# APPENDIX - L

# ECONOMIC EVALUATION ON WATER RESOURCES DEVELOPMENT PLAN

## 1. COMPARISON OF UNIT COST FOR WATER RESOURCES DEVELOPMENT

Based on the detailed construction cost estimate for the selected three (3) dam projects which are described in Appendix-K, the unit construction cost for water resources development is derived for each of the selected dam projects as follows:

| No. | Description | Name of Dam Project | | |
|---|---|---|---|---|
| | | Development Scenario-1 | Development Scenario-2 | |
| | | Kidunda | Mgeta | Ngerengere |
| (1) | Dam height (m) | 26 | 45 | 36.0 |
| (2) | Effective storage volume ($10^6$¥$m^3$) | 158.5 | 10.5 | 30.0 |
| (3) | Yield of dependable discharge for water supply to DES/irrigation development ($m^3$/sec) | 28.2 | 7.1 | 1.8 |
| (4) | Hydropower development (kw) | 3,900 | 2,300 | 400 |
| (5) | Total present-day construction cost (Mill. US$) | 101.1 | 110.6 | 90.8 |
| Construction cost per dependable discharge (Mill. US$/$m^3$/sec): (5)/(3) | | 3.59 | 15.58 | 50.4 |

As seen in the above table, the Kidunda dam project exhibits the distinguished economic efficiency of the water resources development.

Table L.1 shows the unit construction costs of dam projects for municipal water supply at current prices in Kenya and Indonesia. As seen in the Table, the unit construction costs range mostly between 20 and 100 million US$/$m^3$/sec. It is obvious that the Kidunda dam project should be given the high priority. Besides, the Ngerengere dam project whose unit construction cost becomes the highest among the selected three dam projects in the Ruvu River Basin falls within the normal range of the unit construction cost as far as the Table shows.

From the above comparison, needless to say, the post-Study action should be taken towards the realization of the Kidunda dam project. This Study recommends to carry out the prefeasibily study on the Kidunda dam project forecasting on the emvironmental impact assessment in relation to the ecosystem of the Selous Game Reserve and the geological investigation at the Kidunda dam site.

In the following Chapter 2, the economic evaluation on the water resources development related with the Kidunda dam project (Development Scenario-1) is described.

# 2. ECONOMIC EVALUATION ON DEVELOPMENT SCENARIO-1: KIDUNDA DAM PROJECT

## 2.1 General

The economic evaluation was made on the water resource development plan in the Development Scenario-1 which comprise the following;

i) The Kidunda dam project including hydropower development
ii) The dam - related 5 irrigation projects including the flood control works therefor : Kidunda irrigation, Bagamoyo irrigation development, low-lift pump irrigation, Ruvu national youth and Makurunge Irrigation projects

On the other hand, the cost and benefit for the three water conveyance projects were not included in those for the water resources development.

As explained in the other Appendices of this Supporting Report, the following benefits would be derived for the project life of the Kidunda dam through implementation of the Development Scenario-1;

i) Increase of water supply to Dar Es Salaam in dry season,
ii) Increase of water for irrigation in dry season,
iii) Electricity generation making use of water to be released for regular water use in the lower reach, and
iv) Flood control.

Out of the above benefits, the benefit accrued from the flood control which is primarily planned for the new irrigation projects are not taken into consideration, although it is expected that the flood control plan combined by the flood control effect of the Kidunda reservoir would create the intangible benefit, and estimable benefit in remote future.

The cash flow for benefit and cost was prepared for each of the following cases of water resources development to assess the economic viability;

i) Kidunda dam project
ii) Dam related 5 irrigation project
iii) The whole of the water resources development (i + ii)

To carry out the above sectoral economic analysis, the following procedures were taken;

(1) Separation of benefit accrued from municipal water supply to Dar Es Salaam: Since the benefit accrued from the municipal water supply can be achieved by construction of the Kidunda dam and 3 water conveyance projects, it was divided into these two portions.

(2) Allocation of cost of the Kidunda dam project: Since the Kidunda dam project is to accure the benefit of municipal water supply inclusive of hydropower benefit and benefit of irrigation development, the total cost for the Kidunda dam project was allocated to these two portions.

## 2.2 Basic Assumption Adopted for Economic Analysis

The basic assumption adopted in carrying out the economic analysis are as follows;

(1) General prices and useful lives.

- The financial value is at a level as of November 1993. The exchange rate is set at TShs. 460 per US dollar.
- The project life is set at 50 years after the completion of the Kidunda dam. Useful lives of electric and mechanical equipment are set at 25 years. Therefore their replacement would take place in the 25th year after the initial installation.
- A discount rate is set at 8%.

(2) Economic benefits

As aforesaid, the benefits accrued from the Kidunda dam project comprise those of municipal water supply, hydropower generation and irrigation development as explained as follows:

(i) Benefit of municipal water supply

In order to determine the unit price of drinking water corresponding to the willingness to pay, the water is divided into two categories, domestic and the rest. The domestic use is further divided into two ones, minimum requirement for survival (5 lpcd) and the rest.

Willingness to pay could only be proved at the survival level. Even now, the citizens living outside the distribution system have to pay between TShs. 50 and 100 per 20 litre tin container to water vendors. (TShs. 2,500 - 5,000/$m^3$). Therefore, it is assumed that people would pay TShs. 3,750/$m^3$ to get water for 5 lpcd on the condition without the water resources development.

Whereas, the ordinary domestic users pay the bill at a rate of TShs. 25/$m^3$ in average, a little more than one third of the unit operation cost at present efficiency level. While, foreign residents pay the bill at a rate of TShs. 450/$m^3$.

If a minimum wage earner who brings home TShs. 15,000 at the end of a month, he may give consent to pay its three percent for water rate, and if his family of four uses 15 cubic meter per month (125 lpcd), the unit rate per cubic meter would be TShs. 30. Hence, the level of willingness to pay hovers between TShs. 30 and 450. As a result, it is assumed that it is equivalent to the unit cost per cubic meter, estimated at TShs. 88.70, which comprise O&M and capital cost.

For the rest of the sectors, mainly industry and commerce, can always transfer the cost of water to the prices of commodity they deal with. The unit price is fixed at TShs. 105, at the rate which industrial users pay now.

(ii) Benefit of hydropower generation

The benefit of hydropower generation is set at the value equivalent to the cost of the most competitive alternative thermal. The cost is divided into two categories, i.e., construction and O&M costs.

(iii) Benefit of Irrigation Development

Net incremental benefit of the project is defined as the difference between the net production value under "with project" condition and the production value under "without project" condition. Net production value is further defined as the difference between the gross production value and the crop production costs in both "with project" and "without project" conditions as explained in Appendix-G of this Supporting Report.

