A pumping station with a total head of 19 m would tap irrigation water from the Ilagan river near Benito Solven about 36 km upstream of its confluence with the Cagayan river. Irrigation water tapped at the pumping station would be conveyed by a main canal of 16.9 km long and be distributed through 15 lateral/sublateral canals totalling to 46.2 km long to the project area. LAT-H (See Fig. 6.9) is better choice than an additional pumping station to serve northern part of the project area extending over the right bank of the lowermost reaches of the Ilagan river because of topographic conditions.

As discussed in the succeeding chapter, part of the Tumauini RIS (2,300 ha) is designed to be fed by the Ilagan river. It is proposed, therefore, that part of the facilities of the Ilagan IP be jointly used for both the Ilagan IP and the Tumauini RIS. They are the pumping station, the main canal, part of a lateral canal (Lat. H) and part of a sublateral canal (Lat. H-2). The design discharge of the main canal at its head is estimated to be 7.18 m^3/s for the cropping pattern-A and 6.63 m^3/s for the cropping pattern-B. Fig. 6.20 shows design discharges of respective proposed canals for the case of the cropping pattern-A.

The salient features of the project is summarized in Table 6.20.

6.12 Gappal Irrigation Project

The Gappal Irrigation Project having a net irrigation area of 4,400 ha, lies along the Cagayan river in the right bank at the opposite side of the service area of the Magat River Irrigation System.

Since two (2) water sources, the Cagayan river and the creeks traversing the project area, are conceivable for the project, preliminary study on the project was conducted regarding each water source.

Case - I (Water source; the Cagayan river)

A pumping station with a total pump head of 33 m would be constructed on the right bank of the Cagayan river near Anggadanan. The irrigation water tapped at the pumping station would be conveyed to the project area of 4,400 ha net through a main canal of 40.3 km long. Design discharge of the main canal at its head is 5.98 m^3/s for the cropping pattern-A and 5.86 m^3/s for the cropping pattern-B, respectively.

The irrigation flow diagram for the cropping pattern-A and the salient features of the project are shown in Fig. 6.21 and Table 6.21, respectively.

Case - II (Water source; Sinalugan river, a tributary of Madalan river, and Caunayan creek)

The project would rely on dependable water exploited by three (3) storage dams to be constructed on the Sinalugan river, a tributary of the Madalan river and the Caunayan creek. The required storage volume of each dam with a 80% dependability is estimated as shown below.

Water source	: Sinalgan R.	Tributary of Madalan R.	Caunayan creek
Name of dam	: Colorado dam	Calaocan dam	Sta Maria dam
Required storage volume ($10^6 m^3$)			
i) Cropping pattern-A:	58.4	41.0	18.1
ii) Cropping pattern-B:	42.1	28.6	16.2

Irrigation water would be taken at just downstream of respective dams through one (1) irrigation outlet each and conveyed to the project area by three (3) headreaches with a total length of 29.4 km. Irrigation diagram for the cropping pattern-A is shown in Fig. 6.22.

The salient features of the proposed irrigation facilities are summarized in Table 6.22 and those for the dams are given in Chapter V of ANNEX DA.

VII CANDIDATE SCHEMES FOR REHABILITATION/IMPROVEMENT OF EXISTING IRRIGATION SYSTEMS

7.1 Objective Areas

Five (5) existing national irrigation systems were taken up as candidate schemes for rehabilitation/improvement because of its low irrigation intensity. They are the Dummun River Irrigation System (RIS), Baggao Irrigation System (IS), Solana-Tuguegarao IS, Pinacanauan RIS and Tumauini IS. An aggregate area of these systems totals up to 12,000 ha net, breakdown of which is shown in Table 6.1. Location of these systems is presented in Fig. 6.1.

7.2 Constraints and Problems

As discussed in Chapter I, decrease in actual irrigation area is commonly attributed to deterioration of canals and structures and insufficiency of on-farm facilities in any of these systems.

Except for the Solana-Tuguegarao Irrigation System (IS) which taps water from the Cagayan River, other four (4) NISs are dependent for their water source on the unregulated flow from the tributaries of the Cagayan river. As all the existing systems are run-of-the river ones and the catchment area of the tributary at each intake site is relatively small, the possibly maximum irrigation area by the river runoffs were examined at first for each system on monthly basis by water balance calculation. Input data for water balance calculation are possible intake discharges and unit diversion irrigation water requirements. In the calculation, the possible intake discharges are assumed to be 70% of the river discharges in case it is less than the designed intake capacity and to be the same as the designed intake capacity in case 70% of the river discharges exceed the designed intake capacity. The possible intake discharges thus estimated are shown in Table 7.1 to 7.5. Unit diversion irrigation water requirement by both the proposed cropping pattern-A and -B were calculated on monthly basis for 22 years from 1963 to 1984 for each irrigation system, and are

shown in Table 7.6 and 7.7.

The results of the water balance calculation are summarized in Tables 7.8 and 7.9 for the cropping pattern -A and -B respectively. Table 7.10, showing possibly maximum annual annual irrigation area with a 80% dependability, indicates that:

i) In the Dummon RIS, Paranan area of the Baggao IS and Tumauini IS, the actual irrigation area is decisively affected by the capricious river runoff not only for the dry season but also the wet season.

   In other words, the multi-cropping index would remain 0.6 to 1.2 even after the existing facilities are rehabilitated/improved, unless water resources is newly exploited.

ii) In the Pared area of the Baggao IS and the Pinacanauan RIS, a year-round irrigation would be attainable for the whole irrigation service area with a multi-cropping index of more than 1.90, from the viewpoint of water source.

   This means that deterioration and/or inadequacy of the existing facilities is determinant on shrinkage of the actual irrigation area.

iii In Solana-Tuguegarao IS, the multi-cropping index would be increased only to 1.3 even if decreased pump capacity is restored to its nominal capacity.

7.3 Rehabilitation/Improvement Plan

In order to cope with the above-mentioned constraints and problems radically and meet the proposed cropping pattern (Ref. Chapter VI of ANNEX AG), the following conceptions were considered for rehabilitation/improvement of the systems.

Name of System	Proposed Work
Dummun RIS	a. rehabilitation of existing system, and b. construction of a storage dam.
Baggao IS	
Pared area	a. rehabilitation of existing system.
Paranan area	a. rehabilitation of existing system, and b. construction of a storage dam.
Solana-Tuguegarao IS	
Solana area	a. rehabilitation of existing pumping station and existing system, and b. construction of additional pumping station.
Tuguegarao area	abandoned
Pinacanauan RIS	a. rehabilitation of existing system.
Tumauini IS	a. rehabilitation of existing system, and b. construction of a storage dam or seeking supplementary water source other than the Tumauini river

(1) Irrigation Water Requirement

Irrigation water requirement at diversion was calculated for each of the systems on monthly basis. The results are shown in Table 7.11 and 7.12.

(2) Dummun RIS

The Dummun RIS, having an irrigation service area of 2,070 ha, slenderly extends over both banks of downstream reaches of the Dummun river. It is administratively located in Gattaran municipality of the

province of Cagayan.

A storage dam is proposed to construct on the Dummun river at about 15 km upstream of the existing intake for the Dummun RIS because of insufficiency of river runoff during the drought period. A required storage volume with a dependability of 80% is estimated to be 24.1 x 10^6 m^3 for the cropping pattern-A and 14.2 x 10^6 m^3 for the cropping pattern-B (Ref. Chapter III of ANNEX WB).

The existing intake has sufficient flow capacity for both design discharges of the cropping pattern-A and -B. The existing canal system is also sufficiently big for both cropping patterns. The proposed work is, therefore, concentrated to rehabilitation and/or upgrading of the system in addition to the new dam.

The general layout and the salient features of the rehabilitation works are shown in Fig. 7.1 and Table 7.13, respectively. The salient features of the proposed dam is shown in Chapter V of ANNEX DA.

(3) Baggao IS

The Baggao IS is located in a hollow lying between the Pared river and the Paranan river. It falls under a jurisdiction of Baggao municipality in the province of Cagayan.

As shown in Table 7.10, the Pared area of 549 ha could sufficiently be served by the unregulated flow of the Pared river, and hence only rehabilitation/improvement of the existing system is needed for the Pared area. While, as for the Paranan area of 1,263 ha, river discharges with a 80% dependability could serve only 760 ha a year for the cropping pattern-A and 1,210 ha a year for the cropping pattern-B, corresponding to a multi-cropping index of 0.60 and 0.96, respectively. These are far from the proposed multi-cropping index of 2.0. Therefore, a storage dam is proposed to construct on the Paranan river at 2 km upstream of the existing Paranan intake. Required storage volume with a dependability of 80% is estimated to be 18.1 x 10^6 m^3 for the cropping pattern-A and 10.1 x 10^6 m^3 for the

cropping pattern-B (Ref. Chapter III of ANNEX WB).

The existing irrigation systems inclusive of two (2) intakes have sufficient design capacity for both proposed cropping patterns. The proposed works on the systems is limited to rehabilitation and/or upgrading works.

The general layout and the salient features of proposed rehabilitation works are presented in Fig. 7.2 and Table 7.14, respectively. The salient features of the dam are shown in Chapter V of ANNEX DA.

(4) Pinacanauan RIS

The Pinacanauan RIS has an irrigation service area of 1,200 ha, which extends over right bank of the middle to lower reaches of the Pinacanauan de Tuguegarao river. It is covered by Peneblanca municipality of the province of Cagayan.

The unregulated flow of the Pinacanauan de Tuguegarao river, present water source of the system, could afford a year-round irrigation with a multi-cropping index of 2.0 for both cropping patterns. Design capacity of the existing system as well as the existing intake has enough for both proposed cropping patterns.

Proposed works are, therefore, limited to the rehabilitation and/or improvement of the existing system.

The general layout and the salient features are given in Fig. 7.3 and Table 7.15, respectively.

(5) Solana-Tuguegarao IS

The Solana-Tuguegarao IS consists of the Solana pump irrigation system and the Tuguegarao pump irrigation system. The former with an irrigation service area of 2,829 ha lies along the Cagayan river on the left bank at the opposite side of Tuguegarao city, while the latter, having an

irrigation service area of 314 ha, is located on the southern outskirts of the Tuguegarao city.

The Solana pumping station has decreased in its pump capacity to 1.3 m^3/s/unit from its nominal capacity of 1.5 m^3/s/unit because of various reasons (Ref. IR-218). Therefore, restoration of the pump capacity is primarily needed. However, the pump station after restoration could afford to irrigate an paddy field of about 1,800 ha out of about 2,800 ha (See Table 7.10). An additional pump equipment is proposed to meet the proposed cropping patterns. Aside from the renovation of the pumping station, rehabilitation/improvement of the existing system is also needed.

As for the Tuguegarao irrigation system, it is proposed to abandon it because major part of its service area is being converted into other land-category than farm lands.

The general layout and the salient features are presented in Fig. 7.4 and Table 7.16, respectively.

(6) Tumauini IS

The Tumauini IS is located in Tumauini municipality of the province of Isabela. It covers the irrigation service are of 3,987 ha, extending over both banks of the lower reaches of the Pinacanauan de Tumauini river.

Present water source, the unregulated flow of the Pinacanauan de Tumauini river, can serve only 2,290 ha a year for the cropping pattern-A and 3,820 ha for the cropping pattern-B, which correspond to a multi-cropping index of 0.57 and 0.96, respectively.

In order to overcome such water deficit, the following three (3) alternative plans were conceived on the water source for the project;

Case	Water Source
Case - 1	Dependable flow to be exploited by a new storage dam on the Tumauini river
Case - 2	Unregulated flow of the Tumauini river + Dependable flow to be generated by a series of new storage dams on the creeks/streams traversing in the service area
Case - 3	Unregulated flow of the Tumauini river + Unregulated flow of the Ilagan river + Dependable flow to be generated by a new storage dam on a creek

Among three (3) alternatives, the case-3 was finally taken up and the case-1 and -2 were discarded because of its extremely high construction cost.

The service area to be fed by the Ilagan river is confined to a southern area of 2,300 ha due to a topographic cause although the Ilagan river can afford to command the more service area. The remaining area of 1,687 ha out of 3,987 ha would be dependent on the Tumauini river and the Matamag creek.

As for the former area, the pumping station and part of irrigation canals for the Ilagan Irrigation Project would be jointly used to tap and convey the irrigation water to a proposed regulating pond. A booster pump with a total head of 10 m would be provided at the regulating pond. The latter area would be mainly served by the Tumauini river through the existing irrigation system with rehabilitation/improvement. Since the Tumauini river cannot fulfill the requirement (Ref. Chapter II of WB), a

small storage dam is proposed on the Matamag creek as a supplemental water source. The required storage volume with a 80% dependability is estimated to be 6.9×10^6 m^3 for the cropping pattern-A and 4.3×10^6 m^3 for the cropping pattern-B (Ref. Chapter III of ANNEX WB). Correlation of the Tumauini IS and the Ilagan IP is illustrated in Fig. 7.5.

General layout and the salient features of the project are shown in Fig. 7.6 and Table 7.17, respectively. And the salient features of the dam and reservoir is shown in Chapter V of ANNEX DA.

VIII COST ESTIMATE OF CANDIDATE SCHEMES

8.1 Basic Condition of Cost Estimate

Estimation of the construction cost for the candidate schemes was made in terms of project cost and economic cost. The project cost comprises: i) direct construction cost; ii) compensation cost; iii) cost for O & M facilities; iv) engineering cost; v) administration cost; and vi) physical contingency.

The direct construction cost is estimated on the basis of the preliminary facility plan and the standard unit costs at a price level as of December 1985. The standard unit costs are determined referring to those used for the on-going projects in the Basin such as the Magat River Irrigation Project, the Chico River Irrigation Project, Stage I and the Cagayan Integrated Agricultural Development Project as well as those employed in the feasibility study of similar irrigation projects in the Philippines. The major standard unit costs employed in the present study are shown in Table 8.1.

The compensation cost covers the cost for acquiring the private lands for the project implementation. The unit rates adopted in the present study are;

paddy field	₱10,000/ha
upland	₱8,000/ha
grassland	₱3,000/ha

The cost for O & M facilities, which includes the construction cost of office and quarters and procurement cost of machinery and equipment required for operation and maintenance works, is assumed to be ₱1,000/ha for the new schemes and ₱500/ha for the rehabilitation/improvement schemes.

Engineering cost, which includes cost for engineering services for study and detail design works for the project and supervisory works of the whole construction works, is assumed to be 8% of the sum of direct

construction cost, compensation cost and cost for O & M facilities.

Administration cost covers the cost for Government's administration and overhead needed for project implementation and is assumed to be 7% of the sum of direct construction cost, compensation cost and cost for O & M facilities.

Physical contingency is assumed to be 15% of the sum of the above item i) to v).

All of these costs are expressed in peso currency at the price level as of December 1985. The conversion rate among Philippine Peso, U.S. Dollar and Japanese Yen is assumed to be: ₱19.0 = U.S. $1.0 = ¥200 referring to the current exchange rate in December 1985.

The project cost is divided into foreign and local currency components. The foreign currency component covers i) procurement cost for construction and O & M equipment and machinery, ii) materials to be imported, iii) expense and fees of consultants, etc.

In case a multipurpose dam is involved in the candidate scheme, some costs to be borne by the irrigation project is allocated by the separable costs-remaining benefit method (Ref. IR-321).

8.2 Estimate of Project Cost

The project costs for each of the candidate schemes were estimated in both cases of the cropping pattern-A and -B on the basis of the above-mentioned conditions and assumptions. The project costs for each scheme is shown in Table 8.2 and 8.3.

The summaries of cost allocation of the multipurpose dams which would jointly be used as water source of irrigation schemes are given in Table 8.4 to 8.13.

8.3 Operation, Maintenance and Replacement Costs

In addition to the initial investment cost estimated precedently, operation, maintenance and replaceemnt costs (OMR% Cost) are needed to maintain the function of the facilities properly over the anticipated project life.

The annual operation and maintenance costs (O & M Cost) comprise the salaries of the personnel concerned, the materials and labor costs for repair and maintenance of facilities and equipment, and the running cost of project facilities. Annual O & M costs of the irrigation system except for running cost for pumps is assumed to be ₱400/ha. Running cost for the pumps is estimated on monthly basis based on average diversion water requirement and electric charge of ₱2.11/kWh, which is the actual unit rate of CAGELCO as of November 1985 applied for the Solana-Tuguegarao IS. The O & M costs for each of irrigation systems are summarized in Table 8.14.

Some of the project facilities such as mechanical and electrical works should be replaced at a certain interval within the anticipated project life because of their shorter durable year. The replacement cost required for each irrigation system is shown in Table 8.15.

The annual OMR costs for the dam is assumed to be 1.0% of its economic cost and is presented in Table 8.16.

8.4 Estimate of Economic Cost

The project cost estimated in previous section is converted into the economic cost by multiplying the standard conversion factor of 0.82 by the local currency component of the project cost except for the compensation cost. Production foregone is applied in stead of this compensation cost in general.

Thus estimated economic cost for each candidate scheme is shown in Table 8.17.

IX CALCULATION BASIS OF IRRIGATION WATER REQUIREMENT

9.1 General

In estimating irrigation water requirement, the factors considered are i) crop evapotranspiration; ii) percolation; iii) land soaking and land preparation requirements; iv) effective rainfall; and v) irrigation losses consiting of application, operation and conveyance losses.

Due to insufficiency of field measurements for evapotranspiration, percolation rate, effective rainfall, etc., an empirical method is adopted for estimating irrigation water requirement with many simplified assumptions.

9.2 Calculation Method and Procedure

Calculation methodology and procedure employed in the present study are summarized below.

Paddy

$$CWR = ET + P \quad \text{--- (1)}$$

$$FWR = FC + LS + LP \quad \text{--- (2)}$$

$$DWR = (FWR - RE)/IE \quad \text{--- (3)}$$

where, CWR : Crop water requirement
ET : Crop Evapotranspiration
P : Deep percolation
FWR : Field water requirement
LS : Land soaking requirement
LP : Land preparation requirement
DWR : Diversion irrigation water requirement
RE : Effective rainfall
IE : Irrigation efficiency

Diversified Crops

In case of diversified crops, deep percolation and land soaking requirement are not considered to estimate irrigation water requirement. Therefore, above equations (1) and (2) are modified as follows:

$$CWR = ET \quad \text{--- (1)'}$$

$$FWR = CWR + LP \quad \text{--- (2)'}$$

9.3 Crop Evapotranspiration

Crop evapotranspiration (ET), consumptive use of crops, varies seasonally correlating with the growing stages of the crops and climatic factors. Owing to the difficulty in obtaining accurate field measurements despite laborious, time-consuming and costly works, ET is commonly calculated by prediction methods especially in project planning stage. Since no sufficient field measurements of ET are available in the Basin, ET is calculated by using the following equation.

$$ET = Kc \cdot ETo \quad \text{--- (4)}$$

where, Kc ; crop coefficient

ETo ; reference crop evapotranspiration (mm)

For estimating reference crop evapotranspiration (ETo) which covers the effect of meteorological factors, the Food And Agricultural Organization of The United Nations (FAO) recommends the Blaney-Criddle, Radiation, modified Penman and Pan Evaporation methods and recognizes that the modified Penman method is the best, followed by the Pan Evaporation method in respect of accuracy (Ref. IR-319). On the other hand, the modified Penman or Pan Evaporation method is prevailingly employed for project planning in the Philippines.

Pan evaporation data have been accumulated for five (5) years or more at nine (9) meteorological stations in the Basin, while meteorological data necessary for estimating ETo by the modified Penman method are only available at Tuguegarao meteorological observatory in the same. Therefore, the Pan Evaporation method is employed in the present study. ETo by using

the Pan Evaporation method is estimated by following equation.

$$ETo = Kp \cdot Ep \qquad \text{--- (5)}$$

where, Kp ; pan coefficient

Ep ; pan evaporation (mm)

Pan coefficient is determined to be 1.0 for paddy and 0.85 for diversified crops in compliance with NIA's recommendation. Pan evaporation used in the present study is shown in Table 9.1.

The crop coefficient (Kc), which covers the effect of crop characteristics, presents the relationship between ETo and ET. Values of Kc vary with the crop, its growth stage, growing season and the prevailing weather conditions. The Kc employed in the present study is given in Fig. 9.1. The Kc for paddy is the one drawn by the International Rice Research Institute (IRRI) as a generalized growth stage relationship between ET and Ep (Ref. IR-310). As for the Kcs for the diversified crops are those recommended by FAO (Ref. IR-319).

9.4 Percolation

Percolation which is defined as the quantity of water lost due to downward flow through a depth of soil, is greatly affected by soil texture, groundwater depth and drainability of the area.

Measurements on percolation rate were conducted in the MRMP area (Ref. IR-210 & 220) and in the Matuno River Development Project area (Ref. IR-201 & 202). On the other hand, similar standard percolation rates for each soil texture are recommended in Design Guides (Ref. IR-313), Manual on Canals and Canal Structures (Ref. IR-316) and The Philippine Recommends for Irrigation Water Management (Ref. IR-311). In due consideration above measurements and standard percolation rate, the percolation rate for the present study is assumed as follows.

Soil Type	Percolation Rate (mm/day)
i) Clay - silty clay	1.5
ii) Clay loam - Loam	2.0
iii) Sandy clay loan	3.0
iv) Sandy loam	5.0

9.5 Land Soaking Requirement

Land soaking requirement is defined as the quantity of water, fed by either irrigation or rainfall, required to soak or saturate the land to soften it prior to the initial breaking down of the soil by using the plow or other mechanical means (Ref. IR-311).

In the Philippines, land soaking requirement is recommended to calculate by using the following formula (Ref. IR-311, 313 and 316).

$$LS = \frac{(Sc-Mc)\ Bd}{100} \times Drz \qquad \text{--- (6)}$$

where, Ls : Land soaking requirement (mm)
Sc : Soil saturation capacity (%)
Mc : Moisture content (%)
Wet season paddy MC = Pwp
Dry season paddy MC = (Fc + Pwp)/2
Pwp : Permanent wilting point (%)
Fc : Field capacity (%)
Bd : Bulk density
Drz : Depth of root zone (300 mm for paddy)

General physical properties of different soil textures employed are:

Soil Texture	Sc(%)	Pwp(%)	Fc(%)	Bd
Sandy (S)	38	4	9	1.65
Sandy loam (SL)	43	6	14	1.50
Loam (L)	47	10	22	1.40
Clay loam (CL)	49	13	27	1.35
Silty clay (SC)	51	15	31	1.30
Clay (C)	53	17	35	1.25

Source: IR-312

Land soaking requirement for each soil texture is calculated based on equation (6) and are eventually generalized as shown below for the present study.

Soil Texture	Land Soaking Requirement (mm)	
	Wet season paddy	Dry season paddy
Sandy - Sandy loam	168	156
Loam - Clay loam	155	130
Silty clay - Clay	140	109

9.6 Land Preparation Water Requirement

(1) Paddy

Land preparation water requirement for paddy field is defined as the amount of water needed from the first plowing to the last harrowing (Ref. IR-311). It should be sufficient to meet evaporation and deep percolation losses over the land preparation period and ponding water for transplanting, and is calculated by the following equation.

$$Lp = SP + (Ev + P) \cdot t \qquad \text{--- (7)}$$

Where, LP : Land preparation requirement (mm)
SP : Depth of ponding for transplanting (25 mm)
Ev : Evaporation (0.7 x Ep)
P : Percolation (mm/day)
t : Number of days for land preparation (23 days)

(2) Diversified Crops

Land preparation water requirement for diversified crops is estimated to be 50 mm with the following assumptions.

i) Diversified crop is raised on light to medium soil.
ii) At land preparation, residual moisture contents is at wilting point.
iii) For land preparation, soil moisture is raised to 50% of the total available moisture (See Table 9.2).
iv) Total available moisture of each soil texture is:

Soil Texture	Total Available Moisture (mm/m)
Sandy	80
Sandy Loam	120
Loam	170
Clay Loam	190

(See Table 9.3)

v) Effective root zone of the major diversified crops to be introduced are as follows:

Crops	Effective root zone (m)
Corn	0.9
Beans	0.6
Groundnuts	0.8

vi) Land preparation water requirement are:

Corn	0.9 m x 80-190 mm/m x 0.5 =	36-86
Beans	0.6 m x 80-190 mm/m x 0.5 =	24-57
G. nuts	0.8 m x 80-190 mm/m x 0.5 =	32-76
Average		52 mm

9.7 Effective Rainfall

Effective rainfall is defined as the portion of total rainfall which meets with part of land soaking, land preparation and crop water requirements (Ref. IR-311). It is compositely influenced by several factors such as rainfall intensity and distribution, permeability and water holding capacicy of soils, amount of irrigation water supplied, irrigation management practices, form of field plot and topography of lands. Due to complicacy of estimating reliable effective rainfall, standardized method of estimating effective rainfall is not established in the Philippines. As for the paddy, however, daily water balance method is broadly employed for project planning nowadays.

(1) Effective Rainfall for Paddy

Since no standardized method for estimating effective rainfall is established yet, that for present study is estimated for eight (8) selected rain gauges based on sample calculation by using daily water balance methods with several assumptions. The procedure and assumptions employed are as follows.

i) Procedure of effective rainfall calculation

a. Sample calculation of effective rainfall.

b. Assuming correlation between actual monthly rainfall and potential effective rainfall at various magnitude of rainfall.

c. Calculation of potential effective rainfall at selected rain gauge stations.

ii) Sample calculation of effective rainfall

a. Method; daily water balance

b. Sample project; Magat River Irrigation System

c. Assumptions;

- Net storage depth is 50 mm.
- Rainfall less than 5 mm/day is ineffective.
- Rainfall beyond the net storage depth is ineffective.
- Daily decreasing depth by evapotranspiration and percolation is assumed to be 9 mm/day for the dry season paddy and 7 mm/day for the dry season (Ref. IR-210).

d. Calculation period: 22 years (1963-1984)

iii) Correlation between actual monthly rainfall (R) and effective rainfall (RE)

Results of the sample calculation are illustrated in Fig. 9.2, which shows that he effectiveness of monthly rainfall is higher than 60% in most cases when actual rainfall is less than 200 mm in depth. However, effectiveness tends to decrease gradually with increase in monthly rainfall over 200 mm.

In calculating effective rainfall by the daily water balance method, it is assumed the ideal water management is practised throughout the paddy cultivation period. In actual operation, however, gate operation is generally made once a 5-day, 7-day or sometimes 10-day, and it is hardly possible to operate the gates quickly responding to unforeseeable rainfall without modernized water management facilities such as telecommunication system. Actual

effective rainfall would, therefore, be less than the amount calculated by the above daily water balance method. Taking practical water management into account, correlation between actual monthly rainfall (R) and effective rainfall (RE) is conservatively established as shown in Fig. 9.2, which is expressed by the following equation.

Actual monthly rainfall (R)	Potential effective rainfall (RE)
$R \leq 200$ mm/month	$RE = 0.2 \times R + 80 < 210$
$R > 200$ mm/month	$RE = 0.2 \times R + 80 < 210$

iv) Potential effective rainfall

Potential monthly effective rainfall for the selected rain gauges is calculated for 22 years from 1963 to 1984 based on the above equations and is shown in Table 9.4 to 9.7.

(2) Effective Rainfall for Diversified Crops

Since no standardized calculation method is established for the diversified crops as well and the diversified crop lands to be irrigated is quite minor in the Basin, effective rainfall for the diversified crops for the present study is computed by a rather simple method of USDA, SCS method recommended by FAO (Ref. IR-320).

9.8 Irrigation Efficiency

Overall irrigation efficiency is attributed to farm application, conveyance and operation losses, and greatly varies by soil condition, length and size of canals, type of regulating structures, water management practices, etc.

For the present study, a generalized irrigation efficiency is uniformly applied for all the irrigation systems/projects. Overall irrigation efficiency employed is 48% for the wet season paddy, 54% for the dry season paddy and 47% for the diversified crops, breakdown of which are as follows.

Crops	IEa		IEc		IEo		IE	
	WS	DS	WS	DS	WS	DS	WS	DS
Paddy	0.7	0.8	0.8	0.8	0.85	0.85	0.48	0.54
Diversified crops		0.65		0.8		0.9		0.47

X AGRICULTURAL WATER DEMANDS

10.1 General

Agricultural water demands were estimated/projected for the years 1985, 1990, 1995, 2000 and 2005 on the basis of the agricultural development plan formulated in the present study.

The agricultural water demands considered are the water demands for irrigation and livestock. As for the fresh water aquaculture, no artificial water supply is expected in future as practised at present.

10.2 Irrigation Water Demand

The Cagayan river basin is divided into 45 subbasins for the sake of water balance study as shown in Fig. 10.1, which is demarcated in due consideration of major existing and proposed intake sites and a selected 14 dams. The irrigation water demands of the CISs and CIPs are calculated by an aggregate irrigation area in each of these subbasins, and those for NISs and NIPs are calculated by irrigation area commanded by each of existing or proposed intakes. These estimated/projected irrigation areas are shown in Table 10.1, which is prepared in accordance with an agricultural land use plan and priority ranking of the candidate schemes discussed in Chapter V of ANNEX AG.

The irrigation water demand for the year 1985 was estimated based on the present cropping pattern presented in Fig. 10.2 and calculation methodology aforementioned. The monthly mean irrigation water demand for the whole Basin is shown in Table 10.2 and summarized below.

(m^3/s)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
130	158	94	69	139	124	156	93	48	19	67	73

The irrigation water demands for the years 1990, 1995, 2000 and 2005 were projected based on assumed land use plan, future cropping pattern illustrated in Fig. 10.3 and the calculation methodology aforementioned. The monthly mean irrigation water demand for the whole of the Basin is shown in Table 10.3 to 10.6 and summarized below.

