefit	Net Benefit
		Construction Cost	Administration	Engineering Service	Land Acquisition	Physical Contingency				
-5	2001		1.4	20.1		2.1		23.6	0.0	-23.6
-4	2002		1.8	13.2		1.5		16.5	0.0	-16.5
-3	2003	62.3	1.8	6.9	7.1	7.8		85.9	0.0	-85.9
-2	2004	124.6	1.8	14.6	7.1	14.8		162.8	0.0	-162.8
-1	2005	124.6	1.8	14.6		14.1		155.1	0.0	-155.1
1	2006						2.8	2.8	98.0	95.2
2	2007						2.8	2.8	102.9	100.1
3	2008						2.8	2.8	108.0	105.3
4	2009						2.8	2.8	113.4	110.7
5	2010						2.8	2.8	119.1	116.3
6	2011						2.8	2.8	125.1	122.3
7	2012						2.8	2.8	131.3	128.5
8	2013						2.8	2.8	137.9	135.1
9	2014						2.8	2.8	144.8	142.0
10	2015						2.8	2.8	152.0	149.2
11	2016						2.8	2.8	159.6	156.8
12	2017						2.8	2.8	167.6	164.8
13	2018						2.8	2.8	176.0	173.2
14	2019						2.8	2.8	184.8	182.0
15	2020						2.8	2.8	194.0	191.2
16	2021						2.8	2.8	194.0	191.2
17	2022						2.8	2.8	194.0	191.2
18	2023						2.8	2.8	194.0	191.2
19	2024						2.8	2.8	194.0	191.2
20	2025						2.8	2.8	194.0	191.2
21	2026						2.8	2.8	194.0	191.2
22	2027						2.8	2.8	194.0	191.2
23	2028						2.8	2.8	194.0	191.2
24	2029						2.8	2.8	194.0	191.2
25	2030						2.8	2.8	194.0	191.2
26	2031						2.8	2.8	194.0	191.2
27	2032						2.8	2.8	194.0	191.2
28	2033						2.8	2.8	194.0	191.2
29	2034						2.8	2.8	194.0	191.2
30	2035						2.8	2.8	194.0	191.2
31	2036						2.8	2.8	194.0	191.2
32	2037						2.8	2.8	194.0	191.2
33	2038						2.8	2.8	194.0	191.2
34	2039						2.8	2.8	194.0	191.2
35	2040						2.8	2.8	194.0	191.2
36	2041						2.8	2.8	194.0	191.2
37	2042						2.8	2.8	194.0	191.2
38	2043						2.8	2.8	194.0	191.2
39	2044						2.8	2.8	194.0	191.2
40	2045						2.8	2.8	194.0	191.2
41	2046						2.8	2.8	194.0	191.2
42	2047						2.8	2.8	194.0	191.2
43	2048						2.8	2.8	194.0	191.2
44	2049						2.8	2.8	194.0	191.2
45	2050						2.8	2.8	194.0	191.2
46	2051						2.8	2.8	194.0	191.2
47	2052						2.8	2.8	194.0	191.2
48	2053						2.8	2.8	194.0	191.2
49	2054						2.8	2.8	194.0	191.2
50	2055						2.8	2.8	194.0	191.2
<b>Total</b>		<b>311.5</b>	<b>8.7</b>	<b>69.3</b>	<b>14.1</b>	<b>40.4</b>	<b>139.5</b>	<b>583.5</b>	<b>8,905.7</b>	<b>8,322.2</b>

EIRR = 21.56%  
 (Discount Rate 15%)  
 B/C = 1.64  
 NPV = 213.1

**Table XXV 2.1.19 Cash Flow of Economic Cost and Benefit for Resettlement Site Development Project for Banquerohan**

(Unit: Milli. Peso)