(3) Economic costs

(i) The total financial cost for the water resources development consists of costs for construction of the Kidunda dam project and irrigation projects including the flood control works. To convert the financial cost into the economic cost, the transfer of payment was taken into account by kind of the construction works. In particular, a ratio of transfer of payment to the financial cost in the flood control works is considered to be considerably high, because the construction works are planned to be undertaken by the local contractor. In the present study stage, 90%, 80%, and 70% of the financial cost are assumed to be equivalent to the economic cost for the dam project, irrigation project and flood control works, respectively.

(ii) The annual O&M costs of the component structures are set at 0.5 percent of their construction costs.

## 2.3 Economic Internal Rate of Return (EIRR) for the Water Resources Development in the Development Scenario-1

(1) Separation of municipal water supply benefit

In order to estimate an economic internal rate of return for the water resources development, the benefit to be accrued from the municipal water supply to Dar Es Salaam was divided into two portions, namely benefit for the water resources development by the Kidunda dam and benefit for the three (3) water conveyance projects, in proportion to the present worth of their economic costs. Table L.2 shows the cash flow for each of the Kidunda dam project and the three water conveyance projects. As shown in Table L.3, a ratio of the present worth of economic cost for the Kidunda dam project to that for the whole of the three water conveyance projects is derived to be 24% to 76%. Therefore, the benefit of the municipal water supply for the Kidunda dam is calculated multiplying the total benefit estimated through the above assumption by 0.24 as shown in Table L.4.

(2) Separation of Kidunda dam cost

To allocate the cost of the Kidunda dam project to costs for the municipal water supply and the irrigation development, the financial cost for hydropower development was excluded from the total cost for the Kidunda dam project as shown in Table L.5. In succession, the financial cost of the Kidunda dam project excluding cost of hydropower is allocated to the municipal water supply and irrigation development in proportion to their uses of water to be exploited by the Kidunda dam.

(3) Estimated EIRR

Table L.6 shows the cash flow of economic cost and benefit for the municipal water supply which include those for hydropower development. Consequently, an economic internal rate return for the municipal water supply is derived to be 14.3% and a ratio of benefit to cost (B/C) at about 2.3. While, an economic internal rate of return for the whole irrigation development is estimated to be as low as 4.2% as shown in Table L.7. On the other hand, an EIRR for the whole water resources development comprising the municipal water supply, hydropower and irrigation development comes to about 10.2% as shown in Table L.8. Therefore, the water resources development by the Kidunda dam project (Development Scenario-1) is judged to be economically sound.

## 3. FINANCIAL STATEMENT

Table L.9 shows the financial statements of the project for the duration of the master plan period. In the Table, prices are fixed at 1993 price level, since there are no enough information about the future inflation rates in different economic sectors. Annual depreciation rate is set at 2%. A long-term loan allocated for building up of a social infra-structure would suit the fund for investment to the project. The likely loan provided is assumed as follows:

- Interest rate at 2.7 per cent,
- Period: 30 years with 10 year grace period.

O&M costs consist of two portions, one for the dam and power house and the other for the total water supply system.

In case the average water and electricity rates are set at Ths. 161 per cubic meter and TSh. 16 per kwh respectively at the commencement of operation of the Kidunda dam, its current assets would reach about 65 per cent of the amount of government subsidy paid long time ago and about seven per cent of the accumulated depreciation at the end of the period. From this time onward, reserved fund would keep increasing, and first replacement of a part of the assets by its own fund in 2027 would become possible.

# APPENDIX-L

## *TABLES*

**Table L.1 COMPARISON OF CONSTRUCTION COST PER DEPENDABLE DISCHARGE OF DAM PROJECT FOR WATER SUPPLY**

| Project Name | Country | Dam Construction Cost (Mill. US$) | Dependable Discharge (m3/sec) | Construction cost par Dependable discharge (Mill. US$/cms) |
|---|---|---|---|---|
| Tsavo | Kenya** | 91.6 * | 1.2 | 76.3 |
| Rare | " | 103.0 * | 2.5 | 41.2 |
| Bojongmanik | Indonesia*** | 52.1 | 2.0 | 26.1 |
| Pasirkopo | " | 95.5 | 4.0 | 23.9 |
| Karian | " | 207.2 | 12.0 | 17.3 |
| Cilawang | " | 87.4 | 4.0 | 21.9 |
| Tanjung | " | 320.3 | 7.0 | 45.8 |
| Sodong | " | 843.0 | 12.0 | 70.3 |
| Parungbadak | " | 1,144.2 | 29.0 | 39.5 |
| Genteng | " | 465.7 | 4.0 | 116.4 |
| Naragong | " | 139.6 | 5.0 | 27.9 |
| Pasiranji | " | 463.3 | 10.0 | 46.3 |
| Nameng | " | 379.8 | 4.0 | 95.0 |
| Pangkalan | " | 905.8 | 12.0 | 75.5 |
| **Kidunda** | **Tanzania** | **101.1** | **28.2** | **3.6** |

Note : *; The construction cost is revised at current price.

Source: **; Final Report, Feasibility Study on Water Supply Augmentation Project of Mombasa-Coastal Area-Hinterland, Sep. 1981.

***; Draft Final Report, Jabotabek Water Resources Managemnet Study, Sep. 1993.

## Table L.2 CASH FLOW FINANCIAL COST FOR KIDUNDA DAM PROJECT AND THREE WATER CONVEYANCE PROJECTS

(Unit : 1000 x US$)