(m^3/s)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1990	220	251	202	94	173	232	287	183	109	50	63	161
1995	264	302	254	101	218	281	338	217	124	59	65	195
2000	281	323	278	106	235	298	360	232	133	63	67	207
2005	295	338	296	105	255	317	379	244	134	66	66	222

10.3 Water Demand for Livestock

The water demands for livestock are those for cattle drink water. It is projected in estimating future agricultural production value that the number of cattle increase linearly from 128 x 10^3 heads at present to 279 x 10^3 heads in the year 2005. Assuming that required drink water of cattle be 80 L/day/head, the annual water demands in the whole Basin were estimated as follows;

(Unit: 10^6 m^3)

1985	1990	1995	2000	2005
3.74	4.84	5.94	7.04	8.15
(0.12)	(0.15)	(0.19)	(0.22)	(0.26)

Figure in parenthesis shows the demand in terms of m^3/s

Table 1.1 Inventory of National Irrigation System

Facilities	Dummun River Irrigation System		Baggao Irrigation System		Pinacanauan Irrigation System	
	Q'ty	Present Condition	Q'ty	Present Condition	Q'ty	Present Condition
1. Service Area (Ha)	2,070		1,812		1,200	
2. Intake						
(1) Design discharge (m^3/s)	4.88		Pared; 1.95 Paranan; 3.29		3.30	
(2) Inlet ($B^m xH^m xNos.$)	1.3x0.9x3	Good	Pared; 1.2x1.2x1 Paranan; 1.6x1.4x1	Intake is covered by sands. Good	1.4x0.8x2	Good
3. Irrigation Facilities						
(1) Main canal (km)	20.4	5.2 km; Low embankment 18.3 km; Silted or insufficient excavation	24.8	1.3 km; Low embankment 2.8 km; Silted	23.1	2.6 km; Low embankment 0.8 km; Insufficient excavation 3.6 km; Totally deteriorated
(2) Lateral · canals (km)	35.7	7.3 km; Low embankment 10.6 km; Silted 7.1 km; Totally deteriorated	34.7	4.8 km; Totally deteriorated	10.6	5.7 km; Low embankment 0.5 km; Silted
(3) Turnouts (Nos.)	66	55 nos; No gate is installed.	76	49 nos; No gate is installed	71	71 nos; No gate is installed
(4) Other structures (Nos.)	203	20% of structures; minor rehabilitation is needed.	316	15% of structures; minor rehabilitation is needed.	165	10% of structures; minor rehabilitation is needed.
4. Drainage Facilities						
(1) Drainage canal (km)	25.7	24 km; Flow area reduced to less than 50% of the designed.	24.3	21.3 km; Flow area reduced to less than 50% of the designed.	2.9	Good
(2) Structures (Nos.)	7	2 nos; Submerged	24	3 nos; Deteriorated	-	
5. On-farm Canals						
(1) Farm ditches (km)	81.5	70% of ditches; poor in condition	115.6	75% of ditches; poor in condition	34.7	Canal density is quite low.
(2) Farm drains (km)	-	No farm drain is constructed.	-	No farm drain is constructed.	-	No farm drain is constructed.
6. O & M Roads						
(1) Roads (km)	35.3	5.8 km; Graveled	28.2	17.3 km; Graveled	26.4	1.0 km; Graveled.
(2) Structures (Nos.)	-		8	Good	8	Good

(To be continued)

(Continuation)

Facilities	Solana-Tuguegarao Irrigation System		Tumauini Irrigation System		Zinundungan River Irrigation System	
	Q'ty	Present Condition	Q'ty	Present Condition	Q'ty	Present Condition
1. Service Area (Ha)	2,829 (Solana Area only)		3,987		1,760	
2. Intake	Pump type: vertical mixed flow	- Pump efficiency is low			5.07 m^3/s /2 0.82 m^3/s /3	
(1) Design discharge (m^3/s)	Pump unit: 4 units HP per unit; 500 HP	- Consecutive operation is possible for 12 hrs. on an average.	9.21		1.7x1.0x4 /2 30"ϕ x 3 /3	
(2) Inlet ($B^m x H^m x$Nos.)	Unit capacity; 1.70 m^3/s Static head; 15.9 m	- Actual unit capacity is 1.3 m^3/s/unit	.2x0.9x4	Good		
(3) Water source (km^2) /1	Cagayan River (19,450 km^2)		Pinacanauan de Tumauini River (170 km^2)		Zinundungan River Sicalao Creek (160 km^2)	
3. Irrigation Facilities						
(1) Main canal (km)	18.4	2.9 km; Low embankemnt. 2.6 km: Silted 5.9 km; Totally deteriorated	23.5	9.6 km: Silted	27.6	
(2) Lateral canal (km)	25.7	2.4 km: Low embankment 8.5 km; Totally deteriorated	82.3	13.5 km: Low embankment. 20.7 km; Silted 1.9 km; Totally deteriorated	16.2	
(3) Turnout (Nos.)	67	6.3 nos; No gate is installed	183	40 nos; No gate is installed	47	
(4) Other structures (Nos.)	125	20% of structures; minor rehabilitation is needed.	339	30% of structures; minor rehabilitation is needed.	180	
4. Drainage Facilities						
(1) Drainage canal (km)	12.9	8.5 km; Flow area reduced to less than 50% of the designed.	23.3	Minor rehabilitation is needed.	-	
(2) Structures (Nos.)	3	Good	11	2 nos; Submereged	-	
5. On-farm canals						
(1) Farm ditches (km)	118.7	60% of the ditch; Poor in condition.	117.6	15% of ditches; Poor in condition.	20.6	
(2) Farm drain (km)	-	No farm drain is constructed.	11.6	Canal density is quite low.	-	
6. O & M Roads						
(1) Roads (km)	32.9	16.0 km; Graveled	52.0	35.5 km: Graveled	34.0	
(2) Structures (Nos.)	-		-		no data	

/1 : Catchment area at intake site.
/2 : Zinundungan main intake.
/3 : Supplementary intake on Sicalao Creek.

Table 1.2 Irrigated Area of Existing NISs

Name of System	Service Area (ha)	Irrigated Area (ha)									
		1985		1984		1983		1982		1981	
		WS	DS	WS	DS	WS	DS	WS	DS	WS	DS
1. Zinundungan RIS	1,760	1,726	1,713	1,700	2,173	1,754 /2	787 /2	1,247 /2	1,647 /2	1,249 /2	853 /2
2. Dummun RIS	2,070	1,444	1,370	1,460	1,374	1,460	379	1,441	1,287	1,426	1,292
3. Baggao IS	1,812	1,306	1,051	1,280	964	1,441 /2	451 /2	1,284 /2	688 /2	1,307 /2	912 /2
- Paranan Area	1,263	848	605	791	537	955	329	835	501	925	491
- Pared Area	549	458	446	489	427	486	122	449	187	382	421
4. Pinacanauan RIS	1,200	290	292	319	279	275	279	220	240	222	221
5. Solana - Tuguegarao IS	3,143	-	958	907	972	1,200	1,095	325	551	-	-
- Solana Area	2,829	0	958	907	972	1,106	1,095	210	449	-	-
- Tuguegarao Area	314	-	-	-	-	94	-	115	102	-	-
6. Tumauini IS	3,987	1,447	1,279	1,879	1,872	1,432	302	1,814 /2	1,470 /2	1,965 /2	1,724 /2

/1: Magat Integrated Irrigation System and Chico River Irrigation System are not presented because these are just completed in 1987.

/2: under construction (pertial operation)

Source: NIA Regional Office

Table 1.3 List of Pump Irrigation Systems

No.	Name of System	Location	Service Area(ha)	Design Discharge (l/s)	No. of Units	Diameter (inch)	Power (Hr.)	Time of Completion
I.	Province of Cagayan							
1.	Afusing PIS	Alcala	50	88	2	10	55/50	Dec. 1980
2.	Barsat West PIS	Baggao	90	90	1	10	65	Nov. 1982
3.	Calapangan Norte PIS	Faire	44	129	3	10	50/56	1981
4.	Calapangan Sur PIS	Lasam	60	169	2	10	70	Sep. 1979
5.	Casicallan PIS	Gattaran	40	45	1	8	75	Dec. 1979
6.	Lamu PIS	Enrile	51	100	1	10	52	1978
7.	Masical PIS	Baggao	50	30	2	8/10	30/55	Sep. 1981
8.	Mami Maracusu PIS	Enrile	160	950	5	8/10	38/65	Dec. 1980
9.	Nanucayan PIS	Faire	110	163	2	8/10	52/91	Jun. 1977
10.	Nassiping PIS	Sn. Vicente	50	85	1	10	50	Aug. 1977
11.	Santor PIS	Baggao	83	300	2	8	55	Nov. 1982
	Sub-total		788					
II.	Province of Kalinga-Apayao							
1.	Calbayan	Pinukpuk	30	40	1	8	65	May 1982
III.	Province of Isabela							
1.	Bungad PIS	San Pablo	50	79	2	8	38	Jun. 1979
2.	Bacradal PIS	Echague	30	44	1	8	55	1978
3.	Cubag-Ugad PIS	Cabagan	30	80	1	10	45	Jan. 1977
4.	Cabanuangan PIS	Jones	30	72	1	8	100	1978
5.	Cansan PIS	Cabagan	20	120	2	8	45	Jan. 1976

(To be continued)

(Continuation)

No.	Name of System	Location	Service Area(ha)	Design Discharge (l/s)	No. of Units	Diameter (inch)	Power (Hr.)	Time of Completion
6.	Cusipa PIS	Jones	38	66	1	8	100	1980
7.	Dalibubon PIS	Jones	40	64	1	10	100	1980
8.	Guimbaoan PIS	Echague	39	305	1	10	55	Dec. 1977
9.	Imbiao PIS	Roxas	46	50	1	8	40	May 1979
10.	Minanga PIS	Naguilian	80	280	3	8/10	52/84	Dec. 1977
11.	Malannao PIS	Angadanan	50	67	2	10	75	Oct. 1981
12.	Malitao PIS	Echague	107	289	2	8	55	1978
13.	Malasin PIS	Angadanan	60	60	1	10	130	Dec. 1980
14.	Payac PIS	Jones	73	300	2	8	55	Feb. 1980
15.	Palattao PIS	Naguilian	30	120	2	8	60	Jun. 1976
16.	Reserva PIS	Echague	25	90	2	8	60	1979
17.	San Jose PIS	Quirino	31	39	1	8	50	Dec. 1979
18.	Sto. Niño PIS	Angadanan	50	107	1	10	130	Dec. 1980
19.	Turod Villa PIS	Roxas	22	34	1	8	50	1980
20.	Upi PIS	Gamu	179	270	3	8/10	55/110	1975
21.	Lulutan PIS	Ilagan	622	622	3	24	265	on-going
	Sub-total		1,652					
IV.	Province of Ifugao							
1.	Busilac PIS	Potia	65	67	1	8	40	May 1978
2.	Cosile PIS	Potia	40	40	1	6	52	Jan. 1979
3.	Hapid PIS	Lamut	25	57	1	6	38	Apr. 1979
	Sub-total		130					

(To be continued)

(Continuation)

No.	Name of System	Location	Service Area(ha)	Design Discharge (l/s)	No. of Units	Diameter (inch)	Power (Hr.)	Time of Completion
V.	Province of Nueva Vizcaya							
1.	Lower Abian PIS	Bambang	32	60	1	8	25	1982
VI.	Province of Quirino							
1.	Difinifin PIS	Maddela	60	77	2	8	55	Dec. 1981
2.	Divisoria Norte PIS	Maddela	100	200	2	10	130	1979
3.	Villa Hermosa PIS	Maddela	50	70	1	8	40	Dec. 1981
	Sub-total		210					
VII.	Mountain Province (none)							
	Total		2,842					

Source: FSDC Head Office, Manila

Table 3.1 Summary of New Physical Area Targets

UNIT; ha

YEAR	NATIONAL	COMMUNAL	TOTAL
1983	60,921	27,327	88,248
1984	81,152	28,387	109,539
1985	85,070	13,351	98,421
1986	19,392	13,676	33,068
1987	2,400	14,389	16,789
1988	14,510	11,000	25,510
1989	26,800	11,000	37,800
1990	63,795	11,000	74,795
1991	51,650	13,000	64,650
1992	18,800	13,500	32,300
1993	34,300	12,000	46,300
1994	11,000	12,000	23,000
1995	-	12,000	12,000
1996	-	12,000	12,000
1997	-	10,000	10,000
1998	-	10,000	10,000
1999	-	10,000	10,000
TOTAL	469,790	234,630	704,420

Source; IR-308

Table 3.2 Summary of Rehabilitation/Restoration Targets

UNIT; ha

YEAR	NATIONAL	COMMUNAL	TOTAL
1983	19,935	23,730	43,665
1984	18,032	21,933	39,965
1985	6,642	20,811	27,453
1986	2,892	15,801	18,693
1987	14,100	13,552	27,652
1988	32,775	15,500	43,275
1989	38,805	15,500	54,305
1990	46,575	15,500	62,075
1991	33,425	17,000	50,425
1992	15,450	17,100	32,550
1993	8,750	16,300	25,050
1994	8,000	16,300	24,300
1995	8,000	16,300	24,300
1996	8,000	16,500	24,500
1997	8,000	15,000	23,000
1998	8,000	15,000	23,000
1999	8,000	15,000	23,000
TOTAL	285,381	286,827	572,208

Source; IR-308

Table 3.3 Funding Requirement; 1983-1999

UNIT: P1,000

REGION	1983	1984	1985	1986	1987	1988	1989	1990	1991
I	69,050	153,020	153,587	263,478	466,996	582,270	582,270	668,270	496,270
II	399,388	266,941	15,005	202,591	199,826	201,305	201,305	201,305	3,305
III	119,586	204,820	225,907	392,654	439,655	645,877	736,467	859,427	210,567
IV	323,002	503,126	357,855	185,155	189,553	21,714	21,714	21,714	21,714
V	105,800	177,945	132,312	17,283	12,505	15,518	15,518	15,518	15,518
VI	21,773	19,640	3,500	3,414	62,123	93,402	167,472	272,332	338,822
VII	13,017	56,500	50,702	107,995	126,385	78,555	8,602	8,602	8,602
VIII	16,384	18,326	22,950	8,470	13,384	13,595	13,595	13,595	13,595
IX	12,300	14,400	7,051	3,482	11,922	5,776	5,776	5,776	5,776
X	124,528	135,100	98,068	37,263	22,689	10,099	10,099	10,099	10,099
XI	177,414	456,945	246,449	259,132	347,197	5,076	5,076	5,076	5,076
XII	14,699	109,850	200,170	507,905	618,586	398,246	642,176	531,176	283,176
Nationwide	596,798	757,200	785,674	443,067	421,724	374,360	374,360	295,160	349,160
TOTAL	1,993,739	2,873,813	2,319,230	2,431,889	2,932,545	2,445,793	2,784,430	2,908,050	1,761,680

UNIT: P1,000

REGION	1992	1993	1994	1995	1996	1997	1998	1999
I	10,270	10,270	10,270	10,270	10,270	10,270	10,270	10,270
II	3,305	3,305	3,305	3,305	3,305	3,305	3,305	3,305
III	266,817	323,067	229,317	10,067	10,067	10,067	10,067	10,067
IV	21,714	21,714	21,714	21,714	21,714	21,714	21,714	21,714
V	15,518	15,518	15,518	15,518	15,518	15,518	15,518	15,518
VI	251,242	2,622	2,622	2,622	2,622	2,622	2,622	2,622
VII	8,602	8,602	8,602	8,602	8,602	8,602	8,602	8,602
VII	13,595	13,595	13,595	13,595	13,595	13,595	13,595	13,595
IX	5,776	5,776	5,776	5,776	5,776	5,776	5,776	5,776
X	10,099	10,099	10,099	10,099	10,099	10,099	10,099	10,099
XI	5,076	5,076	5,076	5,076	5,076	5,076	5,076	5,076
XII	131,156	56,246	6,196	6,196	6,196	6,196	6,196	6,196
Nationwide	369,160	269,160	270,160	128,160	28,160	28,160	28,160	28,160
TOTAL	1,112,330	745,050	602,250	241,000	241,000	141,000	141,000	141,000

Source; IR-308

Table 3.4 Summary of the Project Works

COMPONENTS/ACTIVITIES	PROJECT PACKAGE I	PROJECT PACKAGE II	PROJECT PACKAGE III
A. Total Areas of NIS	127 Systems-597,664 ha	138 Systems-678,587 ha	147 Systems-746,587 ha
B. Implementation Period	1987-1989	1990-1992	1993-1995
C. Project Cost (Dec. 1985 price level)	P597,957,000	P1,381,646,000	P1,475,244,000
1. Restoration Works	One 73 NIS covering about 365,297 ha. Excluded are the 54 systems under NISIP and other rehabilitation programs. P200,000,000	None	None
2. Upgrading Works	None	On 18 systems covering about 32,257 ha which has not received any previous upgrading works. P304,737,000	None
3. Procurement of Equipment	Equipment requirement of 127 System + spare for new equipment P44,492,000	Spare parts for reconditioned equipment P69,259,000	P158,933,000
4. Training	Regional Staff, Systems O & M staff institutional development workers, farmer leaders, trainors. P5,305,000	Continuous P38,000	Continuous P31,000
5. Establishment of Barangay Action Center as an interim phase of the institutional development program.	On 548,318 ha covering 117 NIS. Excluded are the 11 NIS that will come into stream within this period and the 10 NIS that are presently viable and are already spending an O & M level funding equal to or more that the P300/ha funding level recommended for this Package. P1,694,000	On the remaining 130,269 ha. P403,000	On the additional 68,000 ha that would come into stream during this period. P210,000
6. Development of Irrigators Association (IA)	On selected systems covering about 130,000 ha. P14,603,000	On other systems covering another 180,000 ha. P20,229,000	On other systems covering another 190,000 ha. P21,353,000
7. Systems Level Financing of Recurrent O & M Expenditures	548,318 ha at P300/ha cost for O & M P93,485,000	678,870 ha at P350/ha cost for O & M P712,516,000	746,587 ha at P400/ha cost for O & M P181,112,000
8. Engineering and Supervision	Continuous P117,643,000	Continuous P169,676,000	Continuous P181,112,000

Source: IR-220

Table 5.1 Unit Design Discharge

Name of Scheme	Unit Design Discharge (ℓ/s/ha)	
	Cropping Pattern-A	Cropping Pattern-B
1. New Schemes		
(1) Chico River Irrigation Project Stage II	1.66	1.68
(2) Matuno River Development Project	1.50	1.56
(3) Dabubu River Irrigation Project	1.22	1.15
(4) Zinundungan Irrigation Extension Project	1.48	1.48
(5) Alcala Amulung West Irrigation Project	1.39	1.36
(6) Tuguegarao Irrigation Project	1.10	0.99
(7) Lulutan Irrigation Project	1.42	1.39
(8) Ilagan Irrigation Project	0.95	0.91
(9) Gappal Irrigation Project	1.36	1.33
2. Rehabilitation Schemes		
(1) Dummun River Irrigation System	1.86	1.90
(2) Baggao Irrigation System	1.77	1.77
(3) Solana-Tuguegarao Irrigation System	1.77	1.77
(4) Pinacanauan Irrigation System	1.77	1.77
(5) Tumauini Irrigation System	1.80	1.77

Table 5.2 Unit Drainage Requirement

Name of Scheme	Unit Drainage Requirement (ℓ/s/ha)	
	Paddy field	Upland field
1. Chico-Malling Irrigation Project	9.2	29.6
2. Matuno River Irrigation Project	7.47/1	24.17/1
3. Dabubu River Irrigation Project	10.7	23.5
4. Zinundangan Irrigation Exlension Project	13.1	36.7
5. Alcala Amulung West Irrigation Project	9.2	29.6
6. Tuguegarao Irrigation Project	9.2	29.6
7. Lulutar Irrigation Project	6.4	21.0
8. Ilagan Irrigation Project	6.4	21.0
9. Gappal-Irrigation Project	10.7	23.5

/1 Ref. IR-202

Table 6.1 Candidate Schemes for Irrigation Development

Name of Scheme	Project Area (ha, Net) New Area	Existing Irrigation Area	Total	Water Source	Irrigation System
1. New Irrigation Scheme					
(1) Chico Mallig Irrigation Project, Stage II	29,100	2,100	31,200	Chico R.	Gravity
(2) Matuno River Development Project	3,450	9,230	12,680	Matuno R.	Gravity
(3) Dabubu River Irrigation Project	1,000	-	1,000	Dabubu R.	Gravity
(4) Zinundungan Irrigation Extension Project	1,600	150	1,750	Zinundungan R.	Gravity
(5) Alcala Amulung West Irrigation Project	6,750	-	6,750	Cagayan R.	Pump
(6) Tuguegarao Irrigation Project	1,400	-	1,400	Tuguegarao R.	Pump
(7) Lulutan Irrigation Project	2,950	-	2,950	Cagayan R.	Pump
(8) Ilagan Irrigation Project	3,140	60	3,200	Ilagan R.	Pump
(9) Gappal Irrigation Project	4,400	-	4,400	Cagayan R.	Pump
T o t a l	53,790	11,540	65,330		
2. Rehabilitation/Improvement Scheme					
(1) Dummun River Irrigation System	-	2,070	2,070	Dummun R.	Gravity
(2) Baggao Irrigation System	-	1,812	1,812	Pared & Paranan R.	Gravity
(3) Solana-Tuguegarao Irrigation System	-	3,143	3,143	Cagayan R.	Pump
(4) Pinacanauan Irrigation System	-	1,200	1,200	Tuguegarao R.	Gravity
(5) Tumauini Irrigation System	-	3,987	3,987	Pinacanauan R.	Gravity
T o t a l		12,212	12,212		

Table 6.2 Diversion Water Requirement (Chico-Mallig Irrigation Project)

Cropping Pattern-A

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	39.56	44	46.63	4.85	47.13	27.19	26.31	38.8	7.22	16.66	14.89	19.95
1964	39.83	39.36	43.29	4.78	41.89	34.66	32.42	12.65	7.5	4.38	.63	25.95
1965	35.7	44.23	46.39	4.74	38.35	39.29	20	30.84	7.2	8.63	.63	35.72
1966	39.81	42.64	41.63	4.43	28.66	35.34	30.14	17.57	9.79	4.38	.63	20.74
1967	38.9	45.21	46.96	2.47	42.24	21.3	53.58	13	8.33	4.38	.63	36.56
1968	39.34	45.43	46.23	3.99	43.26	28.55	29.02	10.36	7.01	13.54	14.44	37.85
1969	40.52	45.64	47.16	4.25	41.51	33.98	15.95	36.77	7.34	5.95	.63	30.74
1970	34.11	45.41	32.61	4.46	34.35	44.27	32.47	26.69	7.69	4.38	.63	21.93
1971	39.59	39.16	46.21	4.74	40.17	36.34	25.19	35.95	7.24	4.38	.63	20.74
1972	29.54	44.22	43.31	4.57	36.69	32.63	29.69	20.73	7.84	15.55	2.18	34.28
1973	38.43	44.68	44.57	4.06	39.65	32.63	47.45	18.8	8.7	4.38	.63	31.72
1974	40.06	45.41	47.34	4.23	40.67	35.57	51.54	27.89	7.2	4.38	.63	23.81
1975	40.52	45.64	45.82	4.06	36.91	35.57	55.64	18.97	8.74	4.38	8.39	24.51
1976	37.07	45.64	42.73	4.3	34.46	20.32	45.41	22.54	8.35	4.38	.63	32.11
1977	37.99	45.41	47.16	4.64	42.13	38.01	33.61	22.74	6.34	10.19	.63	35.99
1978	40.09	44.45	45.28	4.01	37.81	47.09	34.12	12.65	7.14	4.38	.63	27.86
1979	39.11	43.32	46.96	4.35	36.24	51.19	25.41	35.75	8.34	4.38	.63	30.48
1980	40.52	41.68	41.26	4.65	36.24	55.78	17.3	28.44	8.36	4.38	.63	28.56
1981	39.81	45.18	46.78	4.49	33.34	25.37	55.64	18.27	7.67	4.38	.63	36.62
1982	39.31	44.43	47.16	3.89	36.13	45.83	51.79	22.34	7.37	4.38	.63	26.6
1983	31.13	45.41	44.77	4.77	43.25	51.19	53.6	31.47	7.45	4.38	8.84	37.3
1984	40.52	45.64	46.41	3.56	34.01	31.49	34.64	8.25	10.52	4.38	5.72	27.61
AVERAGE	38.25	44.19	44.76	4.36	38.41	36.93	35.95	23.25	7.88	6.39	2.93	29.44

Cropping Pattern-B

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	38.61	45.57	23.7	.99	16.94	33.08	25.11	48.47	8.72	.94	12.01	17.67
1964	38.88	40.98	21.91	.96	15.17	39.59	31.2	15.96	10.38	.25	6.39	28.02
1965	34.77	45.79	23.54	.94	14.03	43.66	18.81	38.71	8.65	.49	9.48	39.4
1966	38.86	44.23	21.03	.83	11.46	40.18	28.93	22.18	17.49	.25	6.52	19.07
1967	37.95	46.76	23.86	.13	15.28	27.96	52.32	16.41	14.02	.25	9.37	40.37
1968	38.38	46.99	23.47	.66	15.63	34.27	27.81	13.08	7.54	.76	11.93	41.75
1969	39.56	47.19	23.97	.76	15.04	39	14.77	45.98	9.43	.34	8.53	33.78
1970	33.2	46.96	16.32	.84	12.92	48.06	31.25	33.58	11.22	.25	7.75	21.17
1971	38.63	40.78	23.45	.94	14.6	41.06	23.98	44.97	8.88	.25	6.39	19.07
1972	28.66	45.79	21.93	.88	13.53	37.82	28.48	26.18	11.9	.87	9.84	37.84
1973	37.48	46.24	22.59	.99	14.42	37.82	46.2	23.74	15.24	.25	6.39	34.92
1974	39.1	46.96	24.06	.78	14.78	40.38	50.29	35.06	8.65	.25	6.96	24.5
1975	39.56	47.19	22.19	.99	13.59	40.38	54.37	23.96	15.3	.25	10.91	25.73
1976	36.13	47.19	21.61	.76	12.95	34.07	44.17	28.46	14.1	.25	7.95	35.36
1977	37.05	46.96	23.97	.9	15.25	43.24	22.41	28.7	3.6	.58	9.14	39.78
1978	39.13	46.01	22.96	.67	13.93	50.55	32.9	15.96	8.25	.25	8.51	30.33
1979	38.16	44.9	23.86	.79	13.41	54.18	24.21	44.73	13.9	.25	8.33	33.42
1980	39.56	43.28	20.82	.91	13.41	58.24	16.12	35.75	13.98	.25	8.1	31.22
1981	38.86	46.73	23.77	.85	12.67	31.51	54.37	23.07	11.13	.25	7.95	40.38
1982	38.36	45.99	23.97	.63	13.38	49.44	50.54	28.22	9.59	.25	8.05	28.73
1983	30.23	46.96	22.7	.96	15.62	54.18	52.34	39.47	10.06	.25	11.02	41.17
1984	39.56	47.19	23.56	.51	12.84	36.83	33.42	10.41	18.9	.25	10.46	29.98
AVERAGE	37.3	45.76	22.69	.8	14.12	41.61	34.73	29.23	11.41	.36	8.73	31.53

Table 6.3 Diversion Water Requirement
(Matuno River Irrigation Project, Cropping Pattern-A)

Manamtam Intake

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.25	.93	1.51	.16	1.37	.77	.93	.62	.26	.15	.21	.74
1964	1.18	.95	1.4	.15	1.12	.98	.98	.97	.25	.15	.03	.72
1965	.53	1.28	1.47	.13	1.27	1.08	.91	1.21	.26	.41	.32	1.02
1966	1.23	1.21	1.44	.14	1.05	1.13	1.46	.82	.38	.41	.03	.73
1967	.71	1.27	1.35	.12	1.37	1.07	1.02	.8	.25	.15	.03	.93
1968	1.36	1.43	1.41	.07	1.24	.79	.98	.55	.27	.25	.39	1.29
1969	1.27	1.38	1.47	.16	1.21	1.61	1.59	1.23	.28	.2	.17	.78
1970	.46	1.4	1.14	.16	1.32	1.01	1.31	1.11	.26	.15	.03	.68
1971	.95	1.05	1.18	.17	.93	1.47	.74	1.08	.25	.15	.03	.83
1972	.72	1.38	1.53	.13	1.07	1.7	.95	.69	.3	.55	.03	1.33
1973	1.36	1.23	1.34	.17	1.21	1.03	1.64	.46	.28	.15	.03	1.29
1974	1	1.41	1.53	.14	1.52	.97	1.45	1.21	.26	.15	.03	.79
1975	.59	1.2	1.48	.17	1.28	1.64	1.41	1.34	.29	.15	.06	.73
1976	1.36	1.32	.98	.12	.89	1.01	1.33	.79	.24	.15	.18	1.07
1977	.95	1.3	1.51	.14	1.05	1.44	1	.79	.27	.37	.03	1.29
1978	1.35	1.26	1.49	.1	1.27	1.14	1.22	.77	.25	.15	.03	.99
1979	1.2	1.44	1.48	.1	1.08	.83	1.04	.96	.25	.15	.03	1.14
1980	1.36	1.26	.91	.13	1.09	1.98	.1	.97	.26	.15	.03	1.13
1981	1.26	1.22	1.61	.08	.93	.86	.68	.94	.25	.15	.03	1.28
1982	1.27	1.44	.84	.07	1.01	1.19	.98	.8	.26	.32	.09	1.16
1983	1.14	1.44	1.53	.17	1.43	1.71	1.58	1.11	.27	.15	.61	1.31
1984	1.31	1.42	1.07	.09	.99	1.18	.91	.82	.34	.15	.55	1.11
AVERAGE	1.08	1.28	1.36	.13	1.17	1.21	1.14	.91	.27	.22	.14	1.02

Bayombong Intake

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	13.24	9.9	15.92	1.62	14.5	8.12	9.87	6.58	2.74	1.62	2.27	7.8
1964	12.46	10.85	14.82	1.59	11.87	10.4	10.35	10.24	2.64	1.62	.32	7.62
1965	5.63	13.55	15.51	1.35	13.44	11.47	9.7	12.86	2.74	4.32	3.41	10.85
1966	13.08	12.79	15.17	1.48	11.11	11.96	15.43	8.73	4.02	4.41	.32	7.77
1967	7.52	13.46	16.34	1.27	14.5	11.38	10.84	8.48	2.69	1.62	.32	9.89
1968	14.44	15.11	14.89	.73	13.2	8.36	10.35	5.82	2.88	2.61	4.15	13.71
1969	13.49	14.58	15.51	1.62	12.84	17.08	16.87	13.03	3	2.12	1.79	8.3
1970	4.84	14.85	12.05	1.62	14	10.73	13.85	11.71	2.72	1.62	.32	7.23
1971	10.03	11.15	12.44	1.74	9.9	15.64	7.84	11.43	2.62	1.62	.32	8.8
1972	7.59	14.59	16.2	1.36	11.31	17.99	10.11	7.34	3.17	5.88	.32	14.14
1973	14.36	13.02	14.13	1.75	12.8	10.89	17.32	4.87	2.94	1.62	.32	13.71
1974	10.61	14.93	16.2	1.44	16.16	10.24	15.34	12.86	2.79	1.62	.32	8.41
1975	6.21	12.68	15.65	1.73	13.64	17.42	14.97	14.14	3.04	1.62	.65	7.77
1976	14.44	13.97	10.34	1.27	9.46	10.73	14.06	8.35	2.56	1.62	1.87	11.34
1977	10.12	13.73	15.93	1.46	11.15	13.3	10.6	8.35	2.8	3.91	.32	13.63
1978	14.26	13.29	15.72	1.08	13.44	12.12	12.95	8.16	2.64	1.62	.32	10.54
1979	12.72	15.2	15.37	1.08	11.51	8.77	11.08	10.18	2.67	1.62	.32	12.11
1980	14.44	13.38	9.62	1.33	11.55	21.02	10.6	10.25	2.73	1.62	.32	12.03
1981	13.32	12.93	17.03	.79	9.9	9.1	7.19	10	2.64	1.62	.32	13.56
1982	13.41	15.2	8.95	.75	10.67	12.61	10.44	8.48	2.75	3.42	.97	12.28
1983	12.13	15.2	16.2	1.7	15.23	18.17	16.77	11.74	2.82	1.62	6.46	13.87
1984	13.91	15.04	11.38	.96	10.47	12.53	9.7	8.67	3.54	1.62	5.68	11.81
AVERAGE	11.47	13.57	14.34	1.35	12.39	12.82	12.1	9.65	2.87	2.32	1.44	10.78