No.	Year	Cost					Benefit			Net Benefit
		Resettlement Works				O&M Cost	Production	Total	Development	
		Construction Cost	Administration	Engineering Service	Physical Contingency					
-4	2001		1.0	7.6	0.9			9.5	0.0	-9.5
-3	2002	12.9	1.2	4.6	1.9			20.6	0.0	-20.6
-2	2003	48.7	1.2	8.5	5.8			64.2	0.0	-64.2
-1	2004	37.8	1.0	6.6	4.5			49.8	0.0	-49.8
1	2005					0.4	79.3	79.7	106.8	27.1
2	2006					0.4	79.3	79.7	106.8	27.1
3	2007					0.4	79.3	79.7	106.8	27.1
4	2008					0.4	79.3	79.7	106.8	27.1
5	2009					0.4	79.3	79.7	106.8	27.1
6	2010					0.4	79.3	79.7	106.8	27.1
7	2011					0.4	79.3	79.7	106.8	27.1
8	2012					0.4	79.3	79.7	106.8	27.1
9	2013					0.4	79.3	79.7	106.8	27.1
10	2014					0.4	79.3	79.7	106.8	27.1
11	2015					0.4	79.3	79.7	106.8	27.1
12	2016					0.4	79.3	79.7	106.8	27.1
13	2017					0.4	79.3	79.7	106.8	27.1
14	2018					0.4	79.3	79.7	106.8	27.1
15	2019					0.4	79.3	79.7	106.8	27.1
16	2020					0.4	79.3	79.7	106.8	27.1
17	2021					0.4	79.3	79.7	106.8	27.1
18	2022					0.4	79.3	79.7	106.8	27.1
19	2023					0.4	79.3	79.7	106.8	27.1
20	2024					0.4	79.3	79.7	106.8	27.1
21	2025					0.4	79.3	79.7	106.8	27.1
22	2026					0.4	79.3	79.7	106.8	27.1
23	2027					0.4	79.3	79.7	106.8	27.1
24	2028					0.4	79.3	79.7	106.8	27.1
25	2029					0.4	79.3	79.7	106.8	27.1
26	2030					0.4	79.3	79.7	106.8	27.1
27	2031					0.4	79.3	79.7	106.8	27.1
28	2032					0.4	79.3	79.7	106.8	27.1
29	2033					0.4	79.3	79.7	106.8	27.1
30	2034					0.4	79.3	79.7	106.8	27.1
31	2035					0.4	79.3	79.7	106.8	27.1
32	2036					0.4	79.3	79.7	106.8	27.1
33	2037					0.4	79.3	79.7	106.8	27.1
34	2038					0.4	79.3	79.7	106.8	27.1
35	2039					0.4	79.3	79.7	106.8	27.1
36	2040					0.4	79.3	79.7	106.8	27.1
37	2041					0.4	79.3	79.7	106.8	27.1
38	2042					0.4	79.3	79.7	106.8	27.1
39	2043					0.4	79.3	79.7	106.8	27.1
40	2044					0.4	79.3	79.7	106.8	27.1
41	2045					0.4	79.3	79.7	106.8	27.1
42	2046					0.4	79.3	79.7	106.8	27.1
43	2047					0.4	79.3	79.7	106.8	27.1
44	2048					0.4	79.3	79.7	106.8	27.1
45	2049					0.4	79.3	79.7	106.8	27.1
46	2050					0.4	79.3	79.7	106.8	27.1
47	2051					0.4	79.3	79.7	106.8	27.1
48	2052					0.4	79.3	79.7	106.8	27.1
49	2053					0.4	79.3	79.7	106.8	27.1
50	2054					0.4	79.3	79.7	106.8	27.1
Total		99.4	4.3	27.3	13.1	20.3	3,966.6	4,131.0	5,342.4	1,211.4

EIRR = 16.21%  
 (Discount Rate 15%)  
 B/C = 1.02  
 NPV = 8.7

**Table XXV 2.1.20 Cash Flow of Economic Cost and Benefit for Resettlement Site Development Project for Anislag**

(Unit : Milli. Peso)