| | | Year | (1) Kidunda Dam Project | | (2) Water Conveyance Projects | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | New Lower Ruvu-1 | | New Lower Ruvu-2 | | New Upper Ruvu | | Subtotal-(2) | |
| | | | F.C | L.C | F.C | L.C | F.C | L.C | F.C. | L.C | F.C | L.C |
| -6 | -2 | 1997 | 1,870 | 330 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -5 | -1 | 1998 | 1,870 | 2,768 | 1,646 | 349 | 0 | 0 | 0 | 0 | 1,646 | 349 |
| -4 | 1 | 1999 | 21,676 | 6,902 | 3,294 | 720 | 0 | 0 | 0 | 0 | 3,294 | 720 |
| -3 | 2 | 2000 | 21,045 | 6,987 | 10,576 | 2,390 | 0 | 0 | 0 | 0 | 10,576 | 2,390 |
| -2 | 3 | 2001 | 14,427 | 3,110 | 46,341 | 11,443 | 0 | 0 | 0 | 0 | 46,341 | 11,443 |
| -1 | 4 | 2002 | 16,978 | 3,134 | 57,685 | 12,873 | 0 | 0 | 0 | 0 | 57,685 | 12,873 |
| 1 | 5 | 2003 | | | 49,312 | 11,916 | 0 | 0 | 0 | 0 | 49,312 | 11,916 |
| 2 | 6 | 2004 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 7 | 2005 | | | 0 | 0 | 1,733 | 306 | 0 | 0 | 1,733 | 306 |
| 4 | 8 | 2006 | | | 0 | 0 | 1,733 | 306 | 0 | 0 | 1,733 | 306 |
| 5 | 9 | 2007 | | | 0 | 0 | 9,289 | 2,423 | 0 | 0 | 9,289 | 2,423 |
| 6 | 10 | 2008 | | | 0 | 0 | 31,152 | 5,277 | 1,516 | 267 | 32,668 | 5,544 |
| 7 | 11 | 2009 | | | 0 | 0 | 31,984 | 7,205 | 3,032 | 558 | 35,016 | 7,763 |
| 8 | 12 | 2010 | | | 0 | 0 | 0 | 0 | 8,288 | 1,792 | 8,288 | 1,792 |
| 9 | 13 | 2011 | | | 0 | 0 | 0 | 0 | 34,537 | 8,318 | 34,537 | 8,318 |
| 10 | 14 | 2012 | | | 0 | 0 | 0 | 0 | 44,810 | 9,354 | 44,810 | 9,354 |
| 11 | 15 | 2013 | | | 0 | 0 | 0 | 0 | 38,511 | 47,494 | 38,511 | 47,494 |
| 12 | 16 | 2014 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 17 | 2015 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 18 | 2016 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 19 | 2017 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 16 | 20 | 2018 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17 | 21 | 2019 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | | 2020 | | | | | | | | | 0 | 0 |
| 19 | | 2021 | | | | | | | | | 0 | 0 |
| 20 | | 2022 | | | | | | | | | 0 | 0 |
| 21 | | 2023 | | | | | | | | | 0 | 0 |
| 22 | | 2024 | | | | | | | | | 0 | 0 |
| 23 | | 2025 | | | | | | | | | 0 | 0 |
| 24 | | 2026 | | | | | | | | | 0 | 0 |
| 25 | | 2027 | | | 40,835 | 4,537 | | | | | 40,835 | 4,537 |
| 26 | | 2028 | | | | | | | | | 0 | 0 |
| 27 | | 2029 | | | | | | | | | 0 | 0 |
| 28 | | 2030 | | | | | | | | | 0 | 0 |
| 29 | | 2031 | | | | | | | | | 0 | 0 |
| 30 | | 2032 | | | | | 40,835 | 4,537 | | | 40,835 | 4,537 |
| 31 | | 2033 | | | | | | | | | 0 | 0 |
| 32 | | 2034 | | | | | | | | | 0 | 0 |
| 33 | | 2035 | | | | | | | | | 0 | 0 |
| 34 | | 2036 | | | | | | | 44,128 | 4,903 | 44,128 | 4,903 |
| 35 | | 2037 | | | | | | | | | 0 | 0 |
| 36 | | 2038 | | | | | | | | | 0 | 0 |
| 37 | | 2039 | | | | | | | | | 0 | 0 |
| 38 | | 2040 | | | | | | | | | 0 | 0 |
| 39 | | 2041 | | | | | | | | | 0 | 0 |
| 40 | | 2042 | | | | | | | | | 0 | 0 |
| 41 | | 2043 | | | | | | | | | 0 | 0 |
| 42 | | 2044 | | | | | | | | | 0 | 0 |
| 43 | | 2045 | | | | | | | | | 0 | 0 |
| 44 | | 2046 | | | | | | | | | 0 | 0 |
| 45 | | 2047 | | | | | | | | | 0 | 0 |
| 46 | | 2048 | | | | | | | | | 0 | 0 |
| 47 | | 2049 | | | | | | | | | 0 | 0 |
| 48 | | 2050 | | | | | | | | | 0 | 0 |
| 49 | | 2051 | | | | | | | | | 0 | 0 |
| 50 | | 2052 | | | | | | | | | 0 | 0 |

## Table L.3 CASH FLOW OF ECONOMIC COST FOR KIDUNDA DAM PROJECT AND THREE WATER CONVEYANCE PROJECTS

(Unit : 1000 x US$)

| Year | | | Kidunda Dam Project : Cost | | | | Water Conveyance project : Cost | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Construction Cost | | O & M | Total | Construction Cost | | O & M | Total |
| | | | F.C. | L.C. | | | F.C. | L.C. | | |
| -6 | -2 | 1997 | 1,683 | 297 | | 1,980 | 0 | 0 | 0 | 0 |
| -5 | -1 | 1998 | 1,683 | 2,491 | | 4,174 | 1,481 | 314 | | 1,796 |
| -4 | 1 | 1999 | 19,508 | 6,212 | | 25,720 | 2,965 | 648 | | 3,613 |
| -3 | 2 | 2000 | 18,941 | 6,288 | | 25,229 | 9,518 | 2,151 | | 11,669 |
| -2 | 3 | 2001 | 12,984 | 2,799 | | 15,783 | 41,707 | 10,299 | | 52,006 |
| -1 | 4 | 2002 | 15,280 | 2,821 | | 18,101 | 51,917 | 11,586 | | 63,502 |
| 1 | 5 | 2003 | 0 | 0 | 494 | 494 | 44,381 | 10,724 | 179 | 55,284 |
| 2 | 6 | 2004 | 0 | 0 | 494 | 494 | 0 | 0 | 179 | 179 |
| 3 | 7 | 2005 | 0 | 0 | 494 | 494 | 1,560 | 275 | 179 | 2,014 |
| 4 | 8 | 2006 | 0 | 0 | 494 | 494 | 1,560 | 275 | 179 | 2,014 |
| 5 | 9 | 2007 | 0 | 0 | 494 | 494 | 8,360 | 2,181 | 179 | 10,720 |
| 6 | 10 | 2008 | 0 | 0 | 494 | 494 | 29,401 | 4,990 | 628 | 35,019 |
| 7 | 11 | 2009 | 0 | 0 | 494 | 494 | 31,514 | 6,987 | 628 | 39,129 |
| 8 | 12 | 2010 | 0 | 0 | 494 | 494 | 7,459 | 1,613 | 628 | 9,700 |
| 9 | 13 | 2011 | 0 | 0 | 494 | 494 | 31,083 | 7,486 | 628 | 39,198 |
| 10 | 14 | 2012 | 0 | 0 | 494 | 494 | 40,329 | 8,419 | 628 | 49,376 |
| 11 | 15 | 2013 | 0 | 0 | 494 | 494 | 34,660 | 42,745 | 628 | 78,033 |
| 12 | 16 | 2014 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 13 | 17 | 2015 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 14 | 18 | 2016 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 15 | 19 | 2017 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 16 | 20 | 2018 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 17 | 21 | 2019 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 18 | | 2020 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 19 | | 2021 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 20 | | 2022 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 21 | | 2023 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 22 | | 2024 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 23 | | 2025 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 24 | | 2026 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 25 | | 2027 | 0 | 0 | 494 | 494 | 36,752 | 4,084 | 1,586 | 42,422 |
| 26 | | 2028 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 27 | | 2029 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 28 | | 2030 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 29 | | 2031 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 30 | | 2032 | 0 | 0 | 494 | 494 | 36,752 | 4,084 | 1,586 | 42,422 |
| 31 | | 2033 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 32 | | 2034 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 33 | | 2035 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 34 | | 2036 | 0 | 0 | 494 | 494 | 39,715 | 4,413 | 1,586 | 45,714 |
| 35 | | 2037 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 36 | | 2038 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 37 | | 2039 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 38 | | 2040 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 39 | | 2041 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 40 | | 2042 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 41 | | 2043 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 42 | | 2044 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 43 | | 2045 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 44 | | 2046 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 45 | | 2047 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 46 | | 2048 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 47 | | 2049 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 48 | | 2050 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 49 | | 2051 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| 50 | | 2052 | 0 | 0 | 494 | 494 | 0 | 0 | 1,586 | 1,586 |
| IRR= | | | | | | | | | | |
| NPV at Rd=8 % | | | | | | 70,329 | | | | 220,183 |
| Annual Net Value at Rd=8 % | | | | | | 1,021 | | | | 3,195 |
| (Ratio of Annual net cosvalue) | | | | | | (24.2% ) | | | | (75.8%) |

