

Table 6C-16. Average Monthly Wholesale Prices of Garlic
Metro Manila, 1975 - 1978

(Unit:₱/kg)

| <u>Month</u> | <u>1975 - 1976</u> | <u>1976 - 1977</u> | <u>1977 - 1978</u> | <u>1978 - 1979</u> |
|--------------|--------------------|--------------------|--------------------|--------------------|
| Mar. | 6.50 | 9.33 | 8.14 | 6.61 |
| Apr. | 6.34 | 7.58 | 7.20 | 6.32 |
| May | 6.91 | 8.20 | 8.34 | 6.88 |
| Jun. | 7.17 | 8.72 | 9.38 | |
| Jul. | 8.00 | 9.40 | 10.73 | |
| Aug. | 8.00 | 11.45 | 10.52 | |
| Sep. | 8.32 | 12.50 | 11.35 | |
| Oct. | 9.26 | 13.14 | 11.38 | |
| Nov. | 10.79 | 13.16 | 10.40 | |
| Dec. | 10.69 | 12.93 | 10.08 | |
| Jan. | 11.96 | 15.07 | 9.43 | |
| Feb. | 12.01 | 15.07 | 10.95 | |

Source: - Garlic Production and Marketing,
Ilocos Region, Aug., 1978.

- Special Studies Division, Office of the
Secretary, Department of Agriculture.

Table 6C-17. Mungbeans: Average Price Received by Farmers - (shelled)
- Ilocos Region and Philippines -
(Unit: P/ganta)

| Month | 1974 | | 1975 | | 1976 | | 1977 | | 1978 | |
|-----------------|--------|-------------|--------|-------|--------|-------|--------|-------|--------|-------|
| | Ilocos | Philippines | Ilocos | Ph. | Ilocos | Ph. | Ilocos | Ph. | Ilocos | Ph. |
| Jan. | 9.93 | 7.66 | 10.92 | 10.11 | 8.92 | 10.04 | 13.06 | 10.66 | 9.84 | 9.78 |
| Feb. | 12.03 | 7.54 | 10.85 | 10.06 | 8.94 | 8.80 | 12.60 | 10.59 | 10.05 | 9.89 |
| Mar. | 8.03 | 7.69 | 11.25 | 9.34 | 8.79 | 8.80 | 12.88 | 10.28 | 10.17 | 9.92 |
| Apr. | 7.39 | 8.14 | 10.17 | 9.17 | 9.31 | 9.06 | 14.34 | 10.07 | 9.97 | 10.19 |
| May | 7.11 | 8.41 | 8.53 | 9.03 | 9.55 | 9.27 | 10.65 | 10.00 | 10.15 | 10.28 |
| Jun. | 7.27 | 8.10 | 8.62 | 9.04 | 11.46 | 9.20 | 10.78 | 10.11 | 10.68 | 10.44 |
| Jul. | 14.62 | 8.21 | 7.68 | 8.86 | 11.88 | 9.33 | 11.20 | 10.10 | 10.21 | 10.21 |
| Aug. | 7.00 | 8.00 | 8.04 | 8.83 | 11.94 | 10.28 | 10.00 | 9.76 | 10.67 | 10.42 |
| Sep. | 9.22 | 8.45 | 8.66 | 9.13 | 12.00 | 10.11 | 9.00 | 9.65 | 10.54 | 10.18 |
| Oct. | 9.44 | 8.88 | 8.60 | 8.98 | 11.70 | 9.85 | 9.83 | 9.59 | 10.58 | 10.19 |
| Nov. | - | 9.52 | 8.84 | 8.75 | 11.56 | 9.97 | 10.06 | 9.73 | 11.47 | 11.00 |
| Dec. | - | 9.17 | 8.82 | 8.83 | 12.57 | 10.57 | 9.63 | 9.65 | 11.53 | 11.16 |
| Average P/ganta | 9.20 | 8.35 | 9.25 | 9.18 | 10.71 | 9.60 | 11.16 | 10.09 | 10.49 | 10.31 |
| P/kg | 3.93 | 3.57 | 3.95 | 3.92 | 4.58 | 4.10 | 4.77 | 4.31 | 4.48 | 4.41 |

Note : 1 Ganta = 2.34 kg

Source: BAEcon

Table 6C-18. Mungbeans: Retail Price
- Laoag City (shelled)

| <u>Year</u> | <u>Retail Price</u> (₱/kg) |
|-------------|-------------------------------|
| 1974 | 3.44 |
| 1975 | 3.45 (per liter) |
| 1976 | 3.54 (per liter) |
| 1977 | 3.97 |
| 1978 | 3.54 |
| 1979 | 4.00 |

Note: 1 L = 0.733 kg

Table 6C-19. Farm-gate Price of Onion
(Unit: ₱/kg)

| | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Ave. |
|--------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| <u>Philippines</u> | | | | | | | | | | | | | |
| 1972 | 1.59 | 1.59 | 1.52 | 1.92 | 2.28 | 2.00 | 1.50 | 2.90 | 2.60 | 2.96 | 3.80 | 1.67 | 2.19 |
| 1973 | 1.90 | 2.00 | 2.31 | 1.79 | 1.49 | 1.19 | 1.31 | 2.08 | 3.29 | 2.20 | 2.85 | 1.99 | 2.03 |
| 1974 | - | - | - | - | - | - | 3.12 | 3.45 | 3.65 | 3.69 | 5.31 | 5.49 | 4.12 |
| 1975 | 4.22 | 4.39 | 3.70 | 3.54 | 2.66 | 2.59 | 2.98 | 2.95 | 3.02 | 3.11 | 3.61 | 3.70 | 3.37 |
| 1976 | 1.51 | 1.91 | 1.72 | 2.07 | 2.02 | 2.55 | 2.68 | 2.52 | 2.56 | 1.70 | 1.99 | 1.88 | 2.09 |
| 1977 | 1.66 | 1.60 | 1.62 | 1.56 | 1.60 | 1.79 | 1.96 | 2.00 | 2.00 | 1.10 | 1.10 | 1.55 | 1.72 |
| 1978 | 1.28 | 2.36 | 2.20 | 2.34 | 2.41 | 2.50 | 3.29 | 3.33 | 3.62 | 4.13 | 5.08 | 5.11 | 3.14 |
| <u>Ilocos</u> | | | | | | | | | | | | | |
| 1972 | 2.20 | - | - | - | - | - | - | - | - | - | - | - | 2.20 |
| 1973 | - | - | - | 2.10 | - | 1.00 | - | - | - | 1.75 | - | 2.50 | 1.84 |
| 1974 | - | - | - | - | - | - | 2.84 | 3.35 | 3.88 | 3.81 | 4.98 | 5.16 | 4.00 |
| 1975 | 3.25 | 3.25 | 3.44 | 3.20 | 2.90 | 2.19 | 2.00 | 2.50 | 1.15 | 3.15 | - | - | 2.70 |
| 1976 | 1.36 | 1.40 | 1.24 | 2.77 | 2.89 | 3.50 | 3.50 | 1.00 | 1.00 | - | 2.50 | 2.50 | 2.15 |
| 1977 | 1.50 | - | - | - | - | - | - | - | - | - | - | - | 1.50 |
| 1978 | - | 1.15 | 1.16 | 1.81 | 2.03 | 2.39 | 3.87 | 4.12 | - | - | 5.12 | 4.54 | 2.91 |

Source: BAEcon

Table 6C-20. Retail Price of Onion

- Ilocos Region -

(Unit: P/kg)

| Month | 1973 | | | 1974 | | | 1975 | | | 1976 | | | 1977 | | | 1978 | | |
|-------------|-------------|-------------|----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | White | Red | Native | W. | R. | Na. | W. | R. | Na. | W. | R. | Na. | W. | R. | Na. | W. | R. | Na. |
| Jan. | - | - | - | 3.00 | 3.50 | 1.52 | 5.00 | 6.71 | 4.53 | 3.06 | 3.97 | 2.50 | 3.58 | 6.00 | 2.63 | 4.22 | 5.25 | 3.35 |
| Feb. | - | - | - | 2.51 | 3.41 | 2.16 | 5.00 | 4.46 | 2.85 | 2.55 | 3.93 | 2.66 | 3.00 | 4.59 | 2.54 | 2.49 | 4.83 | 2.92 |
| Mar. | 0.80 | - | - | 1.80 | 2.69 | 2.95 | 1.60 | 3.04 | 1.78 | 2.40 | 3.34 | 1.94 | 3.29 | 3.50 | 2.56 | 1.97 | 3.93 | 3.23 |
| Apr. | 0.81 | - | - | 1.74 | 2.50 | 2.58 | 1.46 | 3.30 | 2.23 | 2.00 | 2.82 | 2.47 | 2.44 | 3.09 | 2.11 | 2.27 | 3.45 | 3.53 |
| May | - | - | - | 1.85 | 2.35 | 1.82 | 1.19 | 3.67 | 2.76 | 2.32 | 2.93 | 3.39 | 2.48 | 3.00 | 2.13 | 2.22 | 2.73 | 3.91 |
| Jun. | - | - | - | 2.00 | 2.03 | 2.33 | 1.82 | 3.29 | 2.77 | 3.13 | 2.82 | 3.34 | 3.38 | 3.42 | 2.23 | 2.43 | 2.91 | 4.16 |
| Jul. | - | 1.58 | - | 3.00 | 3.57 | 3.50 | 2.99 | 2.97 | 2.87 | 3.48 | 3.08 | 3.41 | 3.44 | 3.06 | 2.71 | 2.43 | 3.22 | 5.12 |
| Aug. | - | 2.08 | - | 3.00 | 4.00 | 3.10 | 3.00 | 3.29 | 2.73 | - | 4.02 | 3.52 | 3.50 | 3.50 | 2.76 | 3.34 | 3.93 | 5.23 |
| Sep. | - | 2.58 | - | - | 4.28 | 3.57 | 3.79 | 3.95 | 3.02 | - | 3.50 | 3.56 | 3.50 | 3.87 | 2.98 | 3.50 | 5.27 | 5.79 |
| Oct. | - | 3.00 | - | - | 4.00 | 3.92 | - | 3.92 | 3.68 | - | 3.64 | 3.56 | 3.50 | 5.06 | 3.28 | 4.00 | 5.91 | 6.22 |
| Nov. | - | 3.00 | - | - | 4.46 | 3.15 | - | 3.77 | 3.78 | - | 4.73 | 2.79 | - | 4.40 | 3.26 | NA | 6.10 | 6.41 |
| Dec. | - | 3.00 | - | - | 5.79 | 3.95 | - | 4.15 | 2.23 | - | 5.78 | 2.38 | - | 4.63 | 3.18 | 4.42 | 4.94 | 4.19 |
| <u>Ave.</u> | <u>0.81</u> | <u>2.54</u> | <u>-</u> | <u>2.36</u> | <u>3.53</u> | <u>2.88</u> | <u>2.87</u> | <u>3.88</u> | <u>2.94</u> | <u>2.71</u> | <u>3.70</u> | <u>2.96</u> | <u>3.21</u> | <u>4.01</u> | <u>2.70</u> | <u>3.28</u> | <u>4.37</u> | <u>4.19</u> |

Source: BAEcon

B. Prices Indicator

I. Agricultural Products in the Project Area

| a) <u>Farm Gate Price</u> | <u>1978</u> | <u>1979</u> | <u>79/78</u> |
|---------------------------|-------------------|--------------------|--------------|
| Palay | 1.1 ₱/kg | 1.3 ₱/kg | 118% |
| Tobacco | 4.7 " <u>1/</u> | 5.9 " <u>2/</u> | 126% |
| Garlic | (5.5) " <u>1/</u> | (13.2) " <u>2/</u> | 240% |
| | 5.0 <u>3/</u> | 5.0 " <u>3/</u> | 100% |

Note: 1/ Average figures of 68 sample of farm Management Survey.
2/ Average figures of 9 sample of Farm Management Survey.
3/ BAEcon, Laoag.

| b) <u>Retail Price (Laoag)</u> | <u>1978</u> | <u>1980 Jan.</u> | <u>80/78</u> |
|--------------------------------|-------------|------------------|--------------|
| Rice | 2 ₱/kg | 2.3 to 2.45 ₱/kg | 115 to 123% |

II. Production Inputs Materials in the Laoag City, Dealer

| a) <u>Fertilizer</u> | <u>1978</u> | <u>1980</u> | <u>80/78</u> | | |
|----------------------|-------------|---------------------|--------------|--------------------|--------------|
| <u>Urea (46)</u> | 80 ₱/bag | 98.5 ₱/bag | 123% | | |
| 16-20-0 | 74 | 93.5 | 126 | | |
| 21-0-0 | 59 | 73.5 | 125 | | |
| 14-14-14 | 68 | 87.5 | 129 | | |
| 12-12-12 | 62 | 76.5 | 123 | | |
| | | | | | |
| b) <u>Pesticides</u> | | | | | |
| Brodan | 48 | 65 | 135 | | |
| Thiodan | 45 | 52.5 | 117 | | |
| Holidol | 45 | 50 | 111 | | |
| Parapest | 3.5/202 | 4.5 | 129 | | |
| | | | | | |
| c) <u>Herbicides</u> | | | | | |
| 2-4-d | 24.0/quart | 30.8 | 128 | | |
| | | | | | |
| d) <u>Fuel</u> | <u>1978</u> | <u>Before Feb.7</u> | <u>80/78</u> | <u>After Feb.8</u> | <u>80/78</u> |
| Gasolin (Regular) | 1.72 P/1 | 2.93 | 170% | 4.30 | 250% |

III. Labor Wage Rate

a) Farm Labor Wage Based on Farm Management Survey

| | <u>1978</u> | <u>1980</u> | <u>80/78</u> |
|----------------|-------------|-------------|--------------|
| Wage with Meal | 6.0 | 9.0 | 150% |

Note: Actual meal cost would be evaluated in 5.0 Pesos of two time meal and 1.5 Pesos of soft drinks at present.

b) Daily Money Wage Rates in Industrial Establishments in Manila and Suburbs

| | <u>1976</u> | <u>1977</u> | | <u>1978</u> | | <u>1979</u> | |
|-----------------|-------------|-------------|--------------|-------------|--------------|-------------|--------------|
| | <u>Oct.</u> | <u>Oct.</u> | <u>77/76</u> | <u>Oct.</u> | <u>78/77</u> | <u>Sep.</u> | <u>79/78</u> |
| | <u>₱</u> | <u>₱</u> | <u>%</u> | <u>₱</u> | <u>%</u> | <u>₱</u> | <u>%</u> |
| Common Laborers | 13.34 | 14.10 | 106 | 14.42 | 102 | 15.33 | 106 |
| Blacksmiths | 16.39 | 19.12 | 107 | 22.12 | 116 | 24.36 | 110 |
| Carpenters | 12.46 | 15.56 | 125 | 18.44 | 118 | 19.80 | 107 |
| Foremans | 25.67 | 26.74 | 104 | 28.61 | 117 | 31.29 | 109 |

Source: Philippine Economic Indicators

Labor Cost in Feasibility Study
- Unit Price Using by NIA -

| <u>Labor</u> | <u>1978</u> P | <u>1980 Jan.</u> | |
|------------------------------|------------------|------------------|--------|
| Worker | 15.62 | 17.18 | |
| Forman (Common) | 23.89 | 26.28 | |
| Forman (Construction) | 23.89 | 27.36 | |
| Chief Worker | 24.87 | 23.41 | |
| Operator of Vehicle | 21.28 | 22.08 | |
| Assistant of Vehicle | 20.27 | | |
| Operation of Heavy Equipment | 15.62 | 26.28 | |
| Assistant of Heavy Equipment | 23.89 | 23.41 | |
| Mason | 21.28 | 23.41 | |
| Carpenter | 21.28 | 23.41 | |
| Smith | 21.28 | 23.41 | |
| Painter | 21.28 | 23.41 | |
| Welder | 23.89 | 26.28 | |
| Asphalt Worker | 15.62 | 17.18 | |
| Watcher | 20.07 | 22.08 | |
| Head Carpenter | 23.89 | 26.28 | |
| Head Smith | 23.89 | 26.28 | |
| Head Welder | 24.87 | 26.28 | |
| <u>Average</u> | <u>21.48</u> | <u>23.94</u> | +11.1% |

IV - 1. Retail Price Index of Selected Commodities in Metro Manila
(1972 = 100)

| | 1976 Oct. | 1977 Oct. | 1978 Oct. | 1979 Oct. |
|--|-----------|----------------|----------------|----------------|
| All Items | 193.5 | 207.1 (+ 7.0) | 224.3 (+ 8.3) | 271.1 (+ 20.9) |
| 1. Food | 178.9 | 197.1 (+ 10.2) | 218.7 (+ 11.0) | 256.7 (+ 17.4) |
| 2. Beverages | 185.7 | 189.3 (+ 1.9) | 207.1 (+ 9.4) | 264.3 (+ 27.6) |
| 3. Tobacco | 194.2 | 196.5 (+ 1.2) | 214.9 (+ 9.4) | 241.1 (+ 12.2) |
| 4. Wearing Apparel | 187.1 | 211.9 (+ 13.3) | 231.6 (+ 9.3) | 270.1 (+ 16.6) |
| 5. Construction Material | 227.1 | 253.7 (+ 11.7) | 297.5 (+ 17.3) | 363.1 (+ 22.0) |
| 6. Fuel | 210.6 | 220.1 (+ 4.5) | 222.2 (+ 1.0) | 317.1 (+ 14.2) |
| 7. Medicinal and Pharmaceutical preparations | 159.0 | 165.1 (+ 3.8) | 170.8 (+ 3.5) | 193.4 (+ 13.2) |
| 8. Office and School Supplies | 221.7 | 236.8 (+ 6.8) | 261.2 (+ 10.3) | 302.6 (+ 15.8) |
| 9. Household Operations and Supplies | 186.5 | 206.3 (+ 10.6) | 216.1 (+ 4.8) | 265.4 (+ 22.8) |

IV - 2. Average Prices of Selected Locally Produced Commodities in Manila

- Pesos -

| | 1976 Oct. | 1977 Oct. | 1978 Oct. | 1979 Oct. |
|--|--------------|---------------|---------------|---------------|
| <u>Construction Materials</u> | | | | |
| 1. Lumber, Tangile, Rough (bd.ft.) | 1.64 | 2.00 (+ 22%) | 2.00 (+ 0%) | 2.38 (+ 19%) |
| 2. Pipes, G.I., Imported, 1/2" x 20' (each) | 35.75 (Dec.) | 35.75 (+ 0%) | 43.64 (+ 22%) | 55.85 (+ 28%) |
| 3. Pipes, specified brand, local (each) | 31.98 (Dec.) | 32.50 (+ 2%) | 33.48 (+ 3%) | 41.69 (+ 25%) |
| 4. G.I. Sheet, Corrugated, 26 G8' x 32" | 32.16 | 36.80 (+ 14%) | 39.68 (+ 8%) | 48.80 (+ 23%) |
| 5. Plywood, 1/4" x 4' x 8", Lauan, Class C (Sheet) | 25.40 | 27.00 (+ 6%) | 29.60 (+ 10%) | 49.87 (+ 68%) |
| 6. Cement, 94 lbs. (bags) | 15.67 | 15.61 (+ 4%) | 16.30 (+ 4%) | 24.50 (+ 50%) |

Source: Philippine Economic Indicators

Vegetable Prices at Central Public Market, Laoag

| Vegetable | 1980 Feb. | | 1978 Aug. | | |
|------------|-----------|--------------|-----------|------------|--|
| | P/kg | Came from | P/kg | Came from | |
| Cabbage | 1.1 | Ilocos Sur | | | |
| Tomato | 1.0 | Ilocos Norte | 1.0 | Baguio | |
| Onion | 2.0 | Pangasinan | 4.0 | Ilocos Sur | |
| Ginger | 2.0 | Baguio | 1.0/piece | | |
| Red Pepper | 1.0 | Ilocos Norte | | | |
| Cariflower | 3.0 | Ilocos Sur | | | |
| Potato | 4.0 | Baguio | 3.5 | Baguio | |
| Carot | 2.5 | Baguio | | | |
| Red Onion | 2.5 | Ilocos Sur | | | |
| Eggplant | 0.3 | Ilocos Sur | 0.3 | | Note: based on the interview by LRED, NIA and Consultants. |
| Coconuts | 1.5/piece | | | | |
| Garlic | | | 15 | | |
| Peanuts | 2.5/ganta | | 3.6/galon | | |
| | | | | | |

Consumer's Price Index for the Philippines (1972 = 100)

| Region | 1977 Feb. | 1978 Feb. | 1979 Feb. | 1980 Feb. |
|-------------|-----------|---------------|---------------|----------------|
| Philippines | 192.5 | 211.0 (+ 9.6) | 228.7 (+ 8.4) | 278.7 (+ 21.9) |

Consumer's Price Index in Metro Manila (1972 = 100)

| Region | 1977 Feb. | 1978 Feb. | 1979 Feb. | 1980 Feb. |
|-------------|-----------|---------------|---------------|----------------|
| Philippines | 182.4 | 196.6 (+ 7.8) | 214.6 (+ 9.2) | 270.2 (+ 25.9) |

Consumer's Price Index for Areas Outside Metro Manila (1972 = 100)

| Region | 1977 Feb. | 1978 Feb. | 1979 Feb. | 1980 Feb. |
|-------------|-----------|---------------|---------------|---------------|
| Philippines | 194.2 | 213.4 (+ 9.9) | 231.0 (+ 8.2) | 280.1 (+21.3) |

General Wholesale Price Index in Metro Manila (1972 = 100)

| Region | 1977 Feb. | 1978 Feb. | 1979 Feb. | 1980 Feb. |
|-------------|-----------|---------------|---------------|----------------|
| Philippines | 225.6 | 240.1 (+ 6.4) | 262.6 (+ 9.4) | 334.1 (+ 27.2) |

Table 6C-21. Manpower Demand and Supply, Laoag Employment Office

| Group | 1978 | | 1977 | | 1976 | |
|---|---------------|--------------------------|--------------------|--------------------------|--------------------|--------------------------|
| | Supply (A) | Demand (B)/(A) (%) | Supply (A) | Demand (B)/(A) (%) | Supply (A) | Demand (B)/(A) (%) |
| 0/1 Professional, technical and related workers | 82 | 51 62 | 105 54 | 51 51 | 126 29 | 23 23 |
| 2 Administrative, executive & managerial workers | 14 | 19 136 | 2 0 | 0 0 | 7 17 | 24 24 |
| 3 Clerical and related workers | 166 | 50 30 | 186 52 | 28 28 | 225 49 | 22 22 |
| 4 Sales workers | 108 | 236 219 | 78 90 | 114 114 | 106 500 | 472 472 |
| 5 Service workers | 46 | 10 22 | 28 20 | 71 71 | 66 71 | 108 108 |
| 6 Agricultural, animal husbandry and forestry workers, fishermen | 5 | 0 0 | 22 23 | 105 105 | 33 35 | 106 106 |
| 7/8/9 Production and related workers, transport equipment operators and laborers | 328 | 249 76 | 461 620 | 134 134 | 376 163 | 43 43 |
| 10 Workers not classifiable by occupation | 48 | 18 38 | 245 261 | 107 107 | 217 220 | 101 101 |
| <u>Total</u> | <u>797</u> | <u>633 79</u> | <u>1,127 1,120</u> | <u>99 99</u> | <u>1,156 1,084</u> | <u>94 94</u> |

Note: Man power supply means applicants registered.
Man power demand means job vacancies solicited.

Table 6C-22. Consumer Price Index for All Income
Households in Ilocos Norte (1972 = 100)

| <u>Commodity Group</u> | <u>1978</u> (Jan.) | <u>1979</u> (Jan.) | <u>1980</u> (Jan.) |
|-------------------------|-----------------------|-----------------------|-----------------------|
| All Items | 208.65 | 248.56 (+ 39.91) | 307.31 (+ 58.75) |
| I. Food | 197.98 | 216.10 (+ 18.12) | 244.06 (+ 27.96) |
| II. Clothing | 213.15 | 232.25 (+ 19.10) | 279.65 (+ 47.40) |
| III. Housing & Repairs | 192.59 | 385.17 (+ 192.58) | 609.87 (+ 224.70) |
| IV. Fuel, Light & Water | 368.29 | 566.74 (+ 198.45) | 762.61 (+ 195.87) |
| V. Services | 205.55 | 216.87 (+ 11.32) | 296.26 (+ 79.39) |
| VI. Miscellaneous | 228.01 | 241.30 (+ 13.29) | 269.29 (+ 27.99) |

Source: National Census and Statistics Office, NEDA, Laoag.

Note:

| | <u>1978</u> (Jan.) | <u>1979</u> (Jan.) | <u>1980</u> (Jan.) |
|---------------------|-----------------------|-----------------------|-----------------------|
| Housing & Repair | | | |
| Minor Repairs | 222.52 | 207.03 (- 15.49) | 282.47 (+ 75.44) |
| Rentals | 182.75 | 443.76 (+ 261.01) | 717.56 (+ 273.80) |
| Fuel, Light & Water | | | |
| Fuel | 368.39 | 566.64 (+ 198.25) | 762.65 (+ 196.01) |
| Light | 330.55 | 763.59 (+ 433.04) | 1,004.79 (+ 241.20) |
| Water | 333.33 | 333.33 (0) | 333.33 (0) |

C. Trade - Import, Export by Year

Table 6C-23. Export of Garlic

| <u>Year</u> | <u>Destination</u> | <u>Quantity</u> ('000kg) | <u>F.O.B.</u> (US\$'000) | <u>Unit Price</u> (US\$/kg) (P/kg) | | <u>Farm-gate</u> <u>Price (March)</u> (P/kg) |
|-------------|--------------------|------------------------------|-----------------------------|---------------------------------------|-------------|--|
| 1974 | Indonesia | 4.0 | 2.15 | 0.54 | 4.05 | 2.83 |
| 1975 | Indonesia | 8.16 | 7.05 | 0.86 | 6.45 | 4.59 |
| 1976 | - | - | - | - | - | 7.54 |
| 1977 | Guam | | | | | |
| | Fresh of | | | | | |
| | Chilled | 0.06 | 0.027 | 0.45 | 3.33 | |
| | Rehydrated or | | | | | |
| | Evaporated | 0.10 | 0.150 | 1.50 | 11.10 | |
| | Total | <u>0.16</u> | <u>0.177</u> | <u>1.11</u> | <u>8.19</u> | <u>5.07</u> |
| 1978 | Singapore | 642.091 | 503.671 | 0.78 | 5.77 | |
| | Hongkong | 288.500 | 231.336 | 0.80 | 5.92 | |
| | Japan | 1.500 | 6.945 | 4.63 | 34.26 | |
| | Total | <u>932.091</u> | <u>741.952</u> | <u>9.80</u> | <u>5.92</u> | <u>3.90</u> |

Note : Farm-gate price is average price received by farmers on March in Ilocos region.

Source: BAEcon

Table 6C-24. Export of Mungbeans

| Country of Destination | 1976 | | 1977 | | 1978 | |
|------------------------|------------------|------------------------------|------------------|------------------------------|------------------|------------------------------|
| | Quantity Tons | F.O.B. US\$ $\times 10^3$ | Quantity Tons | F.O.B. US\$ $\times 10^3$ | Quantity Tons | F.O.B. US\$ $\times 10^3$ |
| Canada | - | - | 0.023 | 0.162 | - | - |
| United States | 0.505 | 0.632 | 2.891 | 4.149 | 0.785 | 1.828 |
| Taiwan | 15.000 | 2.856 | 74.100 | 26.200 | - | - |
| Japan | - | - | 10.000 | 5.011 | - | - |
| Hongkong | 31.500 | 8.40 | - | - | - | - |
| Pacific Islands | - | - | - | - | 0.304 | 0.234 |
| Hawaii | - | - | - | - | 0.348 | 0.350 |
| Guam | 6.765 | 7.166 | 18.606 | 27.287 | 5.866 | 6.804 |
| Total | 53.770 | 19.004 | 105.620 | 62.809 | 7.303 | 9.371 |

Source: BAEcon

1.15

Table 6C-25. Import of Cotton, Philippines

| | <u>Unit</u> | <u>1976</u> | <u>1977</u> |
|----------------|----------------------------|-------------|-------------|
| 1) Quantity | MT | 30,654 | 20,460 |
| 2) F.O.B Value | Dollars 10 ³ \$ | 36,618 | 30,332 |
| 3) C.I.F Value | Dollars 10 ³ \$ | - | 32,829 |
| 4) C.I.F/MT | \$ | - | 1,604 |
| 5) F.O.B/MT | \$ | 1,195 | 1,483 |

Source: 1979 Foreign Trade Statistics of the Philippines

Table 6C-26. Import of Cotton by Main Origin Country

| <u>Country of Origin</u> | <u>1977</u> | | | |
|---------------------------------|-----------------------|------------------------------------|------------------------------------|-----------------------|
| | <u>Quantity</u> MT | <u>F.O.B</u> 10 ³ \$ | <u>C.I.F</u> 10 ³ \$ | <u>F.O.B/MT</u> \$ |
| United States | 18,753 | 27,660 | 29,962 | 1,475 |
| Mexico | 339 | 541 | 584 | 1,596 |
| Guatemala | 445 | 810 | 875 | 1,820 |
| El Salvador | 204 | 370 | 400 | 1,813 |
| Nicaragua | 224 | 358 | 391 | 1,598 |
| India | 2 | 2 | 2 | |
| United Arab Republic (Egypt) | 39 | 128 | 133 | 3,282 |
| Sudan | 36 | 69 | 70 | 1,917 |
| Mozambique | 44 | 76 | 78 | 1,727 |
| Total | <u>20,086</u> | <u>30,014</u> | <u>32,495</u> | <u>15,228</u> |

Note : Commodity is cotton (other than linters), not carded or combed.

Source: IBID

Table 6C-27. Export of Onion, Fresh or Chilled

| Description | 1974 | | 1975 | | 1976 | | 1977 | | 1978 | |
|------------------|-------------------|-------------------------|-------------------|-------------------------|-------------------|-------------------------|-------------------|-------------------------|-------------------|-------------------------|
| | Quantity ('000kg) | F.O.B. Value (US\$'000) | Quantity ('000kg) | F.O.B. Value (US\$'000) | Quantity ('000kg) | F.O.B. Value (US\$'000) | Quantity ('000kg) | F.O.B. Value (US\$'000) | Quantity ('000kg) | F.O.B. Value (US\$'000) |
| 1) United States | - | - | 3.1 | 0.89 | - | - | 7.0 | 3.6 | - | - |
| 2) Fed of Malaya | - | - | 14.0 | 3.61 | - | - | 160.0 | 51.6 | - | - |
| 3) Singapore | - | - | 636.0 | 179.25 | 396.25 | 136.10 | 1,573.68 | 443.92 | 475.0 | 193.79 |
| 4) Hong Kong | 76.73 | 12.95 | 167.28 | 23.15 | 92.34 | 19.74 | 127.51 | 47.31 | 104.23 | 53.93 |
| 5) Japan | 1,424.45 | 383.70 | - | - | 2,774.5 | 623.00 | 4,954.71 | 1,085.73 | 814.51 | 198.91 |
| 6) Netherland | - | - | 175.0 | 36.03 | - | - | - | - | - | - |
| 7) Guam | - | - | 0.4 | 0.09 | - | - | - | - | - | - |
| Total | 1,501.18 | 396.65 | 995.78 | 243.00 | 3,263.09 | 778.84 | 6,822.9 | 1,632.16 | 1,393.74 | 446.63 |

F.O.B. Price (US\$/kg)
(P/kg)

Domestic Price P/kg

0.26
1.95
4.00

0.24
1.80
2.70

0.24
1.80
2.15

0.24
1.80
2.15

0.24
1.80
2.15

0.24
1.80
2.15

0.32
2.37
2.91

Note : Domestic Price is Farm-gate Price of Ilocos except that of Philippines.

Source: BAEcon

Economic Costs of Farm Labor

A. Methods of Estimation

Pricing of farm labor is the assessment of the opportunity cost. The opportunity costs are estimated in the following criteria.

Point A: The opportunity for off-farm employment

During the "non-peak period" farmers can, and often do, undertake activities like fishing, carpentry, home repairs, wood gathering, cottage industries, construction work and other casual labor. Wage rates of these jobs are unclear. According to the farm labor wage survey by NIA, however, the meal cost for hired labor is 5 pesos. The value of the incremental caloric intake demanded by changes in labor activity would be considered 5 pesos.

Point B: The farm work season as usual (non-peak period)

The opportunities for work would compete with the permanent off-farm employment opportunities. The less production off-farm employment is scarce, the more farm labor force is drawn into farm work. The least farm wage without meal, according to the NIA survey, is about 8 pesos. This rate would be in the marginal rate to compete with the off-farm employment.

Point C: The full employment peak period

At the employment level corresponding to full employment back periods, the opportunity cost is equal to the observed market wage rate. Average farm hired labor wage of 15 pesos in the Project Area is considered as market wage rate.

Point D: The attractive farm wage rate

Labor would be hired under the more demand than the full employment for farmers themselves. Then wage rate go up. The opportunity

cost of alternative labor pool correspond to the highest level of farm labor wage in the Project Area.

It is postulated that the marginal opportunity cost of labor supplied for farm work in the Project Area can be represent by an "S shaped" curves which is drawn in Figure 6C-1 and 6C-2 using Point A, B, C and D as mentioned above.

2. Avairable Farm Labor Force

In the Project Area, it is scarecely that peoples get the opportunity of occupation except for farm labor. Under this conditions, the farm laborers projections in the Project Area are estimated on the assumption that there are fixed relation between total laborer and farm laborer. Farm laborers estimations are done by correlation analysis using the time series data of total populat-ions, total laborers, total farm laborers and etc. The result of the estimation is shown in table 6C-39.