No.	Year	Cost					Benefit			Net Benefit
		Resettlement Works				O&M Cost	Production	Total	Development	
		Construction Cost	Administration	Engineering Service	Physical Contingency					
-4	2001		0.7	4.2	0.5			5.4	0.0	-5.4
-3	2002	9.3	0.9	2.6	1.3			14.0	0.0	-14.0
-2	2003	35.0	0.9	4.7	4.1			44.6	0.0	-44.6
-1	2004	27.1	0.7	3.6	3.1			34.6	0.0	-34.6
1	2005					0.2	50.4	50.6	67.8	17.3
2	2006					0.2	50.4	50.6	67.8	17.3
3	2007					0.2	50.4	50.6	67.8	17.3
4	2008					0.2	50.4	50.6	67.8	17.3
5	2009					0.2	50.4	50.6	67.8	17.3
6	2010					0.2	50.4	50.6	67.8	17.3
7	2011					0.2	50.4	50.6	67.8	17.3
8	2012					0.2	50.4	50.6	67.8	17.3
9	2013					0.2	50.4	50.6	67.8	17.3
10	2014					0.2	50.4	50.6	67.8	17.3
11	2015					0.2	50.4	50.6	67.8	17.3
12	2016					0.2	50.4	50.6	67.8	17.3
13	2017					0.2	50.4	50.6	67.8	17.3
14	2018					0.2	50.4	50.6	67.8	17.3
15	2019					0.2	50.4	50.6	67.8	17.3
16	2020					0.2	50.4	50.6	67.8	17.3
17	2021					0.2	50.4	50.6	67.8	17.3
18	2022					0.2	50.4	50.6	67.8	17.3
19	2023					0.2	50.4	50.6	67.8	17.3
20	2024					0.2	50.4	50.6	67.8	17.3
21	2025					0.2	50.4	50.6	67.8	17.3
22	2026					0.2	50.4	50.6	67.8	17.3
23	2027					0.2	50.4	50.6	67.8	17.3
24	2028					0.2	50.4	50.6	67.8	17.3
25	2029					0.2	50.4	50.6	67.8	17.3
26	2030					0.2	50.4	50.6	67.8	17.3
27	2031					0.2	50.4	50.6	67.8	17.3
28	2032					0.2	50.4	50.6	67.8	17.3
29	2033					0.2	50.4	50.6	67.8	17.3
30	2034					0.2	50.4	50.6	67.8	17.3
31	2035					0.2	50.4	50.6	67.8	17.3
32	2036					0.2	50.4	50.6	67.8	17.3
33	2037					0.2	50.4	50.6	67.8	17.3
34	2038					0.2	50.4	50.6	67.8	17.3
35	2039					0.2	50.4	50.6	67.8	17.3
36	2040					0.2	50.4	50.6	67.8	17.3
37	2041					0.2	50.4	50.6	67.8	17.3
38	2042					0.2	50.4	50.6	67.8	17.3
39	2043					0.2	50.4	50.6	67.8	17.3
40	2044					0.2	50.4	50.6	67.8	17.3
41	2045					0.2	50.4	50.6	67.8	17.3
42	2046					0.2	50.4	50.6	67.8	17.3
43	2047					0.2	50.4	50.6	67.8	17.3
44	2048					0.2	50.4	50.6	67.8	17.3
45	2049					0.2	50.4	50.6	67.8	17.3
46	2050					0.2	50.4	50.6	67.8	17.3
47	2051					0.2	50.4	50.6	67.8	17.3
48	2052					0.2	50.4	50.6	67.8	17.3
49	2053					0.2	50.4	50.6	67.8	17.3
50	2054					0.2	50.4	50.6	67.8	17.3
<b>Total</b>		<b>71.4</b>	<b>3.1</b>	<b>15.2</b>	<b>9.0</b>	<b>10.5</b>	<b>2,518.8</b>	<b>2,627.9</b>	<b>3,392.4</b>	<b>764.5</b>