Table 6.4 Diversion Water Requirement
(Matuno River Irrigation Project, Cropping Pattern-B)

Manamtan Intake

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.21	.98	.78	.04	.51	.96	.89	.78	.39	.01	.36	.71
1964	1.14	1	.72	.04	.44	1.18	.93	1.21	.34	.01	.22	.69
1965	.5	1.33	.76	.03	.48	1.24	.87	1.52	.4	.03	.38	1.13
1966	1.2	1.26	.74	.03	.42	1.28	1.41	1.04	.72	.03	.24	.71
1967	.67	1.32	.8	.02	.51	1.23	.98	1.01	.37	.01	.29	1.03
1968	1.32	1.47	.73	0	.47	.98	.93	.69	.45	.02	.39	1.43
1969	1.23	1.42	.76	.04	.46	1.71	1.55	1.54	.5	.02	.35	.8
1970	.42	1.45	.58	.04	.49	1.18	1.26	1.38	.38	.01	.27	.62
1971	.91	1.1	.6	.05	.39	1.58	.7	1.35	.33	.01	.27	.88
1972	.68	1.42	.8	.09	.42	1.78	.91	.87	.56	.04	.32	1.48
1973	1.32	1.28	.69	.05	.46	1.19	1.59	.58	.48	.01	.28	1.43
1974	.96	1.46	.8	.03	.57	1.14	1.4	1.52	.42	.01	.29	.82
1975	.55	1.25	.77	.04	.48	1.73	1.37	1.67	.51	.01	.33	.71
1976	1.32	1.37	.49	.02	.38	1.18	1.28	.99	.3	.01	.35	1.18
1977	.92	1.34	.78	.03	.42	1.56	.96	.99	.42	.03	.28	1.43
1978	1.31	1.3	.77	.02	.48	1.29	1.18	.97	.34	.01	.32	1.09
1979	1.16	1.48	.75	.02	.43	1.02	1	1.21	.36	.01	.29	1.27
1980	1.32	1.31	.46	.03	.43	2.04	.96	1.21	.39	.01	.27	1.26
1981	1.22	1.27	.84	0	.39	1.04	.64	1.19	.34	.01	.3	1.42
1982	1.23	1.48	.42	0	.41	1.33	.94	1.01	.4	.02	.33	1.28
1983	1.11	1.48	.8	.04	.53	1.8	1.54	1.39	.43	.01	.43	1.45
1984	1.27	1.47	.55	.01	.4	1.32	.87	1.03	.63	.01	.42	1.24
AVERAGE	1.04	1.33	.7	.03	.45	1.35	1.1	1.14	.43	.02	.32	1.09

Bayombong Intake

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	12.83	10.44	8.21	.37	5.39	10.23	9.41	8.31	4.17	.12	3.81	7.58
1964	12.06	10.6	7.61	.35	4.64	12.22	9.9	12.87	3.58	.12	2.38	7.26
1965	5.28	14.05	7.98	.25	5.04	13.14	9.25	16.07	4.2	.31	4.02	12
1966	12.67	13.29	7.8	.31	4.44	13.57	14.97	11.03	7.61	.32	2.59	7.52
1967	7.15	13.96	8.44	.22	5.39	13.07	10.38	10.71	3.92	.12	3.13	10.88
1968	14.03	15.59	7.65	.02	4.98	10.44	9.9	7.35	4.79	.19	4.16	15.21
1969	13.08	15.07	7.98	.37	4.88	18.09	16.4	16.28	5.29	.16	3.74	8.46
1970	4.49	15.38	6.11	.37	5.21	12.5	13.38	14.68	4.06	.12	2.85	6.57
1971	9.65	11.68	6.32	.42	4.13	16.8	7.39	14.32	3.46	.12	2.85	9.35
1972	7.23	15.07	8.36	.26	4.49	18.9	9.65	9.27	5.55	.42	3.41	15.71
1973	13.94	13.52	7.29	.43	4.87	12.64	16.85	6.15	5.04	.12	2.97	15.21
1974	10.22	15.42	8.36	.29	5.98	12.07	14.87	16.07	4.42	.12	3.03	8.65
1975	5.86	13.19	8.06	.42	5.09	18.35	14.5	17.64	5.41	.12	3.53	7.52
1976	14.03	14.46	5.2	.23	4.02	12.3	13.59	10.55	3.15	.12	3.76	12.54
1977	9.73	14.23	8.22	.3	4.45	16.51	10.14	10.55	4.45	.29	2.98	15.13
1978	13.85	13.8	8.1	.15	5.04	13.71	12.49	10.31	3.58	.12	3.45	11.6
1979	12.32	15.68	7.91	.15	4.54	10.8	10.63	12.79	3.78	.12	3.08	13.46
1980	14.03	13.88	4.83	.24	4.55	21.58	10.14	12.88	4.15	.12	2.9	13.98
1981	12.92	13.44	8.82	.02	4.13	11.08	6.74	12.58	3.58	.12	3.2	15.06
1982	13	15.48	4.47	.02	4.38	14.13	9.98	10.71	4.23	.25	3.55	13.62
1983	11.73	15.68	8.36	.41	5.64	19.05	16.8	14.68	4.51	.12	4.58	15.41
1984	13.5	15.52	5.75	.11	4.27	14.06	9.25	10.95	6.66	.12	4.48	13.11
AVERAGE	11.07	14.07	7.35	.24	4.8	14.34	11.64	12.12	4.55	.17	3.38	11.6

Table 6.5 Diversion Water Requirement
(Dabubu River Irrigation Project)

Cropping Pattern-A

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	.77	.51	1.1	.16	.86	.24	.38	.18	.19	.12	.04	.49
1964	.69	.51	.97	.16	.71	.38	.41	.37	.16	.12	.04	.48
1965	.84	1.02	1.22	.15	.9	.45	.4	.56	.21	.12	.04	.63
1966	.84	.99	1.19	.15	.69	.45	.7	.72	.28	.12	.04	.43
1967	.63	.83	1.12	.1	.96	.43	.49	.48	.19	.12	.04	.72
1968	.8	.94	1.18	.12	.93	.31	.68	.23	.19	.16	.04	.63
1969	.75	1.02	.99	.16	.81	.74	1.32	.29	.2	.12	.04	.46
1970	.49	.78	1.06	.1	1.06	.5	.92	.33	.19	.12	.04	.44
1971	.4	.77	.48	.18	.72	.33	.38	.29	.18	.12	.04	.42
1972	.35	.97	1.14	.04	.66	.62	.81	.62	.24	.23	.04	.78
1973	.82	1	1.13	.18	.9	.24	.65	.33	.22	.12	.04	.57
1974	.67	.93	1.22	.17	.8	.44	.92	.59	.19	.12	.04	.45
1975	.54	1.01	1.19	.16	.78	.59	.75	.75	.22	.12	.2	.47
1976	.47	.93	1.04	.12	.69	.44	.89	.33	.19	.12	.04	.49
1977	.49	.91	1.18	.17	.74	1.05	.98	.65	.19	.3	.04	.84
1978	.86	1	1.22	.17	.79	1.07	1.07	.29	.18	.12	.04	.58
1979	.86	.98	1.15	.11	.68	.44	.23	.39	.18	.12	.04	.79
1980	.69	.95	1.07	.14	.84	1.21	.59	.96	.23	.12	.04	.53
1981	.66	1.02	1.2	.17	.9	.41	.52	.34	.19	.12	.04	.71
1982	.77	.99	1.19	.12	.84	.62	1.25	.37	.19	.12	.04	.59
1983	.43	.97	1.17	.15	.8	.91	1.18	.63	.22	.12	.04	.84
1984	.69	.97	.72	.08	.68	.43	.44	.34	.31	.12	.36	.56
AVERAGE	.66	.91	1.09	.14	.81	.56	.73	.46	.21	.13	.06	.59

Cropping Pattern-B

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	.73	.53	.71	.1	.39	.42	.36	.23	.21	.04	.22	.44
1964	.65	.54	.61	.1	.35	.55	.4	.47	.17	.04	.15	.42
1965	.8	1.04	.8	.09	.41	.61	.38	.69	.27	.04	.2	.67
1966	.8	1.01	.78	.09	.34	.61	.69	.87	.41	.04	.16	.34
1967	.59	.85	.72	.05	.45	.59	.47	.6	.24	.04	.21	.78
1968	.77	.96	.77	.07	.43	.49	.66	.28	.21	.05	.22	.67
1969	.72	1.04	.63	.1	.37	.86	1.3	.37	.26	.04	.18	.38
1970	.46	.81	.68	.05	.51	.65	.91	.41	.22	.04	.18	.36
1971	.36	.8	.25	.12	.35	.5	.36	.36	.17	.04	.15	.33
1972	.31	.99	.74	.01	.33	.76	.79	.75	.34	.07	.19	.84
1973	.78	1.02	.73	.12	.41	.43	.63	.41	.31	.04	.15	.58
1974	.64	.96	.8	.11	.37	.6	.91	.72	.24	.04	.17	.36
1975	.5	1.03	.78	.1	.36	.73	.73	.9	.31	.04	.28	.4
1976	.43	.96	.66	.06	.34	.6	.87	.42	.22	.04	.16	.45
1977	.45	.93	.77	.11	.35	1.15	.96	.78	.2	.09	.19	.91
1978	.83	1.02	.8	.11	.36	1.16	1.05	.36	.19	.04	.19	.59
1979	.83	1	.74	.06	.34	.6	.21	.5	.18	.04	.21	.85
1980	.65	.97	.69	.08	.38	1.31	.57	1.14	.32	.04	.18	.51
1981	.62	1.04	.78	.11	.41	.57	.5	.42	.24	.04	.19	.77
1982	.74	1.02	.78	.07	.38	.76	1.23	.47	.21	.04	.2	.62
1983	.39	.99	.76	.09	.37	1.02	1.16	.76	.3	.04	.22	.9
1984	.65	.99	.43	.03	.34	.59	.42	.42	.45	.04	.35	.57
AVERAGE	.62	.93	.7	.08	.38	.71	.71	.56	.26	.04	.2	.58

Table 6.6 Diversion Water Requirement
(Zinundungan Irrigation Extension Project)

Cropping Pattern-A

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	2.07	2.05	2.54	.28	2.26	1.06	1.39	1.73	.45	.68	.84	1.09
1964	2.09	2.38	2.02	.28	2.19	1.44	2.25	.86	.39	.24	.04	1.26
1965	1.86	2.3	2.53	.2	1.65	1.49	1.09	1.3	.39	.61	.09	1.8
1966	2.16	2.41	2.45	.13	1.53	1.93	1.47	1.06	.48	.24	.04	1.34
1967	2.08	2.43	2.53	.17	2.1	1.14	1.9	.92	.4	.24	.04	1.77
1968	1.91	2.41	2.56	.23	2.1	1.76	2.22	.54	.39	.68	.9	2.03
1969	2.09	2.47	2.57	.27	2.12	1.93	.82	2.25	.39	.24	.04	1.56
1970	1.76	2.44	2.35	.26	1.63	2.4	2.39	.96	.41	.24	.04	1.27
1971	1.87	2.04	2.35	.29	2.07	1.49	1.42	1.85	.4	.24	.04	1.16
1972	1.72	2.42	2.24	.23	1.75	2.16	1.35	1	.49	.88	.11	1.78
1973	1.94	2.38	2.41	.29	2.3	1.22	1.82	.78	.4	.24	.04	1.57
1974	2	2.43	2.58	.22	1.73	2.37	2.92	1.06	.39	.24	.04	1.18
1975	1.81	2.46	2.44	.26	1.7	1.3	1.95	.87	.55	.24	.56	1.82
1976	1.75	2.46	2.16	.28	1.72	1.37	1.57	1.04	.46	.24	.04	1.59
1977	1.82	2.35	2.45	.28	2.09	1.41	1.46	1.1	.38	.94	.04	1.94
1978	2.07	2.44	2.41	.26	1.87	1.93	1.51	.61	.39	.24	.26	1.46
1979	2.15	2.2	2.57	.25	1.9	2.75	1.42	2.18	.42	.24	.04	1.43
1980	1.96	2.39	2.33	.27	1.65	2.37	1.31	1.45	.44	.24	.04	1.57
1981	1.99	2.43	2.47	.26	1.75	1.2	1.85	1.06	.41	.24	.04	1.96
1982	2.06	2.39	2.58	.18	1.66	1.71	2.04	1.18	.4	.24	.04	1.35
1983	1.68	2.47	2.35	.29	2.33	2.26	1.97	1.17	.4	.24	.29	1.06
1984	2.09	2.44	2.49	.15	1.68	1.18	1.92	.72	.58	.24	.04	1.52
AVERAGE	1.95	2.37	2.43	.24	1.9	1.72	1.73	1.17	.43	.36	.17	1.5

Cropping Pattern-B

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	2.02	2.13	1.36	.09	.86	1.41	1.33	2.16	.75	.07	.67	.98
1964	2.04	2.46	1.06	.09	.82	1.74	2.18	1.08	.46	.02	.34	1.29
1965	1.81	2.38	1.35	.04	.66	1.79	1.02	1.64	.46	.06	.52	1.98
1966	2.11	2.49	1.31	.01	.63	2.17	1.41	1.33	.81	.02	.36	1.43
1967	2.03	2.51	1.35	.03	.79	1.48	1.83	1.16	.52	.02	.48	1.95
1968	1.86	2.49	1.37	.06	.75	2.02	2.16	.68	.45	.07	.68	2.23
1969	2.04	2.55	1.38	.08	.6	2.17	.76	2.78	.48	.02	.48	1.7
1970	1.71	2.53	1.24	.08	.66	2.59	2.33	1.21	.59	.02	.41	1.31
1971	1.83	2.12	1.24	.09	.78	1.79	1.36	2.3	.53	.02	.37	1.12
1972	1.67	2.5	1.18	.06	.69	2.37	1.29	1.27	.84	.09	.52	1.95
1973	1.89	2.46	1.28	.09	.87	1.55	1.76	.98	.56	.02	.36	1.72
1974	1.95	2.51	1.38	.05	.68	2.56	2.86	1.33	.48	.02	.39	1.15
1975	1.76	2.54	1.3	.07	.67	1.62	1.89	1.09	.95	.02	.61	1.4
1976	1.7	2.54	1.14	.09	.68	1.68	1.51	1.31	.76	.02	.42	1.74
1977	1.78	2.43	1.31	.09	.78	1.72	1.4	1.39	.42	.09	.49	2.14
1978	2.02	2.53	1.28	.08	.72	2.17	1.44	.77	.45	.02	.55	1.59
1979	2.1	2.28	1.38	.07	.72	2.9	1.36	2.7	.68	.02	.44	1.56
1980	1.92	2.47	1.23	.08	.66	2.56	1.24	1.82	.68	.02	.44	1.72
1981	1.94	2.51	1.32	.07	.69	1.53	1.79	1.33	.57	.02	.49	2.16
1982	2.01	2.47	1.39	.04	.66	1.97	1.97	1.49	.5	.02	.44	1.45
1983	1.58	2.55	1.24	.09	.67	2.46	1.9	1.48	.53	.02	.56	.94
1984	2.04	2.52	1.33	.02	.67	1.51	1.86	.91	1.01	.02	.49	1.66
AVERAGE	1.9	2.45	1.29	.07	.73	1.99	1.67	1.47	.61	.03	.47	1.6

Table 6.7 Diversion Water Requirement
(Alcala-Amulung West Irrigation Project)

Cropping Pattern-A

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	6.72	8.07	8.96	1.43	7.85	3.84	3.69	7.01	1.27	3.01	2.87	3.36
1964	6.81	6.94	8.09	1.4	6.68	4.87	4.72	1.8	1.31	.79	.27	4.19
1965	5.85	8.13	8.86	1.38	5.96	5.76	2.82	5.06	1.27	1.57	.27	6.07
1966	6.79	7.77	7.67	1.25	4.55	4.96	4.21	2.47	2.07	.79	.27	3.47
1967	8.59	8.4	9.02	.44	6.75	3.03	9.37	1.85	1.62	.79	.27	6.26
1968	6.67	8.45	8.84	1.06	6.99	4.03	4.06	1.49	1.24	2.45	2.79	6.56
1969	6.97	8.48	9.08	1.17	6.6	4.78	2.27	6.52	1.29	1.08	.27	4.97
1970	5.49	8.43	5.49	1.26	5.83	6.79	4.77	4.13	1.38	.79	.27	3.63
1971	6.74	6.91	8.82	1.38	6.82	5.17	3.53	6.31	1.28	.79	.27	3.47
1972	4.45	8.12	8.11	1.31	5.65	4.59	4.15	2.91	1.44	2.81	.54	5.75
1973	6.47	8.23	8.42	1.44	6.19	4.59	7.96	2.64	1.7	.79	.27	5.17
1974	6.87	8.43	9.12	1.16	6.44	5	8.91	4.4	1.27	.79	.27	3.89
1975	6.97	8.48	8.22	1.44	5.68	5	9.85	2.67	1.75	.79	1.66	3.99
1976	6.16	8.48	7.95	1.19	5.34	4	7.5	3.2	1.62	.79	.27	5.3
1977	6.38	8.43	9.08	1.34	6.74	5.67	3.82	3.25	1.15	1.85	.27	6.13
1978	6.89	8.18	8.58	1.07	5.82	7.43	5.05	1.8	1.26	.79	.27	4.48
1979	6.62	7.92	9.02	1.21	5.59	8.37	9.56	6.26	1.65	.79	.27	4.92
1980	6.97	7.51	7.57	1.25	5.59	9.39	2.45	4.5	1.66	.79	.27	4.59
1981	6.79	8.37	8.98	1.28	5.19	3.6	9.85	2.57	1.37	.79	.27	6.28
1982	6.65	8.15	9.08	1.02	5.58	7.16	8.96	3.16	1.29	.79	.27	4.29
1983	4.8	8.43	8.47	1.4	6.98	8.37	9.39	5.22	1.3	.79	1.75	6.44
1984	6.97	8.48	8.88	.88	5.28	4.44	5.18	1.2	2.28	.79	1.18	4.44
AVERAGE	6.44	8.13	8.47	1.22	6.05	5.49	5.71	3.65	1.48	1.16	.68	4.89

Cropping Pattern-B

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	6.59	8.29	5.81	.9	3.7	4.65	3.52	8.34	1.48	.85	2.48	3.05
1964	6.68	7.17	5.16	.87	3.01	5.55	4.56	2.25	1.71	.23	1.06	4.48
1965	5.72	8.34	5.73	.86	2.62	6.36	2.66	6.14	1.47	.45	1.48	6.58
1966	6.66	7.98	4.84	.76	2.18	5.63	4.05	3.11	3.12	.23	1.07	3.24
1967	6.46	8.61	5.85	.12	3.06	3.95	9.19	2.32	2.4	.23	1.47	6.79
1968	6.54	8.66	5.72	.6	3.19	4.82	3.89	1.86	1.32	.7	2.44	7.09
1969	6.84	8.69	5.9	.7	2.97	5.47	2.1	7.78	1.58	.31	1.35	5.39
1970	5.37	8.64	3.26	.76	2.39	7.31	4.6	5.07	1.86	.23	1.24	3.03
1971	6.61	7.14	5.7	.86	2.81	5.82	3.37	7.55	1.5	.23	1.06	3.24
1972	4.32	8.33	5.17	.8	2.47	5.3	3.99	3.66	1.99	.8	1.6	6.24
1973	6.34	8.44	5.4	.91	2.73	5.3	7.79	3.32	2.6	.23	1.06	5.61
1974	6.73	8.64	5.93	.69	2.88	5.66	8.73	5.39	1.47	.23	1.14	3.99
1975	6.84	8.69	5.25	.91	2.48	5.66	9.68	3.35	2.66	.23	2	4.15
1976	6.03	8.69	5.05	.71	2.39	4.79	7.33	4.02	2.41	.23	1.27	5.74
1977	6.25	8.64	5.9	.82	3.04	6.28	3.15	4.07	.77	.53	1.44	6.65
1978	6.76	8.39	5.52	.61	2.52	7.91	4.88	2.25	1.41	.23	1.35	4.82
1979	6.49	8.14	5.85	.72	2.46	8.78	3.4	7.5	2.41	.23	1.32	5.33
1980	6.84	7.73	4.76	.83	2.46	9.73	2.29	5.51	2.43	.23	1.29	4.95
1981	6.66	8.59	5.82	.78	2.35	4.44	9.68	3.23	1.84	.23	1.27	6.79
1982	6.52	8.37	5.9	.57	2.45	7.66	8.79	3.96	1.6	.23	1.29	4.58
1983	4.68	8.64	5.44	.87	3.18	8.78	9.22	6.32	1.66	.23	2.05	6.97
1984	6.84	8.69	5.74	.46	2.37	5.17	5.01	1.49	3.43	.23	1.83	4.77
AVERAGE	6.31	8.34	5.44	.73	2.71	6.14	5.54	4.48	1.96	.33	1.48	5.18

Table 6.8 Diversion Water Requirement
(Tuguegarao Irrigation Project)

Cropping Pattern-A

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	.94	1.32	1.58	.39	1.04	.29	.27	1.11	.19	.48	.51	.46
1964	.96	1.05	1.36	.30	.8	.36	.41	.14	.2	.13	.09	.52
1965	.75	1.33	1.55	.38	.65	.52	.21	.65	.19	.25	.09	.85
1966	.96	1.25	1.26	.33	.55	.37	.3	.19	.42	.13	.09	.47
1967	.91	1.4	1.59	.07	.81	.24	1.39	.15	.29	.13	.09	.89
1968	.93	1.41	1.55	.27	.86	.31	.29	.12	.19	.39	.5	.96
1969	1	1.41	1.61	.31	.78	.35	.18	1	.19	.18	.09	.61
1970	.67	1.4	.75	.34	.58	.72	.43	.45	.22	.13	.09	.48
1971	.95	1.05	1.54	.38	.72	.41	.26	.95	.19	.13	.09	.47
1972	.44	1.32	1.37	.35	.61	.34	.3	.21	.24	.45	.13	.78
1973	.88	1.35	1.44	.4	.69	.34	1.08	.2	.31	.13	.09	.65
1974	.98	1.4	1.62	.31	.75	.37	1.29	.51	.19	.13	.09	.49
1975	1	1.41	1.39	.4	.61	.37	1.5	.2	.33	.13	.31	.5
1976	.82	1.41	1.33	.31	.58	.3	.98	.25	.29	.13	.09	.69
1977	.87	1.4	1.61	.36	.01	.5	.25	.26	.19	.3	.09	.86
1978	.99	1.34	1.48	.27	.62	.86	.47	.14	.19	.13	.09	.55
1979	.92	1.20	1.59	.32	.6	1.06	.26	.94	.31	.13	.09	.61
1980	1	1.18	1.23	.37	.6	1.28	.19	.53	.31	.13	.09	.56
1981	.96	1.39	1.58	.34	.57	.28	1.5	.19	.21	.13	.09	.89
1982	.92	1.33	1.61	.26	.6	.8	1.3	.24	.2	.13	.09	.53
1983	.52	1.4	1.46	.38	.86	1.06	1.4	.69	.2	.13	.32	.93
1984	1	1.41	1.55	.21	.38	.33	.5	.1	.48	.13	.23	.54
AVERAGE	.88	1.33	1.46	.32	.69	.52	.67	.42	.25	.19	.15	.65

Cropping Pattern-B

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	.93	1.33	1.37	.36	.77	.33	.26	1.2	.21	.34	.49	.44
1964	.96	1.06	1.17	.35	.56	.4	.4	.17	.22	.09	.14	.53
1965	.74	1.34	1.34	.34	.44	.35	.2	.72	.21	.18	.17	.88
1966	.95	1.26	1.07	.3	.38	.41	.29	.23	.49	.09	.14	.45
1967	.9	1.41	1.38	.05	.57	.3	1.38	.18	.34	.09	.17	.93
1968	.92	1.42	1.34	.24	.61	.36	.28	.15	.2	.28	.47	.99
1969	.99	1.43	1.4	.28	.54	.4	.17	1.08	.21	.13	.16	.64
1970	.66	1.42	.61	.3	.39	.75	.42	.51	.25	.09	.15	.47
1971	.94	1.06	1.34	.34	.5	.45	.25	1.03	.21	.09	.14	.45
1972	.43	1.34	1.18	.32	.4	.39	.29	.26	.27	.32	.2	.81
1973	.88	1.36	1.25	.36	.47	.39	1.07	.24	.37	.09	.14	.68
1974	.97	1.42	1.41	.27	.52	.41	1.28	.57	.21	.09	.14	.5
1975	.99	1.43	1.2	.36	.4	.41	1.49	.24	.39	.09	.33	.51
1976	.81	1.43	1.14	.28	.39	.35	.97	.3	.35	.09	.15	.72
1977	.86	1.42	1.4	.33	.57	.54	.24	.91	.16	.21	.16	.89
1978	.98	1.35	1.28	.24	.41	.89	.46	.17	.2	.09	.16	.57
1979	.91	1.3	1.38	.29	.4	1.09	.25	1.02	.36	.09	.16	.63
1980	.99	1.2	1.05	.33	.4	1.31	.18	.59	.36	.09	.15	.58
1981	.95	1.4	1.37	.31	.39	.33	1.49	.24	.24	.09	.15	.93
1982	.91	1.34	1.4	.23	.4	.84	1.29	.29	.22	.09	.15	.55
1983	.51	1.42	1.26	.35	.61	1.09	1.39	.76	.22	.09	.34	.96
1984	.99	1.43	1.35	.19	.39	.38	.49	.12	.55	.09	.27	.56
AVERAGE	.87	1.34	1.26	.29	.48	.56	.66	.47	.28	.13	.21	.67

Table 6.9 Diversion Water Requirement (Lulutan Irrigation Project)

Cropping Pattern-A

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	2.88	2.05	3.66	.38	3.36	.97	1.63	.76	.65	.41	.08	1.79
1964	2.66	2.07	3.33	.37	2.75	1.59	1.76	1.59	.62	.41	.08	1.74
1965	3.11	3.49	3.99	.36	3.47	1.92	1.69	2.2	.7	.41	.08	2.38
1966	3.11	3.39	3.92	.37	2.63	1.88	2.85	2.64	.87	.41	.08	1.53
1967	2.49	2.96	3.71	.27	3.66	1.82	2.09	1.97	.68	.41	.08	2.73
1968	2.99	3.26	3.89	.31	3.56	1.3	2.78	.95	.65	.55	.08	2.38
1969	2.85	3.49	3.99	.38	3.18	3.05	4.58	1.25	.69	.41	.08	1.65
1970	2.07	2.83	3.56	.27	3.96	2.12	3.49	1.39	.66	.41	.08	1.58
1971	1.68	2.79	1.96	.42	2.76	1.36	1.63	1.22	.62	.41	.08	1.46
1972	1.46	3.34	3.77	.16	2.5	2.66	3.15	2.35	.76	.77	.08	2.9
1973	3.03	3.42	3.74	.42	3.5	.99	2.68	1.39	.74	.41	.08	2.13
1974	2.62	3.23	3.99	.4	3.12	1.86	3.49	2.27	.67	.41	.08	1.6
1975	2.21	3.46	3.92	.38	3.05	2.51	2.97	2.71	.74	.41	.62	1.68
1976	1.98	3.23	3.51	.31	2.64	1.84	3.38	1.42	.66	.41	.08	1.6
1977	2.06	3.17	3.89	.4	2.89	4	3.64	2.44	.64	1.01	.08	3.07
1978	3.18	3.42	3.99	.41	3.07	4.1	3.91	1.22	.63	.41	.08	2.17
1979	3.18	3.36	3.79	.29	2.61	1.86	.97	1.69	.63	.41	.08	2.92
1980	2.68	3.29	3.58	.35	3.31	4.46	2.51	3.29	.75	.41	.08	1.96
1981	2.56	3.49	3.94	.4	3.5	1.73	2.21	1.44	.67	.41	.08	2.7
1982	2.93	3.41	3.91	.32	3.3	2.66	4.42	1.6	.65	.41	.09	2.24
1983	1.81	3.34	3.84	.36	3.11	3.55	4.19	2.87	.73	.41	.08	3.07
1984	2.66	3.34	2.66	.22	2.61	1.82	1.86	1.44	.92	.41	1.15	2.11
AVERAGE	2.55	3.17	3.63	.34	3.12	2.28	2.81	1.8	.7	.46	.15	2.16

Cropping Pattern-B

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	2.73	2.17	1.95	.12	1.3	1.79	1.55	.95	.74	.04	.87	1.58
1964	2.5	2.19	1.76	.11	1.14	2.33	1.69	2	.58	.04	.57	1.49
1965	2.98	3.59	2.15	.1	1.34	2.62	1.61	2.76	1	.04	.77	2.55
1966	2.95	3.5	2.11	.11	1.1	2.58	2.76	3.29	1.43	.04	.58	1.13
1967	2.33	3.07	1.99	.06	1.41	2.53	2.01	2.47	.89	.04	.83	2.98
1968	2.93	3.36	2.09	.08	1.38	2.07	2.7	1.2	.73	.06	.87	2.54
1969	2.7	3.59	1.79	.12	1.25	3.61	4.5	1.58	.94	.04	.69	1.32
1970	1.92	2.94	1.9	.06	1.54	2.79	3.41	1.75	.78	.04	.7	1.2
1971	1.54	2.9	.98	.14	1.14	2.12	1.55	1.54	.56	.04	.57	1.07
1972	1.31	3.45	2.02	.01	1.07	3.26	3.07	2.94	1.21	.08	.73	3.16
1973	2.87	3.53	2	.14	1.35	1.8	2.6	1.75	1.12	.04	.57	2.16
1974	2.46	3.34	2.15	.12	1.23	2.57	3.41	2.83	.86	.04	.64	1.23
1975	2.06	3.57	2.11	.11	1.21	3.12	2.89	3.37	1.13	.04	.97	1.38
1976	1.83	3.34	1.87	.07	1.11	2.55	3.3	1.79	.81	.04	.58	1.59
1977	1.9	3.28	2.09	.12	1.17	4.45	3.56	3.04	.7	.11	.72	3.36
1978	3.02	3.53	2.15	.13	1.22	4.54	3.83	1.54	.64	.04	.72	2.24
1979	3.02	3.47	2.03	.07	1.1	2.57	.89	2.14	.63	.04	.8	3.19
1980	2.52	3.4	1.91	.1	1.28	4.67	2.43	4.06	1.16	.04	.67	1.86
1981	2.41	3.59	2.12	.12	1.35	2.45	2.13	1.81	.89	.04	.72	2.94
1982	2.77	3.51	2.1	.08	1.28	3.26	4.34	2.02	.76	.04	.79	2.36
1983	1.66	3.45	2.06	.1	1.29	4.05	4.1	2.96	1.1	.04	.85	3.36
1984	2.5	3.45	1.37	.04	1.1	2.53	1.78	1.81	1.55	.04	1.09	2.13
AVERAGE	2.4	3.28	1.94	.1	1.24	2.93	2.73	2.26	.92	.05	.74	2.13