Moreover, in this estimations, farm laborer is separated into full and part time laborer. The meaning of them are as followed.

a) Full time farm laborer

The farm laborers of from 15 to 64 years old except housekeepers are keeping up for the most part of the agricultural production in the Project Area. For this reason, the farm laborers of from 15 to 64 years old except housekeepers are considered the full time farm laborers in this study. The number of full time farm laborers is rising at the rate of 1.9 percent per year, though the rate of full time laborers out of the total laborers is falling.

b) Part time farm laborer

Farm housekeepers except pregnant women and the farm laborers of from 10 to 14 years old, over 65 years old and are considered the part time farm laborers who support the full

time farm laborers. The annual raising rate of the laborers of from 10 to 15 and over 65 years old is minus 0.7 percent. On the other hand, the number of the farm housekeepers except pregnant women are rising at the rate of 0.1 percent per year.

3. Total Labor Demand by Month

The labor demand by month which are shown in Table 6C-38 and was calculated based on the labor requirement of agri-production and construction. These man days by month are converted to percentage of potential full employment as shown at Table 6C-41 and 6C-43.

4. Wage Rate by Month

Wage rate, namely, marginal opportunity cost are assumed by application of percentage of potential full employment of "S-shaped" curve.

Table 6C-28. Monthly Labor Requirements by Crop, Present
(Man-days/month/ha)

| Crops & Operation | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|--------------|
| 1. Paddy, Irrigated, Wet | - | - | - | - | - | 8.0 | 22.1 | 12.8 | 3.1 | 12.8 | 17.5 | - | 76.3 (27.4) |
| 1. Seed-bedding | - | - | - | - | - | 1.1 | 1.4 | 0.2 | - | - | - | - | 2.7 (0.1) |
| 2. Land preparation | - | - | - | - | - | 6.2 | 7.7 | 3.8 | - | - | - | - | 17.7 (4.6) |
| 3. Transplanting | - | - | - | - | - | - | 10.8 | 5.6 | - | - | - | - | 16.4 (8.4) |
| 4. Fertilizing | - | - | - | - | - | - | 0.3 | 0.3 | 0.3 | 0.1 | - | - | 1.0 (-) |
| 5. Spraying | - | - | - | - | - | - | 0.2 | 0.4 | 0.4 | 0.1 | - | - | 1.1 (-) |
| 6. Weeding | - | - | - | - | - | - | 0.9 | 1.8 | 1.7 | 0.6 | - | - | 5.0 (0.1) |
| 7. Water management | - | - | - | - | - | 0.7 | 0.8 | 0.7 | 0.7 | 0.7 | 0.1 | - | 3.7 (-) |
| 8. Harvesting | - | - | - | - | - | - | - | - | - | 7.1 | 8.9 | - | 16.0 (9.0) |
| 9. Post harvesting | - | - | - | - | - | - | - | - | - | 4.2 | 8.5 | - | 12.7 (5.2) |
| 2. Paddy, Irrigated, Dry | 4.1 | 3.4 | 23.5 | 17.8 | - | - | - | - | - | 3.9 | 18.0 | 25.5 | 96.2 (23.5) |
| 1. Seed-bedding | - | - | - | - | - | - | - | - | - | 0.7 | 2.1 | 1.1 | 3.9 (-) |
| 2. Land preparation | - | - | - | - | - | - | - | - | - | 2.7 | 8.2 | 8.2 | 19.1 (5.9) |
| 3. Transplanting | - | - | - | - | - | - | - | - | - | - | 6.0 | 12.1 | 18.1 (8.5) |
| 4. Fertilizing | 0.3 | 0.3 | 0.2 | - | - | - | - | - | - | - | 0.3 | 0.3 | 1.4 (-) |
| 5. Spraying | 0.4 | 0.3 | - | - | - | - | - | - | - | - | 0.4 | - | 1.1 (-) |
| 6. Weeding | 1.9 | 1.5 | - | - | - | - | - | - | - | - | 1.9 | - | 5.3 (-) |
| 7. Water management | 1.5 | 1.3 | 1.5 | 0.2 | - | - | - | - | - | 0.5 | 1.4 | 1.5 | 7.9 (-) |
| 8. Harvesting | - | - | 11.3 | 5.4 | - | - | - | - | - | - | - | - | 16.7 (5.6) |
| 9. Post harvesting | - | - | 10.5 | 12.2 | - | - | - | - | - | - | - | - | 22.7 (3.5) |
| 3. Paddy, Rainfed, Wet | 1.6 | - | - | - | - | 14.3 | 17.6 | 11.0 | 2.9 | 7.0 | 9.6 | 9.6 | 73.6 (19.5) |
| 1. Seed-bedding | - | - | - | - | - | 0.9 | 1.1 | 0.2 | - | - | - | - | 2.2 (-) |
| 2. Land preparation | - | - | - | - | - | 6.2 | 7.7 | 3.9 | - | - | - | - | 17.8 (0.3) |
| 3. Transplanting | - | - | - | - | - | 7.1 | 7.1 | 4.0 | - | - | - | - | 18.2 (6.4) |
| 4. Fertilizing | - | - | - | - | - | 0.1 | 0.5 | 0.5 | 0.5 | 0.4 | - | - | 2.0 (-) |
| 5. Spraying | - | - | - | - | - | - | 0.3 | 0.6 | 0.6 | 0.1 | - | - | 1.6 (-) |
| 6. Weeding | - | - | - | - | - | - | 0.9 | 1.8 | 1.8 | 0.6 | - | - | 5.1 (0.3) |
| 7. Water management | - | - | - | - | - | - | - | - | - | - | - | - | - (-) |
| 8. Harvesting | - | - | - | - | - | - | - | - | - | 3.6 | 5.0 | 5.0 | 13.6 (7.7) |
| 9. Post harvesting | 1.6 | - | - | - | - | - | - | - | - | 2.3 | 4.6 | 4.6 | 13.1 (4.8) |
| 4. Tobacco | 18.2 | 27.8 | 28.9 | 25.0 | 10.0 | - | - | - | 1.2 | 10.2 | 23.9 | 28.2 | 173.4 (8.6) |
| 1. Seed-bedding | - | - | - | - | - | - | - | - | 1.2 | 7.1 | 5.7 | - | 14.0 (-) |
| 2. Land preparation | - | - | - | - | - | - | - | - | - | 3.1 | 8.5 | 8.5 | 20.1 (0.4) |
| 3. Transplanting | - | - | - | - | - | - | - | - | - | 6.6 | 13.8 | - | 20.4 (1.4) |
| 4. Fertilizing | 1.5 | 0.5 | - | - | - | - | - | - | - | - | 1.0 | 1.5 | 4.5 (-) |
| 5. Weeding/Cultivating | - | - | - | - | - | - | - | - | - | - | - | - | - (-) |
| 6. Spraying | 2.4 | 2.2 | 2.3 | - | - | - | - | - | - | 0.8 | 2.4 | - | 10.1 (-) |
| 7. Irrigation | 2.0 | 1.8 | 1.0 | - | - | - | - | - | - | 1.3 | 2.0 | - | 8.1 (-) |
| 8. Topping/Sucker control | - | 0.1 | - | - | - | - | - | - | - | - | - | - | 0.1 (-) |
| 9. Harvesting | 3.5 | 6.7 | 7.4 | 7.4 | 1.2 | - | - | - | - | - | - | - | 26.2 (2.8) |
| 10. Post harvesting | 8.8 | 16.5 | 18.2 | 17.6 | 8.8 | - | - | - | - | - | - | - | 69.9 (4.0) |
| 5. Garlic | 1.6 | 25.4 | 30.7 | - | - | - | - | - | - | 4.5 | 30.4 | 16.8 | 109.4 (20.1) |
| 1. Land preparation | - | - | - | - | - | - | - | - | - | 4.5 | 13.5 | 6.7 | 24.7 (4.1) |
| 2. Planting | - | - | - | - | - | - | - | - | - | - | 14.1 | 7.5 | 21.6 (7.4) |
| 3. Fertilizing | - | - | - | - | - | - | - | - | - | 2.0 | 1.0 | - | 3.0 (-) |
| 4. Thinning | - | - | - | - | - | - | - | - | - | - | - | - | - (-) |
| 5. Spraying | - | - | - | - | - | - | - | - | - | - | - | - | - (-) |
| 6. Irrigation | 1.6 | 0.8 | - | - | - | - | - | - | - | - | 0.8 | 1.6 | 4.8 (0.1) |
| 7. Harvesting | - | 24.6 | 30.7 | - | - | - | - | - | - | - | - | - | 55.3 (8.5) |
| 8. Post harvesting | - | - | - | - | - | - | - | - | - | - | - | - | - (-) |
| 9. Removal of hay | - | - | - | - | - | - | - | - | - | - | - | - | - (-) |
| 6. Mungbeans | - | 3.3 | 14.8 | 17.1 | 6.7 | 12.1 | 7.0 | - | - | - | - | - | 61.0 (11.2) |
| 1. Land preparation | - | 3.3 | 10.3 | 6.4 | - | - | - | - | - | - | - | - | 22.0 (2.3) |
| 2. Planting/Thinning | - | - | 1.8 | 2.7 | 0.5 | - | - | - | - | - | - | - | 5.0 (4.1) |
| 3. Fertilizing | - | - | - | - | - | - | - | - | - | - | - | - | - (-) |
| 4. Cultivation/Weeding | - | - | 2.2 | 3.3 | 0.5 | - | - | - | - | - | - | - | 6.0 (-) |
| 5. Spraying | - | - | 0.5 | 2.7 | 2.8 | - | - | - | - | - | - | - | 6.0 (0.1) |
| 6. Harvesting | - | - | - | - | 1.8 | 5.5 | 2.7 | - | - | - | - | - | 10.0 (4.7) |
| 7. Threshing & cleaning | - | - | - | - | 0.9 | 5.5 | 3.6 | - | - | - | - | - | 10.0 (-) |
| 8. Drying & cleaning | - | - | - | - | 0.2 | 1.1 | 0.7 | - | - | - | - | - | 2.0 (-) |

Note: Figures in parenthesis means hired labor

Table 6C-29. Monthly Labor Requirements by Crop, Without Project
(Man-days/month/year)

| Crops & Operation | Jan | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|--------------|
| 1. Paddy, Irrigated, Wet | - | - | - | - | - | 8.0 | 22.1 | 12.8 | 3.1 | 14.3 | 19.8 | - | 80.1 (49.3) |
| 1. Seed-beding | - | - | - | - | - | 1.1 | 1.4 | 0.2 | - | - | - | - | 2.7 (0.2) |
| 2. Land preparation | - | - | - | - | - | 6.2 | 7.7 | 3.8 | - | - | - | - | 17.7 (14.6) |
| 3. Transplanting | - | - | - | - | - | - | 10.8 | 5.6 | - | - | - | - | 16.4 (3.4) |
| 4. Fertilizing | - | - | - | - | - | - | 0.3 | 0.3 | 0.3 | 0.1 | - | - | 1.0 (1.1) |
| 5. Spraying | - | - | - | - | - | - | 0.2 | 0.4 | 0.4 | 0.1 | - | - | 1.1 (1.1) |
| 6. Weeding | - | - | - | - | - | - | 0.9 | 1.8 | 1.7 | 0.6 | - | - | 5.0 (0.2) |
| 7. Water management | - | - | - | - | - | 0.7 | 0.8 | 0.7 | 0.7 | 0.7 | 0.1 | - | 3.7 (1.1) |
| 8. Harvesting | - | - | - | - | - | - | - | - | - | 8.0 | 10.1 | - | 18.1 (10.2) |
| 9. Post harvesting | - | - | - | - | - | - | - | - | - | 4.8 | 9.6 | - | 14.4 (5.9) |
| 2. Paddy, Irrigated, Dry | 4.1 | 3.4 | 27.9 | 21.3 | - | - | - | - | - | 3.9 | 18.0 | 25.5 | 104.1 (25.3) |
| 1. Seed-beding | - | - | - | - | - | - | - | - | - | 0.7 | 2.1 | 1.1 | 3.9 (1.1) |
| 2. Land preparation | - | - | - | - | - | - | - | - | - | 2.7 | 8.2 | 9.2 | 19.1 (5.9) |
| 3. Transplanting | - | - | - | - | - | - | - | - | - | 6.0 | 12.1 | 18.1 | 36.2 (8.5) |
| 4. Fertilizing | 0.3 | 0.3 | 0.2 | - | - | - | - | - | - | 0.3 | 0.3 | 1.4 | 2.5 (1.1) |
| 5. Spraying | 0.4 | 0.3 | - | - | - | - | - | - | - | - | 0.4 | - | 1.1 (1.1) |
| 6. Weeding | 1.9 | 1.5 | - | - | - | - | - | - | - | - | 1.9 | - | 5.3 (1.1) |
| 7. Water management | 1.5 | 1.3 | 1.5 | 0.2 | - | - | - | - | - | 0.5 | 1.4 | 1.5 | 7.9 (1.1) |
| 8. Harvesting | - | - | 13.6 | 6.5 | - | - | - | - | - | - | - | - | 20.1 (6.7) |
| 9. Post harvesting | - | - | 12.6 | 14.6 | - | - | - | - | - | - | - | - | 27.2 (4.2) |
| 3. Paddy, Rainfed, Wet | 1.8 | - | - | - | - | 14.3 | 17.6 | 11.0 | 2.9 | 7.8 | 10.9 | 10.8 | 77.1 (22.2) |
| 1. Seed-beding | - | - | - | - | - | 0.9 | 1.1 | 0.2 | - | - | - | - | 2.2 (1.1) |
| 2. Land preparation | - | - | - | - | - | 6.2 | 7.7 | 3.9 | - | - | - | - | 17.8 (9.3) |
| 3. Transplanting | - | - | - | - | - | 7.1 | 7.1 | 4.0 | - | - | - | - | 18.2 (6.4) |
| 4. Fertilizing | - | - | - | - | - | 0.1 | 0.5 | 0.5 | 0.5 | 0.4 | - | - | 2.0 (1.1) |
| 5. Spraying | - | - | - | - | - | - | 0.3 | 0.6 | 0.6 | 0.1 | - | - | 1.6 (1.1) |
| 6. Weeding | - | - | - | - | - | - | 0.9 | 1.8 | 1.8 | 0.6 | - | - | 5.1 (3.3) |
| 7. Water management | - | - | - | - | - | - | - | - | - | - | - | - | - (1.1) |
| 8. Harvesting | - | - | - | - | - | - | - | - | - | 4.1 | 5.7 | 5.6 | 15.4 (8.7) |
| 9. Post harvesting | 1.8 | - | - | - | - | - | - | - | - | 2.6 | 5.2 | 5.2 | 14.8 (5.4) |
| 4. Tobacco | 20.7 | 32.7 | 34.3 | 30.3 | 12.1 | - | - | - | 1.2 | 10.2 | 23.9 | 28.2 | 193.6 (10.3) |
| 1. Seed-beding | - | - | - | - | - | - | - | - | 1.2 | 7.1 | 5.7 | - | 14.0 (1.1) |
| 2. Land preparation | - | - | - | - | - | - | - | - | - | 3.1 | 8.5 | 8.5 | 20.1 (0.4) |
| 3. Transplanting | - | - | - | - | - | - | - | - | - | 6.6 | 13.8 | 20.4 | 40.8 (1.4) |
| 4. Fertilizing | 1.5 | 0.5 | - | - | - | - | - | - | - | - | 1.0 | 1.5 | 4.5 (1.1) |
| 5. Weeding/Cultivating | - | - | - | - | - | - | - | - | - | - | - | - | - (1.1) |
| 6. Spraying | 2.4 | 2.2 | 2.3 | - | - | - | - | - | - | 0.8 | 2.4 | - | 10.1 (1.1) |
| 7. Irrigation | 2.0 | 1.8 | 1.0 | - | - | - | - | - | - | 1.3 | 2.0 | - | 8.1 (1.1) |
| 8. Topping/Sucker control | - | 0.1 | - | - | - | - | - | - | - | - | - | - | 0.1 (1.1) |
| 9. Harvesting | 4.2 | 8.1 | 9.0 | 9.0 | 1.5 | - | - | - | - | - | - | - | 31.8 (3.4) |
| 10. Post harvesting | 10.6 | 20.0 | 22.0 | 21.3 | 10.6 | - | - | - | - | - | - | - | 84.5 (4.8) |
| 5. Garlic | 1.6 | 29.6 | 35.9 | - | - | - | - | - | - | 4.5 | 30.4 | 16.8 | 118.8 (21.6) |
| 1. Land preparation | - | - | - | - | - | - | - | - | - | 4.5 | 13.5 | 6.7 | 24.7 (4.1) |
| 2. Planting | - | - | - | - | - | - | - | - | - | 14.1 | 7.5 | 21.6 | 43.2 (7.4) |
| 3. Fertilizing | - | - | - | - | - | - | - | - | - | 2.0 | 1.0 | 3.0 | 6.0 (1.1) |
| 4. Thinning | - | - | - | - | - | - | - | - | - | - | - | - | - (1.1) |
| 5. Spraying | - | - | - | - | - | - | - | - | - | - | - | - | - (1.1) |
| 6. Irrigation | 1.6 | 0.8 | - | - | - | - | - | - | - | - | 0.8 | 1.6 | 4.8 (0.1) |
| 7. Harvesting | - | 28.8 | 35.9 | - | - | - | - | - | - | - | - | - | 64.7 (9.9) |
| 8. Post harvesting | - | - | - | - | - | - | - | - | - | - | - | - | - (1.1) |
| 9. Removal of hay | - | - | - | - | - | - | - | - | - | - | - | - | - (1.1) |
| 6. Mungbeans | - | 3.3 | 14.8 | 17.1 | 7.9 | 14.7 | 8.5 | - | - | - | - | - | 65.7 (12.2) |
| 1. Land preparation | - | 3.3 | 10.3 | 8.4 | - | - | - | - | - | - | - | - | 22.0 (2.3) |
| 2. Planting/Thinning | - | - | 1.8 | 2.7 | 0.5 | - | - | - | - | - | - | - | 5.0 (4.1) |
| 3. Fertilizing | - | - | - | - | - | - | - | - | - | - | - | - | - (1.1) |
| 4. Cultivation/Weeding | - | - | 2.2 | 3.3 | 0.5 | - | - | - | - | - | - | - | 6.0 (1.1) |
| 5. Spraying | - | - | 0.5 | 2.7 | 2.8 | - | - | - | - | - | - | - | 6.0 (0.1) |
| 6. Harvesting | - | - | - | - | 2.2 | 6.7 | 3.3 | - | - | - | - | - | 12.2 (5.7) |
| 7. Threshing & cleaning | - | - | - | - | 1.1 | 6.7 | 4.4 | - | - | - | - | - | 12.2 (1.1) |
| 8. Drying & cleaning | - | - | - | - | 0.2 | 1.3 | 0.8 | - | - | - | - | - | 2.3 (1.1) |

Note: Figures in parenthesis means hired labor

Table 6C-32. Monthly Manpower Requirements by Crop (Phase II and Phase I remaining field)

(Unit: 10³ man-days)

| Crop | Area ha | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
|---------------------------------|------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| | | | | | | | | | | | | | | |
| 1 Paddy Rice, Irrigated, Wet | (P) | 5,717 | - | - | 0.1 | 7.0 | 69.8 | 108.5 | 61.2 | 20.1 | 73.3 | 89.9 | 2.6 | 432.6 |
| | (WO) | 5,717 | - | - | 0.1 | 7.0 | 69.8 | 108.5 | 61.2 | 20.1 | 73.7 | 99.7 | 2.6 | 448.7 |
| | (W) | 7,170 | - | - | - | 6.8 | 140.1 | 349.8 | 98.8 | 43.5 | 256.6 | 70.7 | - | 968.3 |
| | (W)E/ | 4,200 | - | - | - | - | 100.0 | 120.5 | 36.1 | 52.0 | 109.6 | 2.5 | - | 436.8 |
| 2 Paddy Rice, Irrigated, Dry | (P) | 1,197 | 6.5 | 8.2 | 20.8 | 13.2 | 1.6 | - | - | 0.1 | 9.5 | 20.4 | 19.1 | 69.4 |
| | (WO) | 1,197 | 6.5 | 8.2 | 23.8 | 15.6 | 1.6 | - | - | 0.1 | 9.5 | 20.4 | 19.1 | 104.8 |
| | (W) | 11,500 | 71.6 | 171.0 | 249.7 | 25.5 | - | - | - | - | 63.4 | 324.6 | 297.3 | 1,203.0 |
| | (W)E/ | 1,030 | - | - | - | - | - | 33.2 | 22.2 | 5.7 | 21.3 | 17.6 | - | 107.1 |
| 3 Paddy Rice, Rainfed, Wet | (P) | 9,051 | 13.8 | - | - | 0.1 | 1.4 | 129.4 | 159.4 | 98.0 | 26.5 | 89.8 | 84.0 | 666.0 |
| | (WO) | 9,051 | 15.5 | - | - | 0.1 | 1.4 | 129.4 | 159.4 | 98.0 | 26.5 | 100.9 | 94.3 | 696.0 |
| | (W) | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | (W)E/ | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4 Tobacco | (P) | 2,322 | 42.3 | 64.6 | 67.1 | 58.1 | 23.2 | - | - | 2.8 | 23.7 | 55.5 | 65.5 | 402.6 |
| | (WO) | 2,322 | 48.1 | 75.9 | 79.6 | 70.4 | 28.1 | - | - | 2.8 | 23.7 | 55.5 | 65.5 | 449.5 |
| | (W) | 2,340 | 108.4 | 121.7 | 119.0 | 80.7 | 5.3 | - | - | 17.4 | 49.5 | 72.8 | 78.9 | 653.7 |
| | (W)E/ | 3,911 | 6.3 | 99.3 | 120.1 | - | - | - | - | - | 17.6 | 118.9 | 65.7 | 427.9 |
| 5 Garlic | (P) | 3,911 | 6.3 | 115.8 | 140.4 | - | - | - | - | - | 17.6 | 118.9 | 65.7 | 464.8 |
| | (WO) | 3,911 | 6.3 | 115.8 | 140.4 | - | - | - | - | - | 17.6 | 118.9 | 65.7 | 464.8 |
| | (W) | 4,520 | 37.0 | 205.9 | 130.2 | 5.8 | - | - | - | 5.6 | 145.2 | 200.7 | 24.5 | 754.8 |
| | (W)E/ | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 6 Hungbeans | (P) | 1,091 | - | 3.6 | 16.1 | 18.7 | 7.3 | 13.2 | 7.6 | - | - | - | - | 66.6 |
| | (WO) | 1,091 | - | 3.6 | 16.1 | 18.7 | 8.0 | 16.0 | 9.3 | - | - | - | - | 71.7 |
| | (W) | 2,065 | - | - | 15.3 | 49.8 | 26.8 | 48.1 | 37.2 | - | - | - | - | 178.2 |
| | (W)E/ | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7 Cotton | (P) | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | (WO) | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | (W) | 1,030 | 7.0 | 15.0 | 30.4 | 8.8 | - | - | - | 2.2 | 28.3 | 37.0 | 15.5 | 144.1 |
| | (W)E/ | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 8 Onion | (P) | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | (WO) | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | (W) | 250 | 4.5 | 8.9 | 8.7 | 0.7 | - | - | 0.3 | 0.7 | 2.4 | 21.2 | 5.8 | 53.0 |
| | (W)E/ | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 9 Corn | (P) | 275 | 0.3 | 2.8 | - | - | - | - | - | - | - | 3.4 | - | 13.0 |
| | (WO) | 275 | 0.3 | 2.8 | - | - | - | - | - | - | - | 3.4 | - | 13.0 |
| | (W) | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | (W)E/ | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Total | (P) | 23,564 | 69.1 | 178.4 | 224.1 | 90.1 | 40.6 | 212.3 | 275.8 | 159.2 | 49.4 | 377.8 | 236.9 | 2,108.0 |
| | (WO) | 23,564 | 76.6 | 206.2 | 260.0 | 104.8 | 46.1 | 215.2 | 277.5 | 159.2 | 49.4 | 398.7 | 247.2 | 2,248.4 |
| | (W) | 36,225 | 228.5 | 538.9 | 587.7 | 148.2 | 83.2 | 310.4 | 492.4 | 140.9 | 142.7 | 674.6 | 421.9 | 4,499.1 |
| | (W)E/ | - | - | - | - | - | - | - | - | - | - | - | - | - |

Note: 1/ Present is 1978
 2/ Without project is 1992
 3/ With project is 1992
 4/ Followed by paddy rice, dry season
 5/ Followed by garlic, dry season
 6/ Followed by cotton, dry season

Table 6C-35. Monthly Farm Labor Requirement without Project (Excluded Phase I Remaining Area)
- Family and Hired Labor-

| Year | (Unit: 10 ³ man-days) | | | | | | | | | | | | |
|------|----------------------------------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|---------|
| | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
| 1983 | 67.8 | 179.0 | 231.6 | 93.6 | 32.4 | 171.0 | 253.2 | 148.8 | 40.8 | 163.1 | 349.9 | 234.4 | 1,965.5 |
| 1984 | 68.2 | 180.9 | 234.0 | 94.6 | 32.7 | 171.2 | 253.3 | 148.8 | 40.8 | 164.0 | 351.3 | 235.1 | 1,974.9 |
| 1985 | 68.7 | 182.7 | 236.3 | 95.6 | 33.1 | 171.4 | 253.4 | 148.8 | 40.8 | 164.8 | 352.8 | 235.7 | 1,984.2 |
| 1986 | 69.2 | 184.6 | 238.7 | 96.6 | 33.5 | 171.5 | 253.5 | 148.8 | 40.8 | 165.7 | 354.2 | 236.4 | 1,993.5 |
| 1987 | 69.7 | 186.4 | 241.0 | 97.6 | 33.8 | 171.7 | 253.6 | 148.8 | 40.8 | 166.5 | 355.7 | 237.1 | 2,002.9 |
| 1988 | 70.2 | 188.3 | 243.4 | 98.6 | 34.2 | 171.9 | 253.7 | 148.8 | 40.8 | 167.4 | 357.1 | 237.8 | 2,012.2 |
| 1989 | 70.6 | 190.2 | 245.8 | 99.6 | 34.6 | 172.0 | 253.8 | 148.8 | 40.8 | 168.3 | 358.6 | 238.5 | 2,021.6 |
| 1990 | 71.1 | 192.0 | 248.1 | 100.6 | 35.0 | 172.2 | 253.9 | 148.8 | 40.8 | 169.1 | 360.0 | 239.2 | 2,030.9 |
| 1991 | 71.6 | 193.9 | 250.5 | 101.6 | 35.3 | 172.4 | 254.0 | 148.8 | 40.8 | 170.0 | 361.5 | 239.9 | 2,040.3 |
| 1992 | 72.6 | 197.6 | 255.2 | 103.5 | 36.1 | 172.7 | 254.3 | 148.8 | 40.8 | 171.7 | 364.4 | 241.2 | 2,058.9 |

Table 6C-36. Monthly Farm Labor Requirement with Project (Excluded Phase I Remaining Area)
- Family and Hired Labor -

| Year | (Unit: 10 ³ man-days) | | | | | | | | | | | | |
|------|----------------------------------|-------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|---------|
| | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
| 1983 | 67.8 | 179.0 | 231.6 | 93.6 | 32.4 | 171.0 | 253.2 | 148.8 | 40.8 | 163.1 | 350.0 | 234.4 | 1,965.5 |
| 1984 | 66.4 | 180.2 | 233.2 | 94.3 | 32.6 | 171.9 | 280.5 | 147.7 | 40.6 | 169.5 | 337.1 | 224.7 | 1,978.8 |
| 1985 | 63.9 | 182.7 | 236.4 | 95.7 | 33.2 | 181.0 | 343.6 | 143.9 | 39.8 | 180.4 | 299.2 | 208.7 | 2,008.6 |
| 1986 | 63.0 | 184.0 | 238.1 | 96.4 | 33.4 | 182.1 | 370.4 | 142.8 | 39.6 | 192.5 | 286.5 | 199.5 | 2,028.3 |
| 1987 | 61.7 | 186.3 | 241.1 | 97.7 | 33.9 | 180.3 | 391.6 | 142.7 | 39.5 | 193.0 | 259.9 | 188.8 | 2,016.4 |
| 1988 | 149.1 | 334.2 | 322.1 | 96.6 | 58.7 | 254.1 | 423.7 | 122.8 | 110.7 | 550.6 | 487.5 | 229.3 | 3,139.3 |
| 1989 | 153.4 | 356.8 | 344.4 | 101.6 | 63.1 | 257.5 | 423.7 | 122.8 | 113.3 | 559.2 | 490.0 | 229.3 | 3,215.2 |
| 1990 | 157.6 | 379.5 | 366.7 | 106.7 | 67.5 | 260.9 | 423.7 | 122.8 | 116.0 | 567.7 | 492.5 | 229.3 | 3,291.0 |
| 1991 | 162.1 | 405.7 | 392.2 | 112.1 | 72.5 | 264.8 | 423.7 | 122.8 | 117.7 | 577.5 | 494.3 | 229.3 | 3,374.7 |
| 1992 | 165.7 | 425.8 | 411.6 | 116.3 | 76.4 | 267.8 | 423.7 | 122.8 | 118.7 | 583.0 | 495.2 | 229.3 | 3,436.4 |

Table 6C-37. Monthly Construction Labor Requirement with Project
- Unskilled Labor Requirement in Phase II Area -

(Unit: 10³ Persons)

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 1983 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 5.2 | 5.2 | 5.2 | 5.2 | 13.0 | 13.1 | 13.3 | 76.7 |
| 1984 | 43.2 | 43.1 | 42.8 | 42.7 | 42.5 | 16.4 | 16.2 | 16.1 | 16.2 | 42.1 | 42.4 | 42.6 | 406.3 |
| 1985 | 78.8 | 78.7 | 78.5 | 78.2 | 78.2 | 30.7 | 30.7 | 30.7 | 30.7 | 78.2 | 78.4 | 78.4 | 750.2 |
| 1986 | 72.7 | 72.7 | 72.7 | 72.4 | 72.1 | 32.0 | 32.0 | 31.9 | 32.0 | 72.3 | 72.6 | 72.6 | 708.0 |
| 1987 | 42.8 | 42.8 | 42.8 | 42.8 | 42.8 | 25.1 | 25.0 | 25.0 | 25.0 | 42.8 | 42.9 | 42.9 | 442.7 |
| 1988 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1989 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1990 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1991 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1992 | - | - | - | - | - | - | - | - | - | - | - | - | - |

Table 6C-38. Monthly Total Labor Requirement with Project (Excluded Phase I Remaining Area)

(Unit: 10³ Persons)

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
| 1983 | 71.1 | 182.3 | 234.9 | 96.9 | 35.7 | 176.2 | 258.4 | 154.0 | 46.0 | 176.1 | 363.1 | 247.7 | 2,042.4 |
| 1984 | 109.6 | 223.3 | 276.0 | 137.0 | 75.1 | 188.3 | 296.7 | 163.8 | 56.8 | 211.6 | 379.5 | 267.3 | 2,385.9 |
| 1985 | 142.7 | 261.4 | 314.9 | 173.9 | 111.4 | 211.7 | 374.3 | 174.6 | 70.5 | 258.6 | 377.6 | 287.1 | 2,758.7 |
| 1986 | 135.7 | 256.7 | 310.8 | 168.8 | 105.5 | 214.1 | 402.4 | 174.7 | 71.6 | 264.8 | 359.1 | 272.1 | 2,736.3 |
| 1987 | 104.5 | 229.1 | 283.9 | 140.5 | 76.7 | 205.4 | 416.6 | 167.7 | 64.5 | 235.8 | 302.8 | 231.7 | 2,459.2 |
| 1988 | 149.1 | 334.2 | 322.1 | 96.6 | 58.7 | 254.1 | 423.7 | 122.8 | 110.7 | 550.6 | 487.5 | 229.3 | 3,139.4 |
| 1989 | 153.4 | 356.8 | 344.4 | 101.6 | 63.1 | 257.5 | 423.7 | 122.8 | 113.3 | 559.2 | 490.0 | 229.3 | 3,215.1 |
| 1990 | 157.6 | 379.5 | 366.7 | 106.7 | 67.5 | 260.9 | 423.7 | 122.8 | 116.0 | 567.7 | 492.5 | 229.3 | 3,291.0 |
| 1991 | 162.1 | 405.7 | 392.2 | 112.1 | 72.5 | 264.8 | 423.7 | 122.8 | 117.7 | 577.5 | 494.3 | 229.3 | 3,374.7 |
| 1992 | 165.7 | 425.8 | 411.6 | 116.3 | 76.4 | 267.8 | 423.7 | 122.8 | 118.7 | 583.0 | 495.2 | 229.3 | 3,436.4 |

Table 6C-39. Population and Farm Laborer Projections in the Project Area
(Excluded Phase I remaining Area)

(Unit: Persons)

| Year | Total Population | Farm Laborer | | House Keepers | total | Total | Total Farm Laborer per Month # |
|-------|------------------|--|---|---------------|--------|--------|--------------------------------|
| | | Full time laborer 15 years old and over to 64 years old & under | Part time laborer 10 years old & over to 14 years old & under, 65 years old & over | | | | |
| 1978 | 75,900 | 13,800 | 2,700 | 7,700 | 10,300 | 24,100 | 430,700 |
| 1979 | 77,000 | 14,000 | 2,700 | 2,700 | 10,300 | 24,400 | 437,400 |
| 19870 | 78,200 | 14,300 | 2,600 | 7,700 | 10,300 | 24,600 | 444,000 |
| 1981 | 79,300 | 14,600 | 2,600 | 7,700 | 10,300 | 24,900 | 450,700 |
| 1982 | 80,500 | 14,800 | 2,600 | 7,700 | 10,300 | 25,100 | 457,400 |
| 1983 | 81,700 | 15,100 | 2,600 | 7,700 | 10,300 | 25,400 | 464,000 |
| 1984 | 82,900 | 15,300 | 2,600 | 7,700 | 10,300 | 25,600 | 470,700 |
| 1985 | 84,100 | 15,600 | 2,500 | 7,700 | 10,300 | 25,900 | 477,400 |
| 1986 | 85,400 | 15,900 | 2,500 | 7,700 | 10,300 | 26,100 | 484,100 |
| 1987 | 86,700 | 16,100 | 2,500 | 7,800 | 10,300 | 26,400 | 490,700 |
| 1988 | 88,000 | 16,400 | 2,500 | 7,800 | 10,300 | 26,600 | 497,400 |
| 1989 | 89,300 | 16,600 | 2,500 | 7,800 | 10,200 | 26,900 | 504,100 |
| 1990 | 90,700 | 16,900 | 2,500 | 7,800 | 10,200 | 27,100 | 510,700 |
| 1991 | 92,000 | 17,100 | 2,400 | 7,800 | 10,200 | 27,400 | 517,400 |
| 1992 | 93,400 | 17,400 | 2,400 | 7,800 | 10,200 | 27,600 | 524,100 |

Note: * It is assumed that full time and part time laborer are average available to work as 26 days and 7 days per one month, respectively.