Rd : Discount Rate

## Table L.4 SEPARATION OF ECONOMIC BENEFIT ACCRUED FROM MUNICIPAL WATER SUPPLY TO DAR ES SALAAM

(Unit : 1000 x US$)

| | | Year | Total Economic Benefit Accured from Municipal Water Supply to DSM | | | | Allocated Economic Benefit | |
|---|---|---|---|---|---|---|---|---|
| | | | 5 lpcd | Domestic | Industry | Total | Water Resource Development (24 %) | Water Conveyance & Purification (76 %) |
| -6 | -2 | 1997 | | | | | | |
| -5 | -1 | 1998 | | | | | | |
| -4 | 1 | 1999 | | | | | | |
| -3 | 2 | 2000 | | | | | | |
| -2 | 3 | 2001 | | | | | | |
| -1 | 4 | 2002 | | | | | | |
| 1 | 5 | 2003 | 11,349 | 5,853 | 1,396 | 18,598 | 4,464 | 14,134 |
| 2 | 6 | 2004 | 13,227 | 6,879 | 1,571 | 21,677 | 5,202 | 16,475 |
| 3 | 7 | 2005 | 15,141 | 7,941 | 1,738 | 24,820 | 5,957 | 18,863 |
| 4 | 8 | 2006 | 17,123 | 8,982 | 1,903 | 28,008 | 6,722 | 21,286 |
| 5 | 9 | 2007 | 19,150 | 10,045 | 2,061 | 31,256 | 7,501 | 23,755 |
| 6 | 10 | 2008 | 21,229 | 11,134 | 2,211 | 34,574 | 8,298 | 26,276 |
| 7 | 11 | 2009 | 23,370 | 12,251 | 2,355 | 37,976 | 9,114 | 28,862 |
| 8 | 12 | 2010 | 25,578 | 13,402 | 2,493 | 41,473 | 9,954 | 31,519 |
| 9 | 13 | 2011 | 28,105 | 14,741 | 2,654 | 45,500 | 10,920 | 34,580 |
| 10 | 14 | 2012 | 30,690 | 16,113 | 2,808 | 49,611 | 11,907 | 37,704 |
| 11 | 15 | 2013 | 33,344 | 17,522 | 2,955 | 53,821 | 12,917 | 40,904 |
| 12 | 16 | 2014 | 36,076 | 18,975 | 3,096 | 58,147 | 13,955 | 44,192 |
| 13 | 17 | 2015 | 38,895 | 20,476 | 3,232 | 62,603 | 15,025 | 47,578 |
| 14 | 18 | 2016 | 42,012 | 22,173 | 3,388 | 67,573 | 16,218 | 51,355 |
| 15 | 19 | 2017 | 45,203 | 23,919 | 3,538 | 72,660 | 17,438 | 55,222 |
| 16 | 20 | 2018 | 48,478 | 25,718 | 3,681 | 77,877 | 18,690 | 59,187 |
| 17 | 21 | 2019 | 51,849 | 27,577 | 3,820 | 83,246 | 19,979 | 63,267 |
| 18 | | 2020 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 19 | | 2021 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 20 | | 2022 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 21 | | 2023 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 22 | | 2024 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 23 | | 2025 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 24 | | 2026 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 25 | | 2027 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 26 | | 2028 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 27 | | 2029 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 28 | | 2030 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 29 | | 2031 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 30 | | 2032 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 31 | | 2033 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 32 | | 2034 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 33 | | 2035 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 34 | | 2036 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 35 | | 2037 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 36 | | 2038 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 37 | | 2039 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 38 | | 2040 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 39 | | 2041 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 40 | | 2042 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 41 | | 2043 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 42 | | 2044 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 43 | | 2045 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 44 | | 2046 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 45 | | 2047 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 46 | | 2048 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 47 | | 2049 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 48 | | 2050 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 49 | | 2051 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |
| 50 | | 2052 | 55,326 | 29,501 | 3,954 | 88,781 | 21,307 | 67,474 |

| NPV at Rd=8 % | 155,056 |
|---|---|

# Table L.5 FINANCIAL COST OF KIDUNDA DAM PROJECT EXCLUDING HYDROPOWER DEVELOPMENT

(Unit : 1000 x US$)

| | | Year | Total Financial Cost of Kidunda Dam Project : (1) | | | | Financial Cost of Hydropower : (2) | | | | Financial Cost of Kidunda Dam Project Excluding Cost of Hydropower (3)=(1) - (2) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | F.C | L.C | O & M | Total | F.C | L.C | O & M | Total | F.C | L.C | O & M | Total |
| -6 | -2 | 1997 | 1,870 | 330 | | 2,200 | | | | 0 | 1,870 | 330 | 0 | 2,200 |
| -5 | -1 | 1998 | 1,870 | 2,768 | | 4,638 | | | | 0 | 1,870 | 2,768 | 0 | 4,638 |
| -4 | 1 | 1999 | 21,676 | 6,902 | | 28,578 | | | | 0 | 21,676 | 6,902 | 0 | 28,578 |
| -3 | 2 | 2000 | 21,045 | 6,987 | | 28,032 | | | | 0 | 21,045 | 6,987 | 0 | 28,032 |
| -2 | 3 | 2001 | 14,427 | 3,110 | | 17,537 | 5,963 | 847 | | 6,810 | 8,464 | 2,263 | 0 | 10,727 |
| -1 | 4 | 2002 | 16,978 | 3,134 | | 20,112 | 8,945 | 1,270 | | 10,215 | 8,033 | 1,864 | 0 | 9,897 |
| 1 | 5 | 2003 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 2 | 6 | 2004 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 3 | 7 | 2005 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 4 | 8 | 2006 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 5 | 9 | 2007 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 6 | 10 | 2008 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 7 | 11 | 2009 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 8 | 12 | 2010 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 9 | 13 | 2011 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 10 | 14 | 2012 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 11 | 15 | 2013 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 12 | 16 | 2014 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 13 | 17 | 2015 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 14 | 18 | 2016 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 15 | 19 | 2017 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 16 | 20 | 2018 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 17 | 21 | 2019 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 18 | | 2020 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 19 | | 2021 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 20 | | 2022 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 21 | | 2023 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 22 | | 2024 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 23 | | 2025 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 24 | | 2026 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 25 | | 2027 | 6,830 | 1,822 | 504 | 9,156 | 5,963 | 847 | 85 | 6,895 | 867 | 975 | 419 | 2,261 |
| 26 | | 2028 | 10,246 | 2,732 | 504 | 13,482 | 8,945 | 1,270 | 85 | 10,300 | 1,301 | 1,462 | 419 | 3,182 |
| 27 | | 2029 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 28 | | 2030 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 29 | | 2031 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 30 | | 2032 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 31 | | 2033 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 32 | | 2034 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 33 | | 2035 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 34 | | 2036 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 35 | | 2037 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 36 | | 2038 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 37 | | 2039 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 38 | | 2040 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 39 | | 2041 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 40 | | 2042 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 41 | | 2043 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 42 | | 2044 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 43 | | 2045 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 44 | | 2046 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 45 | | 2047 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 46 | | 2048 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 47 | | 2049 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 48 | | 2050 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 49 | | 2051 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| 50 | | 2052 | | | 504 | 504 | | | 85 | 85 | 0 | 0 | 419 | 419 |
| Initial Investment Cost (Thousand US$) | | | 77,866 | 22,901 | | | 14,908 | 2,117 | | | 62,958 | 20,784 | | |