Table 6.10 Diversion Water Requirement (Ilagan Irrigation Project)

Cropping Pattern-A

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.24	.52	2.67	.67	1.15	.22	.22	.13	.39	.27	.23	.9
1964	.94	.54	2.17	.66	1.02	.27	.23	.2	.39	.27	.23	.9
1965	1.45	2.29	3.15	.6	1.24	.29	.22	.73	.45	.27	.23	.98
1966	1.45	2.23	3.03	.62	1.01	.29	.72	1.27	.82	.27	.23	.88
1967	.74	1.63	2.75	.35	1.43	.29	.26	.48	.39	.27	.23	1.14
1968	1.33	2.05	3	.45	1.34	.24	.67	.14	.39	.37	.23	.97
1969	1.16	2.29	2.25	.67	1.06	.62	2.83	.17	.42	.27	.23	.89
1970	.34	1.48	2.55	.36	1.77	.31	1.44	.18	.39	.27	.23	.89
1971	.26	1.45	.43	.79	1.02	.25	.22	.17	.39	.27	.23	.88
1972	.24	2.16	2.84	.06	1	.36	1.06	.9	.63	.51	.23	1.31
1973	1.38	2.23	2.81	.79	1.25	.22	.54	.18	.54	.27	.23	.93
1974	.89	2.03	3.15	.72	1.05	.29	1.44	.82	.39	.27	.23	.89
1975	.45	2.27	3.03	.66	1.04	.34	.87	1.39	.55	.27	.57	.89
1976	.3	2.03	2.44	.44	1.01	.29	1.34	.18	.39	.27	.23	.9
1977	.33	1.95	3.01	.71	1.03	1.59	1.62	1.02	.39	.67	.23	1.52
1978	1.52	2.23	3.15	.75	1.04	1.51	1.96	.17	.39	.27	.23	.93
1979	1.52	2.18	2.86	.41	1	.29	.16	.21	.39	.27	.23	1.33
1980	.94	2.07	2.57	.58	1.07	2.14	.35	2.21	.58	.27	.23	.92
1981	.06	2.29	3.05	.71	1.25	.28	.27	.18	.39	.27	.23	1.11
1982	1.2	2.23	3.03	.47	1.07	.36	2.58	.2	.39	.27	.23	.94
1983	.27	2.16	2.95	.6	1.05	1.15	2.34	.99	.51	.27	.23	1.51
1984	.94	2.16	1.28	.22	1	.29	.24	.18	.94	.27	.96	.93
AVERAGE	.9	1.93	2.64	.56	1.13	.54	.98	.55	.48	.3	.27	1.02

Cropping Pattern-B

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.22	.53	2.53	.65	.98	.28	.21	.14	.4	.24	.29	.88
1964	.92	.55	2.04	.63	.88	.33	.22	.23	.39	.24	.27	.88
1965	1.43	2.3	3	.57	1.06	.35	.22	.78	.47	.24	.28	.99
1966	1.43	2.24	2.88	.6	.88	.35	.71	1.32	.87	.24	.27	.85
1967	.72	1.64	2.61	.34	1.24	.34	.25	.52	.41	.24	.29	1.16
1968	1.32	2.06	2.85	.43	1.16	.31	.66	.17	.4	.33	.29	.99
1969	1.14	2.3	2.12	.65	.89	.66	2.82	.2	.44	.24	.28	.86
1970	.33	1.49	2.42	.34	1.57	.37	1.44	.21	.4	.24	.28	.85
1971	.25	1.46	.33	.77	.88	.31	.21	.19	.38	.24	.27	.84
1972	.23	2.17	2.69	.05	.88	.41	1.05	.95	.66	.45	.28	1.33
1973	1.36	2.23	2.67	.77	1.07	.28	.54	.21	.57	.24	.27	.93
1974	.88	2.03	3	.7	.89	.35	1.44	.87	.41	.24	.27	.86
1975	.44	2.27	2.88	.64	.89	.39	.87	1.44	.58	.24	.6	.87
1976	.29	2.03	2.31	.42	.88	.35	1.33	.21	.4	.24	.27	.89
1977	.32	1.96	2.86	.69	.89	1.62	1.62	1.07	.4	.59	.28	1.54
1978	1.51	2.23	3	.73	.89	1.55	1.95	.19	.39	.24	.28	.94
1979	1.51	2.19	2.71	.39	.88	.35	.16	.24	.39	.24	.29	1.35
1980	.92	2.08	2.44	.56	.91	2.18	.34	2.27	.61	.24	.27	.91
1981	.85	2.3	2.9	.69	1.07	.34	.26	.22	.41	.24	.28	1.13
1982	1.19	2.24	2.87	.45	.9	.41	2.57	.23	.4	.24	.28	.95
1983	.26	2.17	2.8	.57	.89	1.19	2.33	1.03	.54	.24	.29	1.54
1984	.92	2.17	1.18	.21	.88	.34	.23	.22	1	.24	.95	.93
AVERAGE	.88	1.94	2.5	.51	.98	.59	.97	.59	.5	.27	.32	1.02

Table 6.11 Diversion Water Requirement
(Gappal Irrigation Project)

Cropping Pattern-A

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1962	4.07	2.85	5.3	.6	4.71	1.34	2.24	1.04	.93	.59	.13	2.55
1964	3.73	2.88	4.8	.59	3.86	2.19	2.43	2.18	.89	.59	.13	2.48
1965	4.4	5.02	5.8	.56	4.87	2.65	2.32	3.09	1.01	.59	.13	3.36
1966	4.4	4.98	5.7	.57	3.69	2.6	3.96	3.75	1.28	.59	.13	2.19
1967	3.47	4.22	5.39	.41	5.14	2.51	2.88	2.73	.97	.59	.13	3.85
1968	4.22	4.68	5.66	.48	5.01	1.79	3.86	1.31	.93	.79	.13	3.35
1969	4.02	5.02	4.88	.6	4.45	4.23	6.57	1.73	.98	.59	.13	2.35
1970	2.96	4.03	5.15	.42	5.6	2.92	4.92	1.91	.94	.59	.13	2.26
1971	2.32	3.97	2.72	.67	3.88	1.67	2.24	1.69	.89	.59	.13	2.09
1972	2.01	4.81	5.47	.23	3.52	3.66	4.42	3.31	1.11	1.11	.13	4.1
1973	4.28	4.92	5.43	.67	4.91	1.37	3.71	1.91	1.07	.59	.13	3
1974	3.67	4.64	5.8	.63	4.36	2.57	4.92	3.18	.96	.59	.13	2.28
1975	3.06	4.98	5.7	.59	4.27	3.45	4.14	3.85	1.07	.59	.91	2.4
1976	2.73	4.64	5.08	.47	3.71	2.54	4.75	1.95	.95	.59	.13	2.56
1977	2.84	4.54	5.66	.63	4.05	5.63	5.14	3.44	.92	1.46	.13	4.36
1978	4.5	4.92	5.8	.65	4.3	5.76	5.35	1.69	.91	.59	.13	3.06
1979	4.5	4.84	5.5	.45	3.67	2.57	1.34	2.33	.9	.59	.13	4.13
1980	3.75	4.73	5.18	.55	4.63	6.32	9.46	4.74	1.09	.59	.13	2.77
1981	3.59	5.02	5.73	.63	4.91	2.38	3.04	1.98	.97	.59	.13	3.8
1982	4.13	4.9	5.68	.49	4.61	3.66	6.32	2.2	.94	.59	.13	3.15
1983	2.49	4.81	5.59	.56	4.35	4.97	5.98	3.34	1.05	.59	.13	4.35
1984	3.73	4.81	3.77	.33	3.67	2.51	2.56	1.98	1.37	.59	1.68	2.98
AVERAGE	3.58	4.55	5.26	.54	4.37	3.16	3.94	2.51	1.01	.66	.24	3.06

Cropping Pattern-B

UNIT: M^3/S

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	3.86	3.01	2.97	.24	1.89	2.46	2.13	1.31	1.05	.09	1.22	2.25
1964	3.52	3.04	2.64	.23	1.65	3.2	2.32	2.75	.84	.09	.81	2.13
1965	4.19	5.16	3.28	.21	1.95	3.6	2.21	3.85	1.42	.09	1.08	3.58
1966	4.19	5.02	3.22	.22	1.61	3.55	3.84	4.64	2.05	.09	.82	1.64
1967	3.26	4.87	3.02	.12	2.07	3.48	2.77	3.42	1.27	.09	1.17	4.19
1968	4.01	4.82	3.19	.16	2.01	2.86	3.75	1.65	1.04	.12	1.22	3.58
1969	3.8	5.16	2.7	.24	1.8	4.98	6.46	2.18	1.33	.09	.97	1.9
1970	2.65	4.18	2.88	.12	2.28	3.83	4.81	2.41	1.11	.09	.98	1.73
1971	2.12	4.12	1.38	.28	1.65	2.93	2.13	2.12	.81	.09	.81	1.56
1972	1.81	4.95	3.07	.02	1.56	4.48	4.31	4.11	1.72	.17	1.03	4.45
1973	4.07	5.07	3.05	.28	1.97	2.49	3.6	2.41	1.6	.09	.81	3.06
1974	3.45	4.79	3.28	.26	1.78	3.53	4.81	3.96	1.22	.09	.9	1.78
1975	2.86	5.13	3.22	.23	1.76	4.3	4.03	4.76	1.61	.09	1.4	1.98
1976	2.53	4.79	2.82	.15	1.61	3.51	4.64	2.46	1.14	.09	.82	2.27
1977	2.63	4.69	3.19	.25	1.7	6.25	5.03	4.26	1.01	.22	1.01	4.75
1978	4.28	5.07	3.28	.27	1.76	6.35	5.44	2.12	.92	.09	1.01	3.16
1979	4.28	4.98	3.09	.14	1.6	3.53	1.23	2.94	.9	.09	1.13	4.5
1980	3.54	4.87	2.89	.2	1.85	6.88	3.35	5.8	1.65	.09	.94	2.64
1981	3.37	5.16	3.23	.25	1.97	3.37	2.93	2.49	1.26	.09	1.01	4.14
1982	3.91	5.05	3.21	.17	1.85	4.46	6.21	2.78	1.09	.09	1.11	3.32
1983	2.28	4.95	3.15	.21	1.78	5.66	5.86	4.15	1.56	.09	1.19	4.75
1984	3.52	4.95	2.01	.08	1.6	3.48	2.45	2.49	2.22	.09	1.6	3.01
AVERAGE	3.37	4.7	2.94	.2	1.8	4.05	3.83	3.14	1.31	.1	1.05	3.02

Table 6.12 Salient Features of Chico Mallig Irrigation Project

Works	Quantities	
	Cropping Pattern-A	Cropping Pattern-B
1. Net Project Area (ha)	31,200	31,200
2. Dam & Reservoir		
a) Require storage volume (10^6 m³)	537	480
3. Irrigation Facilities (km)		
a) Diversion canal		
- Open channel	31.4	
- Tunnel	3.3	
b) Main canal (km)	134.5	
c) Lateral/sublateral canals (km)	416.1	
d) Bifurcation (Nos)	5	
e) Headgate (Nos)	140	
f) Turnouts (Nos)	870	
g) Other Strectures (Nos)	940	
4. Drainage Facilities		
a) Main & Collector drains (km)	76.9	
b) Structures (Nos)	20	
5. O & M roads (km)	356.0	

Table 6.13 Salient Features of Matuno River Irrigation Project

Works	Quantities	
	Cropping Pattern-A	Cropping Pattern-B
1. Net Project Area (ha)	12,680	12,680
2. Dam & Reservoir		
a) Required storage volume (10^6 m³)	66.7	45.5
3. Headworks		
a) Manamtum		
- Weir (Lm x Hm)	127x2.5	
- Intake (Bm x Hm x Nnos)	2.0x1.5x1	
b) Bayombon		
- Weir (Lm x Hm)	305x1.6	
- Intake (Bm x Hm x Nnos)	3.85x1.5x4	
c) Lanog		
- Weir (Lm x Hm)	35x1.8	
- Intake (Bm x Hm x Nnos)	1.5x0.8x2 2.0x1.0x2	
4. Irrigation Facilities		
a) Main canal		
- Existing canal with rehab. (km)	32.4	
- New canal (km)	58.0	
b) Lateral/sublateral canal		
- Existing canal with rehab. (km)	98.6	
- New canal (km)	94.8	
c) Headgates (Nos)	2	
d) Turnouts (Nos)	370	
e) Other structures (Nos)	1,390	
5. Drainage Facilities		
a) Main & Collector drains (km)	194.9	
b) Structures (Nos)	80	
6. O & M roads (km)	343.9	

Table 6.14 Salient Features of Dabubu Irrigation Project

Works	Quantities	
	Cropping Pattern-A	Cropping Pattern-B
1. Net Project Area (ha)	1,000	1,000
2. Dam & Reservoir		
a) Required storage volume (10^6 m³)	2.0	1.5
3. Headworks		
a) Diversion weir (Lm x Hm)	200x2	
b) Intake (Bm x Hm x Nos)	2.0x1.5x1	
4. Irrigation Facilities		
a) Main canal (km)	13.6	
b) Lateral/sublateral canals (km)	19.0	
c) Headgates (Nos)	5	
d) Turnouts (Nos)	24	
e) Other structures (Nos)	35	
5. Drainage Facilities		
a) Main & Collector drains (km)	-	
b) Structures (Nos)	-	
6. O & M roads (km)	32.6	

Table 6.15 (1) Possible Irrigation Area (Zinundungan RIS, 1,760 ha)

Cropping Pattern-A

Year	Possible Irrigation Area (ha)					Intensity of Irrigation Area (ha)
	Wet Paddy		Dry Paddy		Annual	
	Area	Critical Month	Area	Critical Month		
1963	773	Mar	765	May	1,538	87
1964	810	Feb	1,056	"	1,866	106
1965	1,131	Mar	1,760	-	2,891	164
1966	853	Mar	1,760	-	2,613	148
1967	974	"	1,597	May	2,571	146
1968	916	"	1,406	"	2,322	132
1969	731	"	1,264	"	1,995	113
1970	792	"	1,342	Jul	2,134	121
1971	1,083	"	1,277	May	2,360	134
1972	1,268	"	1,760	-	3,028	172
1973	776	"	713	May	1,489	85
1974	987	"	837	Jul	1,824	104
1975	1,037	"	1,760	-	2,797	159
1976	1,104	"	1,760	-	2,864	163
1977	873	"	1,674	May	2,547	145
1978	762	"	1,760	-	2,522	143
1979	795	"	810	Jun	1,605	91
1980	769	"	1,760	-	2,529	144
1981	760	"	1,760	-	2,520	143
1982	726	"	1,760	-	2,486	141
1983	840	"	750	May	1,590	90
1984	709	"	1,760	-	2,469	140
1985						
Average	885		1,413		2,298	131

Table 6.15 (2) Possible Irrigation Area (Zinundungan RIS, 1,760 ha)

Cropping Pattern-B

Year	Possible Irrigation Area (ha)					Intensity of Irrigation Area (ha)
	Wet Paddy		Dry Paddy		Annual	
	Area	Critical Month	Area	Critical Month		
1963	1,296	Feb	1,760	-	3,056	174
1964	778	"	1,760	-	2,538	144
1965	1,760	-	1,760	-	3,520	200
1966	948	Feb	1,760	-	2,708	154
1967	1,477	"	1,760	-	3,237	184
1968	1,063	Dec	1,760	-	2,823	160
1969	860	Feb	1,760	-	2,620	149
1970	955	"	1,387	Jul	2,342	133
1971	1,760	-	1,760	-	3,520	200
1972	1,639	Feb	1,760	-	3,399	193
1973	902	"	1,760	-	2,662	151
1974	1,581	"	856	Jul	2,437	138
1975	1,618	"	1,760	-	3,378	192
1976	1,280	"	1,760	-	3,040	173
1977	1,265	"	1,760	-	3,025	172
1978	840	"	1,760	-	2,600	148
1979	1,322	"	767	Jun	2,089	189
1980	993	"	1,760	-	2,753	156
1981	1,052	"	1,760	-	2,812	160
1982	928	"	1,760	-	2,688	153
1983	1,248	"	933	Jun	2,181	124
1984	987	"	1,760	-	2,747	156
1985						
Average	1,207		1,619		2,826	161

Table 6.16 Salient Features of Zinundungan Irrigation Extension Project

Works	Quantities	
	Cropping Pattern-A	Cropping Pattern-B
1. Net Project Area (ha)	1,750 (3,510)/1	1,750 (3,510)
2. Dam & Reservoir		
a) Required storage volume ($10^6 m^3$)	53.1	34.7
3. Irrigation Facilities		
a) Main canal (km)	-	
b) Lateral/sublateral canal (km)	37.0	
c) Headgate (Nos)	4	
d) Turnouts (Nos)	43	
e) Other structures (Nos)	69	
4. Drainage Facilities		
a) Main & Collector drains (km)	-	
b) Structures (Nos)	-	
5. O & M roads (km)	32.8	

/1 Including existing service area of Zinundungan RIS.

Table 6.17 Salient Features of Alcala Amulung West Irrigation Project

Works	Quantities	
	Cropping Pattern-A	Cropping Pattern-B
1. Net Project Area (ha)	6,750	6,750
2. Pump Station		
a) Pump type	Vertical mixed flow	
b) Total head (m)	28.6	
c) Unit capacity (m^3/min)	112	
d) Bore (mm)	1,000	
e) Nos of Unit	6	
3. Irrigation Facilities		
a) Main canal (km)	27.8	
b) Lateral/sublateral canals (km)	91.9	
c) Headgates (Nos)	22	
d) Turnouts (Nos)	170	
e) Other structures (Nos)	220	
4. Drainage Facilities		
a) Main & Collector drains (km)	9.0	
b) Structures (Nos)	1	
5. O & M roads (km)	59.5	

Table 6.18 Salient Features of Tuguegarao Irrigation Project

Works	Quantities	
	Cropping Pattern-A	Cropping Pattern-B
1. Net Project Area (ha)	1,400	1,400
2. Pump Station		
a) Pump type	Vertical mixed flow	
b) Total head (m)	23.1	
c) Unit capacity (m³/min)	31.8	
d) Bore (mm)	500	
e) Nos of Unit	4	
3. Irrigation Facilities		
a) Main canal (km)	9.5	
b) Lateral/sublateral canals (km)	14.9	
c) Headgates (Nos)	6	
d) Turnouts (Nos)	28	
e) Other structures (Nos)	44	
4. Drainage Facilities		
a) Main & Collector drains (km)	6.8	
b) Structures (Nos)	4	
5. O & M roads (km)	16.0	

Table 6.19 Salient Features of Lulutan Irrigation Project

Works	Quantities	
	Cropping Pattern-A	Cropping Pattern-B
1. Net Project Area (ha)	2,950	2,950
2. Pump Station		
a) Pump type	Vertical mixed flow	
b) Total head (m)	26.0	
c) Unit capacity (m³/min)	83.8	
d) Bore (mm)	800	
e) Nos of Unit	4	
3. Irrigation Facilities		
a) Main canal (km)	13.5	
b) Lateral/sublateral canals (km)	27.0	
c) Headgates (Nos)	10	
d) Turnouts (Nos)	74	
e) Other structures (Nos)	84	
4. Drainage Facilities		
a) Main & Collector drains (km)	18.9	
b) Structures (Nos)	4	
5. O & M roads (km)	23.2	

Table 6.20 Salient Features of Ilagan Irrigation Project

Works	Quantities	
	Cropping Pattern-A	Cropping Pattern-B
1. Net Project Area (ha)	3,200 (5,500)/1	3,200 (5,500)
2. Pump Station		
a) Pump type	Vertical mixed flow	
b) Total head (m)	19.0	19.0
c) Unit capacity (m³/min)	114.9	106.1
d) Bore (mm)	1,000	900
e) Nos of Unit	5	5
3. Irrigation Facilities		
a) Main canal (km)	16.9	
b) Lateral/sublateral canals (km)	46.2	
c) Headgates (Nos)	15	
d) Turnouts (Nos)	86	
e) Other structures (Nos)	120	
4. Drainage Facilities		
a) Main & Collector drains (km)	6.0	
b) Structures (Nos)	3	
5. O & M roads (km)	51.6	

/1 Including 2,300 ha of Tumauini RIS area which would be served by Ilagan Pumping Station

Table 6.21 Salient Features of Gappal Irrigation Project (Case-1)

Works	Quantities	
	Cropping Pattern-A	Cropping Pattern-B
1. Net Project Area (ha)	4,400	4,400
2. Pump Station		
a) Pump type	Vertical mixed flow	
b) Total head (m)	32.9	
c) Unit capacity (m^3/min)	119.6	
d) Bore (mm)	1,000	
e) Nos of Unit	4	
3. Irrigation Facilities		
a) Main canal (km)	40.3	
b) Lateral/sublateral canals (km)	44.1	
c) Headgates (Nos)	15	
d) Turnouts (Nos)	120	
e) Other structures (Nos)	170	
4. Drainage Facilities		
a) Main & Collector drains (km)	-	
b) Structures (Nos)	-	
5. O & M roads (km)	53.0	

Table 6.22 Salient Features of Gappal Irrigation Project (Case-2)

Works	Quantities	
	Cropping Pattern-A	Cropping Pattern-B
1. Net Project Area (ha)	4,400	4,000
2. Dam & Reservoir/1 (Required storage volume 10^6 m^3)		
a) Colorado dam	58.4	42.1
b) Calaocan dam	41.0	28.6
c) Ste Maria dam	18.1	16.2
3. Irrigation Facilities		
a) Headreaches (km)	29.4	
b) Main canal (km)	32.2	
c) Lateral/sublateral canals (km)		
d) Headgates (Nos)	15	
e) Turnouts (Nos)	120	
f) Other structures (Nos)	200	
4. Drainage Facilities		
a) Main & Collector drains (km)	-	
b) Structures (Nos)	-	
5. O & M roads (km)	82.4	

/1 Salient features of the dam and appurtenant facilities are shown in ANNEX DA.

Table 7.1 Possible Intake Discharge

Dummun RIS — Unit: m³/s

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	2.36	1.42	0.84	0.63	0.61	4.88	4.88	3.22	4.88	2.61	1.45	4.88
1964	2.01	1.52	1.40	0.61	0.98	4.20	4.88	4.88	4.88	4.88	4.88	4.88
1965	4.88	4.01	1.96	1.28	2.57	3.80	4.88	4.88	4.88	4.88	4.88	2.47
1966	1.45	1.17	0.89	0.72	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
1967	4.88	3.22	1.59	4.88	1.96	4.88	4.88	4.88	4.88	4.88	4.88	4.25
1968	2.68	1.77	1.14	1.19	1.00	4.88	4.88	4.88	4.88	4.88	3.27	1.87
1969	1.24	0.91	0.68	1.03	1.19	4.88	4.88	4.88	4.88	4.88	4.88	4.46
1970	3.06	1.52	3.08	1.38	4.88	3.71	4.88	4.88	4.88	4.88	4.88	4.88
1971	3.87	2.99	1.59	1.00	1.28	4.39	4.88	4.55	4.88	4.88	4.88	4.88
1972	4.88	4.88	2.94	1.89	3.85	4.88	4.88	4.88	4.88	2.89	4.15	2.75
1973	1.59	1.21	0.79	0.77	1.80	4.50	2.87	4.88	4.88	4.88	4.88	4.88
1974	4.88	3.10	1.59	1.24	1.91	4.48	1.82	4.20	4.88	4.88	4.88	4.88
1975	4.88	2.73	1.54	1.12	2.47	4.76	1.38	4.88	4.88	4.88	4.88	4.88
1976	3.41	1.87	1.19	1.54	3.57	4.88	3.79	4.88	4.88	4.88	4.88	4.27
1977	2.54	1.54	0.86	0.63	1.35	3.41	4.88	4.88	4.88	4.88	4.88	3.15
1978	1.87	1.28	0.79	0.89	2.78	2.73	4.53	4.88	4.88	4.88	4.88	4.88
1979	2.96	1.96	1.10	0.75	3.24	1.52	4.88	3.85	3.78	4.88	4.88	3.76
1980	2.19	1.45	1.26	0.75	3.92	0.79	4.88	4.88	4.88	4.88	4.88	4.88
1981	2.78	1.59	0.91	0.61	4.22	4.88	2.64	4.88	4.88	4.88	4.88	3.83
1982	2.15	1.33	0.77	0.98	3.34	2.47	1.17	4.88	4.88	4.88	4.88	4.88
1983	3.92	1.98	1.03	0.68	0.65	0.56	0.51	2.66	4.88	4.88	4.18	2.03
1984	0.98	0.61	0.44	1.84	4.62	4.88	4.88	4.88	4.88	4.88	4.88	4.88

Table 7.2 Possible Intake Discharge

Baggao IS
(Paranan Area) — Unit: m³/s

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.38	0.82	0.47	0.35	0.33	3.27	3.29	1.89	3.29	1.52	0.84	3.29
1964	1.17	0.89	0.82	0.30	0.54	2.45	3.06	3.29	3.29	3.29	3.29	3.29
1965	3.29	2.33	1.17	0.72	1.47	2.22	3.29	3.29	3.29	3.01	3.29	1.45
1966	0.84	0.68	0.51	0.42	3.29	3.29	3.29	3.29	2.89	3.15	3.29	3.29
1967	3.24	1.89	0.91	3.29	1.14	3.29	2.96	3.29	3.29	3.29	3.29	2.47
1968	1.56	1.03	0.65	0.70	0.58	3.29	3.29	3.29	3.29	3.29	1.89	1.10
1969	0.72	0.54	0.40	0.61	0.65	3.24	3.29	3.29	3.29	3.29	3.29	2.59
1970	1.77	0.86	1.80	0.79	2.87	2.17	3.29	2.96	3.29	3.29	3.29	3.29
1971	2.26	1.73	0.91	0.56	0.75	2.54	3.29	2.66	3.29	3.29	3.29	3.29
1972	3.29	2.94	1.70	1.07	2.24	3.29	3.29	3.29	3.29	1.68	2.40	1.61
1973	0.91	0.70	0.44	0.42	1.02	2.61	1.66	3.29	2.87	3.29	3.29	3.29
1974	2.89	1.82	0.93	0.72	1.12	2.64	1.07	2.43	3.29	3.29	3.29	3.29
1975	2.59	1.59	0.89	0.63	1.45	2.80	1.14	3.29	2.85	3.29	3.29	3.29
1976	2.01	1.07	0.68	0.89	2.05	3.29	2.17	3.29	3.03	3.29	3.29	2.47
1977	1.47	0.91	0.49	0.35	0.77	2.01	3.29	3.29	3.29	3.29	3.29	1.82
1978	1.05	0.75	0.47	0.51	1.61	1.61	2.64	3.29	3.29	3.29	3.29	3.29
1979	1.73	1.12	0.63	0.42	1.89	0.86	3.29	2.22	2.22	3.29	3.29	2.17
1980	1.28	0.82	0.72	0.42	2.29	0.47	3.29	3.29	3.03	3.29	3.29	3.29
1981	1.61	0.93	0.54	0.35	2.47	3.29	1.54	3.29	3.29	3.29	3.29	2.24
1982	1.24	0.77	0.42	0.54	1.96	1.45	0.70	2.96	3.29	3.29	3.29	3.29
1983	2.26	1.14	0.61	0.37	0.35	0.30	0.28	1.54	3.29	3.29	2.45	1.17
1984	0.56	0.37	0.26	1.10	2.71	3.29	3.29	3.29	3.29	3.29	3.29	3.29

Table 7.3 Possible Intake Discharge

Baggao IS
(Pared Area)

Unit: m³/s

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.95	1.52	0.89	0.63	0.61	1.95	1.95	1.95	1.95	1.95	1.54	1.95
1964	2.15	1.61	1.49	0.61	0.91	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1965	1.95	1.95	1.95	1.35	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1966	1.54	1.24	0.93	0.79	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1967	1.95	1.95	1.70	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1968	1.95	1.87	1.19	1.28	1.05	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1969	1.28	0.98	0.75	1.07	1.24	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1970	1.95	1.61	1.95	1.40	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1971	1.95	1.95	1.68	1.03	1.38	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1972	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1973	1.68	1.28	0.84	0.77	1.91	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1974	1.95	1.95	1.70	1.31	1.95	1.95	1.94	1.95	1.95	1.95	1.95	1.95
1975	1.95	1.95	1.63	1.19	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1976	1.95	1.95	1.26	1.63	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1977	1.95	1.66	0.91	0.70	1.40	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1978	1.95	1.38	0.86	0.91	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1979	1.95	1.95	1.17	0.77	1.95	1.61	1.95	1.95	1.95	1.95	1.95	1.95
1980	1.95	1.54	1.33	0.77	1.95	0.84	1.95	1.95	1.95	1.95	1.95	1.95
1981	1.95	1.70	0.96	0.65	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
1982	1.95	1.40	0.79	1.03	1.95	1.95	1.24	1.95	1.95	1.95	1.95	1.95
1983	1.95	1.95	1.10	0.68	0.68	0.61	0.52	1.95	1.95	1.95	1.95	1.95
1984	1.03	0.63	0.47	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95

Table 7.4 Possible Intake Discharge

Pinacanauan RIS

Unit: m³/s

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	3.30	3.30	3.30	2.68	2.52	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1964	3.30	3.30	3.30	2.57	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1965	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1966	3.30	3.30	3.30	3.24	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1967	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1968	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1969	3.30	3.30	3.01	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1970	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1971	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1972	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1973	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1974	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1975	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1976	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1977	3.30	3.30	3.30	2.80	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1978	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1979	3.30	3.30	3.30	3.27	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1980	3.30	3.30	3.30	3.24	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1981	3.30	3.30	3.30	2.68	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1982	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30
1983	3.30	3.30	3.30	2.89	2.80	2.47	2.22	3.30	3.30	3.30	3.30	3.30
1984	3.30	2.64	1.89	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30