Table 6C-40. Projection of Number of Farm Household
in the Project Area

| | (Unit:households) | | | | |
|---------------------|-------------------|---------------------------|---------------|---------------|---------------|
| <u>Municipality</u> | <u>1975</u> | <u>1980</u> ^{1/} | <u>1985</u> | <u>1990</u> | <u>1995</u> |
| I. Cura | | | | | |
| Solsona | 300 | 306 | 312 | 318 | 324 |
| Dingras | 578 | 590 | 601 | 613 | 624 |
| total | 878 | 896 | 913 | 931 | 948 |
| II. Nueva Era | | | | | |
| Espiritu | 87 | 89 | 91 | 92 | 94 |
| Nueva Era | 106 | 108 | 110 | 113 | 115 |
| Pinili | 118 | 120 | 122 | 125 | 127 |
| total | 311 | 317 | 323 | 330 | 336 |
| III. Madupayas | | | | | |
| Nueva Era | 68 | 69 | 70 | 72 | 73 |
| Badoc | 141 | 144 | 147 | 149 | 153 |
| total | 209 | 213 | 217 | 221 | 226 |
| IV. Batac-Paoay | | | | | |
| Batac | 2,610 | 2,662 | 2,714 | 2,766 | 2,818 |
| Paoay | 1,608 | 1,640 | 1,672 | 1,704 | 1,737 |
| total | 4,218 | 4,302 | 4,387 | 4,470 | 4,555 |
| V. Pinili | 1,150 | 1,173 | 1,196 | 1,219 | 1,242 |
| VI. Badoc-Sinait | | | | | |
| Badoc | 2,489 | 2,539 | 2,589 | 2,638 | 2,688 |
| Sinait | 1,366 | 1,393 | 1,421 | 1,448 | 1,475 |
| total | 3,855 | 3,932 | 4,009 | 4,086 | 4,163 |
| <u>Total</u> | <u>10,621</u> | <u>10,833</u> | <u>11,045</u> | <u>11,257</u> | <u>11,470</u> |

Note: ^{1/}... Growth rate of farmer was estimated at 0.4 percent which indicates the rate from 1960 to 1975 by Agricultural Census.

Figure 6C-1. Typical Opportunity Cost Curves For Farm Labor

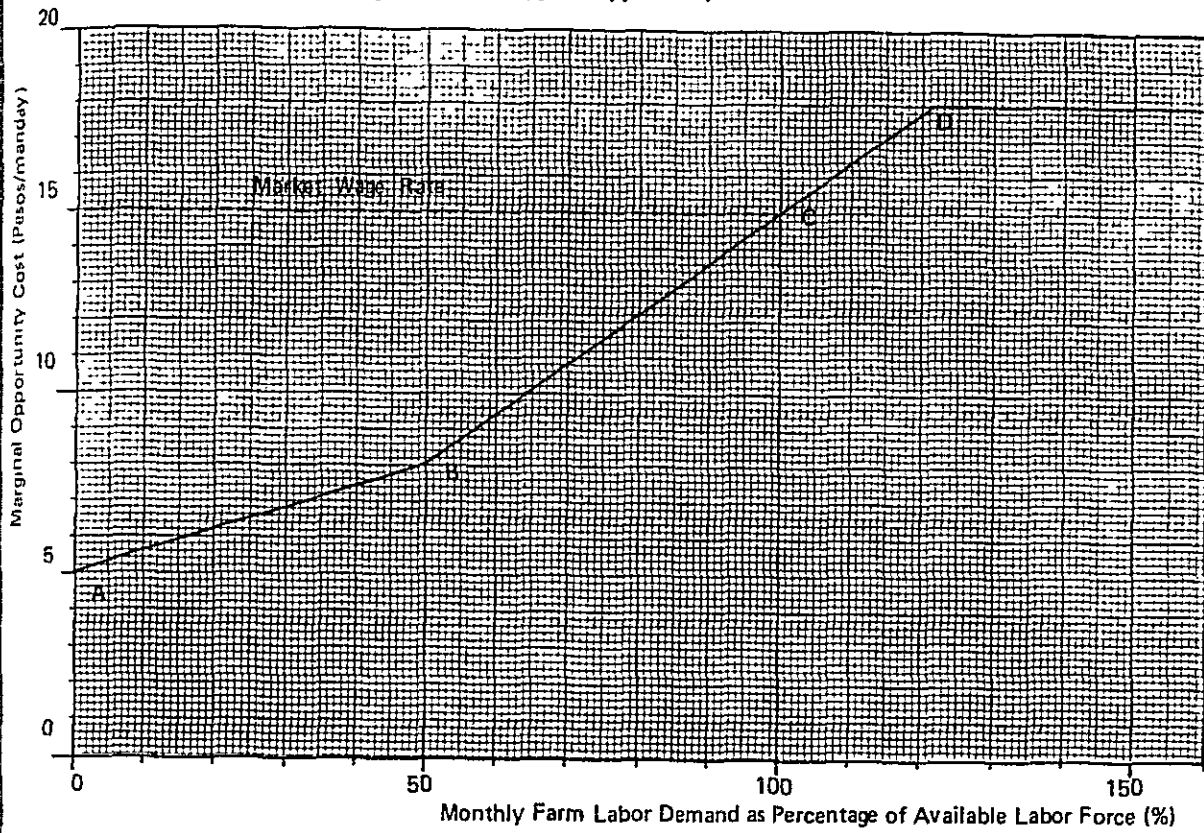


Figure 6C-2. Opportunity Cost Curves For Farm Labor

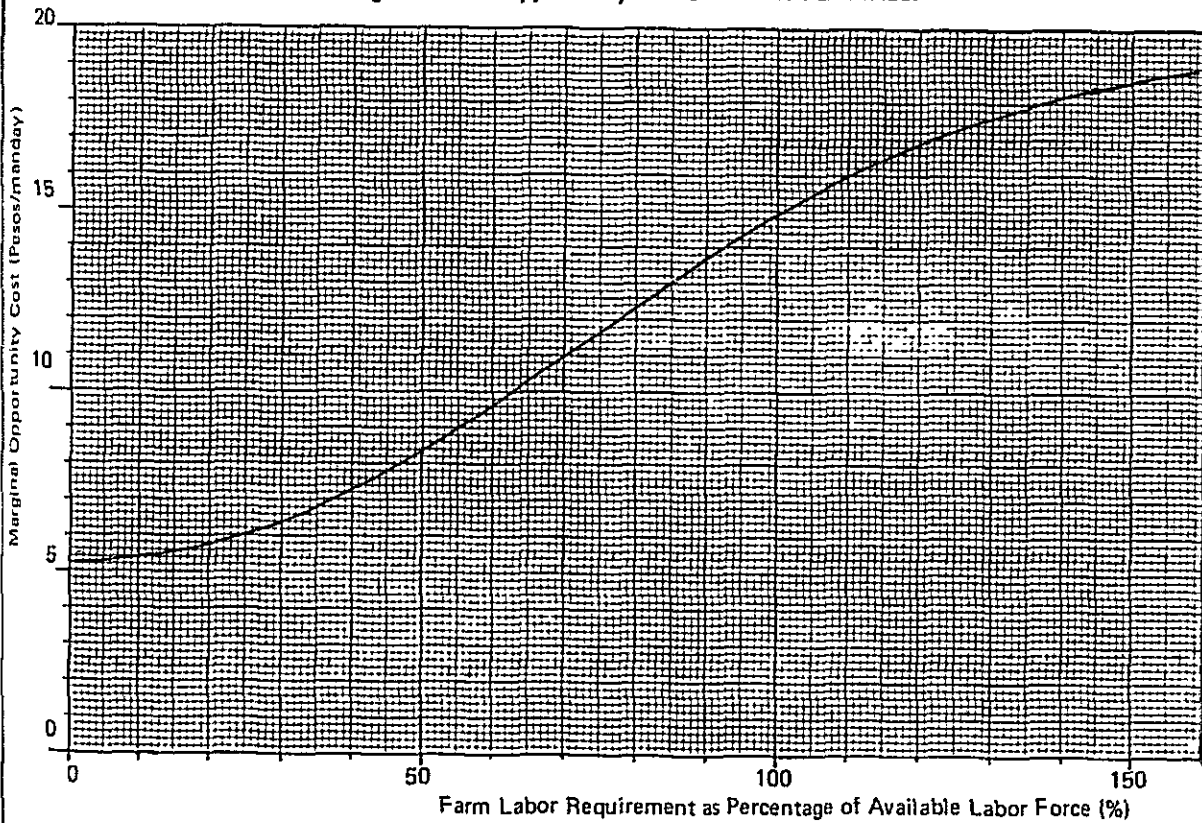


Table 6C-41. Monthly Farm Labor Requirement as Percentage of Potential Full Employment Without Project

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1983 | 0.15 | 0.39 | 0.50 | 0.20 | 0.07 | 0.37 | 0.55 | 0.32 | 0.09 | 0.35 | 0.75 | 0.51 |
| 1984 | 0.15 | 0.39 | 0.50 | 0.20 | 0.07 | 0.37 | 0.54 | 0.32 | 0.09 | 0.35 | 0.74 | 0.50 |
| 1985 | 0.15 | 0.39 | 0.50 | 0.20 | 0.07 | 0.36 | 0.53 | 0.31 | 0.09 | 0.35 | 0.74 | 0.50 |
| 1986 | 0.15 | 0.38 | 0.49 | 0.20 | 0.07 | 0.36 | 0.53 | 0.31 | 0.09 | 0.34 | 0.74 | 0.49 |
| 1987 | 0.15 | 0.38 | 0.49 | 0.20 | 0.07 | 0.35 | 0.52 | 0.30 | 0.09 | 0.34 | 0.72 | 0.49 |
| 1988 | 0.14 | 0.38 | 0.49 | 0.20 | 0.07 | 0.35 | 0.51 | 0.30 | 0.08 | 0.34 | 0.72 | 0.48 |
| 1989 | 0.14 | 0.38 | 0.49 | 0.20 | 0.07 | 0.34 | 0.50 | 0.29 | 0.08 | 0.34 | 0.71 | 0.48 |
| 1990 | 0.14 | 0.37 | 0.48 | 0.20 | 0.07 | 0.34 | 0.50 | 0.29 | 0.08 | 0.33 | 0.70 | 0.47 |
| 1991 | 0.14 | 0.37 | 0.48 | 0.20 | 0.07 | 0.33 | 0.49 | 0.28 | 0.08 | 0.33 | 0.70 | 0.47 |
| 1992 | 0.14 | 0.37 | 0.48 | 0.20 | 0.07 | 0.33 | 0.48 | 0.28 | 0.08 | 0.33 | 0.69 | 0.46 |

(Unit: %)

Table 6C-42. Wage Rate by Month without Project

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
|------|------|------|------|------|------|------|------|------|------|------|-------|------|
| 1983 | 5.55 | 7.20 | 8.40 | 5.76 | 5.40 | 7.01 | 9.00 | 6.57 | 5.42 | 6.82 | 11.67 | 8.52 |
| 1984 | 5.55 | 7.18 | 8.37 | 5.76 | 5.40 | 6.97 | 8.91 | 6.54 | 5.42 | 6.80 | 11.58 | 8.46 |
| 1985 | 5.54 | 7.16 | 8.35 | 5.76 | 5.40 | 6.93 | 8.82 | 6.50 | 5.42 | 6.78 | 11.49 | 8.39 |
| 1986 | 5.54 | 7.14 | 8.32 | 5.76 | 5.40 | 6.89 | 8.72 | 6.47 | 5.41 | 6.76 | 11.39 | 8.33 |
| 1987 | 5.54 | 7.12 | 8.30 | 5.76 | 5.40 | 6.85 | 8.63 | 6.43 | 5.41 | 6.74 | 11.30 | 8.26 |
| 1988 | 5.53 | 7.09 | 8.27 | 5.76 | 5.40 | 6.81 | 8.54 | 6.40 | 5.41 | 6.73 | 11.21 | 8.20 |
| 1989 | 5.53 | 7.07 | 8.25 | 5.76 | 5.40 | 6.77 | 8.45 | 6.36 | 5.41 | 6.71 | 11.12 | 8.13 |
| 1990 | 5.53 | 7.05 | 8.22 | 5.76 | 5.40 | 6.73 | 8.35 | 6.33 | 5.40 | 6.69 | 11.02 | 8.07 |
| 1991 | 5.52 | 7.03 | 8.20 | 5.76 | 5.40 | 6.69 | 8.26 | 6.29 | 5.40 | 6.67 | 10.93 | 8.00 |
| 1992 | 5.52 | 7.01 | 8.17 | 5.76 | 5.40 | 6.65 | 8.17 | 6.26 | 5.40 | 6.65 | 10.84 | 7.94 |

(Unit: Pesos/Man-day)

Table 6C-43. Monthly Farm Labor Requirement as Percentage of Potential Full Employment With Project

| Year | (Unit: %) | | | | | | | | | | | |
|------|-----------|------|------|------|------|------|------|------|------|------|------|------|
| | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
| 1983 | 0.15 | 0.39 | 0.51 | 0.21 | 0.08 | 0.38 | 0.56 | 0.33 | 0.10 | 0.38 | 0.78 | 0.53 |
| 1984 | 0.23 | 0.47 | 0.59 | 0.29 | 0.16 | 0.40 | 0.63 | 0.35 | 0.12 | 0.45 | 0.81 | 0.57 |
| 1985 | 0.30 | 0.55 | 0.66 | 0.36 | 0.23 | 0.44 | 0.78 | 0.37 | 0.15 | 0.56 | 0.79 | 0.60 |
| 1986 | 0.28 | 0.53 | 0.64 | 0.35 | 0.22 | 0.44 | 0.83 | 0.36 | 0.15 | 0.55 | 0.74 | 0.56 |
| 1987 | 0.21 | 0.47 | 0.58 | 0.29 | 0.16 | 0.42 | 0.85 | 0.34 | 0.13 | 0.48 | 0.62 | 0.47 |
| 1988 | 0.30 | 0.67 | 0.65 | 0.19 | 0.12 | 0.51 | 0.85 | 0.25 | 0.22 | 1.11 | 0.98 | 0.46 |
| 1989 | 0.30 | 0.71 | 0.68 | 0.20 | 0.13 | 0.51 | 0.84 | 0.24 | 0.22 | 1.11 | 0.97 | 0.45 |
| 1990 | 0.31 | 0.74 | 0.72 | 0.21 | 0.13 | 0.51 | 0.83 | 0.24 | 0.23 | 1.11 | 0.96 | 0.45 |
| 1991 | 0.31 | 0.78 | 0.76 | 0.22 | 0.14 | 0.51 | 0.82 | 0.24 | 0.23 | 1.11 | 0.96 | 0.44 |
| 1992 | 0.31 | 0.80 | 0.78 | 0.22 | 0.14 | 0.51 | 0.81 | 0.23 | 0.23 | 1.11 | 0.94 | 0.44 |

Table 6C-44. Wage Rate by Month with Project

| Year | (Unit: Pesos/Man-day) | | | | | | | | | | | |
|------|-----------------------|-------|-------|------|------|------|-------|------|------|-------|-------|------|
| | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. |
| 1983 | 5.55 | 7.20 | 8.52 | 5.82 | 5.40 | 7.11 | 9.13 | 6.65 | 5.43 | 7.11 | 12.08 | 8.76 |
| 1984 | 5.93 | 8.05 | 9.51 | 6.33 | 5.59 | 7.30 | 10.04 | 6.82 | 5.47 | 7.82 | 12.50 | 9.26 |
| 1985 | 6.40 | 9.00 | 10.44 | 6.92 | 5.93 | 7.72 | 12.08 | 7.01 | 5.55 | 9.13 | 12.22 | 9.64 |
| 1986 | 6.26 | 8.76 | 10.17 | 6.82 | 5.87 | 7.72 | 12.77 | 6.92 | 5.55 | 9.00 | 11.53 | 9.13 |
| 1987 | 5.82 | 8.05 | 9.38 | 6.33 | 5.59 | 7.51 | 13.05 | 6.74 | 5.49 | 8.17 | 9.90 | 8.05 |
| 1988 | 6.40 | 10.57 | 10.30 | 5.72 | 5.47 | 8.52 | 13.05 | 6.04 | 5.87 | 16.34 | 14.77 | 7.94 |
| 1989 | 6.40 | 11.12 | 10.71 | 5.76 | 5.49 | 8.52 | 12.91 | 5.98 | 5.87 | 16.34 | 14.64 | 7.82 |
| 1990 | 6.48 | 11.53 | 11.26 | 5.82 | 5.49 | 8.52 | 12.77 | 5.98 | 5.93 | 16.34 | 14.52 | 7.82 |
| 1991 | 6.48 | 12.08 | 11.81 | 5.87 | 5.52 | 8.52 | 12.64 | 5.98 | 5.93 | 16.34 | 14.52 | 7.72 |
| 1992 | 6.48 | 12.36 | 12.08 | 5.87 | 5.52 | 8.52 | 12.50 | 5.93 | 5.93 | 16.34 | 14.23 | 7.72 |

Table 6C-45. Monthly Hired Farm Labor Requirement without Project
(Phase II and Phase I Remaining Area)

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
|------|------|------|------|------|-----|------|------|------|------|------|-------|------|-------|
| 1983 | 7.8 | 22.2 | 32.2 | 10.9 | 6.7 | 46.1 | 64.2 | 31.7 | 1.4 | 70.7 | 127.1 | 63.8 | 484.8 |
| 1984 | 7.8 | 22.3 | 32.3 | 11.0 | 6.7 | 46.3 | 64.6 | 32.0 | 1.4 | 70.8 | 127.6 | 64.2 | 487.1 |
| 1985 | 7.8 | 22.4 | 32.4 | 11.1 | 6.7 | 46.5 | 65.0 | 32.3 | 1.4 | 71.0 | 128.2 | 64.6 | 489.4 |
| 1986 | 7.8 | 22.5 | 32.5 | 11.2 | 6.8 | 46.7 | 65.4 | 32.6 | 1.4 | 71.1 | 128.7 | 65.0 | 491.7 |
| 1987 | 7.8 | 22.6 | 32.6 | 11.3 | 6.8 | 46.9 | 65.8 | 32.9 | 1.4 | 71.3 | 129.2 | 65.4 | 494.0 |
| 1988 | 7.9 | 22.6 | 32.7 | 11.5 | 6.8 | 47.1 | 66.1 | 33.2 | 1.4 | 71.4 | 129.8 | 65.7 | 496.2 |
| 1989 | 7.9 | 22.7 | 32.8 | 11.6 | 6.8 | 47.3 | 66.5 | 33.5 | 1.4 | 71.6 | 130.3 | 66.1 | 498.5 |
| 1990 | 7.9 | 22.8 | 32.9 | 11.7 | 6.9 | 47.5 | 66.9 | 33.8 | 1.4 | 71.7 | 130.8 | 66.5 | 500.8 |
| 1991 | 7.9 | 22.9 | 33.0 | 11.8 | 6.9 | 47.7 | 67.3 | 34.1 | 1.4 | 71.9 | 131.4 | 66.9 | 503.1 |
| 1992 | 7.9 | 23.0 | 33.1 | 11.9 | 6.9 | 47.9 | 67.7 | 34.4 | 1.4 | 72.0 | 131.9 | 67.3 | 505.4 |

(Unit: 10³ man-days)

Table 6C-46. Monthly Hired Farm Labor Requirement with Project
(Phase II and Phase I Remaining Area)

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
|------|------|-------|-------|------|------|-------|-------|------|------|-------|-------|-------|---------|
| 1983 | 7.8 | 22.2 | 32.2 | 10.9 | 6.7 | 46.1 | 64.2 | 31.7 | 1.4 | 70.7 | 127.1 | 63.8 | 484.8 |
| 1984 | 7.1 | 21.9 | 32.4 | 10.9 | 6.7 | 47.9 | 79.4 | 28.3 | 3.7 | 75.0 | 120.6 | 59.2 | 493.1 |
| 1985 | 6.0 | 22.6 | 32.8 | 11.0 | 6.8 | 53.5 | 111.9 | 18.1 | 9.3 | 83.4 | 103.2 | 51.8 | 510.4 |
| 1986 | 5.6 | 22.5 | 33.1 | 11.1 | 6.8 | 55.4 | 126.6 | 14.7 | 11.5 | 90.7 | 97.3 | 47.9 | 523.2 |
| 1987 | 4.9 | 23.0 | 33.4 | 11.2 | 6.8 | 56.3 | 139.2 | 13.0 | 13.2 | 92.6 | 84.6 | 42.4 | 520.6 |
| 1988 | 31.7 | 101.6 | 141.6 | 17.9 | 14.5 | 99.3 | 177.6 | 7.5 | 53.6 | 289.7 | 330.8 | 148.7 | 1,414.5 |
| 1989 | 32.0 | 106.2 | 147.3 | 18.4 | 15.5 | 100.0 | 177.6 | 7.5 | 54.5 | 295.3 | 331.8 | 148.7 | 1,434.8 |
| 1990 | 32.3 | 110.8 | 153.1 | 19.0 | 16.6 | 100.8 | 177.6 | 7.5 | 55.4 | 301.0 | 332.8 | 148.7 | 1,455.6 |
| 1991 | 32.6 | 115.4 | 158.8 | 19.5 | 17.6 | 101.6 | 177.6 | 7.5 | 56.3 | 306.7 | 333.8 | 148.7 | 1,476.1 |
| 1992 | 32.9 | 120.0 | 164.6 | 20.0 | 18.4 | 102.4 | 177.6 | 7.5 | 57.1 | 312.4 | 334.8 | 148.7 | 1,496.4 |

(Unit: 10³ man-days)

Table 6C-47. Total Hired Farm Labor Costs by Month without Project
(Phase II and Phase I Remaining Area)

| Year | (Unit: 10 ³ Pesos) | | | | | | | | | | | | |
|------|-------------------------------|------|------|------|-----|------|------|------|------|------|-------|------|-------|
| | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
| 1983 | 43 | 160 | 270 | 63 | 36 | 323 | 578 | 208 | 8 | 482 | 1,300 | 544 | 4,015 |
| 1984 | 43 | 160 | 270 | 64 | 36 | 323 | 575 | 209 | 8 | 482 | 1,314 | 543 | 4,027 |
| 1985 | 43 | 160 | 270 | 64 | 36 | 322 | 572 | 210 | 8 | 481 | 1,329 | 542 | 4,038 |
| 1986 | 43 | 160 | 270 | 65 | 36 | 322 | 570 | 210 | 8 | 481 | 1,343 | 541 | 4,050 |
| 1987 | 43 | 160 | 270 | 66 | 36 | 321 | 567 | 211 | 8 | 481 | 1,358 | 540 | 4,061 |
| 1988 | 44 | 161 | 270 | 66 | 37 | 321 | 564 | 212 | 8 | 480 | 1,372 | 538 | 4,073 |
| 1989 | 44 | 161 | 270 | 67 | 37 | 320 | 561 | 213 | 8 | 480 | 1,387 | 537 | 4,084 |
| 1990 | 44 | 161 | 270 | 68 | 37 | 320 | 559 | 213 | 8 | 480 | 1,401 | 536 | 4,096 |
| 1991 | 44 | 161 | 270 | 68 | 37 | 319 | 556 | 214 | 8 | 479 | 1,416 | 535 | 4,107 |
| 1992 | 44 | 161 | 270 | 69 | 37 | 319 | 553 | 215 | 8 | 479 | 1,430 | 534 | 4,119 |

Table 6C-48. Total Hired Farm Labor Costs by Month with Project
(Phase II and Phase I Remaining Area)

| Year | (Unit: 10 ³ Pesos) | | | | | | | | | | | | |
|------|-------------------------------|-------|-------|------|-----|------|-------|------|------|-------|-------|-------|--------|
| | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
| 1983 | 43 | 160 | 274 | 63 | 36 | 328 | 586 | 211 | 8 | 503 | 1,535 | 559 | 4,306 |
| 1984 | 42 | 176 | 308 | 69 | 37 | 350 | 797 | 193 | 20 | 587 | 1,508 | 548 | 4,635 |
| 1985 | 38 | 203 | 342 | 76 | 40 | 413 | 1,352 | 127 | 52 | 761 | 1,261 | 499 | 5,164 |
| 1986 | 35 | 197 | 337 | 76 | 40 | 428 | 1,617 | 102 | 64 | 816 | 1,122 | 437 | 5,271 |
| 1987 | 29 | 185 | 313 | 71 | 38 | 423 | 1,817 | 88 | 72 | 757 | 838 | 341 | 4,972 |
| 1988 | 203 | 1,074 | 1,458 | 102 | 79 | 846 | 2,318 | 45 | 315 | 4,734 | 4,886 | 1,181 | 17,241 |
| 1989 | 205 | 1,181 | 1,578 | 106 | 85 | 852 | 2,293 | 45 | 320 | 4,825 | 4,858 | 1,163 | 17,511 |
| 1990 | 209 | 1,278 | 1,724 | 111 | 91 | 859 | 2,268 | 45 | 329 | 4,918 | 4,892 | 1,163 | 17,827 |
| 1991 | 211 | 1,394 | 1,875 | 114 | 97 | 866 | 2,245 | 45 | 334 | 5,030 | 4,847 | 1,148 | 18,206 |
| 1992 | 213 | 1,483 | 1,988 | 117 | 102 | 872 | 2,220 | 44 | 339 | 5,105 | 4,764 | 1,148 | 18,395 |

Table 6C-49. Financial and Economic Crop Production Cost per Hectare

- Present - (Unit:₹)

| Item | 1. Paddy Rice Irrigated, Wet | | 2. Paddy Rice Irrigated, Dry | | 3. Paddy Rice Rainfed, Wet | | 4. Tobacco | | 5. Garlic | | 6. Mungbeans | | | | |
|-------------------------------|------------------------------|--------------|------------------------------|------------|----------------------------|--------|--------------|--------------|--------------|--------|--------------|--------------|--------|--------------|--------------|
| | V | F | V | F | V | F | V | F | V | F | V | F | | | |
| 1. Seed | (70) | 85 | (65) | 79 | 81 | (62) | 75 | 37 | 30 | (270) | 876 | 959 | (13) | 59 | 48 |
| 2. Fertilizer | | | | | | | | | | | | | | | |
| N | (53) | 281 | (33) | 185 | 314 | (44) | 255 | 249 | 352 | (41) | 233 | 227 | (-) | - | - |
| P ₂ O ₅ | (13) | 226 | (8) | 141 | 272 | (16) | 188 | 184 | 282 | (14) | 175 | 171 | (-) | - | - |
| K ₂ O | (3) | 50 | (7) | 31 | 30 | (3) | 62 | 60 | 71 | (2) | 54 | 53 | (-) | - | - |
| | | 5 | | 13 | 12 | | 5 | 5 | 5 | | 4 | 3 | | | |
| 3. Agro-chemical | | | | | | | | | | | | | | | |
| 3-1 Insecticides | | | | | | | | | | | | | | | |
| Liquid | (0.6) | 57 | (0.3) | 15 | 12 | (0.5) | 26 | 22 | 83 | (0.1) | 7 | 5 | (-) | - | - |
| Powder | (-) | 44 | (-) | 14 | 11 | (-) | 23 | 19 | 83 | (-) | 7 | 5 | (-) | - | - |
| Granular | (2.8) | 17 | (0.1) | 1 | 1 | (0.5) | 3 | 3 | (-) | (-) | (-) | (-) | (-) | - | - |
| 3-2 Herbicides | | | | | | | | | | | | | | | |
| Liquid | (0.2) | 13 | (0) | 0 | 0 | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | - | - |
| Granular | (3.4) | 6 | (-) | 0 | 0 | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | - | - |
| 4. Animal and Machine | | | | | | | | | | | | | | | |
| 4-1 Animal | (100) | 319 | (100) | 253 | 210 | (100) | 253 | 1,154 | 932 | (100) | 1,119 | 905 | (100) | 1,116 | 903 |
| 4-2 Machine | (-) | 267 | (-) | 267 | 210 | (-) | 267 | 381 | 299 | (-) | 346 | 272 | (-) | 343 | 270 |
| Land Preparation | (-) | 52 | (-) | 52 | 43 | (-) | 52 | 773 | 633 | (-) | 773 | 633 | (-) | 773 | 633 |
| Irrigation by Pump | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) |
| Threshing by Pedal | (75) | 20 | (75) | 20 | 16 | (75) | 20 | 100 | 773 | (100) | 773 | 633 | (100) | 773 | 633 |
| Threshing by Power | (25) | 32 | (25) | 32 | 27 | (25) | 32 | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) |
| Drying | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) | (-) |
| 5. Hired Labor | (27.4) | 411 | (23.5) | 353 | 212 | (19.5) | 293 | 177 | 65 | (20.1) | 302 | 194 | (11.2) | 169 | 80 |
| 6. Others | | 37 | | 30 | 33 | | 34 | 83 | 70 | | 112 | 105 | | 59 | 48 |
| Total | | <u>1,190</u> | | <u>890</u> | <u>905</u> | | <u>1,002</u> | <u>1,864</u> | <u>1,532</u> | | <u>2,649</u> | <u>2,395</u> | | <u>1,402</u> | <u>1,079</u> |

Note: 1/ ... Input volume, 2/ ... Financial cost, 3/ ... Economic cost

Table 6C-50. Financial and Economic Crop Production Cost Per Hectare
- Without Project -
(Unit: ₱)

| Item | 1. Paddy Rice Irrigated, Wet | | 2. Paddy Rice Irrigated, Dry | | 3. Paddy Rice Rainfed, Wet | | 4. Tobacco | | 5. Garlic | | 6. Mungbeans | | | | | | |
|-----------------------|------------------------------|-------|------------------------------|--------|----------------------------|-----|------------|-------|-----------|--------|--------------|-------|--------|-------|-------|--------|-----|
| | V | F | V | F | V | F | V | F | V | F | V | F | | | | | |
| 1. Seed | (70) | 146 | 148 | (65) | 136 | 137 | (62) | 130 | 131 | (0.03) | 37 | 30 | (220) | 1,239 | 1,305 | (13) | 54 |
| 2. Fertilizer | | | | | | | | | | | | | | | | | |
| N | (59) | 324 | 319 | (38) | 209 | 205 | (45) | 247 | 243 | (67) | 458 | 450 | (42) | 301 | 296 | (-) | - |
| P2O5 | (15) | 66 | 65 | (10) | 44 | 43 | (17) | 75 | 74 | (19) | 84 | 82 | (15) | 66 | 65 | (-) | - |
| K2O | (3) | 6 | 6 | (8) | 16 | 15 | (3) | 6 | 6 | (3) | 5 | 6 | (2) | 4 | 4 | (-) | - |
| 3. Agro-chemical | | | | | | | | | | | | | | | | | |
| 3-1 Insecticides | | | | | | | | | | | | | | | | | |
| Liquid | (0.7) | 32 | 26 | (0.3) | 14 | 11 | (0.5) | 23 | 19 | (1.8) | 101 | 83 | (0.1) | 7 | 5 | (-) | - |
| Powder | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - |
| Granular | (3.0) | 18 | 15 | (0.1) | 1 | 1 | (0.5) | 3 | 3 | (-) | - | - | (-) | - | - | (-) | - |
| 3-2 Herbicides | | | | | | | | | | | | | | | | | |
| Liquid | (0.2) | 6 | 5 | (0) | 0 | 0 | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - |
| Granular | (3.6) | 7 | 7 | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - |
| 4. Animal and Machine | | | | | | | | | | | | | | | | | |
| 4-1 Animal | (100) | 267 | 210 | (100) | 267 | 210 | (100) | 267 | 210 | (100) | 381 | 299 | (100) | 346 | 272 | (100) | 343 |
| 4-2 Machine | (-) | 55 | 45 | (-) | 55 | 45 | (-) | 55 | 45 | (-) | 773 | 633 | (-) | 773 | 633 | (-) | 633 |
| Land Preparation | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - |
| Irrigation by Pump | (-) | - | - | (-) | - | - | (-) | - | - | (100) | 773 | 633 | (100) | 773 | 633 | (100) | 773 |
| Threshing by Pedal | (75) | 20 | 16 | (75) | 20 | 16 | (75) | 20 | 16 | (-) | - | - | (-) | - | - | (-) | - |
| Threshing by Power | (25) | 35 | 29 | (25) | 35 | 29 | (25) | 35 | 29 | (-) | - | - | (-) | - | - | (-) | - |
| Drying | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - |
| 5. Hired Labor | (29.3) | 440 | 244 | (25.3) | 380 | 209 | (21.1) | 317 | 171 | (100) | 150 | 73 | (21.5) | 323 | 189 | (12.2) | 183 |
| 6. Others | | | | | | | | | | | | | | | | | |
| Total | 1,413 | 1,132 | 1,159 | 909 | 1,163 | 768 | 1,988 | 1,570 | 3,122 | 2,637 | 1,424 | 1,005 | | | | | |