EIRR = 15.27%  
 ( Discount Rate 15%)  
 B/C = 1.01  
 NPV = 1.32

**Table XXV 2.1.21 Cash Flow of Economic and Benefit for All Projects As a Package in The F/S**

(Unit : Milli. Peso)

No.	Year	Construction Cost			Development			Total	Benefit			Net Benefit
		Direct Cost	O&M	Sub-Total	Investment	Production Cost	Sub-Total		Sabo and Urban Drainage	Development	Sub-Total	
-5	2001	152.1		152.1	0.0	0.0	0.0	152.1	0.0	0.0	0.0	-152.1
-4	2002	195.1		195.1	0.0	0.0	0.0	195.1	0.0	0.0	0.0	-195.1
-3	2003	602.0		602.0	431.8	0.0	431.8	1,033.8	0.0	0.0	0.0	-1,033.8
-2	2004	872.3		872.3	431.8	0.0	431.8	1,304.1	0.0	0.0	0.0	-1,304.1
-1	2005	630.7		630.7	431.8	147.2	579.0	1,209.7	0.0	174.7	174.7	-1,035.0
1	2006		48.1	48.1	0.0	266.0	266.0	314.1	578.2	444.6	1,022.8	708.7
2	2007		48.1	48.1	0.0	278.4	278.4	326.5	484.1	472.6	956.8	630.3
3	2008		48.1	48.1	0.0	292.0	292.0	340.1	500.2	503.7	1,003.8	663.7
4	2009		48.1	48.1	0.0	307.1	307.1	355.2	531.4	537.9	1,069.3	714.1
5	2010		48.1	48.1	431.8	323.8	755.6	803.7	567.5	575.7	1,143.2	339.5
6	2011		48.1	48.1	431.8	342.2	774.0	822.1	605.9	617.4	1,223.3	401.2
7	2012		48.1	48.1	431.8	362.5	794.3	842.4	646.1	663.5	1,309.7	467.3
8	2013		48.1	48.1	0.0	384.9	384.9	433.0	688.4	714.4	1,402.8	969.8
9	2014		48.1	48.1	0.0	399.0	399.0	447.1	732.7	770.6	1,503.3	1,056.2
10	2015		48.1	48.1	0.0	414.1	414.1	462.2	779.4	832.6	1,612.0	1,149.8
11	2016		48.1	48.1	0.0	430.0	430.0	478.1	828.6	901.1	1,729.6	1,251.6
12	2017		48.1	48.1	431.8	446.8	878.6	926.7	880.5	976.7	1,857.2	930.4
13	2018		48.1	48.1	431.8	464.7	896.5	944.6	935.3	1,060.2	1,995.5	1,050.9
14	2019		48.1	48.1	431.8	483.6	915.4	963.5	993.3	1,152.4	2,145.6	1,182.1
15	2020		48.1	48.1	0.0	503.7	503.7	551.8	1,054.6	1,254.1	2,308.7	1,756.9
16	2021		48.1	48.1	0.0	503.7	503.7	551.8	1,064.3	1,254.1	2,318.5	1,766.7
17	2022		48.1	48.1	0.0	503.7	503.7	551.8	1,073.3	1,254.1	2,327.4	1,775.6
18	2023		48.1	48.1	0.0	503.7	503.7	551.8	1,081.5	1,254.1	2,335.6	1,783.8
19	2024		48.1	48.1	0.0	503.7	503.7	551.8	1,089.1	1,254.1	2,343.2	1,791.4
20	2025		48.1	48.1	0.0	503.7	503.7	551.8	1,096.0	1,254.1	2,350.1	1,798.4
21	2026		48.1	48.1	0.0	503.7	503.7	551.8	1,102.5	1,254.1	2,356.6	1,804.8
22	2027		48.1	48.1	0.0	503.7	503.7	551.8	1,108.4	1,254.1	2,362.5	1,810.7