Table 7.5 Possible Intake Discharge

Tumauini IS — Unit: m^3/s

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	3.83	2.29	1.35	1.00	0.93	9.12	9.21	5.30	9.21	4.27	2.33	9.21
1964	3.27	2.43	2.29	0.93	1.54	6.91	8.54	9.21	9.21	9.21	9.21	9.21
1965	9.21	6.53	3.24	2.05	4.15	6.18	9.21	9.21	9.21	8.42	9.21	4.04
1966	2.38	1.87	1.42	1.19	9.21	9.21	9.21	9.21	8.10	8.82	9.21	9.21
1967	9.10	5.25	2.59	9.21	3.15	9.21	8.26	9.21	9.21	9.21	9.21	6.95
1968	4.36	2.85	1.84	1.94	1.59	9.21	9.21	9.21	9.21	9.21	5.34	3.08
1969	1.98	1.45	1.10	1.68	1.89	9.08	9.21	9.21	9.21	9.21	9.21	7.23
1970	4.97	2.43	5.06	2.19	7.69	6.04	9.21	8.28	9.21	9.21	9.21	9.21
1971	6.32	4.90	2.54	1.61	2.12	7.12	9.21	7.37	9.21	9.21	9.21	9.21
1972	9.21	8.24	4.81	3.03	6.28	9.12	9.21	9.21	9.21	4.71	6.72	4.46
1973	2.54	1.96	1.28	1.19	2.85	7.30	4.67	9.21	7.98	9.21	9.21	9.21
1974	8.07	5.09	2.59	1.98	3.15	7.33	2.94	6.84	9.21	9.21	9.21	9.21
1975	7.26	4.41	2.50	1.77	4.01	7.79	3.20	9.21	7.93	9.21	9.21	9.21
1976	5.58	3.06	1.89	2.47	5.81	9.21	6.07	9.21	8.47	9.21	9.21	6.98
1977	4.13	2.50	1.40	1.05	2.22	5.58	9.21	9.21	9.21	9.21	9.21	5.09
1978	2.99	2.12	1.31	1.42	4.48	4.43	7.40	9.21	9.21	9.21	9.21	9.21
1979	4.81	3.22	1.80	1.19	5.32	2.45	9.21	6.28	6.21	9.21	9.21	6.14
1980	3.57	2.33	2.05	1.21	6.37	1.31	9.21	9.21	8.40	9.21	9.21	9.21
1981	4.50	2.59	1.47	1.00	6.88	9.21	4.34	9.21	9.21	9.21	9.21	6.25
1982	3.48	2.15	1.24	1.59	5.48	4.01	1.91	8.31	9.21	9.21	9.21	9.21
1983	6.35	3.24	1.66	1.07	1.03	0.93	0.79	4.29	9.21	9.21	6.84	3.27
1984	1.56	0.98	0.68	3.01	7.51	9.21	9.21	9.21	9.21	9.21	9.21	9.21

Table 7.6 Unit Diversion Water Requirement
(Cropping Pattern-A)

Dummun RIS

UNIT: ℓ/s/ha

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	.57	1.06	1.57	.13	1.63	.84	1.22	1.29	.25	.15	.58	.65
1964	1.32	1.28	1.55	.14	1.31	1.6	1.95	.65	.23	.15	.01	.59
1965	.2	1.48	1.51	.14	1.37	.9	1.02	1.09	.24	.15	.01	.85
1966	1.32	1.35	1.46	.13	1.11	1.67	1.61	1.25	.24	.15	.01	.67
1967	.98	1.24	1.45	.12	1.61	.67	1.65	.3	.23	.15	.01	.65
1968	1.11	1.33	1.4	.12	1.54	1.19	.69	.5	.23	.24	.4	1.17
1969	1.19	1.43	1.46	.14	1.53	1.36	.94	1.45	.23	.15	.01	.71
1970	.42	1.36	1.09	.13	1.4	1.18	1.67	.74	.27	.15	.01	.73
1971	.43	1.08	1.16	.13	1.6	1.43	.73	.92	.27	.15	.01	.67
1972	.8	.76	1.21	.13	1.21	1.68	1.35	.76	.26	.15	.01	1.16
1973	.9	1.51	1.45	.14	1.6	.95	1.59	.72	.25	.15	.01	.85
1974	.76	1.24	1.56	.14	1.62	1.86	1.85	.74	.25	.15	.01	.78
1975	.51	1.27	1.51	.13	1.39	1.39	1.58	.74	.32	.15	.11	.78
1976	1.3	1.52	1.55	.14	1.32	1.26	1.8	.71	.25	.15	.01	1
1977	.73	1.26	1.56	.14	1.55	1.46	.97	1.31	.23	.15	.01	1.23
1978	1.24	1.13	1.41	.14	1.26	1.49	1.8	.55	.24	.15	.01	.88
1979	1.37	1.07	1.57	.13	1.14	1.9	1	.5	.29	.15	.01	1.07
1980	1.03	1.48	1.44	.13	1.23	1.98	.74	1.38	.24	.15	.01	.62
1981	1.09	1.48	1.45	.13	.95	.84	1.62	.72	.21	.15	.01	.83
1982	1.06	1.46	1.56	.12	1.61	1.05	1.07	1.09	.29	.15	.01	.57
1983	.28	1.34	1.4	.14	1.62	1.55	1.99	1.25	.24	.15	.01	.68
1984	.88	1.36	1.09	.1	1.15	.7	1.06	.71	.31	.15	.01	.6
AVERAGE	.89	1.29	1.43	.13	1.4	1.32	1.36	.88	.25	.15	.06	.81

Baggao IS, Pinacanauan RIS and Solana-Tuguegarao IS

UNIT: ℓ/s/ha

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.35	1.48	1.55	.14	1.62	.96	.94	1.31	.24	.56	.49	.68
1964	1.36	1.33	1.45	.14	1.45	1.23	1.14	.45	.25	.15	.01	.9
1965	1.23	1.48	1.54	.14	1.34	1.39	.71	1.06	.24	.29	.01	1.22
1966	1.36	1.43	1.4	.13	.99	1.26	1.07	.62	.32	.15	.01	.71
1967	1.33	1.51	1.56	.08	1.46	.75	1.82	.46	.28	.15	.01	1.25
1968	1.35	1.52	1.53	.12	1.5	1.01	1.03	.37	.24	.46	.48	1.29
1969	1.38	1.53	1.56	.12	1.44	1.21	.57	1.24	.25	.2	.01	1.06
1970	1.18	1.52	1.12	.13	1.2	1.35	1.14	.93	.26	.15	.01	.75
1971	1.35	1.33	1.53	.14	1.4	1.29	.9	1.22	.25	.15	.01	.71
1972	1.04	1.48	1.45	.13	1.28	1.16	1.06	.74	.26	.52	.07	1.18
1973	1.32	1.5	1.48	.14	1.38	1.16	1.63	.67	.29	.15	.01	1.09
1974	1.37	1.52	1.57	.12	1.41	1.26	1.76	.97	.24	.15	.01	.82
1975	1.38	1.53	1.46	.14	1.29	1.26	1.88	.67	.29	.15	.28	.85
1976	1.27	1.53	1.43	.13	1.2	1.01	1.55	.9	.28	.15	.01	1.1
1977	1.3	1.52	1.56	.13	1.46	1.37	.84	.81	.21	.34	.01	1.23
1978	1.37	1.49	1.51	.12	1.32	1.64	1.2	.45	.24	.15	.01	.96
1979	1.34	1.46	1.56	.13	1.26	1.77	.9	1.21	.27	.15	.01	1.05
1980	1.38	1.41	1.38	.13	1.26	1.91	.61	.99	.27	.15	.01	.99
1981	1.36	1.51	1.55	.13	1.16	.9	1.88	.65	.26	.15	.01	1.25
1982	1.35	1.49	1.56	.12	1.26	1.6	1.76	.79	.25	.15	.01	.92
1983	1.09	1.52	1.49	.14	1.5	1.77	1.82	1.08	.23	.15	.29	1.27
1984	1.38	1.53	1.54	.11	1.19	1.12	1.22	.29	.34	.15	.19	.96
AVERAGE	1.31	1.48	1.49	.13	1.33	1.3	1.25	.81	.26	.22	.09	1.01

Tumauini IS

UNIT: ℓ/s/ha

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.27	1.04	1.47	.13	1.39	.63	.88	.46	.25	.15	.11	.7
1964	1.19	1.05	1.37	.13	1.15	.88	.94	.81	.24	.15	.01	.68
1965	1.35	1.51	1.57	.13	1.43	1.02	.9	1.03	.26	.15	.01	.95
1966	1.35	1.48	1.55	.13	1.09	1.01	1.35	1.17	.31	.15	.01	.58
1967	1.14	1.34	1.48	.11	1.5	.98	1.07	.94	.26	.15	.01	1.08
1968	1.3	1.43	1.54	.12	1.46	.76	1.33	.54	.25	.25	.13	.95
1969	1.26	1.51	1.38	.13	1.32	1.47	1.92	.67	.26	.15	.01	.64
1970	.99	1.3	1.43	.11	1.6	1.1	1.57	.72	.25	.15	.01	.61
1971	.84	1.28	.92	.14	1.15	.79	.88	.66	.23	.15	.01	.55
1972	.74	1.46	1.5	.08	1.04	1.33	1.46	1.08	.28	.36	.01	1.13
1973	1.52	1.49	1.49	.14	1.44	.63	1.3	.72	.27	.15	.01	.84
1974	1.18	1.43	1.57	.13	1.3	1	1.57	1.04	.26	.15	.01	.62
1975	1.04	1.51	1.55	.13	1.27	1.26	1.39	1.19	.27	.15	.28	.66
1976	.96	1.43	1.42	.12	1.1	.99	1.53	.74	.25	.15	.01	.7
1977	.99	1.41	1.54	.13	1.2	1.8	1.62	1.1	.24	.46	.01	1.2
1978	1.37	1.49	1.57	.13	1.28	1.85	1.71	.66	.24	.15	.01	.86
1979	1.37	1.47	1.51	.11	1.09	1	.61	.85	.24	.15	.01	1.15
1980	1.2	1.45	1.44	.12	1.38	1.95	1.24	1.37	.27	.15	.01	.77
1981	1.16	1.51	1.56	.13	1.44	.94	1.12	.74	.26	.15	.01	1.07
1982	1.29	1.48	1.55	.12	1.37	1.33	1.88	.81	.25	.15	.01	.88
1983	.89	1.46	1.52	.13	1.29	1.64	1.8	1.08	.27	.15	.01	1.2
1984	1.19	1.46	1.15	.1	1.09	.98	.98	.74	.32	.15	.47	.83
AVERAGE	1.15	1.41	1.46	.12	1.29	1.15	1.32	.87	.26	.18	.06	.85

Table 7.7 Unit Diversion Water Requirement
(Cropping Pattern-B)

Dummun RIS

UNIT: ℓ/s/ha

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	.54	1.12	.74	0	.55	1.07	1.18	1.63	.31	0	.4	.54
1964	1.28	1.34	.73	0	.46	1.73	1.9	.82	.23	0	122	.44
1965	.18	1.54	.71	0	.48	1.12	.98	1.37	.29	0	.31	.89
1966	1.29	1.41	.69	0	.41	1.79	1.57	1.58	.28	0	122	.58
1967	.95	1.3	.69	0	.54	.91	1.61	.38	.24	0	.29	.55
1968	1.08	1.39	.66	0	.52	1.37	.64	.63	.19	0	.4	1.3
1969	1.15	1.48	.69	0	.52	1.52	.9	1.83	.22	0	.27	.65
1970	.39	1.42	.52	0	.49	1.37	1.63	.93	.45	0	.22	.69
1971	.4	1.15	.56	0	.54	1.58	.69	1.16	.42	0	.22	.57
1972	.77	.82	.58	0	.44	1.8	1.31	.95	.39	0	.9	1.28
1973	.87	1.56	.68	0	.54	1.16	1.55	.91	.32	0	.22	.9
1974	.73	1.3	.74	0	.54	1.96	1.81	.94	.3	0	.24	.77
1975	.48	1.33	.71	0	.48	1.54	1.53	.94	.4	0	.35	.78
1976	1.27	1.57	.73	0	.46	1.43	1.76	.89	.35	0	.27	1.09
1977	.71	1.31	.74	0	.52	1.6	.92	1.65	.24	0	.27	1.36
1978	1.2	1.19	.67	0	.45	1.63	1.75	.7	.24	0	.28	.96
1979	1.34	1.13	.74	0	.42	1.99	.96	.63	.53	0	.24	1.18
1980	1	1.54	.68	0	.44	2.05	.7	1.74	.29	0	.25	.43
1981	1.05	1.53	.68	0	.37	1.06	1.57	.92	.11	0	.3	.86
1982	1.03	1.52	.74	0	.54	1.25	1.03	1.37	.52	0	.3	.41
1983	.26	1.4	.66	0	.54	1.69	1.94	1.58	.28	0	.25	.59
1984	.85	1.41	.53	0	.42	.94	1.02	.9	.58	0	.25	.46
AVERAGE	.86	1.35	.68	0	.49	1.48	1.32	1.11	.33	0	.28	.79

Baggao IS, Pinacanauan RIS and Solana-Tuguegarao IS

UNIT: ℓ/s/ha

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.32	1.53	.73	0	.54	1.18	.89	1.65	.3	0	.39	.6
1964	1.33	1.39	.68	0	.5	1.41	1.1	.57	.36	0	.22	.92
1965	1.2	1.54	.73	0	.47	1.54	.67	1.34	.3	0	.33	1.35
1966	1.33	1.49	.66	0	.38	1.43	1.03	.79	.59	0	.22	.65
1967	1.3	1.57	.73	0	.5	.99	1.77	.58	.48	0	.33	1.38
1968	1.31	1.57	.72	0	.51	1.22	.99	.46	.26	0	.39	1.43
1969	1.35	1.58	.74	0	.5	1.39	.52	1.57	.32	0	.3	1.17
1970	1.15	1.57	.54	0	.43	1.68	1.1	1.18	.39	0	.27	.73
1971	1.32	1.38	.72	0	.48	1.46	.65	1.54	.3	0	.22	.65
1972	1	1.54	.68	0	.45	1.34	1.01	.93	.41	0	.34	1.3
1973	1.28	1.55	.7	0	.48	1.34	1.58	.84	.52	0	.22	1.21
1974	1.33	1.57	.74	0	.49	1.44	1.71	1.22	.3	0	.24	.95
1975	1.35	1.58	.69	0	.46	1.44	1.84	.85	.52	0	.37	.89
1976	1.24	1.58	.68	0	.43	1.21	1.52	1.01	.48	0	.28	1.22
1977	1.27	1.57	.74	0	.5	1.59	.8	1.82	.12	0	.32	1.36
1978	1.33	1.55	.71	0	.46	1.76	1.16	.57	.28	0	.3	1.05
1979	1.3	1.51	.73	0	.45	1.87	.86	1.53	.47	0	.29	1.16
1980	1.35	1.46	.46	0	.45	2	.57	1.25	.48	0	.28	1.08
1981	1.33	1.57	.73	0	.42	1.12	1.84	.82	.38	0	.28	1.38
1982	1.21	1.55	.74	0	.45	1.72	1.72	1	.33	0	.28	1
1983	1.05	1.57	.7	0	.51	1.87	1.77	1.37	.35	0	.37	1.41
1984	1.35	1.58	.73	0	.43	1.31	1.17	.37	.64	0	.36	1.04
AVERAGE	1.28	1.54	.7	0	.47	1.47	1.2	1.02	.39	0	.3	1.09

Tumauini IS

UNIT: ℓ/s/ha

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.23	1.1	.69	0	.48	.88	.84	.58	.31	0	.35	.63
1964	1.16	1.11	.65	0	.43	1.1	.89	1.02	.24	0	.22	.6
1965	1.31	1.57	.74	0	.47	1.22	.85	1.9	.41	0	.3	1.03
1966	1.31	1.53	.73	0	.41	1.21	1.31	1.48	.57	0	.22	.43
1967	1.1	1.4	.7	0	.51	1.19	1.03	1.19	.37	0	.33	1.2
1968	1.27	1.49	.73	0	.5	1	1.29	.69	.31	0	.35	1.03
1969	1.23	1.57	.66	0	.47	1.62	1.86	.84	.39	0	.37	.53
1970	.95	1.36	.68	0	.54	1.29	1.53	.92	.33	0	.27	.48
1971	.81	1.34	.45	0	.42	1.02	.84	.83	.24	0	.22	.38
1972	.71	1.52	.71	0	.39	1.49	1.41	1.36	.49	0	.29	1.26
1973	1.28	1.55	.7	0	.5	.89	1.25	.92	.46	0	.22	.88
1974	1.15	1.48	.74	0	.46	1.2	1.53	1.32	.34	0	.25	.49
1975	1.01	1.56	.73	0	.45	1.44	1.35	1.5	.46	0	.37	.55
1976	.93	1.48	.67	0	.41	1.2	1.49	.93	.34	0	.22	.64
1977	.95	1.46	.73	0	.43	1.9	1.57	1.39	.3	0	.28	1.93
1978	1.33	1.55	.74	0	.45	1.94	1.66	.83	.27	0	.29	.91
1979	1.33	1.53	.71	0	.4	1.2	.56	1.07	.26	0	.32	1.28
1980	1.17	1.5	.69	0	.48	2.03	1.2	1.73	.47	0	.26	.75
1981	1.13	1.57	.73	0	.5	1.15	1.08	.94	.37	0	.28	1.19
1982	1.25	1.54	.73	0	.48	1.49	1.83	1.03	.32	0	.31	.95
1983	.86	1.52	.72	0	.46	1.77	1.75	1.36	.45	0	.34	1.33
1984	1.16	1.52	.55	0	.4	1.19	.93	.94	.6	0	.39	.86
AVERAGE	1.13	1.47	.69	0	.46	1.34	1.28	1.1	.38	0	.29	.85

Table 7.8 Possibly Maximum Irrigation Area by River Runoff (Cropping Pattern-A)

Dumoun RIS, 1,070 ha

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	1,109	May	1,135	Mar.	2,244	108
1964	2,070	-	1,136	Feb.	3,206	155
1965	2,070	-	2,070	-	4,140	200
1966	2,070	-	830	Feb.	2,900	141
1967	2,070	-	2,070	-	4,140	200
1968	1,923	May	1,223	Feb.	3,196	154
1969	2,070	-	615	Feb.	2,685	130
1970	2,070	-	1,070	Feb.	3,140	152
1971	2,070	-	2,070	-	4,140	200
1972	2,070	-	2,070	-	4,140	200
1973	1,852	Jul.	776	Feb.	2,628	127
1974	1,006	Jul.	2,070	-	3,076	149
1975	902	Jul.	2,053	Feb.	2,955	143
1976	2,070	-	1,191	Feb.	3,261	157
1977	2,070	-	1,162	Mar.	3,232	156
1978	1,675	Jun.	1,076	Feb.	2,751	133
1979	764	Jun.	1,486	Mar.	2,250	109
1980	385	Jun.	942	Feb.	1,327	64
1981	1,692	Jul.	1,039	Feb.	2,731	131
1982	1,976	Jun.	875	Feb.	2,851	138
1983	263	Jul.	1,414	Feb.	1,677	81
1984	2,070	-	433	Feb.	2,503	121
Average	1,650		1,311		2,961	143

Pinacanauan IS, 1,700 ha

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	1,200	-	1,200	-	2,400	200
1964	1,200	-	1,200	-	2,400	200
1965	1,200	-	1,200	-	2,400	200
1966	1,200	-	1,200	-	2,400	200
1967	1,200	-	1,200	-	2,400	200
1968	1,200	-	1,200	-	2,400	200
1969	1,200	-	1,200	-	2,400	200
1970	1,200	-	1,200	-	2,400	200
1971	1,200	-	1,200	-	2,400	200
1972	1,200	-	1,200	-	2,400	200
1973	1,200	-	1,200	-	2,400	200
1974	1,200	-	1,200	-	2,400	200
1975	1,200	-	1,200	-	2,400	200
1976	1,200	-	1,200	-	2,400	200
1977	1,200	-	1,200	-	2,400	200
1978	1,200	-	1,200	-	2,400	200
1979	1,200	-	1,200	-	2,400	200
1980	1,200	-	1,200	-	2,400	200
1981	1,200	-	1,200	-	2,400	200
1982	1,200	-	1,200	-	2,400	200
1983	1,200	-	1,200	-	2,400	200
1984	1,200	-	1,200	-	2,400	200
Average	1,200		1,200		2,400	200

Baggao IS, Pasad Area, 549 ha

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	549	-	549	-	1,098	200
1964	549	-	549	-	1,098	200
1965	549	-	549	-	1,098	200
1966	549	-	549	-	1,098	200
1967	549	-	549	-	1,098	200
1968	549	-	549	-	1,098	200
1969	549	-	549	-	1,098	200
1970	549	-	549	-	1,098	200
1971	549	-	549	-	1,098	200
1972	549	-	549	-	1,098	200
1973	549	-	549	-	1,098	200
1974	549	-	549	-	1,098	200
1975	549	-	549	-	1,098	200
1976	549	-	549	-	1,098	200
1977	549	-	549	-	1,098	200
1978	549	-	549	-	1,098	200
1979	549	-	549	-	1,098	200
1980	420	Jun.	549	-	969	177
1981	549	-	549	-	1,098	200
1982	549	-	549	-	1,098	200
1983	326	Jan.	549	-	875	159
1984	549	-	399	Feb.	948	173
Average	533		542		1,075	196

Baggao IS, Paranan IS, 1,263 ha

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	611	May	563	Feb.	1,174	93
1964	1,080	May	640	Feb.	1,720	136
1965	1,263	-	1,074	Dec.	2,337	185
1966	1,263	-	456	Feb.	1,719	136
1967	1,263	-	1,204	Feb.	2,467	195
1968	1,137	May	656	Feb.	1,793	142
1969	1,263	-	342	Feb.	1,605	127
1970	1,263	-	548	Feb.	1,811	143
1971	1,263	-	1,254	Feb.	2,517	199
1972	1,263	-	1,238	Dec.	2,501	198
1973	1,051	Jul.	452	Feb.	1,503	119
1974	626	Jul.	1,159	Feb.	1,785	141
1975	620	Jul.	1,006	Feb.	1,626	129
1976	1,263	-	677	Feb.	1,940	154
1977	1,263	-	580	Feb.	1,843	146
1978	915	Jun.	484	Feb.	1,399	111
1979	460	Jun.	742	Feb.	1,202	95
1980	235	Jun.	562	Feb.	797	63
1981	834	Jul.	592	Feb.	1,426	113
1982	407	Jul.	497	Feb.	904	72
1983	138	Jul.	726	Feb.	864	70
1984	1,263	-	234	Feb.	1,497	119
Average	944		713		1,657	131

Solana-Tuguegarao IS, 2,829 ha /1

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	1,818	Aug.	1,961	Feb.	3,779	134
1964	2,128	Jun.	2,158	Feb.	4,286	152
1965	1,948	Jun.	1,948	Feb.	3,896	138
1966	2,098	Jun.	2,013	Feb.	4,111	145
1967	1,695	Jul.	1,911	Feb.	3,606	127
1968	2,459	Jun.	1,911	Feb.	4,370	154
1969	1,911	Aug.	1,899	Feb.	3,810	135
1970	1,786	Jun.	1,911	Feb.	3,697	131
1971	1,948	Aug.	2,174	Feb.	4,122	146
1972	2,239	Jun.	1,948	Feb.	4,187	148
1973	1,899	Jul.	1,935	Feb.	3,834	136
1974	1,754	Jul.	1,911	Feb.	3,665	130
1975	1,630	Jul.	1,899	Feb.	3,529	125
1976	1,974	Jul.	1,899	Feb.	3,873	137
1977	1,961	Jun.	1,911	Feb.	3,872	137
1978	1,704	Jun.	1,935	Feb.	3,639	129
1979	1,604	Jun.	1,987	Feb.	3,591	127
1980	2,400	Aug.	2,055	Feb.	4,455	157
1981	1,630	Jul.	1,911	Feb.	3,541	125
1982	1,744	Jul.	1,935	Feb.	3,679	130
1983	1,604	Jan.	1,911	Feb.	3,515	124
1984	2,290	Jan.	1,899	Feb.	4,189	148
Average	1,919		1,956		3,875	137

/1 Possibly maximum irrigation area is estimated based on nominal pump capacity of Solana Pumping Station (3.0 m³/s).

Tupaulai IS, 3,987 ha

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	1,938	Jun.	1,956	Mar.	3,894	98
1964	3,667	Jun.	2,169	Feb.	5,836	147
1965	3,987	-	3,922	Dec.	7,909	198
1966	3,987	-	1,222	Feb.	5,209	131
1967	3,937	-	3,700	Mar.	7,637	193
1968	3,180	May	1,912	Feb.	5,092	128
1969	3,987	-	923	Feb.	4,910	123
1970	3,987	-	1,787	Feb.	5,774	145
1971	3,987	-	3,657	Feb.	7,644	192
1972	3,987	-	3,540	Dec.	7,527	189
1973	3,336	Jul.	1,765	Feb.	5,001	125
1974	1,922	Jul.	3,439	Feb.	5,361	134
1975	2,370	Jul.	2,827	Feb.	5,197	130
1976	3,987	-	2,067	Feb.	6,054	152
1977	2,937	Jun.	1,712	Feb.	4,649	117
1978	2,284	Jun.	1,368	Feb.	3,652	92
1979	2,042	Jun.	2,105	Feb.	4,147	104
1980	645	Jun.	1,553	Feb.	2,198	55
1981	3,987	-	1,650	Feb.	5,637	141
1982	1,044	Jul.	1,396	Feb.	2,440	61
1983	451	Jul.	2,132	Feb.	2,583	65
1984	3,987	-	845	Feb.	4,832	116
Average	3,004		2,135		5,139	129

Table 7.9 Possibly Maximum Irrigation Area by River Runoff (Cropping Pattern-B)

Dumoga R1B, 2,070 ha

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Bean Area (ha)	Bean Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	374	May	535	Mar.	2,070	-	2,979 (909)	144 (44)
1964	748	May	903	Mar.	2,070	-	3,721 (1,651)	180 (80)
1965	1,876	May	1,500	Mar.	2,070	-	5,346 (3,006)	253 (153)
1966	3,070	-	610	Mar.	2,070	-	4,750 (2,680)	229 (129)
1967	1,217	May	1,097	Mar.	2,070	-	4,384 (2,314)	212 (112)
1968	649	May	814	Mar.	2,070	-	3,533 (1,463)	171 (71)
1969	778	May	466	Mar.	2,070	-	3,314 (1,244)	160 (60)
1970	2,070	-	1,118	Feb.	2,070	-	5,258 (3,188)	254 (154)
1971	800	May	1,371	Mar.	2,070	-	4,241 (2,171)	205 (105)
1972	2,070	-	2,070	-	2,070	-	6,210 (4,140)	300 (200)
1973	1,125	May	545	Mar.	1,010	-	3,240 (1,670)	181 (81)
1974	984	Jul.	1,019	Mar.	2,070	-	4,073 (2,003)	197 (97)
1975	823	Jul.	1,020	Mar.	2,070	-	3,963 (1,893)	191 (91)
1976	2,070	-	768	Mar.	2,070	-	4,908 (2,838)	237 (137)
1977	831	May	551	Mar.	2,070	-	3,452 (1,422)	169 (69)
1978	1,832	Jul.	560	Mar.	2,070	-	4,462 (2,392)	216 (116)
1979	800	Jun.	701	Mar.	2,070	-	3,571 (1,501)	173 (73)
1980	398	Jun.	875	Mar.	2,070	-	3,344 (1,274)	162 (62)
1981	1,630	Jul.	628	Mar.	2,070	-	4,328 (2,258)	209 (109)
1982	1,093	Jul.	494	Mar.	2,070	-	3,657 (1,587)	177 (77)
1983	336	Jul.	735	Mar.	2,070	-	3,068 (998)	148 (48)
1984	2,070	-	406	Mar.	2,070	-	4,546 (2,476)	220 (120)
1985								
Average	1,212		845		2,070		4,127 (2,057)	199 (99)

Pinasungkulan R1B, 1,200 ha

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Bean Area (ha)	Bean Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1964	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1965	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1966	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1967	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1968	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1969	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1970	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1971	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1972	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1973	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1974	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1975	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1976	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1977	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1978	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1979	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1980	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1981	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1982	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1983	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1984	1,200	-	1,200	-	1,200	-	3,000 (2,400)	300 (200)
1985								
Average	1,200		1,200		1,200		3,000 (2,400)	300 (200)

Baggao 1A, Paved Area, 549 ha

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Bean Area (ha)	Bean Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	377	May	549	-	549	-	1,475 (926)	269 (169)
1964	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1965	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1966	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1967	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1968	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1969	549	-	481	Mar.	549	-	1,579 (1,030)	288 (188)
1970	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1971	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1972	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1973	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1974	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1975	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1976	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1977	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1978	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1979	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1980	440	Jun.	549	-	549	-	1,538 (989)	280 (180)
1981	549	-	549	-	549	-	1,647 (1,098)	300 (200)
1982	549	-	506	Mar.	549	-	1,604 (1,055)	292 (192)
1983	286	Jul.	549	-	549	-	1,384 (833)	252 (152)
1984	549	-	506	Mar.	549	-	1,604 (855)	256 (156)
1985								
Average	524		533		549		1,606 (1,057)	293 (193)

Baggao 1B, Forest Area, 1,263 ha

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Bean Area (ha)	Bean Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	204	May	303	Mar.	1,263	-	1,770 (507)	140 (40)
1964	372	May	366	Mar.	1,263	-	2,101 (938)	174 (74)
1965	1,097	May	760	Mar.	1,263	-	3,120 (1,857)	247 (147)
1966	1,263	-	364	Mar.	1,263	-	2,890 (1,627)	229 (129)
1967	381	May	583	Mar.	1,263	-	2,827 (1,364)	208 (108)
1968	387	May	425	Mar.	1,263	-	2,075 (812)	164 (64)
1969	451	May	256	Mar.	1,263	-	1,970 (707)	156 (56)
1970	1,263	-	586	Feb.	1,263	-	3,092 (1,829)	245 (145)
1971	536	May	595	Mar.	1,263	-	2,394 (1,131)	190 (90)
1972	1,263	-	1,172	Mar.	1,263	-	3,698 (2,435)	293 (193)
1973	739	May	297	Mar.	1,263	-	2,299 (1,036)	182 (82)
1974	608	Jul.	592	Mar.	1,263	-	2,463 (1,200)	195 (95)
1975	606	Jul.	610	Mar.	1,263	-	2,479 (1,216)	196 (96)
1976	1,263	-	476	Mar.	1,263	-	3,002 (1,739)	238 (138)
1977	527	May	314	Mar.	1,263	-	2,104 (841)	167 (67)
1978	982	Jun.	311	Mar.	1,263	-	2,556 (1,293)	202 (102)
1979	486	Jun.	404	Mar.	1,263	-	2,153 (890)	170 (70)
1980	246	Jun.	522	Mar.	1,263	-	2,031 (768)	161 (61)
1981	819	Jul.	348	Mar.	1,263	-	2,430 (1,167)	192 (92)
1982	398	Jul.	269	Mar.	1,263	-	1,930 (667)	153 (53)
1983	354	Jul.	409	Mar.	1,263	-	1,826 (563)	145 (45)
1984	1,263	Jul.	169	Mar.	1,263	-	2,695 (1,432)	213 (113)
1985								
Average	714		469				2,446 (1,183)	194 (94)

Solana-Tuguegarao IR, 2,829 ha /1

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Bean Area (ha)	Bean Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	1,852	May	1,385	Mar.	2,829	-	6,616 (3,787)	2.34 (1.34)
1964	2,069	May	2,069	Mar.	2,829	-	6,967 (4,138)	2.46 (1.46)
1965	2,158	Jun.	1,948	Mar.	2,829	-	6,935 (4,106)	2.45 (1.45)
1966	2,381	Jun.	2,098	Feb.	2,829	-	7,308 (4,479)	2.58 (1.58)
1967	1,648	Jul.	1,923	Mar.	2,829	-	6,400 (3,971)	2.26 (1.26)
1968	3,000	May	1,561	Mar.	2,829	-	6,790 (3,961)	2.40 (1.40)
1969	2,083	May	1,923	Mar.	2,829	-	6,835 (4,006)	2.42 (1.42)
1970	1,935	Jun.	1,974	Feb.	2,829	-	6,738 (3,909)	2.38 (1.38)
1971	2,143	May	1,961	Mar.	2,829	-	6,933 (4,104)	2.45 (1.45)
1972	2,344	May	2,027	Feb.	2,829	-	7,200 (4,371)	2.55 (1.55)
1973	1,860	Jul.	2,000	Feb.	2,829	-	6,689 (3,840)	2.36 (1.35)
1974	1,705	Jul.	1,911	Mar.	2,829	-	6,445 (3,616)	2.28 (1.28)
1975	1,594	Jul.	1,961	Feb.	2,829	-	6,384 (3,553)	2.26 (1.26)
1976	1,923	Jul.	1,961	Feb.	2,829	-	6,713 (3,884)	2.37 (1.37)
1977	2,054	May	1,923	Mar.	2,829	-	6,826 (3,997)	2.42 (1.41)
1978	1,829	Jun.	1,987	Mar.	2,829	-	6,645 (3,816)	2.35 (1.35)
1979	1,695	Jun.	1,923	Mar.	2,829	-	6,447 (3,618)	2.28 (1.28)
1980	1,571	Jun.	2,128	Feb.	2,829	-	6,528 (3,699)	2.31 (1.31)
1981	1,594	Jul.	1,935	Mar.	2,829	-	6,360 (3,531)	2.25 (1.25)
1982	1,705	Jul.	1,923	Mar.	2,829	-	6,457 (3,628)	2.28 (1.28)
1983	1,648	Jul.	1,974	Feb.	2,829	-	6,451 (3,622)	2.28 (1.28)
1984	2,459	Jul.	1,948	Mar.	2,829	-	7,236 (4,407)	2.56 (1.56)
1985								
Average	1,920		1,972		2,829		6,722 (3,892)	2.37 (1.38)

/1 Possible irrigation area is estimated based on nominal pump capacity of Solana pumping station (3.0 m^3/s).