Note: 1/ ... Input volume, 2/ ... Financial cost, 3/ ... Economic cost

Table 6C-51. Financial and Economic Crop Production Cost per Hectare

- With Project -

(Unit:₱)

| Item | 1. Paddy Rice Irrigated, Wet | | 2. Paddy Rice Irrigated, Dry | | 3. Tobacco | | 4. Garlic | | 5. Mungbeans | | 6. Cotton | | | | | | | |
|-------------------------------|------------------------------|-------|------------------------------|--------|------------|-------|-----------|-------|--------------|--------|-----------|--------|--------|-------|-------|--------|-------|-------|
| | V | F | V | F | V | F | V | F | V | F | V | F | | | | | | |
| 1. Seed | (50) | 105 | 105 | 105 | (0.03) | 37 | 30 | (420) | 2,365 | 2,491 | (25) | 127 | 105 | (25) | 24 | 24 | | |
| 2. Fertilizer | | | | | | | | | | | | | | | | | | |
| N | (55) | 302 | 297 | (65) | 357 | 351 | (40) | 220 | 216 | (75) | 412 | 405 | (21) | 115 | 113 | (50) | 275 | 270 |
| P ₂ O ₅ | (30) | 133 | 130 | (30) | 133 | 130 | (50) | 221 | 217 | (65) | 287 | 282 | (21) | 93 | 91 | (25) | 111 | 109 |
| K ₂ O | (-) | - | - | (-) | - | - | (35) | 69 | 67 | (35) | 69 | 67 | (21) | 42 | 40 | (25) | 50 | 48 |
| 3. Agro-chemical | | | | | | | | | | | | | | | | | | |
| 3-1 Insecticides | | | | | | | | | | | | | | | | | | |
| Liquid | (2.1) | 128 | 105 | (2.1) | 128 | 105 | (6) | 420 | 342 | (3.0) | 156 | 129 | (3.0) | 156 | 129 | (10.0) | 470 | 380 |
| Powder | (1.5) | 89 | 74 | (1.5) | 89 | 74 | (3.0) | 300 | 246 | (-) | - | - | (-) | - | - | (5.8) | 290 | 278 |
| Granular | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | (17.0) | 119 | 102 | (-) | (-) | (-) | (-) |
| 3-2 Herbicides | | | | | | | | | | | | | | | | | | |
| Liquid | (2.0) | 46 | 38 | (2.0) | 46 | 38 | (-) | - | - | (-) | - | (-) | - | (-) | - | (-) | (-) | (-) |
| Granular | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | (-) | - | (-) | - | (-) | (-) | (-) |
| 4. Animal and Machine | | | | | | | | | | | | | | | | | | |
| 4-1 Animal | (60) | 112 | 88 | (60) | 112 | 88 | (60) | 227 | 178 | (60) | 140 | 111 | (60) | 173 | 136 | (60) | 299 | 235 |
| 4-2 Machine | (40) | 262 | 218 | (40) | 262 | 218 | (40) | 262 | 218 | (40) | 262 | 218 | (40) | 262 | 218 | (40) | 262 | 218 |
| Land Preparation | (40) | 262 | 218 | (40) | 262 | 218 | (40) | 262 | 218 | (40) | 262 | 218 | (40) | 262 | 218 | (40) | 262 | 218 |
| Irrigation by Pump | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - |
| Threshing by Pedal | (50) | 13 | 11 | (50) | 13 | 11 | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - |
| Threshing by Power | (50) | 71 | 59 | (50) | 71 | 59 | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - |
| Drying | (50) | 76 | 61 | (50) | 76 | 61 | (-) | - | - | (-) | - | - | (-) | - | - | (-) | - | - |
| 5. Hired Labor | (39.4) | 591 | 465 | (39.4) | 591 | 475 | (16.9) | 254 | 165 | (32.9) | 494 | 452 | (15.6) | 234 | 136 | (20.3) | 305 | 272 |
| 6. Others | | | | | | | | | | | | | | | | | | |
| Total | | 1,995 | 1,707 | | 3,263 | 1,775 | | 2,100 | 1,757 | | 4,370 | 4,340 | | 1,491 | 1,117 | | 2,175 | 1,870 |

Note: 1/ ... Input volume, 2/ ... Financial cost, 3/ ... Economic cost

... ..
- Without Project -
(Unit:Qt. ... 10³ tons, GPV ... 10⁶ pesos)

| Year | Irrigated | | Paddy Irrigated | | Rainfed | | total | | Tobacco | | Garlic | | Mungbeans | | Total | |
|------|-----------|---------|-----------------|---------|---------|---------|-------|------|---------|------|--------|--------|-----------|-----|-------|-----|
| | Wet Qt. | Dry Qt. | Wet Qt. | Dry Qt. | Wet Qt. | Dry Qt. | GPV | Qt. | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV |
| 1983 | 10.55 | 1.64 | 12.61 | 24.80 | 52.45 | 2.51 | 50.68 | 5.67 | 33.62 | 0.45 | 1.88 | 138.63 | | | | |
| 1984 | 10.63 | 1.66 | 12.72 | 25.01 | 52.90 | 2.54 | 51.28 | 5.73 | 33.98 | 0.45 | 1.88 | 140.04 | | | | |
| 1985 | 10.72 | 1.68 | 12.82 | 25.22 | 53.34 | 2.58 | 52.09 | 5.78 | 34.28 | 0.46 | 1.92 | 141.63 | | | | |
| 1986 | 10.80 | 1.70 | 12.93 | 25.43 | 53.78 | 2.61 | 52.70 | 5.84 | 34.63 | 0.46 | 1.92 | 143.03 | | | | |
| 1987 | 10.89 | 1.72 | 13.03 | 25.64 | 54.23 | 2.64 | 53.30 | 5.90 | 34.99 | 0.47 | 1.96 | 144.48 | | | | |
| 1988 | 10.97 | 1.74 | 13.14 | 25.85 | 54.67 | 2.68 | 54.11 | 5.95 | 35.28 | 0.47 | 1.96 | 146.02 | | | | |
| 1989 | 11.06 | 1.76 | 13.24 | 26.06 | 55.12 | 2.71 | 54.71 | 6.01 | 35.64 | 0.48 | 2.01 | 147.48 | | | | |
| 1990 | 11.14 | 1.78 | 13.35 | 26.27 | 55.56 | 2.74 | 55.32 | 6.07 | 36.00 | 0.48 | 2.01 | 148.89 | | | | |
| 1991 | 11.23 | 1.80 | 13.45 | 26.48 | 56.01 | 2.78 | 56.13 | 6.12 | 36.29 | 0.49 | 2.05 | 150.48 | | | | |
| 1992 | 11.31 | 1.82 | 13.56 | 26.69 | 56.45 | 2.81 | 56.73 | 6.18 | 36.65 | 0.49 | 2.05 | 151.88 | | | | |

Table 6C-53. Production and GPV in the Phase II Field
- With Project -
(Unit:Qt. ... 10³ tons, GPV ... 10⁶ pesos)

| Year | Irrigated | | Paddy Irrigated | | Rainfed | | total | | Tobacco | | Garlic | | Mungbeans | | Cotton | | Total | |
|------|-----------|---------|-----------------|---------|---------|---------|-------|------|---------|------|--------|------|-----------|--------|--------|--------|-------|-----|
| | Wet Qt. | Dry Qt. | Wet Qt. | Dry Qt. | Wet Qt. | Dry Qt. | GPV | Qt. | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV |
| 1983 | 10.55 | 1.64 | 12.61 | 24.80 | 52.45 | 2.51 | 50.68 | 5.67 | 33.62 | 0.45 | 1.88 | - | - | 138.63 | | | | |
| 1984 | 10.63 | 1.66 | 12.72 | 25.01 | 52.90 | 2.54 | 51.28 | 5.73 | 33.98 | 0.45 | 1.88 | - | - | 143.86 | | | | |
| 1985 | 10.72 | 1.68 | 12.82 | 25.22 | 53.34 | 2.58 | 52.09 | 5.78 | 34.28 | 0.46 | 1.92 | - | - | 150.05 | | | | |
| 1986 | 10.80 | 1.70 | 12.93 | 25.43 | 53.78 | 2.61 | 52.70 | 5.84 | 34.63 | 0.46 | 1.92 | - | - | 162.62 | | | | |
| 1987 | 10.89 | 1.72 | 13.03 | 25.64 | 54.23 | 2.64 | 53.30 | 5.90 | 34.99 | 0.47 | 1.96 | - | - | 172.04 | | | | |
| 1988 | 10.97 | 1.74 | 13.14 | 25.85 | 54.67 | 2.68 | 54.11 | 5.95 | 35.28 | 0.47 | 1.96 | - | - | 172.04 | | | | |
| 1989 | 11.06 | 1.76 | 13.24 | 26.06 | 55.12 | 2.71 | 54.71 | 6.01 | 35.64 | 0.48 | 2.01 | 1.15 | 28.75 | 274.82 | | | | |
| 1990 | 11.14 | 1.78 | 13.35 | 26.27 | 55.56 | 2.74 | 55.32 | 6.07 | 36.00 | 0.48 | 2.01 | 1.89 | 35.06 | 302.57 | | | | |
| 1991 | 11.23 | 1.80 | 13.45 | 26.48 | 56.01 | 2.78 | 56.13 | 6.12 | 36.29 | 0.49 | 2.05 | 2.24 | 41.54 | 329.40 | | | | |
| 1992 | 11.31 | 1.82 | 13.56 | 26.69 | 56.45 | 2.81 | 56.73 | 6.18 | 36.65 | 0.49 | 2.05 | 2.49 | 46.19 | 349.10 | | | | |
| | | | | | | | | | | | | 2.27 | 9.49 | 2.58 | 47.86 | 355.82 | | |

Note: Qt. ... Quantity, GPV ... Gross Production Value

Table 6C-54. Production and GPV in the Phase I Remaining Field

- Without Project -
(Unit:Qt. ... 10³ tons, GPV ... 10⁶pesos)

| Year | Irrigated | | Paddy Irrigated | | Paddy Rainfed | | Total | | Tobacco | | Garlic | | Onion | | Corn | | Total | |
|------|-----------|---------|-----------------|---------|---------------|---------|---------|---------|---------|-----|--------|-----|-------|-----|------|------|-------|------|
| | Wet Qt. | Dry Qt. | Wet Qt. | Dry Qt. | Wet Qt. | Dry Qt. | Wet Qt. | Dry Qt. | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV |
| 1983 | 2.61 | 0.74 | 0.57 | 0.57 | 3.92 | 8.29 | - | - | - | - | - | - | - | - | 0.14 | 0.15 | 8.44 | 8.44 |
| 1984 | 2.64 | 0.75 | 0.57 | 0.57 | 3.96 | 8.37 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 8.53 | 8.53 |
| 1985 | 2.66 | 0.76 | 0.58 | 0.58 | 4.00 | 8.46 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 8.62 | 8.62 |
| 1986 | 2.69 | 0.76 | 0.59 | 0.59 | 4.04 | 8.55 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 8.71 | 8.71 |
| 1987 | 2.72 | 0.77 | 0.59 | 0.59 | 4.08 | 8.63 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 8.79 | 8.79 |
| 1988 | 2.74 | 0.78 | 0.61 | 0.61 | 4.13 | 8.74 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 8.90 | 8.90 |
| 1989 | 2.77 | 0.79 | 0.62 | 0.62 | 4.18 | 8.84 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 9.00 | 9.00 |
| 1990 | 2.80 | 0.80 | 0.63 | 0.63 | 4.23 | 8.95 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 9.11 | 9.11 |
| 1991 | 2.82 | 0.80 | 0.64 | 0.64 | 4.26 | 9.01 | - | - | - | - | - | - | - | - | 0.16 | 0.16 | 9.17 | 9.17 |
| 1992 | 2.85 | 0.81 | 0.66 | 0.66 | 4.32 | 9.14 | - | - | - | - | - | - | - | - | 0.16 | 0.16 | 9.30 | 9.30 |

Table 6C-55. Production and GPV in the Phase I Remaining Field

- With Project -
(Unit:Qt. ... 10³ tons, GPV ... 10⁶pesos)

| Year | Irrigated | | Paddy Irrigated | | Paddy Rainfed | | Total | | Tobacco | | Garlic | | Onion | | Corn | | Total | |
|------|-----------|---------|-----------------|---------|---------------|---------|---------|---------|---------|------|--------|------|-------|-----|------|------|-------|-------|
| | Wet Qt. | Dry Qt. | Wet Qt. | Dry Qt. | Wet Qt. | Dry Qt. | Wet Qt. | Dry Qt. | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV |
| 1983 | 2.61 | 0.74 | 0.57 | 0.57 | 3.92 | 8.29 | - | - | - | - | - | - | - | - | 0.14 | 0.15 | 8.44 | 8.44 |
| 1984 | 2.64 | 0.75 | 0.57 | 0.57 | 3.96 | 8.37 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 8.53 | 8.53 |
| 1985 | 2.66 | 0.76 | 0.58 | 0.58 | 4.00 | 8.46 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 8.62 | 8.62 |
| 1986 | 2.69 | 0.76 | 0.59 | 0.59 | 4.04 | 8.55 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 8.71 | 8.71 |
| 1987 | 2.72 | 0.77 | 0.59 | 0.59 | 4.08 | 8.63 | - | - | - | - | - | - | - | - | 0.15 | 0.16 | 8.79 | 8.79 |
| 1988 | 5.57 | 17.31 | - | - | 22.88 | 48.39 | 0.25 | 5.05 | 0.49 | 7.90 | 1.90 | 3.82 | - | - | - | - | 60.16 | 60.16 |
| 1989 | 6.41 | 20.68 | - | - | 27.09 | 57.29 | 0.26 | 5.25 | 0.55 | 3.27 | 2.31 | 4.62 | - | - | - | - | 70.43 | 70.43 |
| 1990 | 7.25 | 24.05 | - | - | 31.30 | 66.20 | 0.26 | 5.25 | 0.62 | 3.68 | 2.71 | 5.45 | - | - | - | - | 80.58 | 80.58 |
| 1991 | 7.88 | 26.58 | - | - | 34.46 | 72.88 | 0.27 | 5.45 | 0.66 | 3.91 | 3.02 | 6.07 | - | - | - | - | 88.31 | 88.31 |
| 1992 | 8.09 | 27.43 | - | - | 35.52 | 75.12 | 0.27 | 5.45 | 0.68 | 4.04 | 3.91 | 7.86 | - | - | - | - | 92.47 | 92.47 |

Note: Qt ... Quantity, GPV ... Gross Production Value

- Without Project -
(Unit:Qt. ... 10³ tons, GPV ... 10⁶ pesos)

| Year | Irrigated | | Paddy | | Tobacco | | Garlic | | Mungbeans | | Corn | | Total | |
|------|-----------|---------|---------|------------|---------|------|--------|------|-----------|------|------|------|-------|--------|
| | Wet Qt. | Dry Qt. | Wet Qt. | Reifed Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV | GPV |
| 1983 | 13.16 | 2.38 | 13.18 | 28.72 | 60.74 | 2.51 | 50.68 | 5.67 | 33.62 | 0.45 | 1.88 | 0.14 | 0.15 | 147.07 |
| 1984 | 13.27 | 2.41 | 13.29 | 28.97 | 61.27 | 2.54 | 51.28 | 5.73 | 33.98 | 0.45 | 1.88 | 0.15 | 0.15 | 148.57 |
| 1985 | 13.38 | 2.44 | 13.40 | 29.22 | 61.80 | 2.58 | 52.09 | 5.78 | 34.78 | 0.46 | 1.92 | 0.15 | 0.16 | 150.25 |
| 1986 | 13.49 | 2.46 | 13.52 | 29.47 | 62.33 | 2.61 | 52.70 | 5.84 | 34.63 | 0.46 | 1.92 | 0.15 | 0.16 | 151.74 |
| 1987 | 13.61 | 2.49 | 13.62 | 29.72 | 62.86 | 2.64 | 53.30 | 5.90 | 34.99 | 0.47 | 1.96 | 0.15 | 0.16 | 153.27 |
| 1988 | 13.71 | 2.52 | 13.75 | 29.98 | 63.41 | 2.68 | 54.11 | 5.95 | 35.28 | 0.47 | 1.96 | 0.15 | 0.16 | 154.92 |
| 1989 | 13.83 | 2.55 | 13.86 | 30.24 | 63.96 | 2.71 | 54.71 | 6.01 | 35.64 | 0.48 | 2.01 | 0.15 | 0.16 | 156.48 |
| 1990 | 13.94 | 2.58 | 13.98 | 30.50 | 64.51 | 2.74 | 55.32 | 6.07 | 36.00 | 0.48 | 2.01 | 0.15 | 0.16 | 158.00 |
| 1991 | 14.05 | 2.60 | 14.09 | 30.74 | 65.02 | 2.78 | 56.13 | 6.12 | 36.29 | 0.49 | 2.05 | 0.16 | 0.16 | 159.65 |
| 1992 | 14.16 | 2.63 | 14.22 | 31.01 | 65.59 | 2.81 | 56.73 | 6.18 | 36.65 | 0.49 | 2.05 | 0.16 | 0.16 | 161.18 |

Table 6C-57: Total Production and GPV (Phase II Field and Phase I Remaining Field)

- With Project -
(Unit:Qt. ... 10³ tons, GPV ... 10⁶ pesos)

| Year | Irrigated | | Paddy | | Tobacco | | Garlic | | Mungbeans | | Cotton | | Onion | | Corn | | Total | |
|------|-----------|---------|---------|------------|---------|------|--------|------|-----------|------|--------|-----|-------|-----|------|------|-------|--------|
| | Wet Qt. | Dry Qt. | Wet Qt. | Reifed Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV | Qt. | GPV | GPV |
| 1983 | 13.16 | 2.38 | 13.18 | 28.72 | 60.74 | 2.51 | 50.68 | 5.67 | 33.62 | 0.45 | 1.88 | - | - | - | - | 0.14 | 0.15 | 147.07 |
| 1984 | 13.27 | 2.41 | 13.29 | 28.97 | 61.27 | 2.54 | 51.28 | 5.73 | 33.98 | 0.45 | 1.88 | - | - | - | - | 0.15 | 0.16 | 152.40 |
| 1985 | 13.38 | 2.44 | 13.40 | 29.22 | 61.80 | 2.58 | 52.09 | 5.78 | 34.28 | 0.46 | 1.92 | - | - | - | - | 0.15 | 0.16 | 162.67 |
| 1986 | 13.49 | 2.46 | 13.52 | 29.47 | 62.33 | 2.61 | 52.70 | 5.84 | 34.63 | 0.46 | 1.92 | - | - | - | - | 0.15 | 0.16 | 171.32 |
| 1987 | 13.61 | 2.49 | 13.62 | 29.72 | 62.86 | 2.64 | 53.30 | 5.90 | 34.99 | 0.47 | 1.96 | - | - | - | - | 0.15 | 0.16 | 180.83 |
| 1988 | 13.71 | 2.52 | 13.75 | 29.98 | 63.41 | 2.68 | 54.11 | 5.95 | 35.28 | 0.47 | 1.96 | - | - | - | - | 0.15 | 0.16 | 180.83 |
| 1989 | 13.83 | 2.55 | 13.86 | 30.24 | 63.96 | 2.71 | 54.71 | 6.01 | 35.64 | 0.48 | 2.01 | - | - | - | - | 0.15 | 0.16 | 180.83 |
| 1990 | 13.94 | 2.58 | 13.98 | 30.50 | 64.51 | 2.74 | 55.32 | 6.07 | 36.00 | 0.48 | 2.01 | - | - | - | - | 0.15 | 0.16 | 180.83 |
| 1991 | 14.05 | 2.60 | 14.09 | 30.74 | 65.02 | 2.78 | 56.13 | 6.12 | 36.29 | 0.49 | 2.05 | - | - | - | - | 0.16 | 0.16 | 180.83 |
| 1992 | 14.16 | 2.63 | 14.22 | 31.01 | 65.59 | 2.81 | 56.73 | 6.18 | 36.65 | 0.49 | 2.05 | - | - | - | - | 0.16 | 0.16 | 180.83 |

Note: Qt. ... Quantity, GPV ... Gross Production Value

Table 6C-58. Total Economic Crop Production Cost (Value of Input Materials, Excluded Labor Cost)
(Unit: 10 pesos)

1. Without Project 1/

| Year | Fertilizer | | Pesticides | | Herbicides | | Sub-total | | Animal and Machinery | | Total | | |
|------|------------|-------------------------------|------------|----------|------------|----------|-----------|-----------|----------------------|-----------|--------|-------|--------|
| | N | P ₂ O ₅ | Liquid | Granular | Liquid | Granular | Animal | Machinery | Animal | Machinery | | | |
| 1983 | 7,379 | 5,599 | 1,385 | 140 | 481 | 85 | 566 | 65 | 15,134 | 5,423 | 10,887 | 1,301 | 27,322 |
| 1984 | 7,379 | 5,618 | 1,392 | 140 | 481 | 86 | 567 | 65 | 15,161 | 5,423 | 10,887 | 1,302 | 27,350 |
| 1985 | 7,379 | 5,641 | 1,400 | 141 | 481 | 87 | 568 | 65 | 15,194 | 5,423 | 10,887 | 1,304 | 27,385 |
| 1986 | 7,379 | 5,659 | 1,408 | 141 | 481 | 88 | 569 | 65 | 15,221 | 5,423 | 10,887 | 1,305 | 27,413 |
| 1987 | 7,379 | 5,683 | 1,416 | 141 | 481 | 89 | 570 | 65 | 15,254 | 5,423 | 10,887 | 1,306 | 27,447 |
| 1988 | 7,379 | 5,700 | 1,424 | 143 | 481 | 90 | 571 | 65 | 15,282 | 5,423 | 10,887 | 1,309 | 27,478 |
| 1989 | 7,379 | 5,718 | 1,432 | 143 | 481 | 91 | 572 | 65 | 15,309 | 5,423 | 10,887 | 1,310 | 27,506 |
| 1990 | 7,379 | 5,742 | 1,439 | 143 | 481 | 92 | 573 | 65 | 15,341 | 5,423 | 10,887 | 1,311 | 27,539 |
| 1991 | 7,379 | 5,760 | 1,448 | 144 | 481 | 93 | 574 | 65 | 15,370 | 5,423 | 10,887 | 1,312 | 27,569 |
| 1992 | 7,379 | 5,794 | 1,455 | 144 | 481 | 94 | 575 | 65 | 15,412 | 5,423 | 10,887 | 1,313 | 27,612 |

2. With Project 1/

| Year | Fertilizer | | Pesticides | | Herbicides | | Sub-total | | Animal and Machinery | | Total | | | | |
|------|------------|-------------------------------|------------|----------|------------|----------|-----------|-----------|----------------------|-----------|-------|--------|--------|--------|--------|
| | N | P ₂ O ₅ | Liquid | Granular | Liquid | Granular | Animal | Machinery | Animal | Machinery | | | | | |
| 1983 | 7,379 | 5,599 | 1,385 | 140 | 481 | 85 | 566 | 65 | 15,134 | 5,464 | 5,423 | 10,887 | 1,301 | 27,322 | |
| 1984 | 7,326 | 5,515 | 1,415 | 132 | 557 | 80 | 735 | 94 | 15,217 | 5,340 | 5,445 | 10,885 | 1,305 | 27,407 | |
| 1985 | 7,192 | 5,323 | 1,542 | 113 | 753 | 294 | 1,092 | 143 | 167 | 15,429 | 5,025 | 5,938 | 10,963 | 1,319 | 27,711 |
| 1986 | 7,144 | 5,384 | 1,624 | 103 | 882 | 392 | 1,309 | 198 | 216 | 15,780 | 4,835 | 5,402 | 11,237 | 1,351 | 28,368 |
| 1987 | 7,112 | 5,553 | 1,725 | 98 | 7,376 | 1,005 | 490 | 35 | 273 | 16,291 | 4,648 | 6,971 | 11,619 | 1,395 | 29,305 |
| 1988 | 13,838 | 8,413 | 4,201 | 508 | 22 | 13,144 | 3,088 | 1,783 | 155 | 32,623 | 5,305 | 5,005 | 10,310 | 2,147 | 45,080 |
| 1989 | 13,838 | 9,396 | 4,683 | 571 | 25 | 14,675 | 3,437 | 1,918 | 173 | 34,727 | 4,737 | 7,018 | 11,755 | 2,324 | 48,806 |
| 1990 | 13,838 | 10,357 | 5,164 | 644 | 28 | 16,193 | 3,775 | 2,098 | 197 | 36,847 | 4,235 | 8,919 | 13,154 | 2,501 | 52,502 |
| 1991 | 13,838 | 11,210 | 5,629 | 707 | 31 | 17,577 | 4,103 | 2,233 | 215 | 38,757 | 3,720 | 10,773 | 14,493 | 2,662 | 55,912 |
| 1992 | 13,838 | 11,210 | 5,629 | 707 | 31 | 17,577 | 4,103 | 2,233 | 215 | 38,757 | 3,720 | 10,773 | 14,493 | 2,662 | 55,912 |

Note: 1/ Phase II and Phase I remaining area

Table 6C-59. Incremental Production Benefits*

(Unit: 10⁶ Pesos)

| Year | Without Project | | | With Project | | | Incremental Production Benefits |
|------|------------------------|-----------------|-------------|------------------------|-----------------|-------------|---------------------------------|
| | Gross Production Value | Input Materials | Input Labor | Gross Production Value | Input Materials | Input Labor | |
| 1983 | 147.07 | 27.32 | 4.02 | 147.07 | 27.32 | 4.31 | 115.44 |
| 1984 | 148.57 | 27.35 | 4.03 | 152.40 | 27.41 | 4.64 | 120.35 |
| 1985 | 150.25 | 27.39 | 4.04 | 162.67 | 27.71 | 5.16 | 129.80 |
| 1986 | 151.74 | 27.41 | 4.05 | 171.32 | 28.37 | 5.27 | 137.68 |
| 1987 | 153.27 | 27.45 | 4.06 | 180.83 | 29.31 | 4.97 | 146.55 |
| 1988 | 154.92 | 27.48 | 4.07 | 334.98 | 45.08 | 17.24 | 272.66 |
| 1989 | 156.48 | 27.51 | 4.08 | 373.00 | 48.81 | 17.51 | 306.68 |
| 1990 | 158.00 | 27.54 | 4.10 | 409.98 | 52.50 | 17.83 | 339.65 |
| 1991 | 159.65 | 27.57 | 4.11 | 437.41 | 55.91 | 18.21 | 363.29 |
| 1992 | 161.18 | 27.61 | 4.12 | 448.29 | 55.91 | 18.40 | 373.98 |

Note: * Benefits in Phase II and Phase I remaining area.

Benefit from Power Generation

Capacity Value

The total power output available by the Project is 42,800 KW, the average generation is expected to be 199.2 GWh, and the firm peak will be 30,510 KW. However, the Project Area, currently covered by 115 KV transmission networks under the Luzon Grid, will be supplied with power through the same networks in future as well, and consequently, the power generated by the proposed facilities will be supplied through the said Luzon Grid under the NPC's general power supply plan, not independently to the particular consumer areas. The output value does not take 30,510 KW of the firm peak, but seemingly the 10-year average of the firm peak with an effective average output. The total output value available is estimated, accordingly, at 38,290 KW, the sum of 32,776 kW average firm peak of Bonga power station and 4,514 KW average firm peak of Nueva Era power station.

For alternative study in the Project, an oil thermal plant with designed output of 100,000 KW is to be assumed as an alternative plan in taking into account the harbor capacity for oil handling, and the output of the plant is supposed to be divided in supply, since any alternative plans providing the capacities equivalent to the planned capacities as above are actually unavailable. Furthermore, it is impossible to design the said alternative thermal plant at some place in the central part of the consumer area because of high cost required for oil transportation from the harbor, and the plant would be constructed around the port of San Fernando with oil unloading capacity available. And on the assumption that the power generated therefrom is to be transmitted to the consumer areas through 115 KV lines with 336.4 MCM in conductor size to meet the demand in the same level, the provisional thermal plant should provide 41,350 KW of output value dividable, in taking into account loss of about 1,700 KW and 3.4 percent of the power station consumption.

On the premise of the above, the unit construction cost per KW of the said plant with anti-pollution devices is estimated at ₱4,630.

Annual cost ratio was estimated as the follows.

| | |
|-------------------------|----------------|
| Standard economic life | 15 year |
| Interest | 4.0 percent |
| Depreciation | 6.0 " |
| O & M cost | |
| Personal expenses | 0.05 " |
| Repairing expenses | 2.30 " |
| Others | 1.19 " |
| O & M sub-total | (3.54) " |
| Share to administration | |
| Cost of head office | 0.54 " |
| Fixed property tax | 0.74 " |
| Enterprice tax | 0.28 " |
| <u>Total</u> | <u>15.10 "</u> |

Unit capacity value

$$4,630 \times 0.151 \doteq \underline{700 \text{ ₱/KW}}$$

Capacity value of 41,350 KW of output value dividable is estimated as the follows.

$$41,350 \times 700 = \underline{28,945 \text{ ₱} \times 10^3}$$

Energy Value

Energy value (KWh value) is estimated based on the alternative study. The Bataan Thermal Power Plant with 75,000 KW to 150,000 KW was studied as the alternative plant. According to the study by NPC, the Hi vis fuel oil cost was 35.28052 per MBTU. Heat rate is 11,100 BTU/KWh.

Fuel cost:

$$35.28052 \text{ ₱/MBTU} \times 11,100 \text{ BTU/KWh} = 0.3916 \text{ ₱/KWh}$$

O & M cost and others: 0.02 ₱/KWh

Power Station consuming energy: 4.1 percent

Unit energy value

$$0.4116 \text{ ₱/KWh} \div (1 - 0.041) \div \underline{0.429 \text{ ₱/KWh}}$$

The all electric power to be generated from this Project's plant would be not consumed in the service area just after the completion of the Project. This surplus power should be supplied outside the service area and La Union through 230 KV lines from Narbacan Sub-Station during ten years after the start of plant operation.

The energy demand plan as of 1988 in Narbacan NPC, is projected at 274.24 GWh which is computed using peak demand of 81.63 MW and base demand of 21.24 MW. Then, energy to be in excess of this base demand has to be sent outside the service area. Surplus energy is estimated at average 49.021 GWh based on the hydrogic study for past ten years. According to the energy balance study by year, surplus energy in 1996 will be forecasted at zero.

The following table indicate the both energy of direct supply in the service area and surplus supply outside the service area. Transmission losses are five percent in the former and ten percent in the later.