## Table L.6 CASH FLOW OF ECONOMIC COST AND BENEFIT OF WATER RESOURCE DEVELOPMENT FOR MUNICIPAL WATER SUPPLY TO DAR ES SALAAM

(Unit : 1000 x US$)

| Year | | | Cash Flow of Economic Cost and Benefit for Water Supply Development | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Economic Cost (C) | | | Economic Benefit (B) | | | Net Benefit |
| | | | Dam | Hydro. | Total | Water Supply | Hydro. | Total | (B-C) |
| -6 | -2 | 1997 | 1,116 | 0 | 1,116 | 0 | 0 | 0 | -1,116 |
| -5 | -1 | 1998 | 2,354 | 0 | 2,354 | 0 | 0 | 0 | -2,354 |
| -4 | 1 | 1999 | 14,502 | 0 | 14,502 | 0 | 0 | 0 | -14,502 |
| -3 | 2 | 2000 | 14,225 | 0 | 14,225 | 0 | 0 | 0 | -14,225 |
| -2 | 3 | 2001 | 5,443 | 6,129 | 11,572 | 0 | 1,658 | 1,658 | -9,914 |
| -1 | 4 | 2002 | 5,022 | 9,194 | 14,216 | 0 | 2,486 | 2,486 | -11,730 |
| 1 | 5 | 2003 | 212 | 77 | 289 | 4,464 | 355 | 4,819 | 4,529 |
| 2 | 6 | 2004 | 212 | 77 | 289 | 5,202 | 355 | 5,557 | 5,268 |
| 3 | 7 | 2005 | 212 | 77 | 289 | 5,957 | 355 | 6,312 | 6,023 |
| 4 | 8 | 2006 | 212 | 77 | 289 | 6,722 | 355 | 7,077 | 6,788 |
| 5 | 9 | 2007 | 212 | 77 | 289 | 7,501 | 355 | 7,856 | 7,567 |
| 6 | 10 | 2008 | 212 | 77 | 289 | 8,298 | 355 | 8,653 | 8,364 |
| 7 | 11 | 2009 | 212 | 77 | 289 | 9,114 | 355 | 9,469 | 9,180 |
| 8 | 12 | 2010 | 212 | 77 | 289 | 9,954 | 355 | 10,309 | 10,019 |
| 9 | 13 | 2011 | 212 | 77 | 289 | 10,920 | 355 | 11,275 | 10,986 |
| 10 | 14 | 2012 | 212 | 77 | 289 | 11,907 | 355 | 12,262 | 11,973 |
| 11 | 15 | 2013 | 212 | 77 | 289 | 12,917 | 355 | 13,272 | 12,983 |
| 12 | 16 | 2014 | 212 | 77 | 289 | 13,955 | 355 | 14,310 | 14,021 |
| 13 | 17 | 2015 | 212 | 77 | 289 | 15,025 | 355 | 15,380 | 15,091 |
| 14 | 18 | 2016 | 212 | 77 | 289 | 16,218 | 355 | 16,573 | 16,283 |
| 15 | 19 | 2017 | 212 | 77 | 289 | 17,438 | 355 | 17,793 | 17,504 |
| 16 | 20 | 2018 | 212 | 77 | 289 | 18,690 | 355 | 19,045 | 18,756 |
| 17 | 21 | 2019 | 212 | 77 | 289 | 19,979 | 355 | 20,334 | 20,045 |
| 18 | | 2020 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 19 | | 2021 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 20 | | 2022 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 21 | | 2023 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 22 | | 2024 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 23 | | 2025 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 24 | | 2026 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 25 | | 2027 | 1,147 | 6,206 | 7,353 | 21,307 | 4,499 | 25,806 | 18,454 |
| 26 | | 2028 | 1,614 | 9,270 | 10,885 | 21,307 | 355 | 21,662 | 10,778 |
| 27 | | 2029 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 28 | | 2030 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 29 | | 2031 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 30 | | 2032 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 31 | | 2033 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 32 | | 2034 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 33 | | 2035 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 34 | | 2036 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 35 | | 2037 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 36 | | 2038 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 37 | | 2039 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 38 | | 2040 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 39 | | 2041 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 40 | | 2042 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 41 | | 2043 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 42 | | 2044 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 43 | | 2045 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 44 | | 2046 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 45 | | 2047 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 46 | | 2048 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 47 | | 2049 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 48 | | 2050 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 49 | | 2051 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |
| 50 | | 2052 | 212 | 77 | 289 | 21,307 | 355 | 21,662 | 21,373 |

| | | | |
|---|---|---|---|
| IRR= | | | 14.30% |
| NPV at Rd=8 % | 45,635 | 103,525 | 57,890 |
| Annual Value at Rd=8 % | 662 | 1,502 | 840 |
| B/C | | | 2.27 |