Tumauini 1S, 3,987 ha

Year	Wet Paddy Area (ha)	Wet Paddy Critical Month	Dry Paddy Area (ha)	Dry Paddy Critical Month	Bean Area (ha)	Bean Critical Month	Annual (ha)	Intensity of Irrigation Area (%)
1963	669	May	918	Mar.	3,987	-	5,574 (1,587)	140 (40)
1964	1,339	May	1,672	Mar.	3,987	-	6,998 (3,011)	176 (76)
1965	2,302	May	2,064	Mar.	3,987	-	8,953 (4,966)	225 (125)
1966	3,987	-	916	Mar.	3,987	-	8,890 (4,903)	223 (123)
1967	2,100	May	1,750	Mar.	3,987	-	7,837 (3,850)	197 (97)
1968	1,088	May	1,155	Mar.	3,987	-	6,231 (2,284)	157 (57)
1969	1,432	May	797	Mar.	3,987	-	6,216 (2,229)	156 (56)
1970	3,987	-	1,869	Feb.	3,987	-	9,843 (5,856)	247 (47)
1971	1,843	May	2,761	Mar.	3,987	-	8,591 (4,604)	215 (115)
1972	3,987	-	3,207	Mar.	3,987	-	11,181 (7,194)	280 (180)
1973	1,979	May	859	Mar.	3,987	-	6,825 (2,838)	171 (71)
1974	1,873	Jul.	1,650	Mar.	3,987	-	7,510 (3,523)	188 (88)
1975	2,302	Jul.	1,613	Mar.	3,987	-	7,902 (3,915)	198 (98)
1976	3,987	Jul.	1,331	Mar.	3,987	-	9,825 (5,298)	233 (133)
1977	1,850	May	909	Mar.	3,987	-	6,746 (2,759)	169 (69)
1978	2,395	Jun.	834	Mar.	3,987	-	7,216 (3,229)	181 (81)
1979	2,450	Jun.	1,192	Mar.	3,987	-	7,629 (3,642)	191 (91)
1980	632	Jun.	1,424	Mar.	3,987	-	6,043 (2,096)	153 (53)
1981	3,987	-	942	Mar.	3,987	-	8,916 (4,929)	224 (124)
1982	1,016	Jul.	800	Mar.	3,987	-	5,803 (1,816)	146 (46)
1983	439	Jul.	1,092	Mar.	3,987	-	5,518 (1,531)	138 (38)
1984	3,987	-	591	Mar.	3,987	-	8,565 (4,578)	215 (115)
1985								
Average	2,284		1,381		3,987		7,652 (3,665)	192 (92)

Table 7.10 Possibly Maximum Irrigation Area
(Dependability of 80%)

Name of System	Service Area (ha)	Irrigation Area (ha)			
		Cropping Pattern-A		Cropping Pattern-B	
		Paddy	Beans	Paddy	Beans
Dummun RIS	2,070	1,390(0.67)	2,070(1.00)	2,420(1.17)	-
Baggao IS	1,812	1,790(0.99)	1,812(1.00)	2,308(1.27)	-
Pared Area	549	1,030(1.88)	549(1.00)	1,098(2.00)	-
Paranan Area	1,263	760(0.60)	1,263(1.00)	1,210(0.96)	-
Solana-Tugeugarao IS[/1]	2,829	3,630(1.28)	2,829(1.00)	3,610(1.28)	-
Pinacanauan RIS	1,200	2,400(2.00)	1,200(1.00)	2,400(2.00)	-
Tumauini IS	3,987	2,290(0.57)	3,987(1.00)	3,820(0.96)	-

Note:

- Figures in parentheses show multi-cropping index.
- Out of the Solana-Tuguegarao service area (3,143 ha), Solana area of 314 ha is abandoned due to change of land use.
- Annual irrigation area is estimated assuming that present pump capacity will be restored to the nominal one.

Table 7.11 (1/2) Diversion Water Requirement
(Cropping Pattern-A)

Dummun RIS

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.18	2.2	3.25	.26	3.38	1.75	2.53	2.67	.51	.3	1.19	1.34
1964	2.73	2.64	3.21	.29	2.72	3.32	4.03	1.34	.48	.3	.03	1.22
1965	.42	2.07	3.12	.28	2.83	1.66	2.12	2.25	.5	.3	.03	1.75
1966	2.74	2.79	3.02	.26	2.29	3.45	3.33	2.59	.5	.3	.03	1.39
1967	3.03	2.57	3	.24	3.34	1.38	3.42	.63	.49	.3	.63	1.35
1968	2.39	2.76	2.89	.25	3.19	2.47	1.42	1.03	.47	.49	.82	2.43
1969	2.45	2.95	3.02	.28	3.16	2.82	1.95	2.99	.48	.3	.03	1.47
1970	.87	2.82	2.25	.26	2.91	2.45	3.47	1.52	.56	.3	.03	1.52
1971	.88	2.24	2.4	.27	3.32	2.95	1.52	1.9	.55	.3	.03	1.38
1972	1.65	1.56	2.51	.27	2.49	3.49	2.8	1.56	.83	.3	.03	2.39
1973	1.86	3.12	2.99	.29	3.31	1.96	2.3	1.49	.51	.3	.03	1.77
1974	1.57	2.57	3.23	.29	3.35	3.85	3.83	1.54	.51	.3	.03	1.61
1975	1.06	2.63	3.12	.27	2.68	2.87	3.27	1.54	.66	.3	.23	1.62
1976	2.7	3.15	3.21	.28	2.73	3.6	3.73	1.46	.52	.3	.03	2.06
1977	1.52	2.6	3.23	.28	3.21	3.02	2	2.71	.48	.3	.03	2.55
1978	2.56	2.35	2.92	.28	2.6	3.09	3.72	1.15	.49	.3	.03	1.83
1979	2.84	2.21	3.25	.28	2.36	3.94	2.07	1.83	.61	.3	.03	2.22
1980	2.13	3.07	2.98	.28	2.55	4.09	1.54	2.85	.5	.3	.03	1.28
1981	2.25	3.06	2.99	.27	1.96	1.73	3.35	1.5	.44	.3	.03	1.71
1982	2.19	3.03	3.23	.24	3.33	2.16	2.22	2.25	.6	.3	.03	1.18
1983	.58	2.78	2.89	.28	3.36	3.22	4.12	2.59	.5	.3	.03	1.4
1984	1.82	2.81	2.27	.21	2.38	1.45	2.2	1.47	.64	.3	.03	1.25
AVERAGE	1.83	2.68	2.95	.27	2.89	2.72	2.82	1.82	.52	.31	.13	1.67

Baggao IS (Pared Area)

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	.7	.76	.8	.07	.83	.5	.48	.67	.13	.31	.27	.35
1964	.7	.69	.74	.07	.75	.63	.59	.23	.14	.08	.01	.46
1965	.63	.76	.79	.07	.69	.71	.37	.55	.13	.16	.01	.63
1966	.7	.74	.72	.07	.51	.65	.55	.32	.17	.08	.01	.37
1967	.69	.78	.8	.04	.75	.39	.94	.24	.15	.06	.01	.65
1968	.69	.68	.79	.06	.77	.52	.53	.19	.13	.25	.26	.67
1969	.71	.79	.8	.06	.74	.62	.29	.64	.16	.11	.01	.55
1970	.61	.78	.58	.07	.62	.8	.59	.48	.14	.08	.01	.39
1971	.7	.68	.79	.07	.72	.66	.46	.63	.13	.08	.01	.37
1972	.53	.76	.74	.07	.66	.6	.51	.33	.14	.29	.04	.61
1973	.68	.77	.76	.07	.71	.6	.84	.34	.15	.08	.01	.57
1974	.7	.73	.81	.06	.73	.65	.9	.5	.13	.08	.01	.42
1975	.71	.79	.75	.07	.66	.65	.99	.35	.15	.08	.15	.49
1976	.66	.79	.74	.06	.62	.52	.9	.41	.15	.08	.01	.57
1977	.67	.78	.8	.07	.75	.71	.43	.41	.12	.19	.01	.64
1978	.7	.77	.78	.06	.68	.84	.62	.23	.13	.08	.01	.5
1979	.69	.75	.8	.07	.65	.91	.47	.62	.15	.08	.01	.54
1980	.71	.72	.71	.07	.65	.98	.32	.51	.15	.08	.01	.51
1981	.7	.78	.8	.07	.6	.46	.97	.33	.14	.08	.01	.65
1982	.69	.77	.8	.06	.65	.82	.91	.41	.14	.08	.01	.47
1983	.56	.78	.77	.07	.77	.91	.94	.56	.14	.08	.16	.66
1984	.71	.79	.79	.06	.61	.58	.63	.15	.18	.08	.1	.49
AVERAGE	.67	.76	.77	.07	.69	.67	.64	.42	.14	.12	.05	.52

Baggao IS (Paranan Area)

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.71	1.86	1.95	.17	2.04	1.22	1.18	1.65	.31	.71	.62	.86
1964	1.72	1.68	1.83	.17	1.93	1.56	1.45	.57	.22	.19	.02	1.13
1965	1.55	1.87	1.95	.17	1.69	1.75	.9	1.34	.31	.37	.02	1.54
1966	1.72	1.81	1.76	.16	1.26	1.59	1.35	.79	.4	.19	.02	.9
1967	1.68	1.91	1.97	.11	1.85	.95	2.3	.58	.35	.19	.02	1.58
1968	1.7	1.92	1.94	.15	1.89	1.28	1.3	.46	.3	.58	.6	1.63
1969	1.74	1.93	1.97	.16	1.82	1.52	.71	1.57	.31	.25	.02	1.34
1970	1.48	1.92	1.41	.16	1.51	1.95	1.45	1.18	.33	.19	.02	.95
1971	1.71	1.68	1.94	.17	1.76	1.63	1.13	1.54	.31	.19	.02	.9
1972	1.31	1.87	1.83	.17	1.62	1.46	1.33	.93	.33	.66	.08	1.48
1973	1.66	1.89	1.88	.17	1.74	1.46	2.05	.84	.36	.19	.02	1.38
1974	1.73	1.92	1.98	.16	1.78	1.6	2.22	1.22	.31	.19	.02	1.04
1975	1.74	1.93	1.85	.17	1.63	1.6	2.38	.85	.36	.19	.35	1.07
1976	1.61	1.93	1.8	.16	1.52	1.27	1.97	1.01	.35	.19	.02	1.4
1977	1.64	1.92	1.97	.17	1.84	1.73	1.06	1.02	.27	.43	.02	1.55
1978	1.73	1.88	1.9	.15	1.67	2.07	1.52	.57	.31	.19	.02	1.22
1979	1.69	1.84	1.97	.16	1.6	2.23	1.14	1.53	.35	.19	.02	1.33
1980	1.74	1.77	1.79	.17	1.6	2.41	.78	1.25	.35	.19	.02	1.25
1981	1.72	1.91	1.96	.16	1.47	1.14	2.38	.82	.33	.19	.02	1.58
1982	1.7	1.88	1.97	.15	1.59	2.01	2.23	1	.32	.19	.02	1.16
1983	1.37	1.92	1.88	.17	1.89	2.23	2.3	1.37	.32	.19	.37	1.6
1984	1.74	1.93	1.95	.14	1.5	1.41	1.54	.37	.43	.19	.24	1.21
AVERAGE	1.65	1.87	1.88	.16	1.69	1.64	1.58	1.02	.33	.27	.12	1.28

Table 7.11 (2/2) Diversion Water Requirement
(Cropping Pattern-A)

Solana-Tuguegarao IS

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	3.83	4.18	4.37	.39	4.58	2.73	2.65	3.7	.69	1.59	1.4	1.93
1964	3.85	3.77	4.09	.39	4.11	3.48	3.24	1.27	.72	.42	.04	2.84
1965	3.48	4.2	4.36	.33	3.78	3.92	2.01	3.01	.69	.82	.04	3.45
1966	3.85	4.06	3.95	.35	2.81	3.55	3.03	1.76	.89	.42	.04	2.01
1967	3.76	4.28	4.41	.29	4.14	2.14	5.15	1.3	.78	.42	.04	3.55
1968	3.81	4.3	4.34	.34	4.23	2.87	2.92	1.04	.67	1.29	1.35	3.64
1969	3.91	4.32	4.42	.35	4.07	3.42	1.6	3.52	.7	.57	.04	3.01
1970	3.34	4.3	3.16	.37	3.39	4.38	3.24	2.63	.73	.42	.04	2.13
1971	3.83	3.75	4.34	.38	3.95	3.64	2.53	3.45	.69	.42	.04	2.01
1972	2.93	4.2	4.09	.37	3.62	3.28	2.99	2.08	.75	1.48	.19	3.32
1973	3.72	4.24	4.2	.39	3.9	3.28	4.6	1.89	.81	.42	.04	3.1
1974	3.87	4.3	4.44	.33	3.99	3.58	4.97	2.74	.69	.42	.04	2.32
1975	3.91	4.32	4.14	.39	3.65	3.58	5.33	1.91	.81	.42	.78	2.39
1976	3.6	4.32	4.04	.36	3.4	2.84	4.42	2.26	.78	.42	.04	3.13
1977	3.68	4.3	4.42	.33	4.13	3.87	2.37	2.28	.6	.97	.04	3.48
1978	3.87	4.22	4.26	.31	3.74	4.63	3.4	1.27	.68	.42	.04	2.73
1979	3.79	4.12	4.41	.35	3.58	4.99	2.55	3.43	.78	.42	.04	2.98
1980	3.91	3.98	3.92	.38	3.58	5.41	1.74	2.79	.78	.42	.04	2.8
1981	3.85	4.28	4.39	.37	3.29	2.55	5.33	1.84	.73	.42	.04	3.53
1982	3.81	4.22	4.42	.33	3.57	4.51	4.99	2.24	.71	.42	.04	2.6
1983	3.07	4.3	4.22	.38	4.23	4.99	5.15	3.06	.72	.42	.82	3.59
1984	3.91	4.32	4.36	.31	3.35	3.16	3.44	.82	.95	.42	.53	2.7
AVERAGE	3.71	4.19	4.22	.36	3.78	3.67	3.53	2.29	.74	.61	.26	2.86

Pinacanauan RIS

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.62	1.77	1.86	.17	1.94	1.16	1.12	1.57	.29	.67	.59	.82
1964	1.63	1.6	1.73	.16	1.74	1.48	1.37	.54	.31	.18	.02	1.08
1965	1.48	1.78	1.85	.16	1.6	1.66	.85	1.28	.29	.35	.02	1.47
1966	1.63	1.72	1.67	.15	1.19	1.51	1.29	.75	.36	.18	.02	.85
1967	1.6	1.81	1.87	.1	1.76	.91	2.18	.55	.33	.18	.02	1.5
1968	1.61	1.82	1.84	.14	1.79	1.22	1.24	.44	.28	.55	.57	1.55
1969	1.66	1.83	1.88	.15	1.73	1.45	.68	1.49	.3	.24	.02	1.28
1970	1.42	1.82	1.34	.15	1.44	1.86	1.37	1.12	.31	.18	.02	.9
1971	1.62	1.59	1.84	.16	1.68	1.55	1.07	1.46	.29	.18	.02	.85
1972	1.24	1.78	1.73	.16	1.54	1.39	1.27	.88	.32	.63	.08	1.41
1973	1.58	1.8	1.78	.17	1.66	1.39	1.95	.8	.34	.18	.02	1.31
1974	1.64	1.82	1.88	.15	1.69	1.52	2.11	1.16	.29	.18	.02	.99
1975	1.66	1.83	1.75	.17	1.55	1.52	2.26	.81	.34	.18	.33	1.01
1976	1.53	1.83	1.71	.15	1.44	1.21	1.87	.96	.33	.18	.02	1.33
1977	1.56	1.82	1.88	.16	1.75	1.64	1.01	.97	.26	.41	.02	1.48
1978	1.64	1.79	1.81	.14	1.58	1.96	1.44	.54	.29	.18	.02	1.16
1979	1.61	1.75	1.87	.15	1.52	2.12	1.08	1.46	.33	.18	.02	1.26
1980	1.66	1.69	1.66	.16	1.52	2.29	.74	1.18	.33	.18	.02	1.19
1981	1.65	1.81	1.86	.16	1.39	1.08	2.26	.78	.31	.18	.02	1.5
1982	1.61	1.79	1.88	.14	1.51	1.91	2.12	.95	.3	.18	.02	1.1
1983	1.3	1.82	1.79	.16	1.79	2.12	2.18	1.3	.3	.18	.35	1.52
1984	1.66	1.83	1.85	.13	1.42	1.34	1.46	.35	.4	.18	.22	1.15
AVERAGE	1.57	1.78	1.79	.15	1.6	1.56	1.5	.97	.32	.26	.11	1.21

Tumauini IS

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	5.05	4.15	5.85	.52	5.55	2.49	3.5	1.84	.98	.59	.44	2.79
1964	4.76	4.18	5.45	.51	4.57	3.52	3.73	3.21	.94	.59	.06	2.71
1965	5.36	6.03	6.25	.5	5.71	4.07	3.6	4.09	1.05	.59	.06	3.79
1966	5.36	5.89	6.19	.51	4.36	4.01	5.4	4.66	1.22	.59	.06	2.33
1967	4.53	5.35	5.92	.43	5.96	3.91	4.27	3.76	1.03	.59	.06	4.32
1968	5.19	5.72	6.14	.46	5.84	3.04	5.3	2.16	.98	.98	.5	3.79
1969	5.02	6.03	5.52	.52	5.28	5.88	7.67	2.66	1.04	.59	.06	2.56
1970	3.96	5.18	5.72	.43	6.37	4.39	6.26	2.89	.99	.59	.06	2.44
1971	3.33	5.12	3.68	.55	4.58	3.14	3.5	2.61	.93	.59	.06	2.19
1972	2.96	5.83	5.99	.34	4.16	5.3	5.81	4.29	1.1	1.43	.06	4.52
1973	5.25	5.94	5.94	.55	5.76	2.53	5.17	2.89	1.08	.59	.06	3.34
1974	4.7	5.69	6.25	.53	5.17	3.98	6.26	4.16	1.02	.59	.06	2.47
1975	4.16	6	6.19	.51	5.06	5.04	5.56	4.74	1.09	.59	1.1	2.61
1976	3.82	5.69	5.68	.46	4.38	3.94	6.1	2.94	1	.59	.06	2.81
1977	3.93	5.6	6.14	.53	4.79	7.17	6.45	4.39	.97	1.82	.06	4.8
1978	5.45	5.94	6.25	.54	5.09	7.36	6.81	2.61	.96	.59	.06	3.41
1979	5.45	5.86	6.01	.45	4.33	3.98	2.41	3.39	.95	.59	.06	4.6
1980	4.79	5.77	5.74	.5	5.49	7.78	4.95	5.46	1.09	.59	.06	3.06
1981	4.62	6.03	6.21	.53	5.76	3.75	4.47	2.96	1.02	.59	.06	4.29
1982	5.13	5.92	6.16	.47	5.47	5.3	7.48	3.24	.99	.59	.06	3.53
1983	3.53	5.83	6.08	.5	5.15	6.55	7.16	4.29	1.06	.59	.06	4.6
1984	4.76	5.83	4.59	.39	4.33	3.91	3.89	2.96	1.29	.59	1.88	3.32
AVERAGE	4.6	5.62	5.82	.49	5.14	4.59	5.26	3.46	1.04	.7	.22	3.39

Table 7.12 (1/2) Diversion Water Requirement
(Cropping Pattern-B)

Dummun RIS

UNIT: m^3/s

	JAN	FEB	MAR	APP	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.12	2.33	1.53	0	1.13	2.21	2.44	3.37	.63	0	.83	1.12
1964	2.66	2.76	1.51	0	.96	3.58	3.94	1.7	.45	0	.46	.91
1965	.37	3.19	1.47	0	.99	2.32	2.83	2.85	.59	0	.65	1.84
1966	2.67	2.91	1.42	0	.85	3.7	3.24	3.27	.59	0	.46	1.19
1967	1.96	2.69	1.42	0	1.12	1.09	3.32	.8	.5	0	.61	1.13
1968	2.23	2.88	1.37	0	1.08	2.84	1.33	1.3	.39	0	.83	2.7
1969	2.39	3.07	1.42	0	1.07	3.15	1.66	3.78	.45	0	.56	1.35
1970	.81	2.94	1.08	0	1.01	2.83	3.37	1.93	.94	0	.46	1.43
1971	.83	2.37	1.15	0	1.11	3.26	1.43	2.4	.87	0	.47	1.18
1972	1.59	1.7	1.2	0	.9	3.73	2.71	1.98	.78	0	.62	2.64
1973	1.8	3.23	1.41	0	1.11	2.4	3.21	1.88	.66	0	.46	1.87
1974	1.5	2.69	1.52	0	1.12	4.05	3.74	1.94	.63	0	.49	1.6
1975	1	2.75	1.47	0	1	3.19	3.17	1.94	1.23	0	.71	1.61
1976	2.63	3.26	1.51	0	.96	2.96	3.64	1.85	.72	0	.56	2.26
1977	1.46	2.72	1.52	0	1.08	3.32	1.91	3.42	.49	0	.56	2.83
1978	2.49	2.47	1.38	0	.93	3.38	3.62	1.45	.51	0	.59	1.98
1979	2.77	2.34	1.53	0	.87	4.12	1.98	1.3	1.11	0	.5	2.44
1980	2.06	3.19	1.41	0	.92	4.25	1.45	3.6	.61	0	.51	1
1981	2.18	3.17	1.41	0	.76	2.2	3.26	1.89	.23	0	.62	1.78
1982	2.12	3.14	1.52	0	1.11	2.58	2.13	2.85	1.08	0	.62	.84
1983	.53	2.9	1.37	0	1.12	3.5	4.02	3.27	.58	0	.53	1.22
1984	1.76	2.92	1.09	0	.87	1.95	2.11	1.86	1.19	0	.51	.95
AVERAGE	1.77	2.8	1.4	0	1	3.06	2.72	2.3	.69	0	.57	1.63

Baggao IS (Pared Area)

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	.72	.84	.4	0	.3	.65	.49	.91	.16	0	.21	.33
1964	.73	.76	.37	0	.27	.77	.6	.31	.2	0	.12	.33
1965	.66	.85	.4	0	.26	.85	.37	.74	.16	0	.18	.74
1966	.73	.82	.36	0	.21	.78	.56	.43	.32	0	.12	.36
1967	.71	.86	.4	0	.28	.54	.97	.32	.26	0	.18	.76
1968	.72	.86	.4	0	.28	.67	.54	.25	.14	0	.21	.78
1969	.74	.87	.4	0	.27	.76	.29	.86	.18	0	.16	.64
1970	.63	.86	.29	0	.24	.92	.6	.65	.21	0	.15	.4
1971	.72	.76	.4	0	.27	.8	.47	.85	.17	0	.12	.36
1972	.55	.85	.37	0	.25	.74	.56	.51	.22	0	.19	.71
1973	.7	.85	.38	0	.26	.74	.87	.46	.29	0	.12	.66
1974	.73	.86	.41	0	.27	.79	.94	.67	.16	0	.13	.46
1975	.74	.87	.38	0	.25	.79	1.01	.47	.29	0	.2	.49
1976	.68	.87	.37	0	.24	.66	.83	.55	.26	0	.15	.67
1977	.7	.86	.4	0	.27	.84	.44	.56	.06	0	.17	.75
1978	.73	.85	.39	0	.26	.97	.64	.31	.15	0	.16	.58
1979	.72	.83	.4	0	.25	1.05	.47	.84	.26	0	.16	.64
1980	.74	.8	.36	0	.25	1.1	.31	.69	.26	0	.15	.59
1981	.73	.86	.4	0	.23	.61	1.01	.45	.21	0	.15	.76
1982	.72	.85	.4	0	.25	.95	.94	.55	.18	0	.15	.55
1983	.58	.86	.39	0	.28	1.03	.97	.75	.19	0	.2	.77
1984	.74	.87	.4	0	.24	.72	.64	.2	.35	0	.2	.57
AVERAGE	.7	.84	.39	0	.26	.8	.66	.56	.21	0	.16	.6

Baggao IS (Paranan Area)

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.67	1.94	.92	0	.68	1.48	1.13	2.09	.38	0	.49	.76
1964	1.67	1.76	.86	0	.63	1.78	1.39	.72	.45	0	.28	1.23
1965	1.51	1.94	.92	0	.59	1.95	.84	1.7	.37	0	.42	1.71
1966	1.67	1.88	.83	0	.48	1.8	1.3	1	.75	0	.28	.82
1967	1.64	1.98	.93	0	.63	1.25	2.24	.74	.6	0	.41	1.75
1968	1.66	1.99	.91	0	.64	1.54	1.25	.59	.32	0	.49	1.8
1969	1.7	2	.93	0	.63	1.75	.66	1.99	.41	0	.37	1.48
1970	1.45	1.99	.68	0	.55	2.12	1.39	1.49	.49	0	.34	.92
1971	1.67	1.75	.91	0	.61	1.84	1.08	1.95	.38	0	.28	.82
1972	1.27	1.94	.86	0	.57	1.7	1.28	1.18	.52	0	.43	1.64
1973	1.62	1.96	.88	0	.61	1.7	2	1.07	.66	0	.28	1.53
1974	1.68	1.99	.93	0	.62	1.81	2.16	1.55	.37	0	.3	1.07
1975	1.7	2	.87	0	.58	1.81	2.32	1.08	.66	0	.46	1.12
1976	1.57	2	.85	0	.55	1.53	1.92	1.28	.61	0	.35	1.54
1977	1.6	1.99	.93	0	.63	1.93	1.01	1.29	.15	0	.4	1.72
1978	1.68	1.95	.9	0	.59	2.22	1.46	.72	.36	0	.37	1.33
1979	1.65	1.91	.93	0	.57	2.36	1.09	1.94	.6	0	.37	1.46
1980	1.7	1.85	.83	0	.57	2.52	.72	1.58	.6	0	.35	1.37
1981	1.67	1.98	.92	0	.54	1.41	2.32	1.04	.48	0	.35	1.75
1982	1.66	1.95	.93	0	.57	2.18	2.17	1.27	.42	0	.35	1.26
1983	1.33	1.99	.89	0	.64	2.36	2.24	1.73	.44	0	.47	1.78
1984	1.7	2	.92	0	.54	1.65	1.48	.47	.8	0	.45	1.31
AVERAGE	1.61	1.94	.89	0	.59	1.85	1.52	1.29	.49	0	.38	1.37

Table 7.12 (2/2) Diversion Water Requirement
(Cropping Pattern-B)