Supply Plan

| Year | Service Area | Outside (Surplus) | Total |
|------|------------------|-------------------|-----------|
| | GWh | GWh | GWh |
| 1988 | 150.177 x 0.95 + | 49.021 x 0.90 = | 186.787 |
| 1989 | 156.305 x 0.95 + | 42.893 x 0.90 = | 187.093 |
| 1990 | 162.432 x 0.95 + | 36.766 x 0.90 = | 187.400 |
| 1991 | 168.560 x 0.95 + | 30.638 x 0.90 = | 187.706 |
| 1992 | 194.688 x 0.95 + | 24.510 x 0.90 = | 188.013 |
| 1993 | 180.815 x 0.95 + | 18.383 x 0.90 = | 188.320 |
| 1994 | 186.943 x 0.95 + | 12.255 x 0.90 = | 188.625 |
| 1995 | 193.070 x 0.95 + | 6.128 x 0.90 = | 188.932 |
| 1996 | 199.198 x 0.95 + | 0 | = 189.238 |
| ⋮ | ⋮ | | |
| 2027 | ⋮ | | = 189.238 |

Table 6C-60. Power Benefit

| Year | Equivalent Capacity KW | Unit KW value Peso | Capacity value Px10 ³ (A) | Energy GWh | Unit | | Energy value Px10 ³ (B) | Total benefits (A)+(B)Px10 ³ |
|------|---------------------------|--------------------------|--|---------------|-------|--------|--|---|
| | | | | | KWh | Peso | | |
| 1988 | 41,350 | 700 | 28,945 | 186.787 | 0.429 | 80,131 | 109,076 | |
| 1989 | 41,350 | 700 | 28,945 | 187.093 | 0.429 | 80,263 | 109,208 | |
| 1990 | 41,350 | 700 | 28,945 | 187.400 | 0.429 | 80,395 | 109,340 | |
| 1991 | 41,350 | 700 | 28,945 | 187.706 | 0.429 | 80,526 | 109,471 | |
| 1992 | 41,350 | 700 | 28,945 | 188.013 | 0.429 | 80,658 | 109,603 | |
| 1993 | 41,350 | 700 | 28,945 | 188.320 | 0.429 | 80,789 | 109,734 | |
| 1994 | 41,350 | 700 | 28,945 | 188.625 | 0.429 | 80,920 | 109,865 | |
| 1995 | 41,350 | 700 | 28,945 | 188.932 | 0.429 | 81,052 | 109,997 | |
| 1996 | 41,350 | 700 | 28,945 | 189.238 | 0.429 | 81,183 | 110,128 | |

A. Project Cost Allocation

1. First Stage Allocation for Nueva Era Dam

1) Cost of Nueva Era Dam ----- 101,002 ₱ x 10³

2) Allocation

Irrigation 101,002 x 0.062 = 6,262 ₱ x 10³

Power 101,002 x 0.938 = 94,740 ₱ x 10³

Note: Each cost include project administration and contingency

2. Cost of Joint Facilities and Others to be Allocated

Joint facilities:

Palsiguan Dam (232 m³ x 10⁶) ----- 819,634 ₱ x 10³

Headrace ----- 125,214 ₱ x 10³

Sub-total ----- 944,848 ₱ x 10³

Others:

Preparation, pre-engineering

Land acquisition, construction equipments

Operation and maintenance cost

Project facilities

Sub-total ----- 462,285 ₱ x 10³

Joint cost ----- 1,407,133 ₱ x 10³

3. Specific Cost

Irrigation

Nueva Era Dam, cost allocated, diversion dams, irrigation and drainage canal, on farm, road, land acquisition, O & M cost, agricultural development

Total ----- 564,179 ₱ x 10³

Power

Nueva Era Dam, cost allocated, plants

Total ----- 257,692 ₱ x 10³

4. Justifiable Expenditure Value

1) Irrigation

a) Annual incremental net production value

$$245 \text{ P} \times 10^6$$

b) O & M cost $5.76 \text{ P} \times 10^6$

c) Justifiable expenditure value

$$(245 - 5.76) \div \frac{0.12 (1 + 0.12)^{50}}{(1 + 0.12)^{50} - 1} = 1,987 \text{ P} \times 10^6$$

2) Power

a) Annual benefit $110.128 \text{ P} \times 10^6$

b) O & M cost $2.947 \text{ P} \times 10^6$

c) Justifiable expenditure value

$$(110.128 - 2.947) \frac{0.12 (1 + 0.12)^{40}}{(1 + 0.12)^{40} - 1} \left(1 - \frac{0.1}{(1 + 0.12)^{40}}\right) = 903 \text{ P} \times 10^6$$

5. Alternative Construction Cost

1) Irrigation

a) Alternative dam + headrace

Storage capacity $198.4 \text{ m}^3 \times 10^6$

Dam cost $718,800 \text{ P} \times 10^3$

Headrace $125,214 \text{ P} \times 10^3$

Sub-total $844,014 \text{ P} \times 10^3$

b) Specific cost $564,179 \text{ P} \times 10^3$

c) Alternative construction cost $1,408,193 \text{ P} \times 10^3$

2) Power

a) Alternative dam + headrace

Storage capacity $232 \text{ m}^3 \times 10^6$

Dam cost $819,634 \text{ P} \times 10^3$

Headrace $125,214 \text{ P} \times 10^3$

Sub-total $944,848 \text{ P} \times 10^3$

b) Specific cost $257,692 \text{ P} \times 10^3$

c) Alternative construction cost $1,202,540 \text{ P} \times 10^3$

6. Allocation Method

Alternative dam size for power is same to joint dam size. Then the cost allocation was estimated using the Alternative Justifiable Expenditure method, because separable cost is not available.

7. Second Stage Cost Allocation

(Unit: ₱ x 10⁶)

| <u>Item</u> | <u>Irrigation</u> | <u>Power</u> | <u>Total</u> |
|----------------------------------|-------------------|--------------|--------------|
| a. Alternative cost | 1,408 | 1,203 | 2,611 |
| b. Justifiable expenditure value | 1,987 | 903 | 2,890 |
| c. Smaller either of a and b. | 1,408 | 903 | 2,311 |
| d. Specific cost | 564 | 258 | 822 |
| e. c - d | 844 | 645 | 1,489 |
| f. % | 56.5 | 43.5 | 100.0 |
| g. Allocated cost | 795 | 612 | 1,407 |

B. Cost Allocation on Nueva Era Dam and Main Link Canal

1. Scope of Joint Facilities

Nueva Era Dam: Dam excluding each intake facilities for joint users

Main Link Canal: From the intake of Nueva Era dam to the end of siphon

2. Joint Users

Nueva Era Dam: Irrigation in Project Phase I
Irrigation in Project Phase II
Hydro Power in Project Phase II

Main Link Canal: Irrigation in Project Phase I
Irrigation in Project Phase II

3. Joint Cost

Nueva Era Dam: 1. Dam cost ----- $108.8 \text{ P} \times 10^6$
2. Dead cost of Nueva Era temporary diversion dam for irrigation
 $10 \text{ P} \times 10^6 \times 0.9 \times 45/50 = 8.1 \text{ P} \times 10^6$

Main Link Canal

1. Intake to entrance of siphon ----- $12.5 \text{ P} \times 10^6$
2. Siphon ----- $4.3 \text{ P} \times 10^6$
3. Dead cost of temporary irrigation canal with $1.746 \text{ m}^3/\text{sec}$.
 $7.5 \text{ P} \times 10^6 \times 0.9 \times 10/15 = 4.5 \text{ P} \times 10^6$

4. Methods of Allocation

- (a) Separable cost alternative justifiable expenditure method
- (b) Priority expenditure method
- (c) Alternative cost allocation method
- (d) Effective capacity of reservoir allocation method
- (e) Maximum cross-sectional area of flow allocation method
- (f) Ceiling method

In a first of all, as a rule, method (a) has to be considered. But this allocation is situated at the first stage allocation in the integrated allocation. The allocated cost on the Palsiguan dam and headrace have to be counted into special cost, but it is impossible. Then method (a) can not be applied.

Method (b) is not suitable, because the priority for demand to water resources will be not decided. Effective capacity of Nueva Era dam is 500,000 cubic meter for hydro power and irrigation. Then method (d) is not suitable.

Method (f) would be used for allocation. The Phase I Project had a plan to construct new diversion dam for the Nueva Era Irrigation System at the present place and a reservoir dam for hydro power at the upper stream of Bonga river. In the Phase II Project, this diversion dam plan was changed to be jointed with the Nueva Era dam.

Then, a construction cost of new diversion dam will be considered as an upper limit of allocation cost to be beared by irrigation section.

In conclusion the allocation methods to be applied are as the follows:

Nueva Era Dam: Alternative cost allocation method ceiling method

Main Link Canal: Alternative cost allocation method maximum cross-sectional area of flow allocation method

Nueva Era dam cost, in a first, will be allocated between irrigation and hydro power. As the result, the allocated cost to irrigation will be allocated between the Phase I irrigation and the Phase II irrigation using the irrigation area method.

Nueva Era Dam

Alternative cost for power ----- 108.8 ₱ x 10⁶
Alternative cost for irrigation ----- 10.0 ₱ x 10⁶
Diversion dam cost in the Phase I Project --- 23.3 ₱ x 10⁶
Irrigation area for the Phase I (use the Nueva Era dam)---- 1,200 ha
Irrigation area for the Phase II(use the Nueva Era dam)--- 36,225 ha

Main Link Canal

Alternative cost for the Phase I irrigation

- 1) From intake of Nueva Era dam to end to siphon --- 6.1 ₱ x 10⁶
- 2) Siphon ----- 1.4 ₱ x 10⁶

Alternative cost for the Phase II irrigation

- 1) From intake of Nueva Era dam to end of siphon -- 12.3 ₱ x 10⁶
- 2) Siphon ----- 4.3 ₱ x 10⁶

Maximum cross-sectional area of flow for the Phase I irrigation

- 1) Intake to siphon ----- Q = 1.746 cu.m/sec
- 2) Siphon ----- Q = 1.746 cu.m/sec

Maximum cross-sectional area of flow for the Phase II irrigation

- 1) Intake to siphon ----- Q = 29.273 cu.m/sec
- 2) Siphon ----- Q = 17.544 cu.m/sec

5. Cost Allocation

Nueva Era Dam

i. Alternative cost allocation method

$$\text{Power percent } 108.8 \times \frac{108.8}{108.8 + 10.0} = 91.6\%$$

$$\text{Irrigation percent } 108.8 \times \frac{10.0}{108.8 + 10.0} = 8.4\%$$

$$\text{Power allocation cost } 108.8 \times 0.916 = 99.7 \text{ ₱ x } 10^6$$

$$\text{Irrigation allocation cost } 108.8 \times 0.084 = 9.1 \text{ ₱ x } 10^6$$

(1) Phase I irrigation allocated cost

$$9.1 \times \frac{1,200}{1,200 + 36,225} = 0.29 \text{ P} \times 10^6$$

(2) Phase II irrigation cost

i) Nueva Era dam allocated cost

$$9.1 \times \frac{36,225}{1,200 + 36,225} = 8.81 \text{ P} \times 10^6$$

ii) Dead cost of Nueva Era temporary diversion dam

$$8.1 \times \frac{8.81}{99.7 + 8.81} = 0.66 \text{ P} \times 10^6$$

iii) i) + ii) $8.81 + 0.66 = 9.47 \text{ P} \times 10^6$

(3) Power total allocated cost

$$99.7 + 8.1 \times \frac{99.7}{99.7 + 8.81} = 99.7 + 7.44 \\ = 107.14 \text{ P} \times 10^6$$

ii. Ceiling Method

Diversion dam cost in the Phase I Project $23.3 \text{ P} \times 10^6$

Main link canal cost ----- $16.6 \text{ P} \times 10^6$

Upper limit allocation cost to irrigation

$$23.3 - 16.6 = 6.7 \text{ P} \times 10^6$$

(1) Power allocated cost $108.8 - 6.7 = 102.1 \text{ P} \times 10^6$ (93.8%)

(2) Phase I irrigation allocated cost

$$0.7 \times 1,200/37,425 = 0.21 \text{ P} \times 10^6$$

(3) Phase II irrigation cost

i) Nueva Era dam allocated cost

$$6.7 \times \frac{36,225}{1,200 + 36,225} = 6.49 \text{ P} \times 10^6$$

ii) Dead cost of Nueva Era temporary diversion dam

$$8.1 \times \frac{6.49}{102.1 + 6.49} = 0.48 \text{ P} \times 10^6$$

iii) i) + ii) $6.49 + 0.48 = 6.97 \text{ P} \times 10^6$

| iii. | Alternative Cost Method ₱ x 10 ⁶ | Ceiling Method ₱ x 10 ⁶ |
|-------------------------|--|---------------------------------------|
| (1) Phase I irrigation | 0.29 | 0.21 |
| (2) Phase II irrigation | 9.47 | 6.97 |
| (3) Power | 107.14 | 109.72 |
| Total | 116.90 | 116.90 |
| (2) + (3) | 116.61 | 116.69 |

Main Link Canal

i. Alternative allocation method

1) Intake to siphon

Phase I irrigation allocated cost

$$12.3 \times \frac{6.1}{6.1 + 12.3} = 4.1 \text{ ₱} \times 10^6$$

Phase II irrigation allocated cost

(1) Canal cost

$$12.3 \times \frac{12.3}{6.1 + 12.3} = 8.2 \text{ ₱} \times 10^6$$

(2) Dead cost of temporary irrigation canal 4.5 ₱ x 10⁶

(3) (1) + (2) 8.2 + 4.5 = 12.7 ₱ x 10⁶

2) Siphon

Phase I irrigation allocated cost

$$4.3 \times \frac{1.4}{1.4 + 4.3} = 1.06 \text{ ₱} \times 10^6$$

Phase II irrigation allocated cost

(1) Siphon cost

$$4.3 \times \frac{4.3}{1.4 + 4.3} = 3.24 \text{ ₱} \times 10^6$$

(2) Dead cost of temporary irrigation canal 4.5 ₱ x 10⁶

(3) (1) + (2) 3.24 + 4.5 = 7.74 ₱ x 10⁶

3) Total

Phase I 4.1 + 1.06 = 5.16 ₱ x 10⁶

Phase II 12.7 + 7.74 = 20.44 ₱ x 10⁶

ii. Maximum cross-sectional area of flow method

1) Intake to siphon

Phase I irrigation allocated cost

$$12.3 \times \frac{1.746}{1.746 + 29.273} = 0.69 \text{ P} \times 10^6$$

Phase II irrigation allocated cost

(1) Canal cost

$$12.3 \times \frac{29.273}{1.746 + 29.273} = 11.61 \text{ P} \times 10^6$$

(2) Dead cost of temporary irrigation canal $4.5 \text{ P} \times 10^6$

(3) (1) + (2) $11.61 + 4.5 = 16.11 \text{ P} \times 10^6$

2) Siphon

Phase I irrigation allocated cost

$$4.3 \times \frac{1.746}{1.746 + 17.544} = 3.89 \text{ P} \times 10^6$$

Phase II irrigation allocated cost

(1) Siphon cost

$$4.3 \times \frac{17.544}{1.746 + 17.544} = 0.41 \text{ P} \times 10^6$$

(2) Dead cost of temporary irrigation canal $4.5 \text{ P} \times 10^6$

(3) (1) + (2) $0.41 + 4.5 = 4.91 \text{ P} \times 10^6$

3) Total

Phase I $0.69 + 3.89 = 4.58 \text{ P} \times 10^6$

Phase II $16.11 + 4.91 = 21.02 \text{ P} \times 10^6$

iii. Combined average method - $\text{P} \times 10^6$ -

1) Include dead cost

| <u>Allocation Method</u> | <u>Phase I</u> | <u>Phase II</u> |
|--------------------------------------|----------------|-----------------|
| Alternative cost | 5.16 | 20.44 |
| Maximum cross-sectional area of flow | 4.58 | 21.02 |
| Combined average | 4.87 | 20.73 |

2) Exclude dead cost

| <u>Allocation Method</u> | <u>Phase I</u> | <u>Phase II</u> |
|--------------------------------------|----------------|-----------------|
| Alternative cost | 5.16 | 11.44 |
| Maximum cross-sectional area of flow | 4.58 | 12.02 |
| Combined average | 4.87 | 11.73 |

3) Detail figures on 1) and 2)

| <u>Allocation Method</u> | <u>Phase I</u> | | <u>Phase II</u> | |
|--------------------------------------|-------------------------|---------------|-------------------------|---------------|
| | <u>Intake to Siphon</u> | <u>Siphon</u> | <u>Intake to Siphon</u> | <u>Siphon</u> |
| (Include dead cost) | | | | |
| Alternative cost | 4.1 | 1.06 | 12.70 | 7.74 |
| Maximum cross-sectional area of flow | 0.69 | 3.89 | 16.11 | 4.91 |
| Combined average | 2.40 | 2.47 | 14.41 | 6.32 |
| (Exclude dead cost) | | | | |
| Alternative cost | 4.1 | 1.06 | 8.20 | 3.24 |
| Maximum cross-sectional area of flow | 0.69 | 3.89 | 11.61 | 0.41 |
| Combined average | 2.40 | 2.47 | <u>9.91</u> | <u>1.82</u> |

Table 6C-61. Investment Cost for Project Evaluation

| Description | Foreign Currency | Local Currency | Financial Cost | | | Economic Cost | | | | | | | | | | | | | |
|------------------------------------|------------------|----------------|----------------|-----------------------|----------------|---------------|----------------|-------|-----------|-----------|---------|--|--|--|--|--|--|--|--|
| | | | Total Cost | Percent of Allocation | Allocated Cost | Total Cost | Allocated Cost | Power | | | | | | | | | | | |
| | | | (\$) | (%) | Agriculture | (%) | Agriculture | Power | | | | | | | | | | | |
| 1. Civil Works ^{1/} | | | | | | | | | | | | | | | | | | | |
| 1-1 Preparation | 19,511 | 32,620 | 52,131 | 56.5 | 29,454 | 43.5 | 22,677 | 0.789 | 41,131 | 23,239 | 17,822 | | | | | | | | |
| 1-2 Palsiguan Dam | 466,377 | 228,137 | 694,474 | 56.5 | 392,378 | 43.5 | 302,096 | 0.808 | 561,135 | 317,041 | 244,044 | | | | | | | | |
| 1-3 Headrace | 49,941 | 54,575 | 104,516 | 56.5 | 59,052 | 43.5 | 45,464 | 0.813 | 84,972 | 48,000 | 36,963 | | | | | | | | |
| 1-4 Power Plant & Tailrace | 123,938 | 49,777 | 173,715 | - | - | 100.0 | - | 0.878 | 152,522 | - | 152,522 | | | | | | | | |
| 1-5 Nueva Era Dam | 42,667 | 41,816 | 84,483 | 6.2 | 5,238 | 93.8 | 79,245 | 0.797 | 67,333 | 4,175 | 63,158 | | | | | | | | |
| 1-6 Diversion Dam | 11,521 | 9,698 | 21,219 | 100.0 | - | - | - | 0.830 | 17,612 | 17,612 | - | | | | | | | | |
| 1-7 Irrigation Canal | 131,469 | 187,685 | 319,154 | 100.0 | - | - | - | 0.819 | 261,387 | 261,387 | - | | | | | | | | |
| 1-8 Drainage Canal | 12,250 | 19,512 | 31,762 | 100.0 | - | - | - | 0.766 | 24,330 | 24,330 | - | | | | | | | | |
| 1-9 On-Farm | 2,472 | 20,640 | 23,112 | 100.0 | - | - | - | 0.731 | 16,895 | 16,895 | - | | | | | | | | |
| 1-10 Road | 9,716 | 14,202 | 23,918 | 100.0 | - | - | - | 0.752 | 17,986 | 17,986 | - | | | | | | | | |
| 1-11 Pre-Engineering | 0 | 5,156 | 5,156 | 56.5 | 2,913 | 43.5 | 2,243 | 0.840 | 4,331 | 2,446 | 1,885 | | | | | | | | |
| Sub-total | 869,822 | 663,818 | 1,533,640 | - | - | - | - | - | 1,249,634 | 733,120 | 516,514 | | | | | | | | |
| 2. Land Acquisition & Compensation | 0 | 31,337 | 31,337 | 100.0 | - | - | - | - | 15,228 | 15,228 | - | | | | | | | | |
| 3. Construction Equipments | 312,693 | 1,000 | 313,693 | 56.5 | 177,237 | 43.5 | 136,456 | 0.827 | 254,424 | 146,575 | 112,849 | | | | | | | | |
| 4. Agricultural Development | 0 | 4,340 | 4,340 | 100.0 | - | - | - | 0.838 | 3,637 | 3,637 | - | | | | | | | | |
| 5. Operation & Maintenance Cost | 557 | 6,764 | 7,321 | 100.0 | - | - | - | 0.826 | 6,047 | 6,047 | - | | | | | | | | |
| 6. Project Facilities | 949 | 6,789 | 7,738 | 56.5 | 4,372 | 43.5 | 3,366 | 0.842 | 6,515 | 3,681 | 2,834 | | | | | | | | |
| 7. Project Administration | 0 | 57,275 | 57,275 | - | - | - | - | 0.828 | 47,420 | 32,012 | 15,408 | | | | | | | | |
| 8. Consulting Services | 16,269 | 1,888 | 18,157 | 56.5 | 10,259 | 43.5 | 7,898 | 0.983 | 17,848 | 10,084 | 7,764 | | | | | | | | |
| Sub-total | 1,200,290 | 773,211 | 1,973,501 | - | - | - | - | - | 1,505,753 | 950,384 | 555,369 | | | | | | | | |
| 9. Contingency | 180,044 | 115,982 | 296,026 | - | - | - | - | 0.865 | 255,960 | 153,269 | 102,691 | | | | | | | | |
| Sub-total | 1,380,334 | 889,193 | 2,269,527 | - | - | - | - | - | 1,861,713 | 1,103,653 | 758,060 | | | | | | | | |
| 10. Dead Cost ^{2/} | - | - | - | - | - | - | - | - | 10,900 | 10,900 | - | | | | | | | | |
| Total | 1,380,334 | 889,193 | 2,269,527 | - | - | - | - | - | 1,872,613 | 1,114,553 | 758,060 | | | | | | | | |

Note: 1/ Conversion rates are calculated in dividing financial cost to, trade and non-trade good cost by work item.
2/ Dead cost of constructed facilities (Nueva Era Dam and Main Link Canal) of Phase I Project.

Philippines Inflation Rate (Slide up rate)

- Retail Price Index of Selected Commodities
in Metro Manila (1972 = 100) -

| | <u>1977</u> | <u>1978</u> | <u>1979</u> | <u>1980</u> |
|------------------------------|-------------|-------------|-------------|-------------|
| | Jan. | Jan. | Jan. | Jan. |
| <u>Construction Material</u> | | | | |
| 1972 = 100 | 244.1 | 255.1 | 308.7 | 369.9 |
| | 100 | - | - | 151 |
| | - | 100 | - | 145 |
| | - | - | 100 | 120 |
| <u>Fuel</u> | | | | |
| 1972 = 100 | 212.6 | 220.1 | 308.7 | 321.3 |
| | 100 | - | - | 151 |
| | - | 100 | - | 146 |
| | - | - | 100 | 104 |

Source: Philippine Economic Indicators

Price Escalation Index

| | <u>1980</u> | <u>1981</u> | <u>1982</u> | <u>1983</u> | <u>1984</u> | <u>1985</u> | <u>1986</u> | <u>1987</u> | <u>1988</u> | <u>1989</u> | <u>1990</u> |
|--------------------------|--------------------|--------------------|-------------------|-------------|-------------|-------------|-------------------|-------------|-------------|-------------|-------------|
| Foreign exchange content | 10.4 | 9.0 | 8.0 | 7.0 | 6.7 | 6.5 | 6.3 | 6.2 | 6.0 | 5.8 | 5.7 |
| Local content | 16.0 ^{1/} | 10.0 ^{2/} | 8.0 ^{2/} | 8.0 | 8.0 | 8.0 | 7.0 ^{3/} | 7.0 | 7.0 | 7.0 | 7.0 |

Source: Foreign exchange content is based on the international price index, Price Prospects for Major Primary Commodities.

Local Content:

- ^{1/} The Ministry of Labor estimated as of 22 (1980) that the inflation rate will remain high at 16 per cent this year.
- ^{2/} World Bank, Appraisal Report, Samar Integrated Development Project, Oct. 1979.
- ^{3/} Long-Term Philippine Development Plan up to the Year 2000.

Table 6D-1 Project Economic Cost and Return
- Irrigation and Power Project -

| Year | Capital | | Project Cost | | Benefits | | Incremental | | Total | | Incremental | | 1% | 10% | 14% |
|--------|----------|--------|--------------|-------------|----------|------------|-------------|------------|-----------|------------|-------------|------------|--------|--------|--------|
| | 1/ | 2/ | Irrigation | Power Plant | Total | Production | Power | Production | Power | Production | Power | Production | | | |
| 1 | 1.07 | - | - | - | 1.07 | - | - | - | - | - | - | - | 0.95 | - | 0.96 |
| 2 | 8.53 | - | - | - | 8.53 | - | - | - | - | - | - | - | 6.68 | 1.86 | 1.86 |
| 3 | 67.92 | - | - | - | 67.92 | - | - | - | - | - | - | - | 47.08 | 20.84 | 20.84 |
| 4 | 162.46 | - | - | - | 162.46 | - | - | - | - | - | - | - | 101.61 | 60.86 | 60.86 |
| 5 | 257.11 | - | - | - | 257.11 | - | - | - | - | - | - | - | 137.89 | 119.22 | 119.22 |
| 6 | 446.57 | - | - | - | 446.57 | - | - | - | - | - | - | - | 204.21 | 242.36 | 242.36 |
| 7 | 385.36 | - | - | - | 485.36 | - | - | - | - | - | - | - | 147.80 | 334.56 | 334.56 |
| 8 | 435.74 | - | - | - | 435.74 | - | - | - | - | - | - | - | 154.63 | 489.19 | 489.19 |
| 9 | 7.84 | - | 4.73 | 2.05 | 14.62 | 5.78 | 7.06 | 149.20 | 107.08 | 258.37 | 243.75 | 15.62 | 81.14 | 74.52 | 74.52 |
| 10 | 1989 | - | 4.73 | 2.10 | 6.83 | 6.83 | 7.11 | 181.79 | 107.21 | 291.00 | 284.17 | 6.83 | 83.72 | 76.89 | 76.89 |
| 11 | 1990 | - | 4.73 | 2.15 | 6.88 | 6.88 | 7.15 | 213.29 | 107.34 | 322.63 | 315.75 | 6.88 | 82.32 | 75.44 | 75.44 |
| 12 | 1991 | - | 4.73 | 2.19 | 6.92 | 6.92 | 7.19 | 235.32 | 107.47 | 344.79 | 337.87 | 6.92 | 77.35 | 70.43 | 70.43 |
| 13 | 1992 | - | 4.73 | 2.24 | 6.97 | 6.97 | 7.24 | 249.53 | 107.60 | 354.13 | 347.16 | 6.97 | 70.89 | 63.92 | 63.92 |
| 14 | 1993 | - | 4.73 | 2.28 | 7.01 | 7.01 | 7.28 | 249.53 | 107.73 | 354.26 | 347.25 | 7.01 | 62.75 | 55.74 | 55.74 |
| 15 | 1994 | - | 4.73 | 2.33 | 7.06 | 7.06 | 7.33 | 249.53 | 107.87 | 354.40 | 347.34 | 7.06 | 55.54 | 48.48 | 48.48 |
| 16 | 1995 | - | 4.73 | 2.38 | 7.11 | 7.11 | 7.38 | 249.53 | 110.00 | 354.53 | 347.42 | 7.11 | 49.16 | 42.05 | 42.05 |
| 17 | 1996 | - | 4.73 | 2.42 | 7.15 | 7.15 | 7.43 | 249.53 | 110.13 | 354.66 | 347.51 | 7.15 | 43.51 | 37.36 | 37.36 |
| 18 | 1997 | - | 4.73 | 2.47 | 7.20 | 7.20 | 7.47 | 249.53 | 110.13 | 354.66 | 347.46 | 7.20 | 38.50 | 32.87 | 32.87 |
| 19 | 1998 | - | 4.73 | 2.51 | 7.24 | 7.24 | 7.52 | 249.53 | 110.13 | 354.66 | 347.42 | 7.24 | 34.08 | 28.80 | 28.80 |
| 20 | 1999 | - | 4.73 | 2.56 | 7.29 | 7.29 | 7.57 | 249.53 | 110.13 | 354.66 | 347.37 | 7.29 | 30.15 | 25.23 | 25.23 |
| 21 | 2000 | - | 4.73 | 2.61 | 7.34 | 7.34 | 7.61 | 249.53 | 110.13 | 354.66 | 347.32 | 7.34 | 26.67 | 22.16 | 22.16 |
| 22 | 2001 | - | 4.73 | 2.65 | 7.38 | 7.38 | 7.66 | 249.53 | 110.13 | 354.66 | 347.28 | 7.38 | 23.62 | 19.45 | 19.45 |
| 23 | 2002 | - | 4.73 | 2.70 | 7.43 | 7.43 | 7.70 | 249.53 | 110.13 | 354.66 | 347.23 | 7.43 | 20.87 | 17.05 | 17.05 |
| 24 | 2003 | - | 4.73 | 2.74 | 7.47 | 7.47 | 7.75 | 249.53 | 110.13 | 354.66 | 347.19 | 7.47 | 18.47 | 14.96 | 14.96 |
| 25 | 2004 | - | 4.73 | 2.79 | 7.52 | 7.52 | 7.80 | 249.53 | 110.13 | 354.66 | 347.14 | 7.52 | 16.35 | 13.12 | 13.12 |
| 26 | 2005 | - | 4.73 | 2.84 | 7.57 | 7.57 | 7.84 | 249.53 | 110.13 | 354.66 | 347.09 | 7.57 | 14.47 | 11.52 | 11.52 |
| 27 | 2006 | - | 4.73 | 2.88 | 7.61 | 7.61 | 7.88 | 249.53 | 110.13 | 354.66 | 347.05 | 7.61 | 12.81 | 10.10 | 10.10 |
| 28 | 2007 | - | 4.73 | 2.93 | 7.66 | 7.66 | 7.93 | 249.53 | 110.13 | 354.66 | 347.00 | 7.66 | 11.31 | 8.85 | 8.85 |
| 29 | 2008 | - | 4.73 | 2.97 | 7.70 | 7.70 | 7.98 | 249.53 | 110.13 | 354.66 | 346.96 | 7.70 | 10.03 | 7.77 | 7.77 |
| 30 | 2009 | - | 4.73 | 3.02 | 7.75 | 7.75 | 8.02 | 249.53 | 110.13 | 354.66 | 346.91 | 7.75 | 8.88 | 6.80 | 6.80 |
| 31 | 2010 | - | 4.73 | 3.07 | 7.80 | 7.80 | 8.07 | 249.53 | 110.13 | 354.66 | 346.86 | 7.80 | 7.84 | 5.97 | 5.97 |
| 32 | 2011 | - | 4.73 | 3.11 | 7.84 | 7.84 | 8.12 | 249.53 | 110.13 | 354.66 | 346.82 | 7.84 | 6.94 | 5.24 | 5.24 |
| 33 | 2012 | - | 4.73 | 3.16 | 7.89 | 7.89 | 8.17 | 249.53 | 110.13 | 354.66 | 346.77 | 7.89 | 6.14 | 4.58 | 4.58 |
| 34 | 2013 | - | 4.73 | 3.20 | 7.93 | 7.93 | 8.21 | 249.53 | 110.13 | 354.66 | 346.73 | 7.93 | 5.44 | 4.02 | 4.02 |
| 35 | 2014 | - | 4.73 | 3.25 | 7.98 | 7.98 | 8.25 | 249.53 | 110.13 | 354.66 | 346.68 | 7.98 | 4.82 | 3.54 | 3.54 |
| 36 | 2015 | - | 4.73 | 3.29 | 8.02 | 8.02 | 8.29 | 249.53 | 110.13 | 354.66 | 346.64 | 8.02 | 4.26 | 3.09 | 3.09 |
| 37 | 2016 | - | 4.73 | 3.34 | 8.07 | 8.07 | 8.34 | 249.53 | 110.13 | 354.66 | 346.59 | 8.07 | 3.74 | 2.70 | 2.70 |
| 38 | 2017 | - | 4.73 | 3.39 | 8.12 | 8.12 | 8.39 | 249.53 | 110.13 | 354.66 | 346.54 | 8.12 | 3.13 | 2.39 | 2.39 |
| 39 | 2018 | - | 4.73 | 3.43 | 8.16 | 8.16 | 8.43 | 249.53 | 110.13 | 354.66 | 346.50 | 8.16 | 2.45 | 2.08 | 2.08 |
| 40 | 2019 | - | 4.73 | 3.48 | 8.21 | 8.21 | 8.48 | 249.53 | 110.13 | 354.66 | 346.45 | 8.21 | 2.60 | 1.84 | 1.84 |
| 41 | 2020 | - | 4.73 | 3.52 | 8.25 | 8.25 | 8.52 | 249.53 | 110.13 | 354.66 | 346.41 | 8.25 | 2.32 | 1.59 | 1.59 |
| 42 | 2021 | - | 4.73 | 3.57 | 8.30 | 8.30 | 8.57 | 249.53 | 110.13 | 354.66 | 346.36 | 8.30 | 2.04 | 1.42 | 1.42 |
| 43 | 2022 | - | 4.73 | 3.62 | 8.35 | 8.35 | 8.62 | 249.53 | 110.13 | 354.66 | 346.31 | 8.35 | 1.44 | 1.03 | 1.03 |
| 44 | 2023 | - | 4.73 | 3.66 | 8.39 | 8.39 | 8.66 | 249.53 | 110.13 | 354.66 | 346.27 | 8.39 | 1.59 | 1.07 | 1.07 |
| 45 | 2024 | - | 4.73 | 3.71 | 8.44 | 8.44 | 8.71 | 249.53 | 110.13 | 354.66 | 346.22 | 8.44 | 1.42 | 0.93 | 0.93 |
| 46 | 2025 | - | 4.73 | 3.75 | 8.48 | 8.48 | 8.75 | 249.53 | 110.13 | 354.66 | 346.18 | 8.48 | 1.25 | 0.83 | 0.83 |
| 47 | 2026 | - | 4.73 | 3.80 | 8.53 | 8.53 | 8.80 | 249.53 | 110.13 | 354.66 | 346.13 | 8.53 | 1.11 | 0.73 | 0.73 |
| 48 | 2027 | - | 4.73 | 3.85 | 8.58 | 8.58 | 8.85 | 249.53 | 110.13 | 354.66 | 346.08 | 8.58 | 0.97 | 0.66 | 0.66 |
| 49 | 2028 | - | 4.73 | 3.89 | 8.63 | 8.63 | 8.89 | 249.53 | 110.13 | 354.66 | 346.04 | 8.63 | 0.87 | 0.55 | 0.55 |
| 50 | 2029 | - | 4.73 | 3.93 | 8.68 | 8.68 | 8.93 | 249.53 | 110.13 | 354.66 | 346.00 | 8.68 | 0.76 | 0.48 | 0.48 |
| Total: | 1,872.60 | 198.66 | 185.51 | 384.17 | 2,256.77 | 10,127.87 | 4,620.77 | 14,748.53 | 12,523.88 | 80.01 | - | 3.72 | - | - | - |

