

Annex I5.6.1 Economic Analysis of Program 1-3: Rainwater Utilization in Tidal Swamp Area

(1) Introduction

Preliminary economic evaluation has been conducted for the Program 1-3: Rainwater Utilization in Tidal Swamp Area. The objective of the economic evaluation is to analyze the feasibility of the proposed measures from the viewpoint of national economy. The Projects are analyzed by quantitative method by cost-benefit analysis deriving such indices as EIRR, B/C ratio, and NPV, which are commonly used for economic analyses of the same types of development projects.

(2) Results of Economic Analysis

Results of economic analysis indicated that the program has slightly lower economic efficiency with EIRR of 10.7% compared to the opportunity cost of capital in Indonesia (12%). The benefit cost ratio (B/C) is 0.93, and the net present value is –8,215 (Rp. million) with the discount rate of 12%. The cash flow of the analysis is shown in **Attachment II**. Although the EIRR is slightly lower than the opportunity cost of capital in Indonesia, the program is for the purpose of basic human needs and to solve regional unbalance in the Musi River Basin, and thus the implementation using the government fund is strongly recommended.

(3) Basic Conditions for Economic Analysis

The economic analyses of the program are examined based on the following basic conditions:

(a) Price Level and Exchange Rate

The analyses are made at the price level of September 2002 and applied foreign exchange rates are one U.S. dollar equivalent to Rp.9,035 and 100 Japanese Yen equivalent to Rp.7,405.

(b) Project Life

The project life depends on the insurability of the facilities. The project life of 25 years is assumed for water tank and septic tank for the economic analysis. The residual value of the facilities at the end of project life was neglected since it does not give significant effect for the results of the analyses.

(c) Discount Rate

A discount rate of 12% is applied. The rate has been adopted for economic analyses of similar projects in Indonesia.

(d) Standard Conversion Factor (SCF)

The standard conversion factor (SCF) of 0.90 is applied to adjust the effects of trade distortion and the local costs for non-traded goods and services. The process to estimate SCF is presented in **Attachment H1** in the **Annex H6.2.5** of Sector H.

(e) Transfer Payment

From the viewpoint of national economy, the transfer payment such as taxes, duty, subsidy and interest is merely a domestic monetary movement without direct productivity. Therefore, it is excluded from the costs of goods and services in the economic analysis.

(f) Economic Project Cost

The economic project costs are estimated from the financial program cost adjusting by SCF after deducting the direct transfer payment.

(g) Operation and Maintenance Cost

No operation and maintenance cost has been considered since it will be negligibly small.

(4) Estimation of Benefit

There are several methods for the estimation of economic benefit in projects for rural water supply. Of these, most commonly applied one is the estimation of benefit based on the willingness to pay. Thus, for the present evaluation, willingness to pay has been applied for the benefit calculation.

(a) Willingness to Pay to Water Tank

As discussed under sub-section **5.4.3 Program 1-3: Rainwater Utilization in Tidal Swamp Area**, the capacity of water tank has been determined as follows:

Storage Capacity: $10 \text{ (liter/person/day)} \times 4 \text{ (person/household)} \times 100 \text{ (day)} - 1,000 \text{ (existing steel drum, etc. in liter/household)} = 3,000 \text{ (liter/household)}$

The necessary water is presently purchased as bottled water at a cost of Rp. 2,500 per 19 liters, namely, Rp.131.6 per liter. Willingness to pay of the local residents has thus been estimated at 50% of the cost of bottled water considering that the rainwater quality should need some additional cost to use, e.g., boiling or percolation. Water tank benefit has thus assumed at Rp. 65.8/liter or Rp. 197,400/household in financial basis.

(b) Willingness to Pay to Septic Tank

Willingness to pay to septic tank is estimated at 20% of that for water tank based on the interview in the field.

(c) Total Willingness to Pay

The willingness to pay to water tank and septic tank has thus been obtained at Rp. 236,880/household in financial basis.

(d) Intangible Benefit

Though the program can expect other economic benefit, e.g. decrease in water related diseases, they were not included in the benefit calculation since they are intangible.

(5) Economic Cost and Benefit

(a) Annual Work Quantity

The program targets the total household of 92,000 in tidal swamp are in South Sumatra Province. Considering the budget availability, implementation period of 10 years has been considered. Thus, the program supplies water tank and septic tank for 9,200 a year for 10-year period.

(b) Annual Economic Cost

From the total financial program cost of Rp. 198,700 million as obtained before, annual cost was obtained at Rp. 19,870 million per yera for the 10-year period. The economic cost for the same period has obtained at Rp.17,900 million per year considering the standard conversion factor of 0.9.

(c) Annual Economic Benefit

Considering the number of household at 9,200 for the annual implementation, and financial basis benefit of Rp. 236,880/household, benefit in the financial basis has been obtained at Rp.2,179 million per 9,200 household implementation. Economic benefit has thus been obtained at Rp. 1,961 million per 9,200 household implementation considering standard conversion factor of 0.9.

(6) Cost-Benefit Analysis

Based on the benefits and costs discussed above, economic viability of the program has been examined by cost-benefit analysis. The analysis has been conducted by the discounted cash flow analysis. The cash flow of the program is presented in **Attachment I1**. The benefit of the program is assumed to accrue after a completion of

annual basis work. The results of the analysis have been discussed under (2) **Results of Economic Analysis** above.

Attachment I1 Cash Flow of Program 1-3

(Unit: Rp.million)

Year	Cost	Benefit	Net Benefit
1	17,900	1,961	-15,939
2	17,900	3,922	-13,978
3	17,900	5,883	-12,017
4	17,900	7,844	-10,056
5	17,900	9,805	-8,095
6	17,900	11,766	-6,134
7	17,900	13,727	-4,173
8	17,900	15,688	-2,212
9	17,900	17,649	-251
10	17,900	19,611	1,711
11	0	19,611	19,611
12	0	19,611	19,611
13	0	19,611	19,611
14	0	19,611	19,611
15	0	19,611	19,611
16	0	19,611	19,611
17	0	19,611	19,611
18	0	19,611	19,611
19	0	19,611	19,611
20	0	19,611	19,611
21	0	19,611	19,611
22	0	19,611	19,611
23	0	19,611	19,611
24	0	19,611	19,611
25	0	19,611	19,611
Total	179,000	402,016	223,016

EIRR (%) = 10.7
B/C (ratio) = 0.93
NPV (Rp. milion) = -8,215

1. Basic Conditions

- 1) Willingness to pay for Water Tank (3 m³):
50% of Rp. 2,500/19 lit. (Water Bottle Price)
= Rp.65.8/liter or Rp.197,400/household
 - 2) Willingness to pay for Septic Tank:
20% of Water Tank Value (Assumption)
= Rp.39,480/household
- Total of 1) and 2)
=Rp.236,880/household
- 3) Standard Conversion Factor = 0.9
 - 4) Life of Facilities = 25 years

2. Annual Work Quantity

- 1) Benefit = 92,000 households
- 2) Implementation Years = 10 years
- 3) Number of Annual Benefit Households
= 92,000/10 = 9,200 households

3. Annual Economic Cost & Benefit

- 1) Annual Cost
= 19,870x0.9 = Rp. 17,900 million
- 2) Annual Benefit
Water Tank
= Rp.197,400 x 9,200 x 0.9
= Rp. 1,634 million
Septic Tank
= 1,634x0.2 = Rp. 327 million
Total
= 1,634+327 = Rp. 1,961 million

4. Cost & Benefit Flow

Shown in Left Table