Solana-Tuguegarao IS

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	3.73	4.34	2.06	0	1.53	3.32	2.52	4.67	.84	0	1.11	1.7
1964	3.75	3.94	1.93	0	1.41	3.98	3.11	1.6	1.01	0	.62	2.75
1965	3.39	4.36	2.05	0	1.33	4.36	1.89	3.8	.84	0	.93	3.83
1966	3.75	4.22	1.87	0	1.08	4.04	2.91	2.23	1.67	0	.63	1.84
1967	3.67	4.44	2.07	0	1.42	2.81	5.02	1.65	1.35	0	.92	3.91
1968	3.71	4.46	2.05	0	1.44	3.44	2.8	1.31	.72	0	1.1	4.04
1969	3.81	4.48	2.08	0	1.4	3.92	1.48	4.45	.92	0	.84	3.31
1970	3.25	4.46	1.51	0	1.23	4.76	3.11	3.33	1.09	0	.76	2.06
1971	3.73	3.92	2.05	0	1.37	4.12	2.41	4.36	.86	0	.62	1.84
1972	2.84	4.36	1.93	0	1.29	3.8	2.86	2.63	1.15	0	.96	3.68
1973	3.63	4.4	1.98	0	1.36	3.8	4.48	2.39	1.47	0	.62	3.42
1974	3.77	4.46	2.09	0	1.38	4.06	4.84	3.46	.84	0	.68	2.39
1975	3.81	4.48	1.95	0	1.29	4.06	5.2	2.41	1.47	0	1.04	2.52
1976	3.51	4.48	1.91	0	1.23	3.42	4.29	2.86	1.36	0	.78	3.45
1977	3.59	4.46	2.08	0	1.42	4.32	2.25	2.88	.33	0	.9	3.86
1978	3.77	4.38	2.01	0	1.31	4.98	3.27	1.6	.8	0	.84	2.98
1979	3.69	4.28	2.07	0	1.27	5.3	2.43	4.34	1.34	0	.82	3.28
1980	3.81	4.14	1.85	0	1.27	5.65	1.62	3.53	1.35	0	.79	3.06
1981	3.75	4.44	2.07	0	1.2	3.17	5.2	2.32	1.08	0	.78	3.91
1982	3.71	4.38	2.08	0	1.27	4.08	4.86	2.84	.93	0	.79	2.82
1983	2.98	4.46	1.99	0	1.44	5.3	5.02	3.87	.98	0	1.04	3.98
1984	3.81	4.48	2.05	0	1.22	3.7	5.32	1.04	1.8	0	1.01	2.94
AVERAGE	3.61	4.36	1.99	0	1.33	4.14	3.4	2.89	1.1	0	.84	3.07

Pinacanauan RIS

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	1.58	1.84	.87	0	.65	1.41	1.07	1.98	.36	0	.47	.72
1964	1.59	1.67	.82	0	.6	1.69	1.32	.68	.43	0	.26	1.16
1965	1.44	1.85	.87	0	.56	1.85	.8	1.61	.35	0	.4	1.62
1966	1.59	1.79	.79	0	.46	1.71	1.23	.95	.71	0	.27	.78
1967	1.56	1.88	.88	0	.6	1.19	2.13	.7	.57	0	.39	1.66
1968	1.57	1.89	.87	0	.61	1.46	1.19	.56	.31	0	.47	1.71
1969	1.62	1.9	.88	0	.59	1.66	.63	1.89	.39	0	.36	1.41
1970	1.38	1.89	.64	0	.52	2.02	1.32	1.41	.46	0	.32	.87
1971	1.58	1.66	.87	0	.58	1.75	1.02	1.85	.36	0	.26	.78
1972	1.21	1.85	.82	0	.55	1.61	1.22	1.12	.49	0	.41	1.56
1973	1.54	1.86	.84	0	.58	1.61	1.9	1.01	.62	0	.24	1.45
1974	1.6	1.89	.89	0	.59	1.72	2.05	1.47	.35	0	.29	1.01
1975	1.62	1.9	.83	0	.55	1.72	2.21	1.02	.62	0	.44	1.07
1976	1.49	1.9	.81	0	.52	1.45	1.82	1.21	.58	0	.33	1.47
1977	1.52	1.89	.88	0	.6	1.83	.96	1.22	.14	0	.38	1.64
1978	1.6	1.86	.85	0	.56	2.11	1.39	.68	.34	0	.35	1.26
1979	1.56	1.81	.88	0	.54	2.25	1.03	1.84	.57	0	.35	1.39
1980	1.62	1.75	.79	0	.54	2.4	.69	1.5	.57	0	.34	1.3
1981	1.59	1.88	.88	0	.51	1.34	2.21	.98	.46	0	.33	1.66
1982	1.57	1.86	.88	0	.54	2.07	2.06	1.2	.4	0	.33	1.19
1983	1.27	1.89	.84	0	.61	2.25	2.13	1.64	.42	0	.44	1.69
1984	1.62	1.9	.87	0	.52	1.57	1.41	.44	.76	0	.43	1.25
AVERAGE	1.53	1.85	.84	0	.56	1.76	1.45	1.23	.47	0	.36	1.3

Tumauini IS

UNIT: m^3/s

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1963	4.92	4.4	2.76	0	1.93	3.51	3.33	2.32	1.23	0	1.38	2.52
1964	4.63	4.43	2.58	0	1.67	4.41	3.56	4.06	.98	0	.88	2.37
1965	5.23	6.25	2.94	0	1.97	4.88	3.43	5.17	1.65	0	1.21	4.12
1966	5.23	6.11	2.91	0	1.82	4.83	5.22	5.89	2.25	0	.89	1.7
1967	4.4	5.58	2.79	0	2.03	4.74	4.1	4.76	1.49	0	1.32	4.79
1968	5.06	5.94	2.89	0	2	3.98	5.12	2.73	1.22	0	1.38	4.12
1969	4.89	6.25	2.61	0	1.86	6.45	7.49	3.37	1.56	0	1.08	2.1
1970	3.84	5.41	2.7	0	2.14	5.16	6.08	3.65	1.3	0	1.09	1.9
1971	3.21	5.35	1.79	0	1.68	4.07	3.33	3.3	.94	0	.88	1.55
1972	2.84	6.05	2.82	0	1.57	5.95	5.64	5.42	1.94	0	1.15	5.04
1973	5.11	6.17	2.8	0	1.98	3.54	5	3.65	1.83	0	.68	3.5
1974	4.57	5.91	2.94	0	1.83	4.8	6.08	5.26	1.44	0	.99	1.95
1975	4.03	6.22	2.91	0	1.8	5.72	5.38	5.99	1.84	0	1.46	2.2
1976	3.49	5.91	2.68	0	1.62	4.77	5.92	3.71	1.35	0	.89	2.55
1977	3.81	5.83	2.89	0	1.73	7.57	6.28	5.55	1.18	0	1.13	5.32
1978	5.31	6.17	2.94	0	1.81	7.74	6.63	3.3	1.08	0	1.13	3.62
1979	5.31	6.06	2.83	0	1.61	4.8	2.25	4.28	1.85	0	1.27	5.09
1980	4.66	6	2.71	0	1.91	8.11	4.77	6.9	1.87	0	1.04	3
1981	4.49	6.25	2.92	0	1.98	4.6	4.29	3.74	1.48	0	1.13	4.74
1982	5	6.14	2.9	0	1.91	5.95	7.3	4.09	1.28	0	1.25	3.82
1983	3.41	6.05	2.86	0	1.82	7.04	6.98	5.42	1.8	0	1.34	5.32
1984	4.63	6.05	2.19	0	1.61	4.74	3.72	3.74	2.41	0	1.55	3.45
AVERAGE	4.47	5.84	2.74	0	1.82	5.33	5.09	4.39	1.51	0	1.15	3.4

Table 7.13 Salient Features of Dummun River Irrigation System

Works	Existing Facilities	Proposed Works	
		Rehabilitation	New Construction
1. Dam & Reservoir			
a) Required storage volume (10^6 m³)	-	-	24.1/1 14.2/2
2. Headworks			
a) Intake (Bm x Hm x Nos)	1.3x0.9x3	-	-
3. Irrigation Facilities			
a) Main canal (km)	20.4	18.3	-
b) Lateral/sublateral canals (km)	35.7	22.3	2.7
c) Headgates (Nos)	9	2	-
d) Turnouts (Nos)	66	55	-
e) Other structures (Nos)	194	36	1
4. Drainage Facilities			
a) Drainage canals (km)	25.7	25.7	-
b) Structures (Nos)	7	-	-
5. O & M roads			
a) Roads (km)	35.3	29.5	9.7
b) Gravel metalling (km)	5.8	29.5	9.7
6. On-Farm Facilities			
a) Farm ditches (km)	81.5	65.3	63.4
b) Farm drains (km)	-	-	136.0

Table 7.14 Salient Features of Baggao Irrigation System

Works	Existing Facilities	Proposed Works	
		Rehabilitation	New Construction
1. Dam & Reservoir			
a) Required storage volume (10^6 m³)	-	-	18.1/1 10.1/2
2. Headworks			
a) Intake (Bm x Hm x Nos)			
- Pared	1.2x1.2x1	-	-
- Paranan	1.6x1.4x1	-	-
3. Irrigation Facilities			
a) Main canal (km)	24.8	9.8	-
b) Lateral/sublateral canal (km)	34.7	4.0	-
c) Headgates (Nos)	13	4	-
d) Turnouts (Nos)	76	49	-
e) Other structures (Nos)	303	42	6
4. Drainage Facilities			
a) Drainage canals (km)	13.1	13.1	-
b) Strucutres (Nos)	24	-	-
5. O & M roads			
a) Roads (km)	28.2	3.4	27.9
b) Gravel metalling (km)	24.8	3.4	27.9
6. On-Farm Facilities			
a) Farm ditches (km)	116.0	102.0	11.0
b) Farm drains (km)	-	-	120.0

/1 For cropping pattern-A

/2 For cropping pattern-B

Table 7.15 Salient Features of Pinacanauan Irrigation System

Works	Existing Facilities	Proposed Works	
		Rehabilitation	New Construction
1. Headworks			
a) Intake (Bm x Hm x Nos)	1.4x0.8x2	-	-
2. Irrigation Facilities			
a) Main canal (km)	23.1	8.2	-
b) Lateral/sublateral canal (km)	10.6	6.1	-
c) Headgates (Nos)	5	2	-
d) Turnouts (Nos)	71	71	-
e) Other structures (Nos)	161	29	-
3. Drainage Facilities			
a) Drainage canals (km)	2.9	-	-
b) Structures (Nos)	-	-	-
4. O & M roads			
a) Roads (km)	26.4	25.4	3.3
b) Gravel metalling (km)	1.0	25.4	3.2
5. On-Farm Facilities			
a) Farm ditches (km)	34.7	23.9	49.3
b) Farm drains (km)	-	-	79.0

Table 7.16 Salient Features of Solana-Tuguegarao Irrigation System

Works	Existing Facilities	Proposed Works	
		Rehabilitation	New Construction
1. Pumping Station	(Solana Station)		
a) Pump type	Vertical mixed flow		Vertical mixed flow
b) Bore (mm)	-	-	1,000
c) Pump unit (m^3/min)	78	90	109
d) Pump unit (Nos)	4	4	1
2. Irrigation Facilities			
a) Main canal (km)	18.4	11.4	-
b) Lateral/sublateral canal (km)	25.7	10.9	-
c) Headgates (Nos)	8	8	-
d) Turnouts (Nos)	67	63	-
e) Other structures (Nos)	117	5	2
3. Drainage Facilities			
a) Drainage canals (km)	12.9	12.9	-
b) Structures (Nos)	3	-	-
4. O & M roads			
a) Roads (km)	32.9	16.9	-
b) Gravel metalling (km)	16.0	16.9	-
5. On-Farm Facilities			
a) Farm ditches (km)	118.7	90.2	79.4
b) Farm drains (km)	-	-	187.0

Table 7.17 Salient Features of Tumauini Irrigation System

Works	Existing Facilities	Proposed Works	
		Rehabilitation	New Construction
1. Dam & Reservoir			
a) Required storage volume (10^6 m³)	-	-	(6.9)/1 (4.3)/2
2. Headworks			
a) Intake (Bm x Hm x Nos)	1.2x0.9x4	-	-
3. Booster Pump (Nos)	-	-	(800mm x 4units)/1 (700mm x 4units)/2
4. Irrigation Facilities			
a) Main canal (km)	23.5	9.6	-
b) Lateral/sublateral canal (km)	82.3	29.8	10.0
c) Headgates (Nos)	21	13	3
d) Turnouts (Nos)	183	40	-
e) Other structures (Nos)	322	84	6
5. Drainage Facilities			
a) Drainage canals (km)	23.3	23.3	-
b) Structures (Nos)	11	-	-
6. O & M roads			
a) Roads (km)	52.0	16.4	38.4
b) Gravel metalling (km)	35.5	16.4	38.4
7. On-Farm Facilities			
a) Farm ditches (km)	118.0	41.2	16.1
b) Farm drains (km)	11.6	4.1	252.0

/1 For the cropping pattern-A

/2 For the cropping pattern-B

Table 8.1 Unit Cost for Irrigation System

Work Item	Unit	Unit Cost (₱)		
		F.C.	L.C.	Total
1. Excavation	m^3			
headworks, earth		25	15	40
large canal, earth		15	10	25
small canal, earth		-	30	30
rock		90	60	150
2. Embankment	m^3			
excavated material		15	5	20
borrowed material		40	20	60
3. Backfill	m^3	15	20	35
4. Reinforcement concrete	m^3	850	600	1,450
5. Plain concrete	m^3	800	550	1,350
6. Lining concrete	m^3	800	550	1,350
7. Reinforcement bar	ton	10,600	4,600	15,200
8. Wooden form	m^2	50	200	250
9. Stone masonry	m^3	690	560	1,250
10. Concrete pipe	m			
ϕ400		260	150	410
ϕ500		360	190	550
ϕ600		450	250	700
ϕ700		550	300	850
ϕ800		780	420	1,200
ϕ1,000		910	490	1,400
11. Gravell metalling	m^2	20	15	35

Table 8.2 Project Cost of Each Candidate Scheme (Cropping Pattern-A)

(PATTERN-A) (UNIT:P1000)

WORK ITEMS	CHICO-MALLIG			NATUNO			DABUBU			ZINUNDUNGAN		
	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL
I) DAM												
1) DIRECT COST	-	-	-	-	-	-	10360	8010	18370	-	-	-
2) INDIRECT COST	-	-	-	-	-	-	1470	1580	3050	-	-	-
3) PHYSICAL CONT.	- *	- *	- *	- *	- *	- *	1770	1440	3210	- *	- *	- *
(TOTAL-I)	685060	503620	1188680	387450	190830	578280	13600	11030	24630	128894	97236	226130
II) IRRIGATION												
1) DIRECT COST												
A) DIVER. DAM	-	-	-	87854	61781	149635	13201	14260	27461	-	-	-
B) PUMP STATION	-	-	-	-	-	-	-	-	-	-	-	-
C) DIVER. CANAL	323429	230965	554394	-	-	-	-	-	-	-	-	-
D) IRR. & DRG.	568866	453082	1021948	242531	184775	427306	16322	11352	27674	26303	21893	48196
2) COMPENSATION	0	9162	9162	0	2494	2494	0	156	156	0	405	405
3) O/M FACILITIES	24960	6240	31200	10144	2536	12680	800	200	1000	1400	350	1750
4) ENGNR. SERVICE	103469	25867	129336	37895	9474	47369	3603	900	4503	3222	806	4028
5) ADMINISTRATION	0	113170	113170	0	41448	41448	0	3940	3940	0	3525	3525
(SUB-TOTAL)	1020724	838486	1859210	378424	302508	680932	33926	30808	64734	30925	26979	57904
6) PHYSICAL CONT.	153109	125774	278883	56764	45376	102140	5089	4621	9710	4639	4047	8686
(TOTAL-II)	1173833	964260	2138093	435188	347884	783072	39015	35429	74444	35564	31026	66590
III) GRAND TOTAL	1858893	1467880	3326773	822638	538714	1361352	52615	46459	99074	164458	128262	292720

(UNIT:P1000)

WORK ITEMS	ALCALA-AMULUNG			TUGUEGARAO			LULUTAN			ILAGAN		
	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL
I) DAM												
1) DIRECT COST	-	-	-	-	-	-	-	-	-	-	-	-
2) INDIRECT COST	-	-	-	-	-	-	-	-	-	-	-	-
3) PHYSICAL CONT.	-	-	-	-	-	-	-	-	-	-	-	-
(TOTAL-I)	0	0	0	0	0	0	0	0	0	0	0	0
II) IRRIGATION												
1) DIRECT COST												
A) DIVER. DAM	-	-	-	-	-	-	-	-	-	-	-	-
B) PUMP STATION	86018	10406	96424	30730	4721	35451	51404	8119	59523	21980	2792	24772
C) DIVER. CANAL	-	-	-	-	-	-	-	-	-	-	-	-
D) IRR. & DRG.	127132	96027	223159	21179	16705	37884	44024	31822	75846	55179	41855	97034
2) COMPENSATION	0	1662	1662	0	315	315	0	765	765	0	622	622
3) O/M FACILITIES	5400	1350	6750	1120	280	1400	2360	590	2950	2560	640	3200
4) ENGNR. SERVICE	20992	5248	26240	4803	1201	6004	8901	2225	11126	8040	2010	10050
5) ADMINISTRATION	0	22960	22960	0	5254	5254	0	9736	9736	0	8794	8794
(SUB-TOTAL)	239542	137653	377195	57832	28476	86308	106689	53257	159946	87759	56713	144472
6) PHYSICAL CONT.	35931	20648	56579	8675	4271	12946	16003	7989	23992	13164	8507	21671
(TOTAL-II)	275473	158301	433774	66507	32747	99254	122692	61246	183938	100923	65220	166143
III) GRAND TOTAL	275473	158301	433774	66507	32747	99254	122692	61246	183938	100923	65220	166143

(UNIT:P1000)

WORK ITEMS	GAPPAL (PUMP)			GAPPAL (DAM)			DUMMUN			BAGGAO		
	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL
I) DAM												
1) DIRECT COST	-	-	-	175860	112130	287990	-	-	-	-	-	-
2) INDIRECT COST	-	-	-	23040	33060	56100	-	-	-	-	-	-
3) PHYSICAL CONT.	-	-	-	29830	21780	51610	- *	- *	- *	- *	- *	- *
(TOTAL-I)	0	0	0	228730	166970	395700	205645	148915	354560	206167	149293	355460
II) IRRIGATION												
1) DIRECT COST												
A) DIVER. DAM	-	-	-	-	-	-	-	-	-	-	-	-
B) PUMP STATION	72004	10201	82205	-	-	-	-	-	-	-	-	-
C) DIVER. CANAL	-	-	-	20742	15184	35926	-	-	-	-	-	-
D) IRR. & DRG.	82386	62296	144682	65887	51880	117767	11195	13756	24951	8897	10168	19065
2) COMPENSATION	0	808	808	0	889	889	0	0	0	0	0	0
3) O/M FACILITIES	3520	880	4400	3520	880	4400	828	207	1035	725	181	906
4) ENGNR. SERVICE	14854	3714	18568	10175	2544	12719	1663	416	2079	1278	320	1598
5) ADMINISTRATION	0	16247	16247	0	11129	11129	0	1819	1819	0	1398	1398
(SUB-TOTAL)	172764	94146	266910	100324	82506	182830	13686	16198	29884	10900	12067	22967
6) PHYSICAL CONT.	25914	14122	40036	15049	12376	27425	2053	2430	4483	1635	1810	3445
(TOTAL-II)	198678	108268	306946	115373	94882	210255	15739	18628	34367	12535	13877	26412
III) GRAND TOTAL	198678	108268	306946	344103	261852	605955	221384	167543	388927	218702	163170	381872

(UNIT:P1000)

WORK ITEMS	SOLANA-TUGUEBARAO			PINANCANALIN			TUMAUINI		
	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL
I) DAM									
1) DIRECT COST	-	-	-	-	-	-	40660	27030	67690
2) INDIRECT COST	-	-	-	-	-	-	5420	5180	10600
3) PHYSICAL CONT.	-	-	-	-	-	-	6910	4830	11740
(TOTAL-I)	0	0	0	0	0	0	52990	37040	90030
II) IRRIGATION									
1) DIRECT COST									
A) DIVER. DAM	-	-	-	-	-	-	-	-	-
B) PUMP STATION	23106	5062	28168	-	-	-	91863	14242	106105
C) DIVER. CANAL	-	-	-	-	-	-	-	-	-
D) IRR. & DRG.	11633	14084	25717	8620	8179	16799	61179	48425	109604
2) COMPENSATION	0	0	0	0	0	0	0	346	346
3) O/M FACILITIES	1132	283	1415	480	120	600	1595	399	1994
4) ENGNR. SERVICE	3539	885	4424	1114	278	1392	13955	3489	17444
5) ADMINISTRATION	0	3871	3871	0	1218	1218	0	15263	15263
(SUB-TOTAL)	39410	24185	63595	10214	9795	20009	168592	82164	250756
6) PHYSICAL CONT.	5912	3627	9539	1532	1469	3001	25289	12325	37614
(TOTAL-II)	45322	27812	73134	11746	11264	23010	193881	94489	288370
III) GRAND TOTAL	45322	27812	73134	11746	11264	23010	246871	131529	378400

*:Allocated cost

Table 8.3 Project Cost of Each Candidate Scheme (Cropping Pattern-B)

(PATTERN-B) (UNIT:P1000)

WORK ITEMS	CHICO-MALLIG			MATUNO			DAPUDU			ZINUNDUNGAN		
	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL
I) DAM												
1) DIRECT COST	-	-	-	-	-	-	9720	7510	17230	-	-	-
2) INDIRECT COST	-	-	-	-	-	-	1380	1490	2870	-	-	-
3) PHYSICAL CONT.	- $	- $	- $	- $	- $	- $	1660	1360	3020	- $	- $	- $
(TOTAL-I)	666550	486530	1153080	308510	151950	460460	12760	10360	23120	112518	84882	197400
II) IRRIGATION												
1) DIRECT COST												
A) DIVER. DAM	-	-	-	87054	61781	148835	13201	14260	27461	-	-	-
B) PUMP STATION	-	-	-	-	-	-	-	-	-	-	-	-
C) DIVER. CANAL	323429	230965	554394	-	-	-	-	-	-	-	-	-
D) IRR. & DRG.	568866	453082	1021948	242531	184775	427306	16322	11352	27674	26303	21893	48196
2) COMPENSATION	0	9162	9162	0	2494	2494	0	156	156	0	405	405
3) O/M FACILITIES	24960	6240	31200	10144	2536	12680	800	200	1000	1400	350	1750
4) ENGNR. SERVICE	103469	25867	129336	37895	9474	47369	3603	900	4503	3222	806	4028
5) ADMINISTRATION	0	113170	113170	0	41448	41448	0	3940	3940	0	3525	3525
(SUB-TOTAL)	1020724	838486	1859210	378424	302508	680932	33926	30808	64734	30925	26979	57904
6) PHYSICAL CONT.	153109	125774	278883	56764	45376	102140	5089	4621	9710	4639	4047	8686
(TOTAL-II)	1173833	964260	2138093	435188	347884	783072	39015	35429	74444	35564	31026	66590
III) GRAND TOTAL	1840383	1450790	3291173	743698	499834	1243532	51775	45789	97564	148082	115908	263990

(UNIT:P1000)

WORK ITEMS	ALCALA-ANULUNG			TUGUEGARAO			LIBLUTAN			ILAGAN		
	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL
I) DAM												
1) DIRECT COST	-	-	-	-	-	-	-	-	-	-	-	-
2) INDIRECT COST	-	-	-	-	-	-	-	-	-	-	-	-
3) PHYSICAL CONT.	-	-	-	-	-	-	-	-	-	-	-	-
(TOTAL-I)	0	0	0	0	0	0	0	0	0	0	0	0
II) IRRIGATION												
1) DIRECT COST												
A) DIVER. DAM	-	-	-	-	-	-	-	-	-	-	-	-
B) PUMP STATION	86018	10406	96424	30730	4721	35451	51404	8119	59523	23837	2978	26815
C) DIVER. CANAL	-	-	-	-	-	-	-	-	-	-	-	-
D) IRR. & DRG.	127132	96027	223159	21179	16705	37884	44024	31822	75846	53258	40378	93636
2) COMPENSATION	0	1662	1662	0	315	315	0	765	765	0	560	560
3) O/M FACILITIES	5400	1350	6750	1120	280	1400	2360	590	2950	2560	640	3200
4) ENGNR. SERVICE	20992	5248	26240	4803	1201	6004	8901	2225	11126	7949	1987	9936
5) ADMINISTRATION	0	22960	22960	0	5254	5254	0	9736	9736	0	8695	8695
(SUB-TOTAL)	239542	137653	377195	57832	28476	86308	106689	53257	159946	87604	55238	142842
6) PHYSICAL CONT.	35931	20648	56579	8675	4271	12946	16003	7989	23992	13141	8286	21427
(TOTAL-II)	275473	158301	433774	66507	32747	99254	122692	61246	183938	100745	63524	164269
III) GRAND TOTAL	275473	158301	433774	66507	32747	99254	122692	61246	183938	100745	63524	164269

(UNIT:P1000)

WORK ITEMS	GAPPAL (PUMP)			GAPPAL (DAM)			DUMMON			BAGGAO		
	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL
I) DAM												
1) DIRECT COST	-	-	-	165160	104570	269730	-	-	-	-	-	-
2) INDIRECT COST	-	-	-	21590	30660	52250	-	-	-	-	-	-
3) PHYSICAL CONT.	-	-	-	28010	20280	48290	- $	- $	- $	- $	- $	- $
(TOTAL-I)	0	0	0	214760	155510	370270	181320	131300	312620	162939	117991	280930
II) IRRIGATION												
1) DIRECT COST												
A) DIVER. DAM	-	-	-	-	-	-	-	-	-	-	-	-
B) PUMP STATION	72004	10201	82205	-	-	-	-	-	-	-	-	-
C) DIVER. CANAL	-	-	-	20742	15184	35926	-	-	-	-	-	-
D) IRR. & DRG.	82386	62296	144682	65887	51880	117767	11195	13756	24951	8897	10168	19065
2) COMPENSATION	0	808	808	0	889	889	0	0	0	0	0	0
3) O/M FACILITIES	3520	880	4400	3520	880	4400	828	207	1035	725	181	906
4) ENGNR. SERVICE	14854	3714	18568	10175	2544	12719	1663	416	2079	1278	320	1598
5) ADMINISTRATION	0	16247	16247	0	11129	11129	0	1819	1819	0	1398	1398
(SUB-TOTAL)	172764	94146	266910	100324	82506	182830	13686	16198	29884	10900	12067	22967
6) PHYSICAL CONT.	25914	14122	40036	15049	12376	27425	2053	2430	4483	1635	1810	3445
(TOTAL-II)	198678	108268	306946	115373	94882	210255	15739	18626	34367	12535	13877	26412
III) GRAND TOTAL	198678	108268	306946	330133	250392	580525	197059	149928	346987	175474	131868	307342

(UNIT:P1000)

WORK ITEMS	SOLANA-TUGUEGARAO			PINANCANALIN			TUNAUIN1		
	FC	LC	TOTAL	FC	LC	TOTAL	FC	LC	TOTAL
I) DAM									
1) DIRECT COST	-	-	-	-	-	-	31600	20650	52250
2) INDIRECT COST	-	-	-	-	-	-	4180	4020	8200
3) PHYSICAL CONT.	-	-	-	-	-	-	5370	3700	9070
(TOTAL-I)	0	0	0	0	0	0	41150	28370	69520
II) IRRIGATION									
1) DIRECT COST									
A) DIVER. DAM	-	-	-	-	-	-	-	-	-
B) PUMP STATION	23106	5062	28168	-	-	-	82419	12876	95295
C) DIVER. CANAL	-	-	-	-	-	-	-	-	-
D) IRR. & DRG.	11633	14084	25717	8620	8179	16799	57812	45895	103707
2) COMPENSATION	0	0	0	0	0	0	0	311	311
3) O/M FACILITIES	1132	283	1415	480	120	600	1595	399	1994
4) ENGNR. SERVICE	3539	885	4424	1114	278	1392	12884	3221	16105
5) ADMINISTRATION	0	3871	3871	0	1218	1218	0	14092	14092
(SUB-TOTAL)	39410	24185	63595	10214	9795	20009	154710	76794	231504
6) PHYSICAL CONT.	5912	3627	9539	1532	1469	3001	23207	11519	34726
(TOTAL-II)	45322	27812	73134	11746	11264	23010	177917	88313	266230
III) GRAND TOTAL	45322	27812	73134	11746	11264	23010	219067	116683	335750

$:Allocated cost

Table 8.4 Summary of Cost Allocation
(Chico Mallig IP, Cropping Pattern-A)

Unit: ₱10^6

Description	Flood Control	Irrigation	Power	Total
1. Cost to be allocated				4,060.71
a. Construction cost				(3,715.25)
b. OMR cost (capitalized)				(345.46)
2. Benefits (capitalized)	784.62	9,954.67		10,739.29
3. Alternative costs	443.03	3,631.40		4,074.43
4. Justifiable expenditure	443.03	3,631.40		4,074.43
5. Separable costs	94.01	3,360.14		3,454.15
a. Construction costs	(83.85)	(3,090.31)		(3,174.16)
b. OMR cost (capiterized)	(10.16)	(269.83)		(279.99)
6. Remaining justifiable expenditure	349.02	271.26		620.28
7. Per cent distribution	56.3	43.7		100.0
8. Remaining joint costs	341.49	265.07		606.56
a. Construction costs	(304.63)	(236.46)		(541.09)
b. OMR costs	(36.86)	(28.61)		(65.47)
9. Total allocated cost	435.50	3,625.21		4,060.71
a. Construction costs	(388.48)	(3,326.77)		(3,715.25)
b. OMR costs	(47.02)	(298.44)		(345.46)
10. Annual OMR cost	3.89	24.66		28.55

Table 8.5 Summary of Cost Allocation
(Chico Mallig IP, Cropping Pattern-B)

Unit: ₱10^6

Description	Flood Control	Irrigation	Power	Total
1. Cost to be allocated				4,031.45
a. Construction cost				(3,689.14)
b. OMR cost (capitalized)				(342.31)
2. Benefits (capitalized)	784.62	5,884.71		6,669.33
3. Alternative costs	443.03	3,582.40		4,025.43
4. Justifiable expenditure	443.03	3,582.40		4,025.43
5. Separable costs	119.69	3,330.88		3,450.57
a. Construction costs	(106.74)	(3,064.20)		(3,170.94)
b. OMR cost (capiterized)	(12.95)	(266.68)		(279.63)
6. Remaining justifiable expenditure	323.34	251.52		574.86
7. Per cent distribution	56.2	43.8		100.0
8. Remaining joint costs	326.45	254.43		580.88
a. Construction costs	(291.23)	(226.97)		(518.20)
b. OMR costs	(35.22)	(27.46)		(62.68)
9. Total allocated cost	446.14	3,585.31		4,031.45
a. Construction costs	(397.97)	(3,291.17)		(3,689.14)
b. OMR costs	(48.17)	(294.14)		(342.31)
10. Annual OMR cost	3.98	24.31		28.29