1/ I F R = 0.13 + 80.01 * 0.01 = 0.136

Note 1/ Ined unit of these facilities (Nueva Era Dam and Main Link) which constructed in Phase I Project are included in the table. 2/ 2.50 million, 3.00 million, 3.50 million, 4.00 million, 4.50 million, 5.00 million, 5.50 million, 6.00 million, 6.50 million, 7.00 million, 7.50 million, 8.00 million, 8.50 million, 9.00 million, 9.50 million, 10.00 million, 10.50 million, 11.00 million, 11.50 million, 12.00 million, 12.50 million, 13.00 million, 13.50 million, 14.00 million, 14.50 million, 15.00 million, 15.50 million, 16.00 million, 16.50 million, 17.00 million, 17.50 million, 18.00 million, 18.50 million, 19.00 million, 19.50 million, 20.00 million, 20.50 million, 21.00 million, 21.50 million, 22.00 million, 22.50 million, 23.00 million, 23.50 million, 24.00 million, 24.50 million, 25.00 million, 25.50 million, 26.00 million, 26.50 million, 27.00 million, 27.50 million, 28.00 million, 28.50 million, 29.00 million, 29.50 million, 30.00 million, 30.50 million, 31.00 million, 31.50 million, 32.00 million, 32.50 million, 33.00 million, 33.50 million, 34.00 million, 34.50 million, 35.00 million, 35.50 million, 36.00 million, 36.50 million, 37.00 million, 37.50 million, 38.00 million, 38.50 million, 39.00 million, 39.50 million, 40.00 million, 40.50 million, 41.00 million, 41.50 million, 42.00 million, 42.50 million, 43.00 million, 43.50 million, 44.00 million, 44.50 million, 45.00 million, 45.50 million, 46.00 million, 46.50 million, 47.00 million, 47.50 million, 48.00 million, 48.50 million, 49.00 million, 49.50 million, 50.00 million, 50.50 million, 51.00 million, 51.50 million, 52.00 million, 52.50 million, 53.00 million, 53.50 million, 54.00 million, 54.50 million, 55.00 million, 55.50 million, 56.00 million, 56.50 million, 57.00 million, 57.50 million, 58.00 million, 58.50 million, 59.00 million, 59.50 million, 60.00 million, 60.50 million, 61.00 million, 61.50 million, 62.00 million, 62.50 million, 63.00 million, 63.50 million, 64.00 million, 64.50 million, 65.00 million, 65.50 million, 66.00 million, 66.50 million, 67.00 million, 67.50 million, 68.00 million, 68.50 million, 69.00 million, 69.50 million, 70.00 million, 70.50 million, 71.00 million, 71.50 million, 72.00 million, 72.50 million, 73.00 million, 73.50 million, 74.00 million, 74.50 million, 75.00 million, 75.50 million, 76.00 million, 76.50 million, 77.00 million, 77.50 million, 78.00 million, 78.50 million, 79.00 million, 79.50 million, 80.00 million, 80.50 million, 81.00 million, 81.50 million, 82.00 million, 82.50 million, 83.00 million, 83.50 million, 84.00 million, 84.50 million, 85.00 million, 85.50 million, 86.00 million, 86.50 million, 87.00 million, 87.50 million, 88.00 million, 88.50 million, 89.00 million, 89.50 million, 90.00 million, 90.50 million, 91.00 million, 91.50 million, 92.00 million, 92.50 million, 93.00 million, 93.50 million, 94.00 million, 94.50 million, 95.00 million, 95.50 million, 96.00 million, 96.50 million, 97.00 million, 97.50 million, 98.00 million, 98.50 million, 99.00 million, 99.50 million, 100.00 million, 100.50 million, 101.00 million, 101.50 million, 102.00 million, 102.50 million, 103.00 million, 103.50 million, 104.00 million, 104.50 million, 105.00 million, 105.50 million, 106.00 million, 106.50 million, 107.00 million, 107.50 million, 108.00 million, 108.50 million, 109.00 million, 109.50 million, 110.00 million, 110.50 million, 111.00 million, 111.50 million, 112.00 million, 112.50 million, 113.00 million, 113.50 million, 114.00 million, 114.50 million, 115.00 million, 115.50 million, 116.00 million, 116.50 million, 117.00 million, 117.50 million, 118.00 million, 118.50 million, 119.00 million, 119.50 million, 120.00 million, 120.50 million, 121.00 million, 121.50 million, 122.00 million, 122.50 million, 123.00 million, 123.50 million, 124.00 million, 124.50 million, 125.00 million, 125.50 million, 126.00 million, 126.50 million, 127.00 million, 127.50 million, 128.00 million, 128.50 million, 129.00 million, 129.50 million, 130.00 million, 130.50 million, 131.00 million, 131.50 million, 132.00 million, 132.50 million, 133.00 million, 133.50 million, 134.00 million, 134.50 million, 135.00 million, 135.50 million, 136.00 million, 136.50 million, 137.00 million, 137.50 million, 138.00 million, 138.50 million, 139.00 million, 139.50 million, 140.00 million, 140.50 million, 141.00 million, 141.50 million, 142.00 million, 142.50 million, 143.00 million, 143.50 million, 144.00 million, 144.50 million, 145.00 million, 145.50 million, 146.00 million, 146.50 million, 147.00 million, 147.50 million, 148.00 million, 148.50 million, 149.00 million, 149.50 million, 150.00 million, 150.50 million, 151.00 million, 151.50 million, 152.00 million, 152.50 million, 153.00 million, 153.50 million, 154.00 million, 154.50 million, 155.00 million, 155.50 million, 156.00 million, 156.50 million, 157.00 million, 157.50 million, 158.00 million, 158.50 million, 159.00 million, 159.50 million, 160.00 million, 160.50 million, 161.00 million, 161.50 million, 162.00 million, 162.50 million, 163.00 million, 163.50 million, 164.00 million, 164.50 million, 165.00 million, 165.50 million, 166.00 million, 166.50 million, 167.00 million, 167.50 million, 168.00 million, 168.50 million, 169.00 million, 169.50 million, 170.00 million, 170.50 million, 171.00 million, 171.50 million, 172.00 million, 172.50 million, 173.00 million, 173.50 million, 174.00 million, 174.50 million, 175.00 million, 175.50 million, 176.00 million, 176.50 million, 177.00 million, 177.50 million, 178.00 million, 178.50 million, 179.00 million, 179.50 million, 180.00 million, 180.50 million, 181.00 million, 181.50 million, 182.00 million, 182.50 million, 183.00 million, 183.50 million, 184.00 million, 184.50 million, 185.00 million, 185.50 million, 186.00 million, 186.50 million, 187.00 million, 187.50 million, 188.00 million, 188.50 million, 189.00 million, 189.50 million, 190.00 million, 190.50 million, 191.00 million, 191.50 million, 192.00 million, 192.50 million, 193.00 million, 193.50 million, 194.00 million, 194.50 million, 195.00 million, 195.50 million, 196.00 million, 196.50 million, 197.00 million, 197.50 million, 198.00 million, 198.50 million, 199.00 million, 199.50 million, 200.00 million, 200.50 million, 201.00 million, 201.50 million, 202.00 million, 202.50 million, 203.00 million, 203.50 million, 204.00 million, 204.50 million, 205.00 million, 205.50 million, 206.00 million, 206.50 million, 207.00 million, 207.50 million, 208.00 million, 208.50 million, 209.00 million, 209.50 million, 210.00 million, 210.50 million, 211.00 million, 211.50 million, 212.00 million, 212.50 million, 213.00 million, 213.50 million, 214.00 million, 214.50 million, 215.00 million, 215.50 million, 216.00 million, 216.50 million, 217.00 million, 217.50 million, 218.00 million, 218.50 million, 219.00 million, 219.50 million, 220.00 million, 220.50 million, 221.00 million, 221.50 million, 222.00 million, 222.50 million, 223.00 million, 223.50 million, 224.00 million, 224.50 million, 225.00 million, 225.50 million, 226.00 million, 226.50 million, 227.00 million, 227.50 million, 228.00 million, 228.50 million, 229.00 million, 229.50 million, 230.00 million, 230.50 million, 231.00 million, 231.50 million, 232.00 million, 232.50 million, 233.00 million, 233.50 million, 234.00 million, 234.50 million, 235.00 million, 235.50 million, 236.00 million, 236.50 million, 237.00 million, 237.50 million, 238.00 million, 238.50 million, 239.00 million, 239.50 million, 240.00 million, 240.50 million, 241.00 million, 241.50 million, 242.00 million, 242.50 million, 243.00 million, 243.50 million, 244.00 million, 244.50 million, 245.00 million, 245.50 million, 246.00 million, 246.50 million, 247.00 million, 247.50 million, 248.00 million, 248.50 million, 249.00 million, 249.50 million, 250.00 million, 250.50 million, 251.00 million, 251.50 million, 252.00 million, 252.50 million, 253.00 million, 253.50 million, 254.00 million, 254.50 million, 255.00 million, 255.50 million, 256.00 million, 256.50 million, 257.00 million, 257.50 million, 258.00 million, 258.50 million, 259.00 million, 259.

Table 6D-2. Project Economic Cost and Returns
- Irrigation Project -

| Year | Project Cost | | Benefits (2) | Incremental Benefits (2) - (1) | Discount Rate | | | |
|----------------|--------------|------------|-----------------|--------------------------------------|---------------|--------|---|--------|
| | Capital | O & M Cost | | | 15% | 16% | | |
| | Total (1) | | | | | | | |
| 1 1980 | 0.62 | - | - | 0.62 | - | 0.54 | - | 0.53 |
| 2 1981 | 4.89 | - | - | 4.89 | - | 3.70 | - | 3.63 |
| 3 1982 | 39.55 | - | - | 39.55 | - | 26.00 | - | 25.34 |
| 4 1983 | 97.68 | - | - | 97.68 | - | 56.02 | - | 54.11 |
| 5 1984 | 155.54 | - | 3.16 | 152.38 | - | 75.76 | - | 72.55 |
| 6 1985 | 283.10 | - | 10.98 | 272.12 | - | 117.64 | - | 111.68 |
| 7 1986 | 282.73 | - | 17.40 | 265.33 | - | 99.74 | - | 93.87 |
| 8 1987 | 242.96 | - | 24.79 | 218.17 | - | 71.32 | - | 66.54 |
| 9 1988 | 7.48 | 4.73 | 149.29 | 137.08 | - | 38.97 | - | 36.05 |
| 10 1989 | - | 4.73 | 181.79 | 177.06 | - | 43.77 | - | 40.14 |
| 11 1990 | - | 4.73 | 213.29 | 208.56 | - | 44.82 | - | 40.75 |
| 12 1991 | - | 4.73 | 235.32 | 230.59 | - | 43.10 | - | 38.85 |
| 1992 | - | 4.73 | 244.53 | 239.80 | - | 297.33 | - | 251.60 |
| 13-50 -2029 | - | - | - | - | - | - | - | - |
| Total | 1,114.55 | 193.93 | 10,127.87 | 8,819.39 | - | 17.27 | - | 20.86 |

$$IERR = 0.15 + \frac{17.27}{17.27 + 20.86} \times 0.01 = 0.1545$$

Table 61-3. Project Economic Cost and Returns
- Power Project -

(Unit: 10⁶ ₪)

| Year | Project Cost | | | benefits (2) | Incremental Benefits(2)-(1) | Discount Rate | |
|--------------|---------------|---------------|---------------|-----------------|--------------------------------|---------------|----------------|
| | Capital | O & M Cost | Total (1) | | | 11% | 12% |
| 1 1980 | 0.45 | - | 0.45 | - | - 0.45 | - 0.41 | - 0.40 |
| 2 1981 | 3.65 | - | 3.65 | - | - 3.65 | - 2.96 | - 2.91 |
| 3 1982 | 28.37 | - | 28.37 | - | - 28.37 | - 20.74 | - 20.19 |
| 4 1983 | 64.78 | - | 64.78 | - | - 64.78 | - 42.67 | - 41.17 |
| 5 1984 | 101.57 | - | 101.57 | - | -101.57 | - 60.28 | - 57.63 |
| 6 1985 | 163.47 | - | 163.47 | - | -163.47 | - 87.39 | - 82.81 |
| 7 1986 | 202.63 | - | 202.63 | - | -202.63 | - 97.61 | - 91.67 |
| 8 1987 | 192.78 | - | 192.78 | - | -192.78 | - 83.65 | - 77.85 |
| 9 1988 | 0.36 | 2.05 | 2.41 | 109.08 | 106.67 | 41.70 | 38.47 |
| 10 1989 | - | 2.10 | 2.10 | 109.21 | 107.11 | 37.72 | 34.48 |
| 11 1990 | - | 2.15 | 2.15 | 109.34 | 107.19 | 34.01 | 30.82 |
| 12 1991 | - | 2.19 | 2.19 | 109.47 | 107.28 | 30.66 | 27.54 |
| 13 1992 | - | 2.24 | 2.24 | 109.60 | 107.36 | 27.65 | 24.61 |
| 14 1993 | - | 2.28 | 2.28 | 109.73 | 107.45 | 24.93 | 21.98 |
| 15 1994 | - | 2.33 | 2.33 | 109.87 | 107.54 | 22.48 | 19.65 |
| 16 1995 | - | 2.38 | 2.38 | 110.00 | 107.62 | 20.26 | 17.55 |
| 17 1996 | - | 2.42 | 2.42 | 110.13 | 107.71 | 18.27 | 15.68 |
| 18 1997 | - | 2.47 | 2.47 | 110.13 | 107.66 | 16.45 | 14.00 |
| 19 1998 | - | 2.51 | 2.51 | 110.13 | 107.62 | 14.82 | 12.49 |
| 20 1999 | - | 2.56 | 2.56 | 110.13 | 107.57 | 13.34 | 11.16 |
| 21 2000 | - | 2.61 | 2.61 | 110.13 | 107.52 | 12.01 | 9.96 |
| 22 2001 | - | 2.65 | 2.65 | 110.13 | 107.48 | 10.82 | 8.88 |
| 23 2002 | - | 2.70 | 2.70 | 110.13 | 107.43 | 9.74 | 7.93 |
| 24 2003 | - | 2.74 | 2.74 | 110.13 | 107.39 | 8.77 | 7.08 |
| 25 2004 | - | 2.79 | 2.79 | 110.13 | 107.34 | 7.90 | 6.31 |
| 26 2005 | - | 2.84 | 2.84 | 110.13 | 107.29 | 7.11 | 5.63 |
| 27 2006 | - | 2.88 | 2.88 | 110.13 | 107.25 | 6.40 | 5.03 |
| 28 2007 | - | 2.93 | 2.93 | 110.13 | 107.20 | 5.77 | 4.49 |
| 29 2008 | - | 2.97 | 2.97 | 110.13 | 107.16 | 5.20 | 4.01 |
| 30 2009 | - | 3.02 | 3.02 | 110.13 | 107.11 | 4.68 | 3.58 |
| 31 2010 | - | 3.07 | 3.07 | 110.13 | 107.06 | 4.22 | 3.19 |
| 32 2011 | - | 3.11 | 3.11 | 110.13 | 107.02 | 3.80 | 2.85 |
| 33 2012 | - | 3.16 | 3.16 | 110.13 | 106.97 | 3.41 | 2.55 |
| 34 2013 | - | 3.20 | 3.20 | 110.13 | 106.93 | 3.08 | 2.27 |
| 35 2014 | - | 3.25 | 3.25 | 110.13 | 106.88 | 2.77 | 2.02 |
| 36 2015 | - | 3.29 | 3.29 | 110.13 | 106.84 | 2.50 | 1.81 |
| 37 2016 | - | 3.34 | 3.34 | 110.13 | 106.79 | 2.24 | 1.61 |
| 38 2017 | - | 3.39 | 3.39 | 110.13 | 106.74 | 2.03 | 1.44 |
| 39 2018 | - | 3.43 | 3.43 | 110.13 | 106.70 | 1.82 | 1.28 |
| 40 2019 | - | 3.48 | 3.48 | 110.13 | 106.65 | 1.64 | 1.14 |
| 41 2020 | - | 3.52 | 3.52 | 110.13 | 106.61 | 1.48 | 1.02 |
| 42 2021 | - | 3.57 | 3.57 | 110.13 | 106.56 | 1.33 | 0.92 |
| 43 2022 | - | 63.42 | 63.42 | 110.13 | 46.71 | 0.52 | 0.35 |
| 44 2023 | - | 3.66 | 3.66 | 110.13 | 106.47 | 1.08 | 0.72 |
| 45 2024 | - | 3.71 | 3.71 | 110.13 | 106.42 | 0.97 | 0.65 |
| 46 2025 | - | 3.75 | 3.75 | 110.13 | 106.38 | 0.87 | 0.57 |
| 47 2026 | - | 3.80 | 3.80 | 110.13 | 106.33 | 0.79 | 0.52 |
| 48 2027 | - | 3.85 | 3.85 | 110.13 | 106.28 | 0.71 | 0.46 |
| 49 2028 | - | 3.85 | 3.85 | 110.13 | 106.28 | 0.64 | 0.41 |
| 50 2029 | - | 3.85 | 3.85 | 110.13 | 106.28 | 0.57 | 0.37 |
| Total | 758.06 | 185.51 | 943.57 | 4,620.72 | 3,677.15 | 21.45 | - 17.16 |

$$IERR = 0.11 + \frac{21.45}{21.45 + 17.16} \times 0.01 = 0.1156$$

Table 6F-1. Average farms-Area, by Size and Municipalities, April 1971

| Phase | Municipality | Average area | Under 1.0 ha | | 1.0 and under 3.0 ha | | 3.0 and under 5.0 ha | | 5.0 and under 10.0 ha | | 10.0 and under 25.0 ha | | 25.0 and under 50.0 ha | | 50.0 ha and over | |
|----------|------------------|--------------|--------------|-------------|----------------------|-------------|----------------------|--------------|-----------------------|--------------|------------------------|-------|------------------------|-------|------------------|-------|
| | | | 1.0 ha | 0.50 | 3.0 ha | 1.59 | 5.0 ha | 3.61 | 10.0 ha | 5.89 | 25.0 ha | 13.00 | 50.0 ha | 31.10 | 50.0 ha | 90.30 |
| Phase I | Dingras | 1.45 | 0.60 | 0.50 | 1.59 | 3.61 | 5.89 | - | - | - | - | - | - | - | - | - |
| | Espiritu | 1.66 | 0.55 | 0.50 | 1.64 | 3.57 | 6.04 | 13.00 | 31.10 | - | - | - | - | - | - | - |
| | Marcos | 1.24 | 0.50 | 0.50 | 1.60 | 3.79 | 5.67 | - | - | - | - | - | - | - | - | - |
| | Nueva Era | 2.80 | 0.50 | 0.50 | 1.44 | 3.46 | 5.14 | - | - | - | - | - | - | - | 94.50 | - |
| | Solsona | 1.48 | 0.60 | 0.60 | 1.58 | 3.48 | 6.31 | 10.8 | 43.20 | - | - | - | - | - | - | - |
| | <u>Sub Total</u> | <u>1.54</u> | <u>0.57</u> | <u>0.57</u> | <u>1.50</u> | <u>3.58</u> | <u>5.76</u> | <u>11.72</u> | <u>39.17</u> | <u>93.87</u> | | | | | | |
| Phase II | Badoc | 1.14 | 0.57 | 0.57 | 1.52 | 3.55 | 6.26 | - | - | - | - | - | - | - | - | - |
| | Batac | 1.18 | 0.46 | 0.46 | 1.50 | 3.69 | 5.56 | 17.16 | - | - | - | - | - | - | - | - |
| | Paoay | 1.57 | 0.54 | 0.54 | 1.66 | 3.91 | 5.48 | 11.70 | - | - | - | - | - | - | - | - |
| | Pinily | 1.43 | 0.58 | 0.58 | 1.62 | 3.64 | 5.00 | 11.00 | - | - | - | - | - | - | 52.05 | - |
| | <u>Sub Total</u> | <u>1.27</u> | <u>0.53</u> | <u>0.53</u> | <u>1.56</u> | <u>3.70</u> | <u>5.68</u> | <u>14.94</u> | <u>52.05</u> | | | | | | | |

Source: 1971, Agricultural Census

Table 6F-2. Crop Budgets 1/

(Unit: \$/ha)

| Item | 1. Paddy Rice Irrigated, Wet | 2. Paddy Rice Irrigated, Dry | 3. Paddy Rice Rainfed, Wet | 4. Tobacco | 5. Garlic | 6. Mungbeans | 7. Cotton |
|--------------------------|------------------------------|------------------------------|----------------------------|------------|-----------|--------------|-----------|
| 1. Present | | | | | | | |
| Yield (tons/ha) | 2.38 | 2.25 | 1.41 | 1.01 | 1.37 | 0.38 | - |
| Farm-gate Price (\$/ton) | 1,215 | 1,215 | 1,215 | 18,055 | 3,980 | 4,500 | - |
| Gross Production Value | 2,892 | 2,734 | 1,713 | 18,236 | 5,453 | 1,710 | - |
| Production Cost | 1,190 | 981 | 1,002 | 1,864 | 2,649 | 1,402 | - |
| Net Production Value | 1,702 | 1,753 | 711 | 16,372 | 2,804 | 302 | - |
| 2. Without Project | | | | | | | |
| Yield (tons/ha) | 2.66 | 2.67 | 1.58 | 1.21 | 1.58 | 0.45 | - |
| Farm-gate Price (\$/ton) | 2,090 | 2,090 | 2,090 | 19,940 | 5,630 | 5,090 | - |
| Gross Production Value | 5,559 | 5,580 | 3,302 | 24,127 | 8,895 | 2,291 | - |
| Production Cost | 1,413 | 1,159 | 1,163 | 1,988 | 3,122 | 1,424 | - |
| Net Production Value | 4,146 | 4,421 | 2,139 | 22,139 | 5,773 | 867 | - |
| 3. With Project | | | | | | | |
| Yield (tons/ha) | 4.20 | 4.50 | - | 1.70 | 2.60 | 1.10 | 2.50 |
| Farm-gate Price (\$/ton) | 2,090 | 2,090 | - | 19,940 | 5,630 | 5,090 | 18,240 |
| Gross Production Value | 8,778 | 9,405 | - | 33,898 | 14,638 | 5,599 | 45,600 |
| Production Cost | 1,995 | 2,263 | - | 2,100 | 4,370 | 1,490 | 2,175 |
| Net Production Value | 6,783 | 7,142 | - | 31,798 | 10,268 | 4,109 | 43,425 |

Note: 1/ Financial prices are used.

Table 6f-3. Rent Recovery ^{1/} (1.1 ha farm)

(Unit:₱)

| <u>Item</u> | <u>Owner-farm</u> |
|--|-------------------|
| Incremental gross production value | 18,162 |
| Incremental - production cost | 2,719 |
| (including hired labor) | |
| - imputed return on capital ^{2/} | 120 |
| - imputed value for family labor ^{3/} | 1,430 |
| - imputed value for management ^{4/} | 1,816 |
| - allowance for risk ^{4/} | 1,816 |
| Project rent | 10,261 |
| Incremental water charges | 512 |
| Project rent recovery index (%) | 5 |

Note: 1/ All pesos values are in 1980 constant pesos.

2/ Interest charged at 7% (14% per year). It is assumed that farmers borrow 41% of their cash needs in the future without project and would borrow 51% of their cash needs in the future with project.

3/ Family labor valued at 15 ₱/man-day in the future

4/ 10% of incremental gross production value

Study on Inland Fisheries in the Nueva Era Reservoir

1. Present Inland Fisheries in the Ilocos Norte Province

The fisheries are one of the important income sources for the Ilocos Norte province. The statistic data prepared by the provincial government indicate that the average production of the inland fisheries in the province is about 335 tons per annum, which involve the fishes such as mullets, gobies, tilapia, mudfishes, bangus, carp, perches, eels, gurami, tawis, shrimps, crabs, etc.

The total surface areas of the fish ponds in province is 192.15 ha,^{1/} which include 147.05 ha of fresh water fish ponds and 43 ha of brackish water fish ponds. The lake of Paoay is utilized as fish ponds by 2.1 ha of its area.

The fishermen of the province have not carried out the deep-sea fishing, but the off-shore fishing. The annual production of off-shore fishing is about 408 tons. In the province, the aquatic resources other than the above are sea-plants, shellfish and so forth that bring about the annual production of about 27 tons.

As learnt from the above, the inland fisheries have played an important role in the total fisheries of the Ilocos Norte province.

2. Fisheries Development Program in the Ilocos Norte Province^{2/}

The Ilocos Norte provincial government has made a five-year

^{1/} Source: The Ilocos Norte Socio-Economic Profile, 1975, Ilocos Norte Province Capital, Laoag City

^{2/} Regional Development Investment Program
Region 1, 1981 - 1985, Volume VII; Program and Projects,
Ilocos Norte

plan 1981 - 1985 for the fisheries development and aquatic resources conservation, and the major subjects taken up in the plan are fish ponds development, municipal fishing development, fish and fishery products utilization, fishery regulation implementation, etc.

These subjects cover the following matters;

- (1) Fish ponds development: Seedlings production and distribution, and the related survey,
- (2) Municipal fishing development: Encouragement of extension activities, blue revolution (development of fishing ground and training of fishermen),
- (3) Fish and fishery products utilization: Construction of ice plant and cold storage facilities, and
- (4) Fishery regulation implementation: Observation and implementation of the fishery law and regulations.

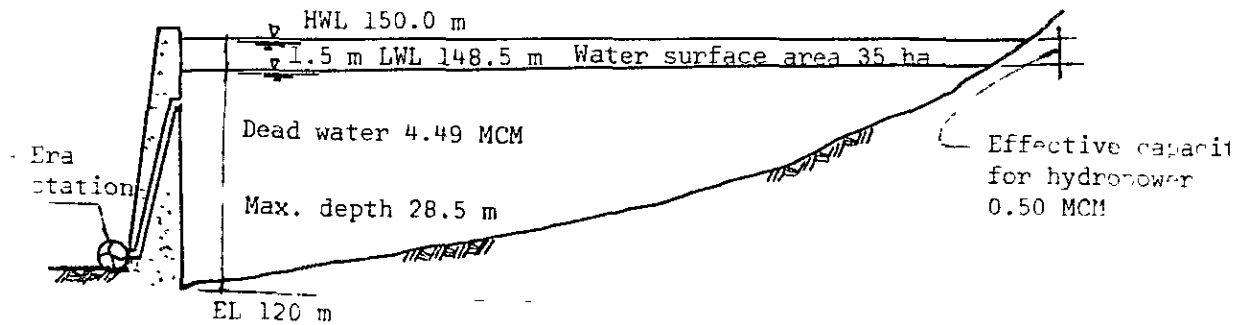
The total budget allotted to execution of the above five-year plan is 7,738 thousand pesos, and the fish ponds development scheme occupies 41 percent of the total budget, and this fact suggests that the fish ponds development is taken up as the most important objective in the fishery development strategy.

3. Study on Possibility of Inland Fisheries in the Nueva Era Reservoir
- Dam operation program and local conditions for fish culture -

The Project involves a plan to construct a reservoir at Nueva Era with total storage capacity of 4.99 MCM and water surface of about 37.3 ha. The water resources to be stored in this reservoir could be utilized for fresh water fish culture.

The Nueva Era reservoir, which will store the water discharged from the proposed Palsigan dam, will function for power generation and irrigation.

The implementation schedule of the Nueva Era dam construction defines that the dam will be completed and start storing the runoff discharges from its own catchment area in June, 1987, while the Palsiguan dam will be completed in December, 1987 and start releasing the water to the Nueva Era dam in 1988. The designed water level and water storage in the Nueva Era reservoir are illustrated in the following figure.



The Nueva Era reservoir, commanding a catchment area of 52.4 sq.km, will have an estimated sediment at the rate of 1,500 cu.m/sq.km per annum. The expected life of the reservoir is 57 years, accordingly, and the effective water depth and the storage capacity during the reservoir life will change as shown in the following table.

Expected Secular Change of Effective Water
Depth and Storage Capacity

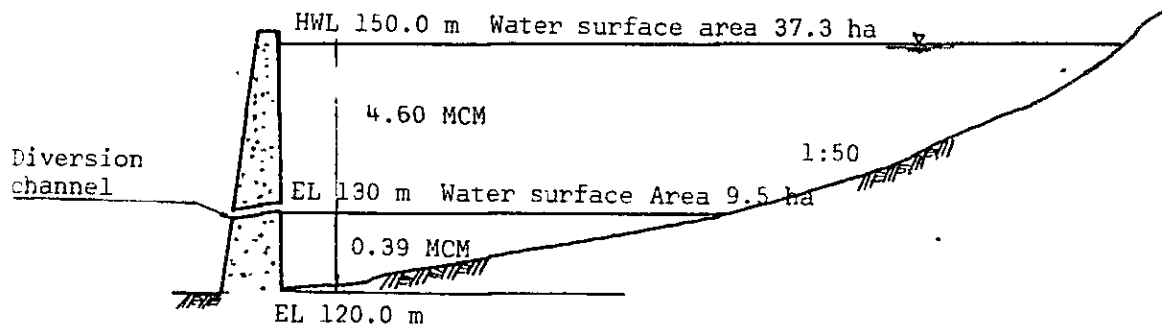
| <u>Calendar Year</u> | <u>Elapsed Year</u> | <u>Water Capacity</u> | | <u>Effective Depth of Water</u> | |
|--------------------------|-------------------------|-----------------------|----------|---------------------------------|-------------|
| | | <u>MCM</u> | <u>%</u> | <u>Maximum</u> | <u>Mean</u> |
| 1988 | (1) | 4.49 | 100 | 28.5 m | 14.2 m |
| 1992 | (5) | 4.18 | 93.1 | 27.0 | 13.5 |
| 1997 | (10) | 3.78 | 84.2 | 26.0 | 13.0 |
| 2002 | (15) | 3.39 | 75.5 | 25.5 | 12.8 |
| 2007 | (20) | 2.99 | 66.6 | 24.2 | 12.1 |
| 2012 | (25) | 2.60 | 57.9 | 22.5 | 11.2 |
| 2017 | (30) | 2.20 | 49.0 | 21.0 | 10.5 |
| 2022 | (35) | 1.81 | 40.3 | 19.3 | 9.7 |
| 2027 | (40) | 1.42 | 31.6 | 17.5 | 8.8 |
| 2032 | (45) | 1.03 | 22.9 | 15.0 | 7.5 |
| 2037 | (50) | 0.63 | 14.0 | 12.2 | 6.1 |
| 2042 | (55) | 0.24 | 5.3 | 9.0 | 4.5 |

Above table shows that the water surface area and maximum and mean water depth at full water level are 35 ha, 28.5 m and 14.2 m, respectively, whereas the maximum and mean water depth will be reduced to 21.0 m and 10.5 m with storage capacity reduction 49 percent of the designed capacity, after 30 years elapsed. The water surface area, although quite difficult in prediction of its variation, is expected to remain at 35 ha level within 30 years after completion of the reservoir.

The dimensions of the Nueva Era dam are tabulated as follows, on the basis of the staged development study of the Project. Without water release from the Palsiguan dam, the Nueva Era dam can function only for irrigation proper. The proposed annual dam operation program defines the water depth, full water surface and stored water surface area as follows;

| | <u>Max. Water Depth</u> | <u>Full Water Surface</u> | <u>Stored Water</u> |
|-----------------------------------|-------------------------|---------------------------|---------------------|
| From May 10 to Oct. 31 (175 days) | 30 m | 37.3 ha | 4.99 MCM |
| From Nov. 1 to Mar. 9 (129 days) | Decreased | Reduced | Reduced |
| From Mar. 10 to May 9 (61 days) | 10 m | 9.5 ha | 0.39 MCM |

Illustration of Nueva Era Dam in Stage I Development



| Month | Date | H.W.L (m) | Depth of Water | | Water Surface Area (ha) | Capacity of Reservoir (MCM) |
|-------|------|--------------|----------------|-------------|-------------------------------|-----------------------------------|
| | | | Max. (m) | Mean (m) | | |
| Jan. | | down | 18 | 9 | 20.8 | |
| Feb. | | down | 14 | 7 | 15.3 | |
| Mar. | 10th | 130 | 10 | 5 | 9.5 | 0.39 |
| Apr. | | 130 | 10 | 5 | 9.5 | 0.39 |
| May | 10th | 150 | 30 | 15 | 37.3 | 4.99 |
| Jun. | | 150 | 30 | 15 | 37.3 | 4.99 |
| Jul. | | 150 | 30 | 15 | 37.3 | 4.99 |
| Aug. | | 150 | 30 | 15 | 37.3 | 4.99 |
| Sep. | | 150 | 30 | 15 | 37.3 | 4.99 |
| Oct. | 31th | 150 | 30 | 15 | 37.3 | 4.99 |
| Nov. | | down | 26 | 13 | 31.8 | |
| Dec. | | down | 22 | 11 | 26.3 | |

The stage development study revealed that the completion of the Nueva Era dam and the Palsiguan dam would be at the end of May, 1987 and at the end of December, 1990, respectively, and the afore-said status of the storage in the respective reservoirs would be observed for three years from 1988 to 1990.

As a conclusion, it can be said that the inland fresh water fish culture will be practised stably when the Nueva Era reservoir could be supplied with the released water from the Palsiguan dam, whereas the environment for fish culture could not be secured stably when the Nueva Era reservoir would depend solely upon its own catchment area for storing water.

4. Benefit Estimation

1) Proposed fish species for cultivation

The seedling, growing and cultivation for tilapia and carp have been carried out in the fish pen provided in the Paoay lake and the fish ponds run by the Bureau of Fisheries, Laoag office. The other fish species now cultivated as the provincial inland fisheries are listed up previously.

The survey report^{3/} by the Ministry of Agriculture regarding the regional consumption pattern of major foodstuffs clarifies that the people of the Ilocos region have consumed fish meat in fresh or frozen at the rate of 11.7 kg per capita per annum, which include the following inland fishery products as milkfish by 4.7 kg, tilapia by 1.0 kg, mudifish by 0.4 kg, etc.

Under the circumstances, tilapia, milkfish, carp and so forth are recommended as the major species to be cultivated in the Nueva Era reservoir, in taking into account the actual status of cultivation and consumption.

3/ Regional Consumption Patterns for Major Foods, 1974 - 1976, Ministry of Agriculture, Philippines

2) Cultivation method

The fresh water fish culture can be specified into intensive in the lakes, netting fish-pen cultivation, fish pond cultivation with feeding, and extensive fish pond cultivation without feeding. The detailed survey by expert is required to select a definite fish culture method suitable to the Nueva Era reservoir fish culture, but a simple method with feeding is provisionally taken up in this study.