Rd : Discount Rate

## Table L.7 CASH FLOW OF ECONOMIC COST AND BENEFIT FOR WHOLE IRRIGATION PROJECTS IN DEVELOPMENT SCENARIO-1

(Unit : 1000 x US$)

| Year | | | Cash Flow of Economic Cost and Benefit for the Whole Irrigation Projects | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Economic Cost (C) | | | Economic Benefit (B) | | Net Benefit |
| | | | Dam | Irrigation | Total | Irrigation | Total | (B-C) |
| -6 | -2 | 1997 | 864 | 0 | 864 | 0 | 0 | -864 |
| -5 | -1 | 1998 | 1,821 | 134 | 1,955 | 0 | 0 | -1,955 |
| -4 | 1 | 1999 | 11,218 | 457 | 11,675 | 0 | 0 | -11,675 |
| -3 | 2 | 2000 | 11,004 | 1,089 | 12,093 | 0 | 0 | -12,093 |
| -2 | 3 | 2001 | 4,211 | 2,458 | 6,669 | 0 | 0 | -6,669 |
| -1 | 4 | 2002 | 3,885 | 4,399 | 8,284 | 0 | 0 | -8,284 |
| 1 | 5 | 2003 | 164 | 2,953 | 3,118 | 539 | 539 | -2,579 |
| 2 | 6 | 2004 | 164 | 3,102 | 3,266 | 539 | 539 | -2,727 |
| 3 | 7 | 2005 | 164 | 4,497 | 4,662 | 539 | 539 | -4,123 |
| 4 | 8 | 2006 | 164 | 3,469 | 3,634 | 1,039 | 1,039 | -2,595 |
| 5 | 9 | 2007 | 164 | 1,222 | 1,386 | 1,514 | 1,514 | 128 |
| 6 | 10 | 2008 | 164 | 4,366 | 4,530 | 2,004 | 2,004 | -2,526 |
| 7 | 11 | 2009 | 164 | 3,055 | 3,219 | 2,004 | 2,004 | -1,215 |
| 8 | 12 | 2010 | 164 | 3,727 | 3,892 | 2,480 | 2,480 | -1,412 |
| 9 | 13 | 2011 | 164 | 3,520 | 3,684 | 2,955 | 2,955 | -729 |
| 10 | 14 | 2012 | 164 | 6,729 | 6,894 | 3,738 | 3,738 | -3,156 |
| 11 | 15 | 2013 | 164 | 5,429 | 5,594 | 4,055 | 4,055 | -1,539 |
| 12 | 16 | 2014 | 164 | 3,158 | 3,323 | 4,857 | 4,857 | 1,534 |
| 13 | 17 | 2015 | 164 | 246 | 411 | 5,332 | 5,332 | 4,921 |
| 14 | 18 | 2016 | 164 | 246 | 411 | 5,866 | 5,866 | 5,455 |
| 15 | 19 | 2017 | 164 | 307 | 472 | 5,866 | 5,866 | 5,394 |
| 16 | 20 | 2018 | 164 | 445 | 610 | 5,866 | 5,866 | 5,256 |
| 17 | 21 | 2019 | 164 | 2,915 | 3,080 | 5,866 | 5,866 | 2,786 |
| 18 | | 2020 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 19 | | 2021 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 20 | | 2022 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 21 | | 2023 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 22 | | 2024 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 23 | | 2025 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 24 | | 2026 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 25 | | 2027 | 888 | 261 | 1,149 | 6,029 | 6,029 | 4,880 |
| 26 | | 2028 | 1,249 | 261 | 1,510 | 6,029 | 6,029 | 4,519 |
| 27 | | 2029 | 164 | 84 | 248 | 6,029 | 6,029 | 5,781 |
| 28 | | 2030 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 29 | | 2031 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 30 | | 2032 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 31 | | 2033 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 32 | | 2034 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 33 | | 2035 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 34 | | 2036 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 35 | | 2037 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 36 | | 2038 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 37 | | 2039 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 38 | | 2040 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 39 | | 2041 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 40 | | 2042 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 41 | | 2043 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 42 | | 2044 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 43 | | 2045 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 44 | | 2046 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 45 | | 2047 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 46 | | 2048 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 47 | | 2049 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 48 | | 2050 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 49 | | 2051 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |
| 50 | | 2052 | 164 | 261 | 426 | 6,029 | 6,029 | 5,603 |

| | | | |
|---|---|---|---|
| IRR= | | | 4.16% |
| NPV at Rd=8 % | 50,303 | 26,277 | -24,026 |
| Annual Value at Rd=8 % | 730 | 381 | -349 |
| B/C | | | 0.52 |

Rd : Discount Rate

## Table L.8 CASH FLOW OF ECONOMIC COST AND BENEFIT FOR WHOLE WATER RESOURCES DEVELOPMENT IN DEVELOPMENT SCENARIO-1 (DEVELOPMENT OF KIDUNDA DAM PROJECT AND IRRIGATION PROJECTS)

(Unit : 1000 x US$)

| Year | | | Cash Flow of Economic Cost and Benefit for Water Resources Development | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Total Economic Cost (C) | | | Total Economic Benefit (B) | | | Net Benefit |
| | | | W. S. | Irrigation | Total | W. S. | Irrigation | Total | (B-C) |
| -6 | -2 | 1997 | 1,116 | 864 | 1,980 | 0 | 0 | 0 | -1,980 |
| -5 | -1 | 1998 | 2,354 | 1,955 | 4,309 | 0 | 0 | 0 | -4,309 |
| -4 | 1 | 1999 | 14,502 | 11,675 | 26,177 | 0 | 0 | 0 | -26,177 |
| -3 | 2 | 2000 | 14,225 | 12,093 | 26,318 | 0 | 0 | 0 | -26,318 |
| -2 | 3 | 2001 | 11,572 | 6,669 | 18,241 | 1,658 | 0 | 1,658 | -16,583 |
| -1 | 4 | 2002 | 14,216 | 8,284 | 22,500 | 2,486 | 0 | 2,486 | -20,014 |
| 1 | 5 | 2003 | 289 | 3,118 | 3,407 | 4,819 | 539 | 5,358 | 1,951 |
| 2 | 6 | 2004 | 289 | 3,266 | 3,555 | 5,557 | 539 | 6,096 | 2,541 |
| 3 | 7 | 2005 | 289 | 4,662 | 4,951 | 6,312 | 539 | 6,851 | 1,900 |
| 4 | 8 | 2006 | 289 | 3,634 | 3,923 | 7,077 | 1,039 | 8,116 | 4,193 |
| 5 | 9 | 2007 | 289 | 1,386 | 1,675 | 7,856 | 1,514 | 9,370 | 7,695 |
| 6 | 10 | 2008 | 289 | 4,530 | 4,820 | 8,653 | 2,004 | 10,657 | 5,837 |
| 7 | 11 | 2009 | 289 | 3,219 | 3,508 | 9,469 | 2,004 | 11,473 | 7,965 |
| 8 | 12 | 2010 | 289 | 3,892 | 4,181 | 10,309 | 2,480 | 12,789 | 8,608 |
| 9 | 13 | 2011 | 289 | 3,684 | 3,973 | 11,275 | 2,955 | 14,230 | 10,257 |
| 10 | 14 | 2012 | 289 | 6,894 | 7,183 | 12,262 | 3,738 | 16,000 | 8,817 |
| 11 | 15 | 2013 | 289 | 5,594 | 5,883 | 13,272 | 4,055 | 17,327 | 11,444 |
| 12 | 16 | 2014 | 289 | 3,323 | 3,612 | 14,310 | 4,857 | 19,167 | 15,555 |
| 13 | 17 | 2015 | 289 | 411 | 700 | 15,380 | 5,332 | 20,712 | 20,012 |
| 14 | 18 | 2016 | 289 | 411 | 700 | 16,573 | 5,866 | 22,439 | 21,739 |
| 15 | 19 | 2017 | 289 | 472 | 761 | 17,793 | 5,866 | 23,659 | 22,899 |
| 16 | 20 | 2018 | 289 | 610 | 899 | 19,045 | 5,866 | 24,911 | 24,013 |
| 17 | 21 | 2019 | 289 | 3,080 | 3,369 | 20,334 | 5,866 | 26,200 | 22,831 |
| 18 | | 2020 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 19 | | 2021 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 20 | | 2022 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 21 | | 2023 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 22 | | 2024 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 23 | | 2025 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 24 | | 2026 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 25 | | 2027 | 7,353 | 1,149 | 8,502 | 25,806 | 6,029 | 31,835 | 23,334 |
| 26 | | 2028 | 10,885 | 1,510 | 12,395 | 21,662 | 6,029 | 27,691 | 15,297 |
| 27 | | 2029 | 289 | 248 | 537 | 21,662 | 6,029 | 27,691 | 27,154 |
| 28 | | 2030 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 29 | | 2031 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 30 | | 2032 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 31 | | 2033 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 32 | | 2034 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 33 | | 2035 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 34 | | 2036 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 35 | | 2037 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 36 | | 2038 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 37 | | 2039 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 38 | | 2040 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 39 | | 2041 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 40 | | 2042 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 41 | | 2043 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 42 | | 2044 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 43 | | 2045 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 44 | | 2046 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 45 | | 2047 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 46 | | 2048 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 47 | | 2049 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 48 | | 2050 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 49 | | 2051 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |
| 50 | | 2052 | 289 | 426 | 715 | 21,662 | 6,029 | 27,691 | 26,977 |