23	2028		48.1	48.1	0.0	503.7	503.7	551.8	1,113.9	1,254.1	2,368.0	1,816.2
24	2029		48.1	48.1	0.0	503.7	503.7	551.8	1,118.9	1,254.1	2,373.0	1,821.2
25	2030		48.1	48.1	0.0	503.7	503.7	551.8	1,123.6	1,254.1	2,377.7	1,825.9
26	2031		48.1	48.1	0.0	503.7	503.7	551.8	1,128.0	1,254.1	2,382.1	1,830.3
27	2032		48.1	48.1	0.0	503.7	503.7	551.8	1,132.0	1,254.1	2,386.1	1,834.3
28	2033		48.1	48.1	0.0	503.7	503.7	551.8	1,135.7	1,254.1	2,389.8	1,838.1
29	2034		48.1	48.1	0.0	503.7	503.7	551.8	1,139.2	1,254.1	2,393.3	1,841.5
30	2035		48.1	48.1	0.0	503.7	503.7	551.8	1,142.4	1,254.1	2,396.6	1,844.8
31	2036		48.1	48.1	0.0	503.7	503.7	551.8	2,144.7	1,254.1	3,398.8	2,847.0
32	2037		48.1	48.1	0.0	503.7	503.7	551.8	1,712.2	1,254.1	2,966.3	2,414.5
33	2038		48.1	48.1	0.0	503.7	503.7	551.8	1,448.4	1,254.1	2,702.5	2,150.7
34	2039		48.1	48.1	0.0	503.7	503.7	551.8	1,261.5	1,254.1	2,515.6	1,963.8
35	2040		48.1	48.1	0.0	503.7	503.7	551.8	1,118.4	1,254.1	2,372.5	1,820.7
36	2041		48.1	48.1	0.0	503.7	503.7	551.8	1,004.3	1,254.1	2,258.4	1,706.6
37	2042		48.1	48.1	0.0	503.7	503.7	551.8	911.1	1,254.1	2,165.2	1,613.4
38	2043		48.1	48.1	0.0	503.7	503.7	551.8	834.0	1,254.1	2,088.1	1,536.3
39	2044		48.1	48.1	0.0	503.7	503.7	551.8	769.5	1,254.1	2,023.7	1,471.9
40	2045		48.1	48.1	0.0	503.7	503.7	551.8	715.2	1,254.1	1,969.4	1,417.6
41	2046		48.1	48.1	0.0	503.7	503.7	551.8	669.3	1,254.1	1,923.4	1,371.6
42	2047		48.1	48.1	0.0	503.7	503.7	551.8	630.1	1,254.1	1,884.2	1,332.4
43	2048		48.1	48.1	0.0	503.7	503.7	551.8	596.7	1,254.1	1,850.8	1,299.0
44	2049		48.1	48.1	0.0	503.7	503.7	551.8	568.0	1,254.1	1,822.1	1,270.3
45	2050		48.1	48.1	0.0	503.7	503.7	551.8	543.2	1,254.1	1,797.4	1,245.6
46	2051		48.1	48.1	0.0	503.7	503.7	551.8	521.9	1,254.1	1,776.0	1,224.2
47	2052		48.1	48.1	0.0	503.7	503.7	551.8	503.4	1,254.1	1,757.5	1,205.7
48	2053		48.1	48.1	0.0	503.7	503.7	551.8	487.3	1,254.1	1,741.4	1,189.6
49	2054		48.1	48.1	0.0	503.7	503.7	551.8	473.3	1,254.1	1,727.4	1,175.6
50	2055		48.1	48.1	0.0	356.5	356.5	404.6	461.1	1,079.4	1,540.5	1,135.9
Total		2,452.2	2,404.8	4,857.1	0.0	0.0	27,214.6	32,071.7			100,199.9	68,128.2

EIRR = 17.77%  
 ( Discount Rate 15%)  
 B/C = 1.17  
 NPV = 676.9