It is proposed to purchase the seedlings required for cultivation from the fish larva pen at the Paoay lake or the Bureau of Fisheries and to appoint the beneficiary municipalities as management body of the Nueva Era reservoir fish culture along with the direction of the Fishery Development Plan.

3) Yield estimation

The national statistics^{4/} indicates that the average yield of the cultivated fish in the fish ponds is 600 kg/ha (60 g/sq.m), while the inland fisheries yield in the Ilocos Norte province is about 168 kg/ha (Annual, production 335 ton ÷ 192.15 ha) ÷ (174.3 kg/ha)^{5/}
(2,000 ha) (168 kg/ha)

Where, 192.15 ha expresses the total surface area of the fish ponds in the province and the figure of 2,000 ha expresses the estimated total surface area utilized for inland fisheries. The national average yield from the fish ponds requires an investment 6,000 pesos per hectare on an average. On the basis of these data and information, target yield would be assumed by 100 g/sq.m when the Nueva Era reservoir is supplied with the released water from the Palsiguan dam, while by 60 g/sq.m when the Palsiguan dam does not supply the water to the Nueva Era reservoir.

^{4/} Statistical Yearbook, 1977, NEDA

^{5/} Ilocos Norte Socio-Economic Profile, 1975

(References: The master Plan Survey Report on the Irrawaddy River Basin Integrated Agricultural Development Plan in the Socialist Republic of the Union of Burma (JICA, March, 1980) describes that the fish culture in the reservoir without feeding will produce an yield of 20 g/sq.m, a half of 40 g/sq.m that can be produced from the cultivation in the fish ponds.^{6/}

4) Unit price of fish

The price fluctuation for fish in the retail market is shown in the following table.^{7/}

Retail Prices of Fish in Manila

- Fish, Bangus, Fresh -

(Unit: Pesos/kg)

| <u>Month</u> | <u>1980</u> | <u>1979</u> | <u>1978</u> | <u>1977</u> | <u>1976</u> |
|--------------|--------------|-------------|-------------|-------------|-------------|
| Jan. | 13.08 | 11.07 | 8.00 | 8.98 | |
| Feb. | 14.20 | 10.34 | 9.06 | 9.08 | |
| Mar. | | 10.00 | - | 9.40 | |
| Apr. | | 10.00 | 8.82 | 9.34 | |
| May | | 10.44 | 7.50 | 8.94 | |
| Jun. | | 10.44 | 7.26 | 8.09 | |
| Jul. | | 9.88 | 7.19 | 7.32 | 7.14 |
| Aug. | | 10.60 | 7.19 | 6.84 | 7.56 |
| Sep. | | 10.61 | 7.69 | 7.19 | 7.93 |
| Oct. | | 10.50 | 8.42 | 7.34 | 7.69 |
| Nov. | | 11.35 | 8.42 | 7.39 | 8.31 |
| Dec. | | 12.09 | 9.62 | 7.97 | 8.35 |
| <u>Ave.</u> | <u>13.64</u> | <u>9.74</u> | <u>8.10</u> | <u>8.16</u> | <u>7.83</u> |

Source: Philippine Economic Indicators, NEDA

The above listed prices include those for bangus, the fresh water fish, and from this viewpoint, the quoted prices are considered as those for fresh water fish.

^{6/} The Master Plan Survey Report on the Irrawaddy Basin Integrated Agricultural Development, Annex I, Fisheries, March, 1980, JICA.

^{7/} Source: Philippine Economic Indicators, NEDA

According to the Philippine statistical Yearbook, the production type-wise fish prices are illustrated in the following table. As learnt from the table, the fish cultivated in the fish ponds, although occupying only eight percent of the total fish production, can sell at the highest unit price per kilogram.

Quantity and Value of Fish Production (1975)

| <u>Type of Production</u> | <u>Quantity</u> (10 ³ tons) | <u>Value</u> (10 ⁶ pesos) | <u>Unit Price</u> (₱/kg) |
|--|---|---|-----------------------------|
| Commercial Fishing Vessels | 498.6 | 2,549.0 | 5.1 |
| Fishponds | 106.5 | 809.1 | 7.6 |
| Municipal Fishing and Sustenance Fishing | 731.7 | 2,561.0 | 3.5 |
| Total | 13,336.8 | 5,919.1 | 4.4 |

Source: Philippines Statistical Yearbook, 1977

The economic price of the fish was estimated as follows from the above list.

Retail Price 14.0 pesos/kg - Marketing cost 2.0 pesos/kg
= Farm gate price 12.0 pesos/kg

Economic price = 12.0 pesos/kg x 0.82 (Standard conversion rate)
÷ 10.0 pesos/kg

5) Production cost

The production cost items involved in the fish culture are costs for facilities, seedlings, feeds, fuel and direct salary for workers and other miscellaneous charges.

A Japanese example of carp culture in the Kaminuma fish pond Saitama Prefecture indicates the breakdown of the costs as follows;^{8/}

- a. Water surface area of the fish ponds: 0.62 ha, maximum depth: 3.2 m
- b. Liberated seedling carp: 69 g to 86 g/seedling liberation, density: 1 seedling/3.3 sq.m
- c. Number of liberated seedlings: 4,329 pieces, harvested number: 1,542 pieces (yield 35.6%)
- d. Cultivation period: 146 days
- e. Cost breakdown:
 - Seedling purchase: 19.6%
 - Feed cost: 58.6%
 - Labor cost: 15.2%
 - Facilities cost: 3.4%
- f. Benefit-cost ratio (benefit ÷ gross income): 10%
- g. Growth rate of fish meat (total quantity of feed given 2,826 kg ÷ total weight of fish meat expanded 1,298 kg): 2.18

The case study as above suggests that the carp culture with feed input of about 60 percent of the total cost cannot bring so much a benefit as expected.

At present, the balance sheet on fresh water fish culture in the Philippines are not available, and the annual benefit calculation for the Nueva Era reservoir fish culture is made as shown in the following paragraph in the premise that the aforesaid simple feeding method will be employed and the cost rate will be about 70 percent.

^{8/} Inland Fish Culture as Side-business by Dr. C. Nakamura (Professor at University of Hiroshima) 1973.

6) Annual benefit

For Stage II.

$$35 \text{ ha} \times 1,000 \text{ kg/ha} = 35,000 \text{ kg}$$

$$35,000 \text{ kg} \times 10 \text{ pesos/kg} = 350,000 \text{ pesos}$$

$$350,000 \text{ pesos} \times 0.3 = 105,000 \text{ pesos} \text{ ---- Annual Benefit}$$

For Stage I:

$$37.3 \text{ ha} \times 600 \text{ kg/ha} = 22,380 \text{ kg}$$

$$22,380 \text{ kg} \times 10 \text{ pesos/kg} = 220,380 \text{ pesos}$$

$$220,380 \text{ pesos} \times 0.3 = 66,114 \text{ pesos} \text{ ----- Annual Benefit}$$

For Stage I, when the proposed irrigable area is assumed to be 7,210 ha, the annual incremental agricultural benefit is estimated at 28.36 million pesos at the full benefit year of 1991, whereas the fish culture benefit for the Stage I is 66,114 pesos, equivalent to only 0.23 percent of the agricultural benefit.

The above estimation was made on the fixed rate of the yield and cost ratio, and even when these values are varied as shown below, the benefit created from fish culture in the Stage I, is appreciably small as compared with that from the agricultural benefit.

Benefit from the Fish Culture in the Stage I.

| Yield/ha (kg) | Gross Income (P \times 10 ³) | Cost Rate 70% | | Cost Rate 50% | |
|------------------|---|---------------------------------------|--|---------------------------------------|--|
| | | Cost (P \times 10 ³) | Net Benefit (P \times 10 ³) | Cost (P \times 10 ³) | Net Benefit (P \times 10 ³) |
| 600 | 220 | 154 | 66 | 110 | 110 |
| 1,000 | 373 | 261 | 112 | 189 | 189 |
| 2,000 | 746 | 522 | 224 | 373 | 373 |

Fish Culture Benefit Rate against Annual
Agricultural Incremental Benefit 28.36
Million Pesos (1991)

| <u>Yeild/ha</u> (kg) | <u>Cost Rate 70%</u> (%) | <u>Cost Rate 50%</u> (%) |
|-------------------------|-----------------------------|-----------------------------|
| 600 | 0.23 | 0.39 |
| 1,000 | 0.39 | 0.67 |
| 2,000 | 0.79 | 1.32 |

CHAPTER VII. ALTERNATIVE PLAN OF PHASE II PROJECT

The project is to be completed in full phase

2000

1000

1000

1000

1000

1000

1000

Staged Development Plan of Phase II Project

A. Objectives of Staged Development

The Phase II development in the Ilocos Norte Irrigation Project involves large scaled facilities for irrigation and hydropower generation, extending over wide areas such as provinces of Ilocos Norte, Ilocos Sur and Abra, and the project cost is inevitably estimated at big amounts of about 2,450 million pesos in total, 1,560 million pesos in equivalence of foreign currency and 890 million pesos in local currency. This fact will cause the complexity in full scale implementation of the Project as a whole.

However, in order to materialize the implementation of the Project as early as possible, the staged development plan has been studied as alternatives of the Phase II development scheme.

The subsequent paragraph will discuss about the staged development of the Phase II Project.

B. Development Plan

Water resources for irrigation is the restricting factors to formulate the alternative plan. Major water resources for the Phase II development are the stored water in the Palsiguan dam to be provided across the Palsiguan river in the Abra province and the run-off discharge of each river basin such as Cura, Madupayas and Tibangran rivers in the Ilocos Norte province. Out of these water resources, the plan using the water resources of river run-off discharge mentioned above would be considered most appropriate for first stage development, because of easy and economical development of water resources without Palsiguan dam and trans basin tunnel, though water sources available are mostly limited to the wet season.

On the basis of above considerations, the following two alternative plans, in which the Phase II Project is divided into two stages, Stage I and Stage II, could be formulated for the Phase II development.

Alternative I

Stage I ; to irrigate a part of the Project Area by the diverted water through diversion dams such as Nueva Era diversion dam already provided in Phase I Project and the Proposed Madupayas and Tibangran diversion dams, taking into account an effective utilization of water resources in their own catchment area.

Stage II ; to irrigate the whole Project Area including Phase I area by the stored water in the Palsiguan dam and each run-off discharge from river basin, and also to generate hydropower by using an effective head between the Palsiguan reservoir and the Bonga river bed.

Alternative II

Stage I ; to irrigate a part of Project Area by means of Madupayas and Tibangran diversion dams as well as Nueva Era storage dam, so as to expect the effective utilization of water resources as mentioned in Alternative I.

Stage II ; same as the above Stage II plan in Alternative I

On the above two alternatives, ten-year water balance computations (1960 - 1969) have been made to determine the extent of irrigable areas in the Stage I project, on the basis of following presumptions;

- i) The Stage I Project aims at supplying the irrigation water stably in the wet season, that is, no water is supplied in the dry season due to no river discharge available, except the stored water in the Nueva Era dam by the end of the wet season in Alternative II.
- ii) The main purpose of the Nueva Era dam is to regulate the released water from Palsiguan dam for power generation. However, in the Stage I period, this dam will function as

reservoir with an effective storage capacity of 4.60 MCM, out of total capacity of 4.99 MCM in the Alternative II.

- iii) Necessary irrigation water for the Cura area will be supplied through Labugaon diversion dam to be provided in Phase I Project.
- iv) The diverted river discharge by the Nueva Era diversion dam in Alternative I or the stored water in the reservoir in Alternative II will be used to the right bank area of the Bonga river with the first priority and surplus water after diverting to the areas will be used to the left bank areas of the Bonga river and Madupayas areas.
- v) The return period of five-year has been adopted to determine the irrigable area through water balance study.
- vi) In the case of the Alternative II, the planting of wet season Paddy rice is planned to be started in corresponding to the abundant river discharge to satisfy necessary water requirements for the wet season paddy, that is, the fixed cropping pattern systems are not to be introduced in the Project.
- vii) Hydropower can not be generated in the Stage I development.

The following table indicates the determined irrigable areas during the wet season, in the Stage I period in both alternatives;

Irrigable Area of Each Alternative Plans (Stage I)
(unit: ha)

| <u>Sub-Project Area</u> | <u>Project Area</u> | <u>Irrigable Area</u> | |
|-------------------------|---------------------|-----------------------|-------------------------|
| | | <u>Alternative I</u> | <u>Alternative II</u> |
| Cura | 1,410 | 1,410 | 1,410 |
| Nueva Era | 670 | 308 | 670 + 630 ^{1/} |
| Madupayas | 160 | 160 | 160 |
| Batac-Paoay | 5,190 | 0 | 0 |
| Pinili | 1,190 | 134 | 1,190 |
| Piding | 210 | 210 | 210 |
| Badoc-Sinait | 3,570 | 880 | 3,570 |
| | | | (7,840)(63%) |
| Total | <u>12,400</u> | <u>3,102(25%)</u> | <u>7,210(58%)</u> |

Note, 1/: Dry season irrigable area commanded by the stored water in Nueva Era dam. This area will be used for upland crop in the Stage I period.

$$4,600,000 \text{ m}^3 / 728.5 \text{ mm} \times 10^{-3} \times 1.0 \text{ ha} \times 10^4 \div 630 \text{ ha}$$

As is seen in the above table, irrigable areas in the wet season in the Alternative I is only about 3,100 ha or equal to 25 percent of total Project Area, whereas about 7,200 ha in the Alternative II. However, in the both plans the Batac-Paoay areas of 5,190 ha covered by Link canal-3 can not be irrigated due to the shortage of waters.

On the other hand, construction cost of civil works in Stage I is estimated at 135.4 million pesos for Alternative I (8.8 percent of the required cost for civil works in Phase II plan) and 282.1 million pesos for Alternative II (18.3 percent), respectively.

From the results of study, it is revealed that the Alternative II is much more recommendable as the alternative plan of the Phase II Project than the Alternative I, and so the Alternative II is decided at the staged development plan of the Phase II Project.

The major civil works in the staged development are as follows;

Stage I

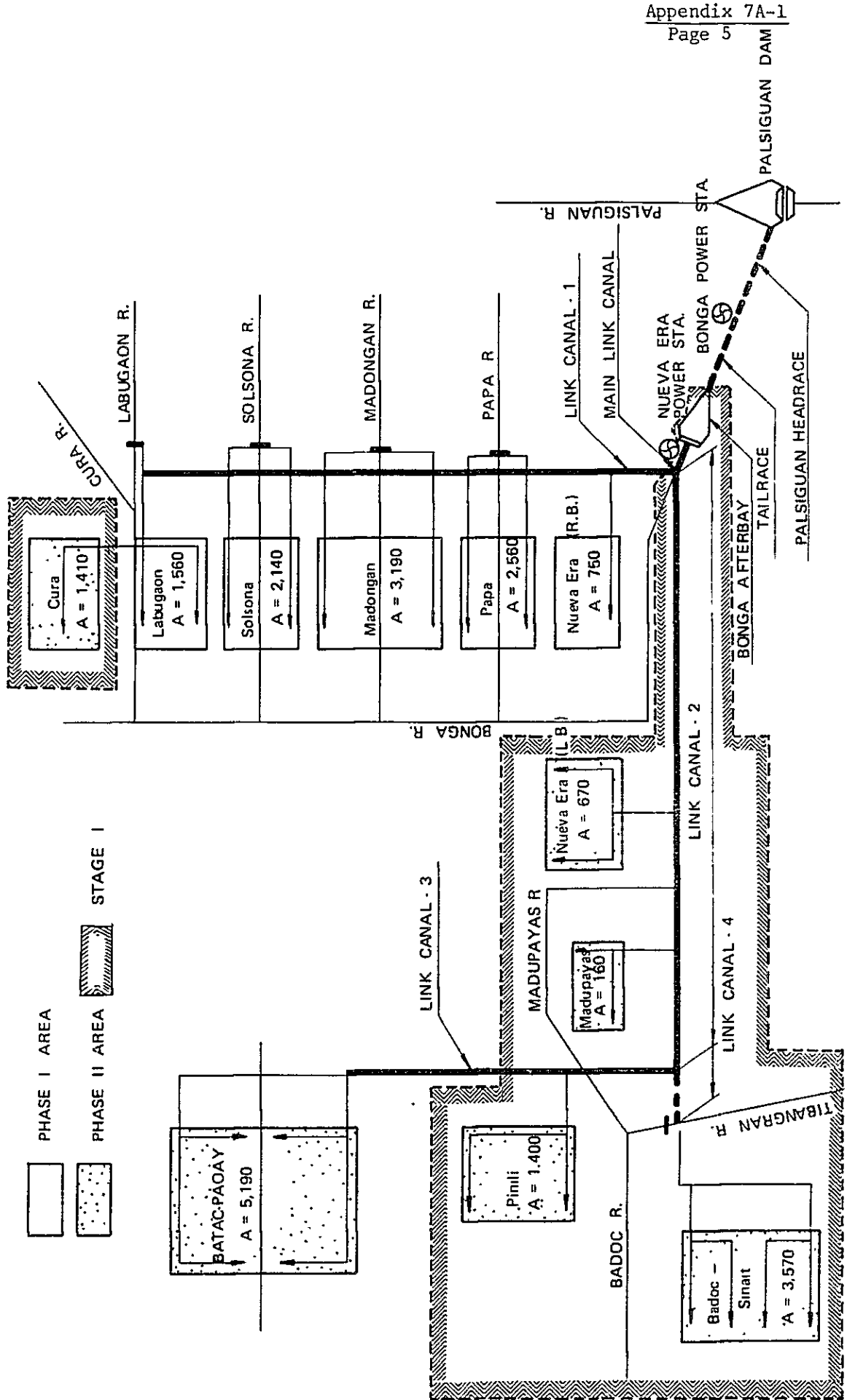
- Nueva Era dam
- Madupayas and Tibangran diversion dams
- Link canal-2, -4 and a part of Link canal-3.
- Irrigation & drainage canals, roads and on-farm facilities for the area of 7,210 ha (Cura, Nueva Era (L.B.), Madupayas, Pinili, Badoc and Sinait).

Stage II

- Palsiguan dam
- Headrace and tailrace tunnels and hydropower facilities
- Main link canal, Link canal-1, and a part of Link canal-3.
- Irrigation & drainage canals, roads and on-farm facilities for the remaining area of 5,190 ha (Batac and Paoay).

The extent of stage I development is illustrated in Figure 7A-1.

FIGURE 7A-1 SCHEMATIC DIAGRAM OF STAGED DEVELOPMENT



C. Implementation Schedule

The alternative Phase II Project has been planned in the two stages, Stage I and Stage II; the first stage (Stage I) aims at developing the area of about 7,210 ha by using the available run-off discharge served by the proposed Nueva Era dam and two diversion dams, and the second stage (Stage II) will be implemented, when the national economic conditions will improve to be able to justify the high cost of developing the storage scheme. In the second stage whole Project Area of 12,400 ha will be served by means of the combination of Palsiguan dam and diversion dams.

Construction periods of the Stage I is planned to take six years from June 1981 to May 1987, including one year for final design from June 1981 to May 1982, and the Stage II is planned to start its construction from January 1985, taking into account long construction period of the Palsiguan dam and tunnel, and will be completed by the end of 1990. Figure 7A-2 indicates the proposed implementation schedule for the staged development.

D. Project Cost and Disbursement Schedule

The Project cost in case of staged development is estimated by applying the same procedures as those of the Project Plan, except for the cost of consulting services, and operation and maintenance cost during construction periods, which are evaluated based upon the expanded implementation schedule. Table 7A-1 to 7A-3 show the detail project cost and disbursement schedule.

The project cost per hectare for overall plan is estimated at 60,468 pesos/ha (8,171 US\$/ha).

| <u>Description</u> | <u>Stage I</u> | <u>Stage II</u> | <u>Alternative Phase II Plan</u> |
|--|----------------|-----------------|--------------------------------------|
| Project Cost (10 ⁶ pesos) ^{1/} | 518.5 | 1,943.5 | 2,462.0 |
| Cost per hectare (P/ha) ^{2/} | - | - | 60,468 (US\$8,171) |

Note: 1/: cost estimated by the purchase basis of construction equipment and exclusive of price escalation.
2/: exclusive of allocated hydropower cost.

Table 7A-1 Disbursement Schedule of Investment Cost for Alternative Phase II (Stage I)

(Unit: 10⁶ pesos)

| | Total | | | 1980 | | | 1981 | | | 1982 | | | 1983 | | | 1984 | | | 1985 | | | 1986 | | | 1987 | | | 1988 | | |
|------------------------------------|---------|---------|---------|------|-------|-------|-------|-------|--------|-------|--------|--------|---------|--------|---------|--------|---------|---------|--------|---------|---------|--------|--------|--------|--------|--------|--------|-------|-----|-------|
| | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | | | |
| 1. Civil Works | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1-1. Preparation | 191 | 800 | 991 | - | - | - | - | - | - | - | - | - | 107 | 450 | 557 | 84 | 350 | 434 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1-2. Palisguan Dam | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1-3. Headrace | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1-4. Power Plant & Tailrace | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1-5. Nueva Era Dam | 42,736 | 41,883 | 84,619 | - | - | - | - | - | - | - | - | - | 1,571 | 1,540 | 3,111 | 7,938 | 7,780 | 15,718 | 12,432 | 12,184 | 24,616 | 11,501 | 11,271 | 22,772 | 9,294 | 9,108 | 18,402 | - | - | - |
| 1-6. Diversion Dam | 11,521 | 9,698 | 21,219 | - | - | - | - | - | - | - | - | - | 545 | 435 | 980 | 4,773 | 3,865 | 8,638 | 5,029 | 4,351 | 9,380 | 1,174 | 1,047 | 2,221 | - | - | - | - | - | - |
| 1-7. Irrigation Canal | 52,363 | 77,250 | 129,613 | - | - | - | - | - | - | - | - | - | 2,832 | 4,274 | 7,106 | 21,839 | 32,493 | 54,332 | 22,805 | 34,465 | 57,270 | - | - | - | 4,887 | 6,018 | 10,905 | - | - | - |
| 1-8. Drainage Canal | 5,004 | 9,561 | 15,565 | - | - | - | - | - | - | - | - | - | 368 | 585 | 953 | 2,610 | 4,156 | 6,766 | 3,026 | 4,820 | 7,846 | - | - | - | - | - | - | - | - | - |
| 1-9. On-farm | 1,424 | 11,839 | 13,263 | - | - | - | - | - | - | - | - | - | - | - | - | 495 | 4,064 | 4,559 | 929 | 7,775 | 8,704 | - | - | - | - | - | - | - | - | - |
| 1-10. Road | 4,761 | 6,959 | 11,720 | - | - | - | - | - | - | - | - | - | - | - | - | 2,361 | 3,451 | 5,812 | 2,400 | 3,508 | 5,908 | - | - | - | - | - | - | - | - | - |
| 1-11. Pre-Engineering | - | 5,156 | 5,156 | - | 1,031 | 1,031 | - | 4,125 | 4,125 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Sub-total | 119,000 | 163,146 | 282,146 | - | 1,031 | 1,031 | - | 4,125 | 4,125 | - | - | - | 5,423 | 7,284 | 12,707 | 40,100 | 56,159 | 96,259 | 46,621 | 67,103 | 113,724 | 12,675 | 12,318 | 24,993 | 14,181 | 15,126 | 29,307 | - | - | - |
| 2. Land Acquisition & Compensation | - | 31,337 | 31,337 | - | - | - | - | - | - | - | 3,137 | 3,137 | - | 9,400 | 9,400 | - | 9,400 | 9,400 | - | 9,400 | 9,400 | - | - | - | - | - | - | - | - | - |
| 3. Construction Equipment | 90,278 | 294 | 90,572 | - | - | - | - | - | - | - | - | - | 90,278 | 294 | 90,572 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4. Agricultural Development | - | 3,515 | 3,515 | - | - | - | - | - | - | - | - | - | - | 110 | 110 | - | 905 | 905 | - | 1,270 | 1,270 | - | 1,230 | 1,230 | - | - | - | - | - | - |
| 5. O & M cost | 557 | 5,584 | 6,141 | - | - | - | - | - | - | - | - | - | - | - | - | 76 | 481 | 557 | 139 | 1,124 | 1,263 | 156 | 1,526 | 1,682 | 186 | 2,453 | 2,639 | - | - | - |
| 6. Project Facilities | 949 | 6,789 | 7,738 | - | - | - | - | - | - | 949 | 6,789 | 7,738 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7. Project Administration (8%) | - | 16,956 | 16,956 | - | 82 | 82 | - | 362 | 362 | - | 816 | 816 | - | 1,378 | 1,378 | - | 5,363 | 5,363 | - | 6,322 | 6,322 | - | 1,209 | 1,209 | - | 1,418 | 1,418 | - | 6 | 6 |
| 8. Consulting Service | 11,143 | 1,301 | 12,444 | - | - | - | 3,437 | 398 | 3,835 | 2,335 | 274 | 2,609 | 1,145 | 134 | 1,279 | 802 | 94 | 896 | 1,140 | 134 | 1,274 | 338 | 39 | 377 | 1,278 | 150 | 1,428 | 668 | 78 | 746 |
| Sub-total | 221,927 | 228,922 | 450,849 | - | 1,113 | 1,113 | 3,437 | 4,885 | 8,322 | 3,284 | 11,016 | 14,300 | 96,846 | 18,600 | 115,446 | 40,978 | 72,402 | 113,380 | 47,900 | 85,353 | 133,253 | 13,169 | 16,322 | 29,491 | 15,645 | 19,147 | 34,792 | 668 | 84 | 752 |
| 9. Contingency (15%) | 33,290 | 34,338 | 67,628 | - | 167 | 167 | 516 | 733 | 1,249 | 493 | 1,652 | 2,145 | 14,527 | 2,790 | 17,317 | 6,147 | 10,860 | 17,007 | 7,185 | 12,803 | 19,988 | 1,975 | 2,448 | 4,423 | 2,347 | 2,872 | 5,219 | 100 | 13 | 113 |
| Sub-total | 255,217 | 263,260 | 518,477 | - | 1,280 | 1,280 | 3,953 | 5,618 | 9,571 | 3,777 | 12,668 | 16,445 | 111,373 | 21,390 | 132,763 | 47,125 | 83,262 | 130,387 | 55,085 | 98,156 | 153,241 | 15,144 | 18,770 | 33,914 | 17,992 | 22,019 | 40,011 | 768 | 97 | 865 |
| 10. Price Escalation | 95,897 | 132,393 | 228,290 | - | 51 | 51 | 393 | 753 | 1,146 | 727 | 2,984 | 3,711 | 31,380 | 7,152 | 38,532 | 17,412 | 36,728 | 54,140 | 25,330 | 54,614 | 79,944 | 8,378 | 12,629 | 21,007 | 11,700 | 17,393 | 29,093 | 577 | 89 | 666 |
| Total | 351,114 | 395,653 | 746,767 | - | 1,331 | 1,331 | 4,346 | 6,371 | 10,717 | 4,504 | 15,652 | 20,156 | 142,753 | 28,542 | 171,295 | 64,537 | 119,990 | 184,527 | 80,415 | 152,770 | 233,185 | 23,522 | 31,399 | 54,921 | 29,692 | 39,412 | 69,104 | 1,345 | 186 | 1,531 |

Table 7A-2 Disbursement Schedule of Investment Cost for Alternative Phase II (Stage II)

(Unit: 10⁶ pesos)

| | Total | | | 1985 | | | 1986 | | | 1987 | | | 1988 | | | 1989 | | | 1990 | | | |
|------------------------------------|-----------|-----------|-----------|---------|--------|---------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------|---------|---------|---------|---|
| | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | F.C. | L.C. | Total | |
| 1. Civil Works | | | | | | | | | | | | | | | | | | | | | | |
| 1-1. Preparation | 19,320 | 31,820 | 51,140 | 15,564 | 26,884 | 42,448 | 3,756 | 4,936 | 8,692 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1-2. Palsiguan Dam | 466,337 | 228,137 | 694,474 | - | - | - | 49,288 | 19,110 | 68,398 | 52,478 | 28,889 | 81,367 | 92,715 | 48,277 | 140,992 | 121,229 | 61,861 | 183,090 | 150,627 | 70,000 | 220,627 | |
| 1-3. Headrace | 49,941 | 54,575 | 104,516 | - | - | - | 1,927 | 2,106 | 4,033 | 9,665 | 10,562 | 20,227 | 14,412 | 15,750 | 30,162 | 16,584 | 18,123 | 34,707 | 7,353 | 8,034 | 15,387 | |
| 1-4. Power Plant & Tailrace | 123,938 | 49,777 | 173,715 | - | - | - | - | - | - | 14,213 | 7,375 | 21,588 | 22,082 | 10,928 | 33,010 | 42,256 | 18,163 | 60,419 | 45,387 | 13,311 | 58,698 | |
| 1-5. Nueva Era Dam | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1-6. Diversion Dam | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1-7. Irrigation Canal | 80,882 | 112,971 | 193,853 | - | - | - | - | - | - | - | - | - | 11,681 | 14,384 | 26,065 | 56,892 | 78,206 | 135,098 | 12,309 | 20,381 | 32,690 | |
| 1-8. Drainage Canal | 6,246 | 9,951 | 16,197 | - | - | - | - | - | - | - | - | - | - | - | - | 3,810 | 6,068 | 9,878 | 2,436 | 3,883 | 6,319 | |
| 1-9. On-farm | 1,048 | 8,801 | 9,849 | - | - | - | - | - | - | - | - | - | - | - | - | 596 | 5,002 | 5,598 | 452 | 3,799 | 4,251 | |
| 1-10. Road | 4,955 | 7,243 | 12,198 | - | - | - | - | - | - | - | - | - | - | - | - | 3,022 | 4,417 | 7,439 | 1,933 | 2,826 | 4,759 | |
| 1-11. Pre-Engineering | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Sub-total | 752,667 | 503,275 | 1,255,942 | 15,564 | 26,884 | 42,448 | 54,971 | 26,152 | 81,123 | 76,356 | 46,826 | 123,187 | 140,890 | 89,339 | 230,229 | 244,389 | 191,840 | 436,229 | 220,497 | 122,234 | 342,731 | |
| 2. Land Acquisition & Compensation | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 3. Construction Equipment | 374,722 | 706 | 375,428 | 374,722 | 706 | 375,428 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 4. Agricultural Development | - | 1,205 | 1,205 | - | - | - | - | - | - | - | - | - | - | - | - | - | 715 | 715 | - | 490 | 490 | |
| 5. O & M cost | 558 | 7,359 | 7,917 | - | - | - | - | - | - | - | - | - | 186 | 2,453 | 2,639 | 186 | 2,453 | 2,639 | 186 | 2,453 | 2,639 | |
| 6. Project Facilities | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 7. Project Administration (8%) | - | 41,074 | 41,074 | - | 2,209 | 2,209 | - | 2,101 | 2,101 | - | 3,758 | 3,758 | - | 7,359 | 7,359 | - | 15,622 | 15,622 | - | 10,025 | 10,025 | |
| 8. Consulting Service | 7,516 | 884 | 8,400 | 204 | 24 | 228 | 941 | 110 | 1,051 | 1,273 | 149 | 1,422 | 1,683 | 197 | 1,880 | 2,275 | 269 | 2,544 | 1,140 | 135 | 1,275 | |
| Sub-total | 1,135,463 | 554,503 | 1,689,966 | 390,490 | 29,823 | 420,313 | 55,912 | 28,363 | 84,275 | 77,629 | 50,733 | 128,362 | 142,759 | 99,348 | 242,107 | 246,850 | 210,899 | 457,749 | 221,823 | 135,337 | 357,160 | |
| 9. Contingency | 170,320 | 83,175 | 253,495 | 58,574 | 4,473 | 63,047 | 8,387 | 4,254 | 12,641 | 11,644 | 7,610 | 19,254 | 21,414 | 14,902 | 36,316 | 37,028 | 31,635 | 68,663 | 33,275 | 20,301 | 53,574 | |
| Sub-total | 1,305,783 | 637,678 | 1,943,461 | 449,064 | 34,296 | 483,360 | 64,299 | 32,617 | 96,916 | 89,273 | 58,343 | 147,616 | 164,173 | 114,250 | 278,423 | 283,878 | 242,534 | 526,412 | 255,096 | 155,638 | 410,734 | |
| 10. Price Escalation | 911,020 | 631,803 | 1,542,823 | 206,496 | 19,082 | 225,578 | 35,571 | 21,946 | 57,517 | 58,052 | 46,087 | 104,139 | 123,375 | 104,564 | 227,939 | 242,450 | 254,488 | 496,938 | 245,076 | 185,636 | 430,712 | |
| Total | 2,216,803 | 1,269,481 | 3,486,284 | 655,560 | 53,378 | 708,938 | 99,870 | 54,563 | 154,433 | 147,325 | 104,430 | 251,755 | 287,548 | 218,814 | 506,362 | 526,328 | 497,022 | 1,023,350 | 500,172 | 341,274 | 841,446 | |



E. Economic Justification

1. Benefited Area

As mentioned in the above Paragraph, the start of construction of the Palsiguan dam and headrace in the staged development will be delayed from 1983, the original plan, to 1986. Then the construction schedule in the staged development will be expressed as follows;

| | <u>Original Development (year)</u> | <u>Staged Development (year)</u> |
|--|--|--|
| Start of full scaled irrigation: | from 1988 | from 1991 |
| Start of partial irrigation: | 1984 to 1987 | 1984 to 1990 |
| Full benefit created from total area: | 1992 | 1995 |
| Start of Palsiguan dam construction: | 1983 | 1986 |
| Start of water storage into Palsiguan dam reservoir: | 1987 | 1990 |

Irrigable area of the Stage I development is estimated at 7,210 ha and 630 ha in the wet and dry season, respectively. Table 7A-4 and Table 7A-5 show the irrigable area by sub-area with the development Project.