| | | | |
|---|---|---|---|
| IRR= | | | 10.16% |
| NPV at Rd=8 % | 95,938 | 129,802 | 33,864 |
| Annual Value at Rd=8 % | 1,392 | 1,884 | 491 |
| B/C | | | 1.35 |

Rd : Discount Rate

# Table L.9 FINANCIAL STATEMENT FOR WATER SUPPLY AND ELECTRICITY ENTERPRISES

BALANCE SHEET (Unit: Mil.US$ in 1993 price)

| | -6 | -5 | -4 | -3 | -2 | -1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| YEAR | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| Assets | 4.20 | 12.85 | 54.39 | 140.21 | 228.30 | 309.64 | 311.68 | 313.72 | 325.43 | 363.64 | 406.42 | 416.50 | 459.36 | 513.52 | 561.02 | 561.02 | 561.02 | 561.02 | 561.02 | 561.02 | 561.02 | 561.02 | 561.02 | 561.02 |
| Depreciation:2% | 0.08 | 0.26 | 1.09 | 2.80 | 4.57 | 6.19 | 6.23 | 6.27 | 6.51 | 7.27 | 8.13 | 8.33 | 9.19 | 10.27 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 |
| (-)Accum.Depreciation | 0.08 | 0.34 | 1.43 | 4.23 | 8.80 | 14.99 | 21.23 | 27.50 | 34.01 | 41.28 | 49.41 | 57.74 | 66.93 | 77.20 | 88.42 | 99.64 | 110.86 | 122.08 | 133.30 | 144.52 | 155.74 | 166.96 | 178.18 | 189.40 |
| Assets: net | 4.11 | 12.51 | 52.96 | 135.97 | 219.50 | 294.65 | 290.46 | 286.22 | 291.42 | 322.36 | 357.01 | 358.76 | 392.43 | 436.32 | 472.60 | 461.38 | 450.16 | 438.94 | 427.72 | 416.50 | 405.28 | 394.06 | 382.84 | 371.62 |
| Current Assets | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.70 | 2.76 | 5.94 | 9.51 | 13.16 | 17.59 | 20.35 | 19.07 | 14.18 | 7.46 | 2.90 | 0.56 | 0.02 | 0.26 | 1.17 | 4.45 | 8.58 | 13.16 |
| TOTAL ASSETS | 4.11 | 12.51 | 52.96 | 135.97 | 219.50 | 294.65 | 291.16 | 288.98 | 297.36 | 331.87 | 370.18 | 376.35 | 412.78 | 455.39 | 486.78 | 468.84 | 453.06 | 439.50 | 427.74 | 416.76 | 406.45 | 398.50 | 391.42 | 384.77 |
| Long Term Loan | 4.20 | 8.65 | 41.54 | 85.82 | 88.10 | 81.34 | 2.04 | 2.04 | 11.71 | 38.21 | 42.78 | 10.08 | 42.86 | 54.16 | 47.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Loan:Cumulative | 4.20 | 12.85 | 54.39 | 140.21 | 228.30 | 309.64 | 311.68 | 313.72 | 325.43 | 363.64 | 406.21 | 415.65 | 455.79 | 502.94 | 539.02 | 523.54 | 507.95 | 492.27 | 476.00 | 457.81 | 437.49 | 416.67 | 393.70 | 368.02 |
| [(-)Amortization:5%] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.64 | 2.72 | 7.01 | 11.42 | 15.48 | 15.58 | 15.69 | 16.27 | 18.18 | 20.32 | 20.83 | 22.97 | 25.68 |
| Reserved Fund | -0.08 | -0.34 | -1.43 | -4.23 | -8.80 | -14.99 | -20.52 | -24.74 | -28.07 | -31.77 | -36.04 | -39.30 | -43.01 | -47.55 | -52.24 | -54.70 | -54.89 | -52.77 | -48.26 | -41.05 | -31.05 | -18.16 | -2.28 | 16.75 |
| TOTAL LIABIL.&CAPITAL | 4.11 | 12.51 | 52.96 | 135.97 | 219.50 | 294.65 | 291.16 | 288.98 | 297.36 | 331.87 | 370.18 | 376.35 | 412.78 | 455.39 | 486.78 | 468.84 | 453.06 | 439.50 | 427.74 | 416.76 | 406.45 | 398.50 | 391.42 | 384.77 |

INCOME AND EXPENDITURE STATEMENT

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Income: Water Supply | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 13.47 | 15.72 | 18.03 | 20.30 | 22.60 | 24.93 | 27.32 | 29.75 | 32.59 | 35.48 | 38.43 | 41.46 | 44.57 | 48.09 | 51.69 | 55.38 | 59.18 | 63.10 |
| Income: Electricity Sale | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 | 1.19 |
| Gov.Contribution | 0.11 | 0.35 | 1.47 | 3.79 | 6.16 | 8.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Income | 0.11 | 0.35 | 1.47 | 3.79 | 6.16 | 8.36 | 14.66 | 16.91 | 19.22 | 21.49 | 23.78 | 26.12 | 28.50 | 30.94 | 33.78 | 36.67 | 39.62 | 42.64 | 45.75 | 49.27 | 52.87 | 56.57 | 60.37 | 64.29 |
| O/M Costs | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.54 | 6.39 | 7.25 | 8.10 | 8.96 | 9.83 | 10.72 | 11.63 | 12.69 | 13.77 | 14.88 | 16.01 | 17.17 | 18.49 | 19.83 | 21.22 | 22.64 | 24.10 |
| Depreciation | 0.08 | 0.26 | 1.09 | 2.80 | 4.57 | 6.19 | 6.23 | 6.27 | 6.51 | 7.27 | 8.13 | 8.33 | 9.19 | 10.27 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 | 11.22 |
| Interest Payment:2.7% | 0.11 | 0.35 | 1.47 | 3.79 | 6.16 | 8.36 | 8.42 | 8.47 | 8.79 | 9.82 | 10.97 | 11.22 | 12.31 | 13.58 | 14.55 | 14.14 | 13.71 | 13.29 | 12.85 | 12.36 | 11.81 | 11.25 | 10.63 | 9.94 |
| Expenditure | 0.20 | 0.60 | 2.56 | 6.59 | 10.73 | 14.55 | 20.19 | 21.13 | 22.54 | 25.19 | 28.05 | 29.38 | 32.21 | 35.48 | 38.47 | 39.13 | 39.81 | 40.52 | 41.24 | 42.07 | 42.87 | 43.69 | 44.49 | 45.26 |
| BALANCE | -0.08 | -0.26 | -1.09 | -2.80 | -4.57 | -6.19 | -5.53 | -4.22 | -3.33 | -3.70 | -4.27 | -3.26 | -3.71 | -4.54 | -4.69 | -2.46 | -0.19 | 2.12 | 4.51 | 7.20 | 10.01 | 12.88 | 15.88 | 19.03 |

CASH FLOW

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Loan | 4.20 | 8.65 | 41.54 | 85.82 | 88.10 | 81.34 | 2.04 | 2.04 | 11.71 | 38.21 | 42.78 | 10.08 | 42.86 | 54.16 | 47.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Income:Water+Elec | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 14.66 | 16.91 | 19.22 | 21.49 | 23.78 | 26.12 | 28.50 | 30.94 | 33.78 | 36.67 | 39.62 | 42.64 | 45.75 | 49.27 | 52.87 | 56.57 | 60.37 | 64.29 |
| Gov.Contribution | 0.11 | 0.35 | 1.47 | 3.79 | 6.16 | 8.36 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total Inflow | 4.31 | 9.00 | 43.01 | 89.60 | 94.26 | 89.70 | 16.70 | 18.95 | 30.93 | 59.70 | 66.56 | 36.20 | 71.36 | 85.11 | 81.27 | 36.67 | 39.62 | 42.64 | 45.75 | 49.27 | 52.87 | 56.57 | 60.37 | 64.29 |
| Investment | 4.20 | 8.65 | 41.54 | 85.82 | 88.10 | 81.34 | 2.04 | 2.04 | 11.71 | 38.21 | 42.78 | 10.08 | 42.86 | 54.16 | 47.49 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| O/M Costs | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.54 | 6.39 | 7.25 | 8.10 | 8.96 | 9.83 | 10.72 | 11.63 | 12.69 | 13.77 | 14.88 | 16.01 | 17.17 | 18.49 | 19.83 | 21.22 | 22.64 | 24.10 |
| Amortization: 5% | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.64 | 2.72 | 7.01 | 11.42 | 15.48 | 15.58 | 15.69 | 16.27 | 18.18 | 20.32 | 20.83 | 22.97 | 25.68 |
| Interest Payment:2.7% | 0.11 | 0.35 | 1.47 | 3.79 | 6.16 | 8.36 | 8.42 | 8.47 | 8.79 | 9.82 | 10.97 | 11.22 | 12.31 | 13.58 | 14.55 | 14.14 | 13.71 | 13.29 | 12.85 | 12.36 | 11.81 | 11.25 | 10.63 | 9.94 |
| Total Outflow | 4.31 | 9.00 | 43.01 | 89.60 | 94.26 | 89.70 | 16.00 | 16.90 | 27.75 | 56.13 | 62.91 | 31.77 | 68.60 | 86.39 | 86.16 | 43.39 | 44.18 | 44.99 | 46.30 | 49.03 | 51.97 | 53.29 | 56.24 | 59.72 |
| Net Cash Inflow | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.70 | 2.06 | 3.18 | 3.57 | 3.65 | 4.43 | 2.76 | -1.28 | -4.88 | -6.72 | -4.56 | -2.34 | -0.54 | 0.24 | 0.91 | 3.28 | 4.14 | 4.57 |
| Cash Balance | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.70 | 2.76 | 5.94 | 9.51 | 13.16 | 17.59 | 20.35 | 19.07 | 14.18 | 7.46 | 2.90 | 0.56 | 0.02 | 0.26 | 1.17 | 4.45 | 8.58 | 13.16 |
| Paid water: m3/day | 0 | 0 | 0 | 0 | 0 | 0 | 105,455 | 123,082 | 141,118 | 158,886 | 176,876 | 195,164 | 213,819 | 232,907 | 255,113 | 277,724 | 300,829 | 324,512 | 348,853 | 376,403 | 404,588 | 433,510 | 463,265 | 493,946 |
| Water rate:TSh./m3 | 161 | | | | | | | | | | | | | | | | | | | | | | | |
| Elec. generation:kw | 3,900 | | | | | | | | | | | | | | | | | | | | | | | |
| Elec. rate:TSh./kWh | 16 | | | | | | | | | | | | | | | | | | | | | | | |
| New o/m cost: Mil.US$ | | | | | | | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 | 0.505 |
| O&M cost: Mil.US$ | | | | | | | 5.038 | 5.880 | 6.742 | 7.591 | 8.450 | 9.324 | 10.215 | 11.127 | 12.188 | 13.268 | 14.372 | 15.503 | 16.666 | 17.982 | 19.329 | 20.711 | 22.132 | 23.598 |
| Unit O&M:TSh./m3 | 4,800 | | 60.208 | | | | factory.&rich | | middle | poor | | | | | | | | | | | | | | |
| | mil.TSh. | | | | | | 10% | 18% | 27% | 45% | 100% | | | | | | | | | | | | | |
| Volume:3.16m3/sec*0.8 | 100 *0.8=> | | 79.723 | | | TSh/m3 | 200 | 360 | 180 | 60 | | | | | | | | | | | | | | |
| | mil.m3/an | | mil.m3/an | | | weight | 20 | 64.8 | 48.6 | 27 | 160.4 | | | | | | | | | | | | | |