The Nueva Era Storage dam would give the useful water resource to the inland water fishery, though the fishing method will be restricted due to fluctuation of water level in the reservoir under staging development.

2. Incremental Benefit

Incremental benefits in the Stage I Project will be accrued from crop productions after 1983. Those in the Stage II Project consist of both benefit streams of agricultural crop production and power which would be grown after 1991.

The fishing culture benefits was roughly estimated in this staged development study. Any special survey for fishing culture has not been conducted during the Phase II study time in the Philippines, so that this benefits were estimated based on some assumptions.

Table 7A-4 Irrigable Area with the Project

| Sub Area | Project Area | Original | | Stage I | | Stage II | |
|--------------------|-----------------|---------------|---------------|--------------|------------|---------------|---------------|
| | | Wet Season | Dry Season | Wet Season | Dry Season | Wet Season | Dry Season |
| Cura | 1,410 | 1,410 | 1,410 | 1,410 | - | 1,410 | 1,410 |
| Nueva Era (L.B.) | 670 | 670 | 670 | 670 | 630 | 670 | 670 |
| Madupayas | 160 | 160 | 160 | 160 | - | 160 | 160 |
| Batac-Paoay | 5,190 | 5,190 | 5,190 | 0 | - | 5,190 | 5,190 |
| Pinili | 1,400 | 1,400 | 1,400 | 1,400 | - | 1,400 | 1,400 |
| Badoc-Sinait | 3,570 | 3,570 | 3,570 | 3,570 | - | 3,570 | 3,570 |
| <u>Total</u> | <u>12,400</u> | <u>12,400</u> | <u>12,400</u> | <u>7,210</u> | <u>-</u> | <u>12,400</u> | <u>12,400</u> |
| Labugaon | (1,560) | - | 780 | - | - | - | 780 |
| Solsona | (2,140) | - | 1,530 | - | - | - | 1,530 |
| Madongan | (3,190) | 900 | 2,470 | - | - | 900 | 2,470 |
| Papa | (2,560) | 1,220 | 2,160 | - | - | 1,220 | 2,160 |
| Nueva Era (R.B.) | (750) | - | 300 | - | - | - | 300 |
| <u>Total</u> | <u>(10,200)</u> | <u>2,120</u> | <u>7,240</u> | <u>-</u> | <u>-</u> | <u>2,120</u> | <u>7,240</u> |
| <u>Grand Total</u> | | <u>14,520</u> | <u>19,640</u> | <u>7,210</u> | <u>630</u> | <u>14,520</u> | <u>19,640</u> |

(unit: ha)

Table 7A-5 Irrigable Area with the Project by Year

| Area | Sub Area | (Unit: ha) | | | | | | | | | | | | | | | |
|----------|--------------------------|--------------|--------------|--------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|---------------|---------------|---------------|
| | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
| | | Wet | Dry | Wet | Dry | Wet | Dry | Wet | Dry | Wet | Dry | Wet | Dry | Wet | Dry | Wet | Dry |
| Phase II | Cura | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 | 1,410 |
| | Nueva Era (L.B.) | - | 308 | 308 | 670 | 630 | 670 | 630 | 670 | 630 | 670 | 630 | 670 | 630 | 670 | 630 | 670 |
| | Madupayas | - | - | - | 160 | - | 160 | - | 160 | - | 160 | - | 160 | - | 160 | - | 160 |
| | Batac-Paoay | - | - | - | - | - | - | - | - | - | - | - | - | - | 5,190 | 5,190 | 5,190 |
| | Pinili | - | - | 344 | 1,400 | - | 1,400 | - | 1,400 | - | 1,400 | - | 1,400 | - | 1,400 | - | 1,400 |
| | Badac-Sinait | - | 880 | 880 | 3,570 | - | 3,570 | - | 3,570 | - | 3,570 | - | 3,570 | - | 3,570 | - | 3,570 |
| | <u>Sub-Total (A)</u> | <u>1,410</u> | <u>2,598</u> | <u>2,942</u> | <u>7,210</u> | <u>630</u> | <u>7,210</u> | <u>630</u> | <u>7,210</u> | <u>630</u> | <u>7,210</u> | <u>630</u> | <u>7,210</u> | <u>630</u> | <u>12,400</u> | <u>12,400</u> | <u>12,400</u> |
| Phase I | Labugaon | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 780 |
| | Solsona | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1,530 |
| | Madongan | - | - | - | - | - | - | - | - | - | - | - | - | - | 900 | 2,160 | 2,160 |
| | Papa | - | - | - | - | - | - | - | - | - | - | - | - | - | 1,220 | 2,470 | 2,470 |
| | Nueva Era (R.B.) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 300 |
| | <u>Sub-Total (B)</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>-</u> | <u>2,120</u> | <u>7,240</u> | <u>7,240</u> |
| | <u>Grand Total (A+B)</u> | <u>1,410</u> | <u>2,598</u> | <u>2,942</u> | <u>7,210</u> | <u>630</u> | <u>7,210</u> | <u>630</u> | <u>7,210</u> | <u>630</u> | <u>7,210</u> | <u>630</u> | <u>7,210</u> | <u>630</u> | <u>14,520</u> | <u>19,640</u> | <u>19,640</u> |

The following table shows the incremental agricultural and power benefits in each stage.

Incremental Benefits

(Unit: million pesos)

| <u>Year</u> | <u>Stage I</u> | <u>Stage II</u> | <u>Stage I + Stage II</u> |
|-------------|----------------|-----------------|---------------------------|
| 1983 | -0.29 | 0 | -0.29 |
| 1984 | 3.27 | 0 | 3.27 |
| 1985 | 6.87 | 0 | 6.87 |
| 1986 | 9.01 | 0 | 9.01 |
| 1987 | 26.54 | 6.88 | 33.42 |
| 1988 | 30.97 | 8.65 | 39.62 |
| 1989 | 35.21 | 9.68 | 44.89 |
| 1990 | 38.18 | 10.42 | 48.60 |
| 1991 | 39.05 | 113.40 | 152.45 |
| 1992 | 39.26 | 144.07 | 183.33 |
| 1993 | 39.40 | 175.16 | 214.56 |
| 1994 | 39.54 | 196.95 | 236.49 |
| 1995 | 39.72 | 206.22 | 245.94 |

Note: Benefits in Phase I remaining area are included after 1991. Fishing benefits are included after 1987.

3. Economic Cost

The financial project costs excluding escalation factor was re-estimated at economic cost as shown in the following table.

Evaluation of Project Economic Cost^{1/}

- Initial Capital -

(Unit: million pesos)

| <u>Year</u> | <u>Stage I</u> | <u>Stage II</u> | <u>Stage I + Stage II</u> |
|-------------|----------------|-----------------|---------------------------|
| 1980 | 1.07 | - | 1.07 |
| 1981 | 8.53 | - | 8.53 |
| 1982 | 12.99 | - | 12.99 |
| 1983 | 33.13 | - | 33.13 |
| 1984 | 117.27 | - | 117.27 |
| 1985 | 138.36 | 100.36 | 238.71 |
| 1986 | 32.79 | 84.93 | 117.72 |
| 1987 | 41.78 | 144.89 | 186.67 |
| 1988 | 7.83 | 267.96 | 275.79 |
| 1989 | - | 499.64 | 499.64 |
| 1990 | - | 391.27 | 391.27 |
| Total | 393.76 | 1,489.04 | 1,882.80 |

Note: ^{1/} estimated on the basis of depreciation costs of construction equipment.

4. Internal Rate of Return

Internal rate of return of the Stage I Project is estimated at 8 percent as follows;

$$\begin{aligned} \text{IRR} &= 0.08 + \frac{11.39}{11.39 + 17.53} \times 0.01 \\ &= 0.0839 \approx 0.08 \end{aligned}$$

The incremental production benefit and power benefit to be expected after 1991 in the Stage II Project would be estimated at enough value to justify the initial investment cost.

Internal rate of return of the Stage II Project is estimated at 15 percent.

$$\begin{aligned} \text{IRR} &= 0.15 + \frac{12.39}{12.39 + 19.95} \times 0.01 \\ &= 0.1539 \approx 0.15 \end{aligned}$$

Overall staged development Project (alternative Phase II) combined by Stage I and Stage II shows the internal rate of return of 13 percent.

Table 7A-7. Incremental Production Benefits ^{1/} -Stage I-
(Unit: 10⁶pesos)

| Year | Without Project | | | | With Project | | | | Incremental Production Benefits | Fishing Benefits | Incremental Total Benefits |
|------|------------------------|----------------------------|------------------|----------------------|------------------------|----------------------------|------------------|----------------------|---------------------------------|------------------|----------------------------|
| | Gross Production Value | Production Input Materials | Cost Input Labor | Net Production Value | Gross Production Value | Production Input Materials | Cost Input Labor | Net Production Value | | | |
| 1983 | 147.07 | 27.32 | 4.02 | 115.73 | 147.07 | 27.32 | 4.31 | 115.44 | -0.29 | - | -0.29 |
| 1984 | 148.57 | 27.35 | 4.03 | 117.19 | 152.40 | 27.41 | 4.53 | 120.46 | 3.27 | - | 3.27 |
| 1985 | 150.25 | 27.39 | 4.04 | 118.82 | 157.17 | 26.72 | 4.76 | 125.69 | 6.87 | - | 6.87 |
| 1986 | 151.74 | 27.41 | 4.05 | 120.28 | 160.99 | 26.72 | 4.98 | 129.29 | 9.01 | - | 9.01 |
| 1987 | 153.27 | 27.45 | 4.06 | 121.76 | 183.40 | 29.72 | 5.45 | 148.23 | 26.47 | 0.07 | 26.54 |
| 1988 | 154.92 | 27.48 | 4.07 | 123.37 | 191.20 | 31.39 | 5.52 | 154.29 | 30.92 | 0.07 | 30.97 |
| 1989 | 156.48 | 27.51 | 4.08 | 124.89 | 197.23 | 31.64 | 5.56 | 160.03 | 35.14 | 0.07 | 35.21 |
| 1990 | 158.00 | 27.54 | 4.10 | 126.36 | 201.86 | 31.80 | 5.59 | 164.47 | 38.11 | 0.07 | 38.18 |
| 1991 | 159.65 | 27.57 | 4.11 | 127.97 | 204.39 | 31.83 | 5.61 | 166.95 | 38.98 | 0.07 | 39.05 |
| 1992 | 161.18 | 27.61 | 4.12 | 129.45 | 206.11 | 31.84 | 5.63 | 168.64 | 39.19 | 0.07 | 39.26 |
| 1993 | 162.75 | 27.64 | 4.13 | 130.98 | 207.81 | 31.85 | 5.65 | 170.31 | 39.33 | 0.07 | 39.40 |
| 1994 | 164.32 | 27.67 | 4.14 | 132.51 | 209.51 | 31.86 | 5.67 | 171.98 | 39.47 | 0.07 | 39.54 |
| 1995 | 165.88 | 27.71 | 4.15 | 134.02 | 211.23 | 31.87 | 5.69 | 173.67 | 39.65 | 0.07 | 39.72 |

Note: ^{1/} Benefits in Phase II and Phase I remaining area.

Table 7A-8. Incremental Production Benefits 1/ -Stage II-
(Unit: 10⁶ poses)

| Year | Without Project | | | With Project | | | Net Pro-duction Value | Net Pro-duction Value | Incremental Production Benefits | Fishing Benefits | Incremental Total Benefits |
|------|-------------------------|----------------------------|------------------|-------------------------|----------------------------|------------------|-----------------------|-----------------------|---------------------------------|------------------|----------------------------|
| | Gross Pro-duction Value | Production Input Materials | Cost Input Labor | Gross Pro-duction Value | Production Input Materials | Cost Input Labor | | | | | |
| 1983 | 147.07 | 27.32 | 4.31 | 115.44 | 27.32 | 4.31 | 115.44 | 0 | 0 | 0 | 0 |
| 1984 | 152.40 | 27.41 | 4.53 | 120.46 | 27.41 | 4.53 | 120.46 | 0 | 0 | 0 | 0 |
| 1985 | 157.17 | 26.72 | 4.76 | 125.69 | 26.72 | 4.76 | 125.69 | 0 | 0 | 0 | 0 |
| 1986 | 160.99 | 26.72 | 4.98 | 129.29 | 26.72 | 4.98 | 129.29 | 0 | 0 | 0 | 0 |
| 1987 | 183.40 | 29.72 | 5.45 | 148.23 | 29.72 | 5.45 | 148.23 | 6.81 | 0.07 | 6.88 | 6.88 |
| 1988 | 191.20 | 31.39 | 5.52 | 154.29 | 31.39 | 5.52 | 154.29 | 8.58 | 0.07 | 8.65 | 8.65 |
| 1989 | 197.23 | 31.64 | 5.56 | 160.03 | 31.64 | 5.56 | 160.03 | 9.61 | 0.07 | 9.68 | 9.68 |
| 1990 | 201.86 | 31.80 | 5.59 | 164.47 | 31.80 | 5.59 | 164.47 | 10.35 | 0.07 | 10.42 | 10.42 |
| 1991 | 204.39 | 31.83 | 5.61 | 166.95 | 45.08 | 17.24 | 280.24 | 113.29 | 0.11 | 113.40 | 113.40 |
| 1992 | 206.11 | 31.84 | 5.63 | 168.64 | 48.81 | 17.51 | 312.60 | 143.96 | 0.11 | 144.07 | 144.07 |
| 1993 | 207.61 | 31.85 | 5.65 | 170.31 | 52.50 | 17.83 | 345.36 | 175.05 | 0.11 | 175.16 | 175.16 |
| 1994 | 209.51 | 31.86 | 5.67 | 171.98 | 55.91 | 18.21 | 368.82 | 196.84 | 0.11 | 196.95 | 196.95 |
| 1995 | 211.23 | 31.87 | 5.69 | 173.67 | 55.91 | 18.40 | 379.78 | 206.11 | 0.11 | 206.22 | 206.22 |

Note: 1/ Benefits in Phase II and Phase I remaining area.

Table 7A-9. Incremental Production Benefits 1/ -Stage I + Stage II-
(Unit: 10⁶ pesos)

| Year | Without Project | | | With Project | | | Incremental Production Benefits | Fishing Benefits | Incremental Total Benefits |
|-------------------|------------------------|----------------------------|----------------------|------------------------|----------------------------|----------------------|---------------------------------|------------------|----------------------------|
| | Gross Production Value | Production Input Materials | Net Production Value | Gross Production Value | Production Input Materials | Net Production Value | | | |
| 1983 | 147.07 | 27.32 | 115.73 | 147.07 | 27.32 | 115.44 | -0.29 | - | -0.29 |
| 1984 | 148.57 | 27.35 | 117.19 | 152.40 | 27.41 | 120.46 | 3.27 | - | 3.27 |
| 1985 | 150.25 | 27.39 | 118.82 | 157.17 | 26.72 | 125.69 | 6.87 | - | 6.87 |
| 1986 | 151.74 | 27.41 | 120.28 | 160.99 | 26.72 | 129.29 | 9.01 | - | 9.01 |
| 1987 | 153.27 | 27.45 | 121.76 | 183.40 | 29.72 | 148.23 | 26.47 | 0.07 | 26.54 |
| 1988 | 154.92 | 27.48 | 123.37 | 191.20 | 31.39 | 154.29 | 30.92 | 0.07 | 30.57 |
| 1989 ¹ | 156.48 | 27.51 | 124.89 | 197.23 | 31.64 | 160.03 | 35.14 | 0.07 | 35.21 |
| 1990 | 158.00 | 27.54 | 126.36 | 201.86 | 31.80 | 164.47 | 38.11 | 0.07 | 38.18 |
| 1991 | 159.65 | 27.57 | 127.97 | 342.56 | 45.08 | 280.24 | 152.27 | 0.11 | 152.38 |
| 1992 | 161.18 | 27.61 | 129.45 | 378.92 | 48.81 | 312.60 | 183.15 | 0.11 | 183.26 |
| 1993 | 162.75 | 27.64 | 130.98 | 415.69 | 52.50 | 345.36 | 214.38 | 0.11 | 214.49 |
| 1994 | 164.32 | 27.67 | 132.51 | 442.94 | 55.91 | 368.82 | 236.31 | 0.11 | 236.42 |
| 1995 | 165.88 | 27.71 | 134.02 | 454.09 | 55.91 | 379.78 | 245.76 | 0.11 | 245.87 |

Note: 1/ Benefits in Phase II and Phase I remaining area.

Table 7A-10. Project Economic Cost and Returns -Stage I-

(Unit: 10⁶ pesos)

| Year | Project Cost | | Incremental Production Benefits (2) | Benefits (2)-(1) | Discount Rate | |
|-----------------|---------------|--------------|---|---------------------|---------------|----------------|
| | Capital | O & M | | | 8% | 9% |
| 1 1980 | .1.07 | - | - | - 1.07 | - 0.99 | - 0.98 |
| 2 1981 | 8.53 | - | - | - 8.53 | - 7.31 | - 7.18 |
| 3 1982 | 12.99 | - | - | - 12.99 | - 10.31 | - 10.03 |
| 4 1983 | 33.13 | - | -0.29 | - 33.42 | - 24.56 | - 23.67 |
| 5 1984 | 117.27 | - | 3.27 | -114.00 | - 77.59 | - 74.09 |
| 6 1985 | 138.36 | - | 6.87 | -131.49 | - 82.86 | - 78.41 |
| 7 1986 | 32.79 | - | 9.01 | - 23.78 | - 13.88 | - 13.01 |
| 8 1987 | 41.78 | - | 26.54 | - 15.24 | - 8.23 | - 7.65 |
| 9 1988 | 7.83 | 1.37 | 30.97 | 21.77 | 10.89 | 10.02 |
| 10 1989 | - | 1.37 | 35.21 | 33.84 | 15.67 | 14.29 |
| 11 1990 | - | 1.37 | 38.18 | 36.81 | 15.79 | 14.26 |
| 12 1991 | - | 1.37 | 39.05 | 37.68 | 14.96 | 13.40 |
| 13 1992 | - | 1.37 | 39.26 | 37.89 | 13.93 | 12.36 |
| 14 1993 | - | 1.37 | 39.40 | 38.03 | 12.95 | 11.38 |
| 15 1994 | - | 1.37 | 39.54 | 38.17 | 12.03 | 10.48 |
| 16-50 1995-2029 | - | 1.37 | 39.72 | 39.72 | 140.90 | 111.26 |
| <u>Total</u> | <u>393.76</u> | <u>57.54</u> | <u>1,697.21</u> | <u>1,245.91</u> | <u>11.39</u> | <u>- 17.53</u> |

$$IEER = 0.08 + \frac{11.39}{11.39 + 17.53} \times 0.01 = 0.0839$$

Table 7A Part 1 Economic Cost and Revenues - Stage II - (Unit: \$ P)

| Year | Project Cost | | | Benefits | | | Discount Rate | |
|---------|--------------|------------|-------------|---------------------------------|----------------|-----------|---------------|-----------|
| | Capital | Irrigation | Power Plant | Incremental Production Benefits | Power Benefits | Total (2) | 15% | 16% |
| 1 1980 | - | - | - | - | - | - | - | - |
| 2 1981 | - | - | - | - | - | - | - | - |
| 3 1982 | - | - | - | - | - | - | - | - |
| 4 1983 | - | - | - | - | - | - | - | - |
| 5 1984 | - | - | - | - | - | - | - | - |
| 6 1985 | 100.35 | - | - | 100.35 | - | - | - | -43.38 |
| 7 1986 | 84.93 | - | - | 84.93 | - | - | - | -30.05 |
| 8 1987 | 144.89 | - | - | 144.89 | 6.88 | 6.88 | - | -45.12 |
| 9 1988 | 287.96 | - | - | 287.96 | 8.65 | 8.65 | - | -73.72 |
| 10 1989 | 499.64 | - | - | 499.64 | 9.68 | 9.68 | - | -121.12 |
| 11 1990 | 391.27 | - | - | 391.27 | 10.42 | 10.42 | - | -81.84 |
| 12 1991 | - | 3.36 | 2.05 | 5.41 | 113.40 | 222.48 | 109.08 | 40.57 |
| 13 1992 | - | 3.36 | 2.10 | 5.46 | 144.07 | 253.28 | 109.21 | 40.27 |
| 14 1993 | - | 3.36 | 2.15 | 5.51 | 175.16 | 278.99 | 109.34 | 39.42 |
| 15 1994 | - | 3.36 | 2.19 | 5.55 | 196.95 | 306.42 | 109.47 | 36.98 |
| 16 1995 | - | 3.36 | 2.24 | 5.60 | 206.22 | 315.82 | 109.60 | 33.16 |
| 17 1996 | - | 3.36 | 2.28 | 5.64 | 206.22 | 315.95 | 109.73 | 28.85 |
| 18 1997 | - | 3.36 | 2.33 | 5.69 | 206.22 | 316.09 | 109.87 | 24.89 |
| 19 1998 | - | 3.36 | 2.38 | 5.74 | 206.22 | 316.22 | 110.00 | 21.45 |
| 20 1999 | - | 3.36 | 2.42 | 5.78 | 206.22 | 316.35 | 110.13 | 18.50 |
| 21 2000 | - | 3.36 | 2.47 | 5.83 | 206.22 | 316.48 | 110.26 | 15.95 |
| 22 2001 | - | 3.36 | 2.51 | 5.87 | 206.22 | 316.61 | 110.39 | 13.76 |
| 23 2002 | - | 3.36 | 2.56 | 5.92 | 206.22 | 316.74 | 110.52 | 11.86 |
| 24 2003 | - | 3.36 | 2.61 | 5.97 | 206.22 | 316.87 | 110.65 | 10.21 |
| 25 2004 | - | 3.36 | 2.65 | 6.01 | 206.22 | 316.99 | 110.78 | 8.81 |
| 26 2005 | - | 3.36 | 2.70 | 6.06 | 206.22 | 317.12 | 110.91 | 7.66 |
| 27 2006 | - | 3.36 | 2.74 | 6.10 | 206.22 | 317.24 | 111.04 | 6.55 |
| 28 2007 | - | 3.36 | 2.79 | 6.15 | 206.22 | 317.36 | 111.17 | 5.65 |
| 29 2008 | - | 3.36 | 2.84 | 6.20 | 206.22 | 317.48 | 111.30 | 4.87 |
| 30 2009 | - | 3.36 | 2.88 | 6.24 | 206.22 | 317.60 | 111.43 | 4.19 |
| 31 2010 | - | 3.36 | 2.93 | 6.29 | 206.22 | 317.72 | 111.56 | 3.60 |
| 32 2011 | - | 3.36 | 2.97 | 6.33 | 206.22 | 317.84 | 111.69 | 3.10 |
| 33 2012 | - | 3.36 | 3.02 | 6.38 | 206.22 | 317.96 | 111.82 | 2.70 |
| 34 2013 | - | 3.36 | 3.07 | 6.43 | 206.22 | 318.08 | 111.95 | 2.32 |
| 35 2014 | - | 3.36 | 3.11 | 6.47 | 206.22 | 318.20 | 112.08 | 1.98 |
| 36 2015 | - | 3.36 | 3.16 | 6.52 | 206.22 | 318.32 | 112.21 | 1.49 |
| 37 2016 | - | 3.36 | 3.20 | 6.56 | 206.22 | 318.44 | 112.34 | 1.27 |
| 38 2017 | - | 3.36 | 3.25 | 6.61 | 206.22 | 318.56 | 112.47 | 1.11 |
| 39 2018 | - | 3.36 | 3.29 | 6.65 | 206.22 | 318.68 | 112.60 | 0.96 |
| 40 2019 | - | 3.36 | 3.34 | 6.70 | 206.22 | 318.80 | 112.73 | 0.80 |
| 41 2020 | - | 3.36 | 3.39 | 6.75 | 206.22 | 318.92 | 112.86 | 0.59 |
| 42 2021 | - | 3.36 | 3.43 | 6.79 | 206.22 | 319.04 | 112.99 | 0.71 |
| 43 2022 | - | 3.36 | 3.48 | 6.84 | 206.22 | 319.16 | 113.12 | 0.62 |
| 44 2023 | - | 3.36 | 3.52 | 6.88 | 206.22 | 319.28 | 113.25 | 0.53 |
| 45 2024 | - | 3.36 | 3.57 | 6.93 | 206.22 | 319.40 | 113.38 | 0.46 |
| 46 2025 | - | 3.36 | 63.42 | 66.78 | 206.22 | 249.57 | 249.57 | 0.40 |
| 47 2026 | - | 3.36 | 3.66 | 7.02 | 206.22 | 319.52 | 113.51 | 0.27 |
| 48 2027 | - | 3.36 | 3.71 | 7.07 | 206.22 | 319.64 | 113.64 | 0.28 |
| 49 2028 | - | 3.36 | 3.75 | 7.11 | 206.22 | 319.76 | 113.77 | 0.25 |
| 50 2029 | - | 3.36 | 3.80 | 7.16 | 206.22 | 319.88 | 113.90 | 0.22 |
| Total: | 1,489.04 | 131.04 | 173.96 | 305.00 | 1,794.04 | 7,982.91 | 4,290.33 | 12,379.20 |
| | | | | | | | | 12.39 |
| | | | | | | | | -18.95 |

IERR = 0.15 + 12.39 + 18.95 x 0.01 = 0.1539

Table 7A-12. Project Economic Cost and Return
-Stage I + Stage II-

| Year | Project Cost O & M Cost | | | | Benefits | | | Discount Rate | | |
|---------|----------------------------|------------|-------------|----------|---------------------------------------|-------------------|--------------|------------------------------------|---------|---------|
| | Capital | Irrigation | Power Plant | Total | Incremental Production Benefits | Power Benefits | Total (2) | Incremental Benefits (2)-(1) | 13% | 14% |
| | | | | | | | | | (1) | (2)-(1) |
| 1 1980 | 1.07 | - | - | 1.07 | - | - | - | - | 0.95 | - 0.94 |
| 2 1981 | 8.53 | - | - | 8.53 | - | - | - | - | 6.68 | - 8.53 |
| 3 1982 | 12.99 | - | - | 12.99 | - | - | - | - | 9.00 | - 12.99 |
| 4 1983 | 33.13 | - | - | 33.13 | - | - | - | - | 20.50 | - 19.79 |
| 5 1984 | 117.27 | - | - | 117.27 | - | - | - | - | 61.88 | - 59.21 |
| 6 1985 | 238.70 | - | - | 238.70 | - | - | - | - | -111.35 | -105.62 |
| 7 1986 | 117.72 | - | - | 117.72 | 9.01 | - | 9.01 | -108.71 | -46.21 | -43.44 |
| 8 1987 | 186.67 | - | - | 186.67 | 26.54 | - | 26.54 | -160.13 | -60.24 | -56.14 |
| 9 1988 | 275.79 | - | - | 275.79 | 30.57 | - | 30.57 | -246.59 | -82.09 | -75.82 |
| 10 1989 | 499.64 | 1.37 | - | 501.01 | 35.21 | - | 35.21 | -465.80 | -137.22 | -125.63 |
| 11 1990 | 391.27 | 1.37 | - | 392.64 | 38.18 | - | 38.18 | -354.46 | -92.40 | -83.87 |
| 12 1991 | - | 4.73 | 2.05 | 6.78 | 152.38 | 109.08 | 261.46 | 254.68 | 58.75 | + 52.67 |
| 13 1992 | - | 4.73 | 2.10 | 6.83 | 183.26 | 109.21 | 292.47 | 285.64 | 58.33 | 52.02 |
| 14 1993 | - | 4.73 | 2.15 | 6.88 | 214.49 | 109.34 | 323.83 | 316.95 | 57.27 | 50.62 |
| 15 1994 | - | 4.73 | 2.19 | 6.92 | 236.42 | 109.47 | 345.89 | 338.97 | 54.20 | 47.49 |
| 16 1995 | - | 4.73 | 2.24 | 6.97 | 245.87 | 109.60 | 355.47 | 348.59 | 49.32 | 42.83 |
| 17 1996 | - | 4.73 | 2.28 | 7.01 | 245.87 | 109.73 | 355.60 | 348.59 | 43.64 | 37.58 |
| 18 1997 | - | 4.73 | 2.33 | 7.06 | 245.87 | 109.87 | 355.74 | 348.68 | 38.63 | 32.98 |
| 19 1998 | - | 4.73 | 2.38 | 7.11 | 245.87 | 110.00 | 355.87 | 348.76 | 34.21 | 28.91 |
| 20 1999 | - | 4.73 | 2.42 | 7.15 | 245.87 | 110.13 | 356.00 | 348.85 | 30.28 | 25.40 |
| 21 2000 | - | 4.73 | 2.47 | 7.20 | 245.87 | 110.13 | 356.00 | 348.80 | 26.79 | 22.26 |
| 22 2001 | - | 4.73 | 2.51 | 7.24 | 245.87 | 110.13 | 356.00 | 348.76 | 23.72 | 19.53 |
| 23 2002 | - | 4.73 | 2.56 | 7.29 | 245.87 | 110.13 | 356.00 | 348.71 | 20.96 | 17.17 |
| 24 2003 | - | 4.73 | 2.61 | 7.34 | 245.87 | 110.13 | 356.00 | 348.66 | 18.55 | 15.02 |
| 25 2004 | - | 4.73 | 2.65 | 7.38 | 245.87 | 110.13 | 356.00 | 348.62 | 16.42 | 13.18 |
| 26 2005 | - | 4.73 | 2.70 | 7.43 | 245.87 | 110.13 | 356.00 | 348.57 | 14.53 | 11.57 |
| 27 2006 | - | 4.73 | 2.74 | 7.47 | 245.87 | 110.13 | 356.00 | 348.53 | 12.86 | 10.14 |
| 28 2007 | - | 4.73 | 2.79 | 7.52 | 245.87 | 110.13 | 356.00 | 348.48 | 11.36 | 8.88 |
| 29 2008 | - | 4.73 | 2.84 | 7.57 | 245.87 | 110.13 | 356.00 | 348.43 | 10.07 | 7.80 |
| 30 2009 | - | 4.73 | 2.88 | 7.61 | 245.87 | 110.13 | 356.00 | 348.39 | 8.92 | 6.83 |
| 31 2010 | - | 4.73 | 2.93 | 7.66 | 245.87 | 110.13 | 356.00 | 348.34 | 7.87 | 5.99 |
| 32 2011 | - | 4.73 | 2.97 | 7.70 | 245.87 | 110.13 | 356.00 | 348.30 | 6.96 | 5.26 |
| 33 2012 | - | 4.73 | 3.02 | 7.75 | 245.87 | 110.13 | 356.00 | 348.25 | 6.16 | 4.60 |
| 34 2013 | - | 4.73 | 3.07 | 7.80 | 245.87 | 110.13 | 356.00 | 348.20 | 5.47 | 4.04 |
| 35 2014 | - | 4.73 | 3.11 | 7.84 | 245.87 | 110.13 | 356.00 | 348.16 | 4.84 | 3.55 |
| 36 2015 | - | 4.73 | 3.16 | 7.89 | 245.87 | 110.13 | 356.00 | 348.11 | 4.28 | 3.16 |
| 37 2016 | - | 4.73 | 3.20 | 7.93 | 245.87 | 110.13 | 356.00 | 348.07 | 3.78 | 2.71 |
| 38 2017 | - | 4.73 | 3.25 | 7.98 | 245.87 | 110.13 | 356.00 | 348.02 | 3.34 | 2.40 |
| 39 2018 | - | 4.73 | 3.29 | 8.02 | 245.87 | 110.13 | 356.00 | 347.98 | 2.96 | 2.09 |
| 40 2019 | - | 4.73 | 3.34 | 8.07 | 245.87 | 110.13 | 356.00 | 347.93 | 2.61 | 1.84 |
| 41 2020 | - | 4.73 | 3.39 | 8.12 | 245.87 | 110.13 | 356.00 | 347.88 | 2.33 | 1.60 |
| 42 2021 | - | 4.73 | 3.43 | 8.16 | 245.87 | 110.13 | 356.00 | 347.84 | 2.05 | 1.43 |
| 43 2022 | - | 4.73 | 3.48 | 8.21 | 245.87 | 110.13 | 356.00 | 347.79 | 1.81 | 1.21 |
| 44 2023 | - | 4.73 | 3.52 | 8.25 | 245.87 | 110.13 | 356.00 | 347.75 | 1.60 | 1.08 |
| 45 2024 | - | 4.73 | 3.57 | 8.30 | 245.87 | 110.13 | 356.00 | 347.70 | 1.43 | 0.94 |
| 46 2025 | - | 4.73 | 63.42 | 68.15 | 245.87 | 110.13 | 356.00 | 287.85 | 1.04 | 0.69 |
| 47 2026 | - | 4.73 | 3.66 | 8.39 | 245.87 | 110.13 | 356.00 | 347.61 | 1.11 | 0.73 |
| 48 2027 | - | 4.73 | 3.71 | 8.44 | 245.87 | 110.13 | 356.00 | 347.52 | 0.97 | 0.66 |
| 49 2028 | - | 4.73 | 3.75 | 8.48 | 245.87 | 110.13 | 356.00 | 347.47 | 0.87 | 0.56 |
| 50 2029 | - | 4.73 | 3.80 | 8.53 | 245.87 | 110.13 | 356.00 | 347.42 | 0.76 | 0.49 |
| Total | 1,982.79 | 108.58 | 173.36 | 2,264.73 | 2,511.33 | 4,290.13 | 13,831.64 | 11,586.36 | 22.57 | - 37.70 |

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