Table 8.6 Summary of Cost Allocation
(Matuno RIP, Cropping Pattern-A)

Unit: P10^6

Description	Hydropower	Irrigation		Water Supply		Total
		Matuno	Magat	Matuno	Magat	
1. Cost to be allocated						6,862.64
a. Construction cost						(5,855.07)
b. OMR cost (capiterized)						(1,007.57)
2. Benefit (capitalized)	6,554.57	3,514.81	534.58	119.79	204.97	10,928.72
3. Alternative costs	6,554.57	2,163.40	534.58	119.79	204.97	9,577.31
4. Justifiable expenditure	6,554.57	2,163.40	534.58	119.79	204.97	9,577.31
5. Separable costs	3,257.33	870.07	0	0	0	4,127.40
a. Construction costs	(2,632.00)	(783.07)	(0)	(0)	(0)	(3,415.07)
b. OMR cost (capitalized)	(625.33)	(87.00)	(0)	(0)	(0)	(712.33)
6. Remaining justifiable expenditure	3,297.24	1,293.33	534.58	119.79	204.97	5,449.91
7. Per cent distribution	60.5	23.7	9.8	2.2	3.8	100
8. Remaining joint costs	1,654.82	648.25	268.05	60.18	103.94	2,735.24
a. Construction costs	(1,476.20)	(578.28)	(239.12)	(53.68)	(92.72)	(2,440.00)
b. OMR costs	(178.62)	(69.97)	(28.93)	(6.50)	(11.22)	(295.24)
9. Total allocated cost	4,912.15	1,518.32	268.05	60.18	103.94	6,862.64
a. Construction costs	(4,108.20)	(1,361.35)	(239.12)	(53.68)	(92.72)	(5,855.07)
b. OMR costs	(803.95)	(156.97)	(28.93)	(6.50)	(11.22)	(1,007.57)
10. Annual OMR cost	66.44	12.97	2.39	0.54	0.93	83.27

Table 8.7 Summary of Cost Allocation
(Matuno RIP, Cropping Pattern-B)

Unit: P10^6

Description	Hydropower	Irrigation		Water Supply		Total
		Matuno	Magat	Matuno	Magat	
1. Cost to be allocated						6,862.64
a. Construction cost						(5,855.07)
b. OMR cost (capiterized)						(1,007.57)
2. Benefit (capitalized)	6,554.57	1,910.35	534.58	119.79	204.97	9,324.26
3. Alternative costs	6,554.57	1,992.74	534.58	119.79	204.97	9,406.65
4. Justifiable expenditure	6,554.57	1,910.35	534.58	119.79	204.97	9,324.26
5. Separable costs	3,557.76	870.07	0	0	0	4,427.83
a. Construction costs	(2,900.00)	(783.07)	(0)	(0)	(0)	(3,683.07)
b. OMR cost (capitalized)	(657.76)	(87.00)	(0)	(0)	(0)	(744.76)
6. Remaining justifiable expenditure	2,996.81	1,040.28	534.58	119.79	204.97	4,896.43
7. Per cent distribution	61.2	21.2	10.9	2.5	4.2	100
8. Remaing joint costs	1,490.10	516.18	265.40	60.87	102.26	2,434.81
a. Construction costs	(1,329.27)	(460.46)	(236.75)	(54.3)	(91.22)	(2,172.00)
b. OMR costs	(160.83)	(55.72)	(28.65)	(6.57)	(11.04)	(262.81)
9. Total allocated cost	5,047.86	1,386.25	265.40	60.87	102.26	6,862.64
a. Construction costs	(4,229.27)	(1,243.53)	(236.75)	(54.30)	(91.22)	(5,855.07)
b. OMR costs	(818.59)	(142.72)	(28.65)	(6.57)	(11.04)	(1,007.57)
10. Annual OMR cost	67.65	11.80	2.37	0.54	0.91	83.27

Table 8.8 Summary of Cost Allocation
(Zinundungan IEP, Cropping Pattern-A)

Unit: ₱10⁶

Description	Irrigation	Power	Total
1. Cost to be allocated			474.21
a. Construction cost			(418.06)
b. OMR cost (capitalized)			(56.15)
2. Benefits (capitalized)	520.66	160.57	
3. Alternative costs	376.36	160.57	536.93
4. Justifiable expendeture	376.36	160.57	
5. Separable costs	77.24	49.69	126.93
a. Construction costs	(66.59)	(41.70)	(108.29)
b. OMR cost (capiterized)	(10.65)	(7.99)	(18.64)
6. Remaining justifiable expenditure	299.12	110.88	410.00
7. Per cent distribution	73.0	27.0	100.0
8. Remaining joint costs	253.51	93.77	347.28
a. Construction costs	(226.13)	(83.64)	(309.77)
b. OMR costs	(27.38)	(10.13)	(37.51)
9. Total allocated cost	330.75	143.46	474.21
a. Construction costs	(292.72)	(125.34)	(418.06)
b. OMR costs	(38.03)	(18.12)	(56.15)
10. Annual OMR cost	3.14	1.50	4.64

Table 8.9 Summary of Cost Allocation
(Zinundungan IEP, Cropping Pattern-B)

Unit: ₱10⁶

Description	Irrigation	Power	Total
1. Cost to be allocated			434.11
a. Construction cost			(383.29)
b. OMR cost (capitalized)			(50.82)
2. Benefits (capitalized)	310.12	140.12	
3. Alternative costs	340.75	140.12	480.87
4. Justifiable expendeture	310.12	140.12	
5. Separable costs	77.24	49.56	126.80
a. Construction costs	(66.59)	(42.54)	(109.13)
b. OMR cost (capiterized)	(10.65)	(7.02)	(17.67)
6. Remaining justifiable expenditure	232.88	90.56	323.44
7. Per cent distribution	72.0	28.0	100.0
8. Remaining joint costs	221.27	86.04	307.31
a. Construction costs	(197.40)	(76.76)	(274.16)
b. OMR costs	(23.87)	(9.28)	(33.15)
9. Total allocated cost	298.51	135.60	434.11
a. Construction costs	(263.99)	(119.30)	(383.29)
b. OMR costs	(34.52)	(16.30)	(50.82)
10. Annual OMR cost	2.85	1.35	4.20

Table 8.10 Summary of Cost Allocation
(Dummun RIS, Cropping Pattern-A)

Unit: ₱10⁶

Description	Irrigation	Power	Total
1. Cost to be allocated			511.21
a. Construction cost			(449.38)
b. OMR cost (capitalized)			(61.83)
2. Benefits (capitalized)	569.91	66.31	
3. Alternative costs	424.42	66.31	490.73
4. Justifiable expendeture	424.42	66.31	
5. Separable costs	45.74	28.23	73.97
a. Construction costs	(34.37)	(24.96)	(59.33)
b. OMR cost (capiterized)	(11.37)	(3.27)	(14.64)
6. Remaining justifiable expenditure	378.68	38.08	416.76
7. Per cent distribution	90.9	9.1	100.0
8. Remaining joint costs	397.46	39.78	437.24
a. Construction costs	(354.56)	(35.49)	(390.05)
b. OMR costs	(42.90)	(4.29)	(47.19)
9. Total allocated cost	443.20	68.01	511.21
a. Construction costs	(388.93)	(60.45)	(449.38)
b. OMR costs	(54.27)	(7.56)	(61.83)
10. Annual OMR cost	4.49	0.62	5.11

Table 8.11 Summary of Cost Allocation
(Dummun RIS, Cropping Pattern-B)

Unit: ₱10⁶

Description	Irrigation	Power	Total
1. Cost to be allocated			471.30
a. Construction cost			(414.20)
b. OMR cost (capitalized)			(57.10)
2. Benefits (capitalized)	269.35	58.32	
3. Alternative costs	388.41	58.32	446.73
4. Justifiable expendeture	269.35	58.32	
5. Separable costs	45.74	28.69	74.43
a. Construction costs	(34.37)	(25.79)	(60.16)
b. OMR cost (capiterized)	(11.37)	(2.90)	(14.27)
6. Remaining justifiable expenditure	223.61	29.63	253.24
7. Per cent distribution	88.3	11.7	100.0
8. Remaining joint costs	350.44	46.43	396.87
a. Construction costs	(312.62)	(41.42)	(354.04)
b. OMR costs	(37.82)	(5.01)	(42.83)
9. Total allocated cost	396.18	75.12	471.30
a. Construction costs	(346.99)	(67.21)	(414.20)
b. OMR costs	(49.19)	(7.91)	(57.10)
10. Annual OMR cost	4.07	0.65	4.72

Table 8.12 Summary of Cost Allocation (Baggao IS, Cropping Pattern-A)

Unit: ₱10⁶

Description	Irrigation	Power	Total
1. Cost to be allocated			513.41
a. Construction cost			(450.98)
b. OMR cost (capitalized)			(62.43)
2. Benefits (capitalized)	472.26	78.05	
3. Alternative costs	428.97	78.05	507.02
4. Justifiable expendeture	428.97	78.05	
5. Separable costs	36.21	25.88	62.09
a. Construction costs	(26.41)	(22.01)	(48.42)
b. OMR cost (capiterized)	(9.80)	(3.87)	(13.67)
6. Remaining justifiable expenditure	392.76	52.17	444.93
7. Per cent distribution	88.3	11.7	100.0
8. Remaining joint costs	398.52	52.80	451.32
a. Construction costs	(355.46)	(47.10)	(402.56)
b. OMR costs	(43.06)	(5.70)	(48.76)
9. Total allocated cost	434.73	78.68	513.41
a. Construction costs	(381.87)	(69.11)	(450.98)
b. OMR costs	(52.86)	(9.57)	(62.43)
10. Annual OMR cost	4.37	0.79	5.16

Table 8.13 Summary of Cost Allocation (Baggao IS, Cropping Pattern-B)

Unit: ₱10⁶

Description	Irrigation	Power	Total
1. Cost to be allocated			447.99
a. Construction cost			(393.18)
b. OMR cost (capitalized)			(54.81)
2. Benefits (capitalized)	216.71	66.67	
3. Alternative costs	370.69	66.67	437.36
4. Justifiable expendeture	216.71	66.67	
5. Separable costs	36.21	25.88	62.09
a. Construction costs	(26.41)	(22.49)	(48.90)
b. OMR cost (capiterized)	(9.80)	(3.39)	(13.19)
6. Remaining justifiable expenditure	180.50	40.79	221.29
7. Per cent distribution	81.6	18.4	100.0
8. Remaining joint costs	314.89	71.01	385.90
a. Construction costs	(280.93)	(63.35)	(344.28)
b. OMR costs	(33.96)	(7.66)	(41.62)
9. Total allocated cost	351.10	96.89	447.99
a. Construction costs	(307.34)	(85.54)	(393.18)
b. OMR costs	(43.76)	(11.05)	(54.81)
10. Annual OMR cost	3.62	0.91	4.53

Table 8.14 Annual Operation & Maintenance Costs
(Irrigation System)

UNIT: 10^6P

CHICO		MATUNO		DABUBU		ZINUNDUNGAN		ALCALA-AMULUNG	
A	B	A	B	A	B	A	B	A	B
12.48	12.48	5.07	5.07	0.62	0.61	0.70	0.70	28.83	26.42

TUGUEGARAO		LULUTAN		ILAGAN		GAPPAL-PUMP		GAPPAL-DAM	
A	B	A	B	A	B	A	B	A	B
3.69	3.56	11.73	10.70	5.01	5.01	20.35	18.38	1.76	1.76

DUMMUN		BAGGAO		SOLANA-TUGUEGARAO		PINACANAUAN		TUMAUINI	
A	B	A	B	A	B	A	B	A	B
0.83	0.83	0.72	0.72	11.49	10.14	0.48	0.48	13.84	11.54

A; In case of the cropping pattern-A

B; In case of the cropping pattern-B

Table 8.15 Replacement Costs (Irrigation System)

Unit: ₱10⁶

Name of Schemes	Pump & Others(25)*	Gate for Canals(25)*	Gate for Intake(25)*	Rabber Dam(25)*	O&M Equipment(10)*
Chico Mallig	-	21.70	-	-	31.20
Matuno	-	13.55	25.16	5.77	12.68
Dabubu	-	0.55	1.25	-	1.00
Zinundungan	-	1.30	-	-	1.75
Alcala Amulung West	75.58	5.10	-	-	6.75
Tugulgarao	27.09	0.75	-	-	1.40
Lulutan	46.69	2.00	-	-	2.95
Ilagan (Pattern-A)**	18.91	1.34	-	-	3.09
Ilagan (Pattern-B)	20.59	1.24	-	-	3.09
Gappal (Pump)	65.45	3.40	-	-	4.40
Gappal (Dam, Pattern-A)	-	2.60	-	-	4.40
Gappal (Dam, Pattern-B)	-	2.70	-	-	4.00
Dummun	-	0.55	-	-	1.04
Baggao	-	0.61	-	-	0.91
Solana-Tuguegarao	66.02	0.76	-	-	1.41
Pinancanauan	-	0.77	-	-	0.60
Tumauini (Pattern-A)	75.09	1.88	-	-	1.92
Tumauini (Pattern-B)	67.46	1.74	-	-	1.92

*: Durable year

**: Cropping Pattern

Table 8.16 Annual OMR Costs for Dams

Unit: ₱10⁶

Name of Schemes	Name of Dam	OMR Costs A	OMR Costs B
Chico-Mallig IP	Mallig No.2	11.88*	11.53*
Matuno RIP	Matuno No.1	5.78*	4.61*
Dabubu RIP	Dabubu	0.22	0.21
Zinundungan IEP	Zinundungan	2.26*	1.97*
Gappal IP	Colorado, Calaocan, & Sta Maria	3.55	3.33
Dummun RIS	Dummun	3.55*	3.13*
Baggao IS	Paranan	3.56*	2.81*
Tumauini IS		0.82	0.64

* Allocated OMR costs

Table 8.17 Economic Cost of Each Candidate Scheme

UNIT;P10^6

ITEMS	CHICO-MALLIG		MATUNO		DABUBU		ZINUNDUNGAN		ALCALA- AMULUNG	
	PAT-A	PAT-B	PAT-A	PAT-B	PAT-A	PAT-B	PAT-A	PAT-B	PAT-A	PAT-B
1. DAM	1098.03	1065.50	543.93	433.11	22.38	20.98	208.63	182.12	0.00	0.00
2. IRRIGATION	1888.78	1888.78	718.10	718.10	67.94	67.94	60.67	60.67	403.91	403.91
GRAND-TOTAL	2986.81	2954.28	1262.03	1151.21	90.32	88.92	269.30	242.79	403.91	403.91

UNIT;P10^6

ITEMS	TUGUEGARAO		LULUTAN		ILAGAN		GAPPAL PUMP		GAPPAL DAM	
	PAT-A	PAT-B	PAT-A	PAT-B	PAT-A	PAT-B	PAT-A	PAT-B	PAT-A	PAT-B
1. DAM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	355.05	332.62
2. IRRIGATION	93.09	93.09	172.29	172.29	153.88	152.37	286.80	286.80	192.46	192.46
GRAND-TOTAL	93.09	93.09	172.29	172.29	153.88	152.37	286.80	286.80	547.51	525.08

UNIT;P10^6

ITEMS	DUMUN		BAGAO		SOLANA TUGUEGARAO		PINANCANAUAN		TUMAUINI	
	PAT-A	PAT-B	PAT-A	PAT-B	PAT-A	PAT-B	PAT-A	PAT-B	PAT-A	PAT-B
1. DAM	327.76	288.99	328.59	259.69	0.00	0.00	0.00	0.00	82.94	64.07
2. IRRIGATION	31.03	31.03	23.91	23.91	68.13	68.13	20.98	20.98	271.08	250.08
GRAND-TOTAL	358.79	320.02	352.50	283.60	68.13	68.13	20.98	20.98	354.02	314.15

Table 9.1 Monthly Pan Evaporation (EP)

(mm/month)

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sep.	Oct.	Nov.	Dec.
Consuelo/Sto. Domingo	121	139	178	200	192	177	169	144	161	133	120	121
Wacal/Baretbet	99	105	169	177	186	186	175	166	147	140	107	96
Sto. Domingo/Wacal/Baretbet	111	119	178	191	189	188	177	168	158	148	118	113
Baligatan	115	129	186	219	220	183	174	158	153	143	111	102
Echague/Baligatan	104	119	175	194	194	162	162	144	141	126	104	96
Consuelo	109	129	161	180	189	162	158	115	141	102	99	96
Echague	93	109	164	168	167	141	149	130	129	109	96	90
Bontoc	121	123	130	129	93	105	78	96	108	99	87	93
Alimanao/Tuguegarao	116	136	183	204	206	174	172	150	137	133	107	99
Alimanao	152	154	205	234	233	192	186	171	174	164	135	136
Tuguegarao	81	118	161	174	100	156	158	130	99	102	78	61

Table 9.2 General Relationship Between Soil Moisture and the Feel and Appearance of the Soil

Moisture between Wilting Point and Field Capacity:	Feel or Appearance			
	Coarse Soil	Light Soil	Medium Soil	Heavy & Very Heavy Soils
0 (wilting point)	Dry, loose, single grained, flows through fingers	Dry, loose, flows through fingers	Dry, sometimes crusted but breaks down easily to powder condition	Hard, baked, cracked, sometimes has loose crumbs on surface
50% or less	Appears dry, will not form a ball	Appears dry, will not form a ball	Somewhat crumbly, holds together under pressure	Somewhat pliable balls under pressure
50%-75%	Same as above	Tends to ball under pressure, but seldom holds	Forms ball, somewhat plastic, will sometimes stick with pressure	Forms ball, ribbons out between thumb and forefinger
75% to field capacity	Tends to stick together, sometimes forms very weak ball under pressure	Forms weak ball, breaks easily, will not stick	Forms ball, very pliable, slicks readily if high in clay	Easily ribbons out between fingers, has slick feeling
Field capacity	Wet outline of ball	Same as coarse soil	Same as coarse soil	Same as coarse soil
Above field capacity	Appearance of free water when soil is balled in hand	Free water released with kneading	Can squeeze out water	Puddles and free water forms on surface

Source; IR-312

Table 9.3 General Physical Properties of Soils for Irrigation and Drainage

Soil Texture	Infiltration[b] and Permeability (cm/hr) I_f	Total Pore Space % N	Apparent Specific Gravity A_s	Field Capacity % FC	Permanent Wilting Point, % PWP	Total Available Moisture[c]		
						By Weight % $P_w = FC - PWP$	By Volume % $P_v = P_w A_s$	Soil Moisture Expressed as Depth of Water cm/meter $d = \frac{P_w}{100} \times A_s D^*$
Sandy	5 (2.5-25)	38 (32-42)	1.65 (1.55-1.8)	9 (6-12)	4 (2.6)	5 (4-6)	8 (6-10)	8 (7-10)
Sandy Loam	2.5 (1.3-7.6)	43 (40-47)	1.50 (1.40-1.6)	14 (10-18)	6 (4-8)	8 (6-10)	12 (9-15)	12 (9-15)
Loam	1.3 (0.8-2.0)	47 (43-49)	1.40 (1.35-1.5)	22 (18-26)	10 (8-12)	12 (10-14)	17 (14-20)	17 (14-19)
Clay Loam	0.8 (0.25-1.5)	49 (47-51)	1.35 (1.30-1.4)	27 (23-31)	13 (11-15)	14 (12-16)	19 (16-22)	19 (17-22)
Silty Clay	0.25 (0.03-0.5)	51 (49-53)	1.30 (1.30-1.4)	31 (27-35)	15 (13-17)	16 (14-18)	21 (18-23)	21 (18-23)
Clay	0.05 (0.01-0.1)	53 (51-55)	1.25 (1.20-1.3)	35 (31-39)	17 (15-19)	18 (16-20)	23 (20-25)	23 (20-25)

[a] Israelsen and Hansen, 1962.

[b] Intake rates vary greatly with soil moisture and structural stability even beyond the normal ranges shown above.

[c] Normal ranges are shown in parenthesis; readily available moisture ranges from 50%-57% of the total available moisture.

*Depth of root zone.

Source; IR-312

Table 9.4 Potential Effective Rainfall

Station:APARRI unit:mm/month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% *
1963	113	65	0	30	1	142	102	36	127	81	0	142	839	53.4
1964	9	35	3	0	82	48	12	138	159	161	210	158	1015	35.9
1965	164	6	11	4	68	135	127	68	134	89	95	86	987	51.7
1966	8	25	20	30	134	40	54	42	135	148	210	136	982	44.1
1967	56	40	21	51	6	164	49	193	151	187	116	141	1175	42.8
1968	38	27	31	39	24	99	169	162	169	50	20	20	848	45.2
1969	27	14	20	3	28	78	137	11	159	146	140	124	887	48.5
1970	134	23	86	25	59	100	46	124	75	159	210	118	1159	42.9
1971	133	62	73	16	9	70	163	95	86	203	202	137	1249	43.5
1972	81	108	64	19	109	38	86	121	102	105	110	24	967	59.9
1973	67	3	22	0	10	129	56	127	122	210	210	84	1040	33.2
1974	87	40	1	6	5	16	24	123	128	174	186	105	895	46.4
1975	121	36	11	20	62	75	58	123	24	146	59	104	839	56.0
1976	11	1	3	3	80	91	30	129	112	141	142	54	797	53.1
1977	90	38	1	4	22	66	134	33	152	80	142	10	772	50.9
1978	20	55	28	5	96	62	31	153	149	180	128	75	982	47.4
1979	1	64	0	10	125	11	130	162	46	156	173	40	918	45.5
1980	49	6	23	8	102	2	162	22	132	161	170	151	988	44.2
1981	41	7	22	23	174	143	53	126	196	73	110	91	1059	46.1
1982	45	9	1	52	8	117	121	68	51	87	108	166	833	54.0
1983	153	26	31	2	4	54	7	42	136	174	160	194	923	44.7
1984	70	24	85	81	123	160	122	128	31	129	167	155	1275	48.9
Average	69	32	25	20	61	84	85	101	117	138	139	103	974	47.2

Station:TUAO unit:mm/month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% *
1963	8	33	5	7	37	157	136	64	67	28	8	128	678	50.8
1964	6	8	54	10	50	125	72	148	132	127	210	94	1036	42.7
1965	24	14	6	77	138	120	162	102	131	33	68	23	898	51.7
1966	1	5	13	131	160	83	129	126	54	106	188	79	1075	48.0
1967	7	4	6	103	63	150	97	141	118	173	93	26	981	49.5
1968	20	5	3	50	64	97	74	183	133	27	3	0	659	48.8
1969	6	1	2	15	60	83	185	20	126	90	89	50	727	50.2
1970	32	3	23	25	142	50	62	137	101	152	148	92	967	49.8
1971	23	34	23	0	68	120	133	54	114	170	176	113	1028	48.7
1972	35	5	33	52	121	67	139	132	47	12	66	26	735	55.2
1973	18	8	17	3	34	143	102	157	107	191	194	48	1022	42.8
1974	13	4	2	56	125	52	25	126	126	175	160	110	974	48.8
1975	28	2	14	28	130	137	93	147	25	159	28	82	873	49.4
1976	33	2	40	7	127	131	120	128	63	115	140	46	952	54.6
1977	29	10	13	7	65	127	130	121	141	9	80	9	741	54.2
1978	8	3	17	22	101	83	126	175	133	157	53	62	940	48.6
1979	2	21	2	33	96	25	133	26	91	125	123	65	742	56.9
1980	16	7	25	16	139	52	143	89	82	164	125	48	906	49.9
1981	14	4	12	26	121	145	100	126	105	131	130	7	921	53.7
1982	9	7	0	88	137	102	87	113	121	118	125	77	984	57.3
1983	42	1	23	4	31	60	92	114	115	133	51	133	799	56.3
1984	6	3	10	119	134	147	95	168	13	123	82	54	949	50.7
Average	17	8	16	40	97	103	111	118	98	114	106	62	890	50.8

* Ratio to the actual rainfall

Table 9.5 Potential Effective Rainfall

Station:TUGUEGARAO unit:mm/month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% *
1963	4	7	4	1	5	127	138	33	130	9	9	132	599	51.8
1964	3	27	22	4	47	94	112	170	109	127	210	73	998	40.6
1965	21	6	5	6	76	75	166	72	131	44	76	12	690	51.5
1966	3	13	31	22	162	91	121	142	26	100	203	124	1038	46.4
1967	7	2	2	128	44	153	28	168	66	205	80	7	890	43.1
1968	5	1	6	45	96	121	126	189	145	23	11	0	702	47.2
1969	0	0	1	32	50	97	184	43	121	57	113	41	739	51.1
1970	28	1	81	21	111	55	112	93	99	167	144	112	1024	52.7
1971	4	28	6	6	61	87	143	47	128	193	210	124	1037	40.0
1972	48	6	22	15	90	103	123	124	91	16	65	20	723	59.0
1973	9	4	15	0	65	103	52	135	51	179	210	35	858	40.6
1974	2	1	0	33	57	90	36	87	131	180	178	93	888	46.5
1975	0	0	19	0	88	90	20	134	51	180	36	86	704	49.7
1976	15	0	25	29	110	122	60	114	65	123	136	33	832	57.2
1977	11	1	1	11	45	77	150	113	195	36	89	10	739	46.8
1978	2	5	11	44	80	44	105	170	136	136	114	60	907	50.8
1979	6	10	2	27	94	28	142	48	68	137	121	43	726	54.0
1980	0	17	33	11	94	10	178	84	67	147	130	55	826	48.8
1981	3	2	3	19	120	135	20	138	100	134	136	7	817	51.9
1982	5	5	1	51	95	49	35	115	119	111	132	69	787	58.2
1983	41	1	14	5	36	28	28	69	113	147	33	3	518	54.3
1984	0	0	5	68	114	108	103	195	10	121	48	62	834	50.8
Average	10	6	14	26	76	86	99	113	98	117	113	55	813	49.7

Station:NANENG unit:mm/month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% *
1963	9	38	5	6	52	139	146	164	138	46	56	116	915	48.6
1964	17	7	34	13	141	155	141	146	163	136	210	148	1311	41.4
1965	59	38	30	97	98	96	199	144	148	81	41	50	1081	48.3
1966	43	32	48	40	210	149	165	159	80	107	184	145	1362	41.1
1967	122	30	14	94	83	140	150	154	156	159	136	105	1343	47.5
1968	15	0	57	91	134	145	128	202	155	50	36	21	1034	45.6
1969	9	1	16	71	131	157	169	135	126	159	81	54	1109	46.8
1970	31	6	105	24	161	104	103	42	135	184	156	122	1173	47.2
1971	58	56	29	12	123	164	158	112	145	169	162	103	1291	45.7
1972	26	6	20	118	169	124	135	137	123	35	53	35	981	50.9
1973	5	3	41	39	36	182	109	153	154	158	145	29	1054	43.9
1974	61	7	9	78	55	110	128	154	136	178	155	101	1172	47.7
1975	86	1	12	52	136	172	179	135	117	137	51	99	1177	47.2
1976	49	0	64	0	129	161	138	148	134	91	84	51	1049	49.6
1977	19	18	25	38	114	140	123	132	85	8	76	10	788	55.0
1978	2	2	7	39	88	61	141	190	170	157	12	21	890	42.9
1979	14	2	22	14	32	123	136	84	29	105	144	73	772	53.9
1980	13	20	14	2	116	122	130	71	45	153	188	46	920	48.2
1981	17	2	11	4	114	129	148	134	75	145	210	36	1025	38.2
1982	17	6	1	116	137	164	104	210	210	210	159	32	1366	30.6
1983	13	1	24	11	57	65	101	138	186	175	210	2	983	39.0
1984	2	1	25	14	111	66	47	57	6	130	95	63	617	58.1
Average	31	13	28	44	110	130	135	136	123	126	120	66	1064	46.2

* Ratio to the actual rainfall

Table 9.6 Potential Effective Rainfall

Station:ILAGAN unit:mm/month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% *
1963	16	68	18	19	62	169	145	168	126	103	58	127	1079	48.0
1964	26	67	36	22	124	137	138	113	149	131	210	133	1286	45.0
1965	5	2	0	30	52	120	142	78	89	66	105	63	752	56.6
1966	5	7	3	25	137	122	86	55	35	107	205	160	947	46.1
1967	34	26	15	70	36	125	121	91	103	94	74	36	825	59.1
1968	11	13	5	52	44	152	89	155	127	50	57	63	818	50.8
1969	17	2	33	18	79	64	15	135	97	135	142	144	881	51.1
1970	54	32	24	69	10	110	59	126	120	175	138	152	1069	49.7
1971	76	34	116	0	123	149	145	137	152	210	210	182	1534	40.0
1972	89	9	12	124	150	82	73	70	63	35	121	26	854	55.5
1973	9	5	14	0	49	168	93	126	73	164	210	88	999	41.9
1974	28	14	0	11	86	123	59	75	108	210	167	150	1031	40.4
1975	47	3	3	21	93	90	81	52	72	138	35	140	775	54.6
1976	59	14	26	53	136	124	64	124	116	105	206	126	1153	49.9
1977	55	17	5	12	110	24	53	66	131	24	126	15	638	56.9
1978	2	5	0	8	91	18	42	137	140	136	128	83	790	52.0
1979	2	8	11	61	139	123	179	106	142	78	88	24	961	49.4
1980	25	11	23	32	66	5	100	23	69	141	151	108	754	52.7
1981	31	2	2	12	49	130	115	123	104	128	128	38	862	56.1
1982	13	6	4	48	67	82	21	112	122	75	94	75	719	59.6
1983	69	9	8	30	87	43	31	70	76	126	68	15	632	58.9
1984	26	9	75	94	139	125	133	123	21	176	11	90	1022	50.5
Average	32	16	20	37	88	104	90	103	102	119	124	93	926	51.1

Station:SONTOC unit:mm/month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% *
1963	0	9	8	0	125	160	181	138	122	0	65	104	912	46.9
1964	0	0	19	18	137	164	133	181	142	130	157	126	1207	44.5
1965	15	0	18	125	144	129	191	105	93	54	7	24	905	48.3
1966	2	11	18	92	159	115	118	162	51	94	158	84	1064	49.1
1967	9	0	6	47	81	152	190	194	186	164	140	1	1170	39.4
1968	9	0	79	102	144	191	174	170	210	56	31	0	1166	38.8
1969	7	0	9	86	145	144	210	128	116	54	66	20	985	38.8
1970	59	3	55	100	170	152	124	161	167	180	112	46	1329	44.4
1971	21	35	36	24	79	112	177	137	149	158	119	24	1071	47.4
1972	14	0	19	129	162	144	210	100	113	2	16	14	923	42.8
1973	0	2	6	67	174	99	126	137	147	181	128	11	1078	45.4
1974	14	3	13	144	114	132	131	170	116	210	146	64	1257	44.8
1975	8	3	20	56	149	125	144	135	138	97	31	41	947	50.3
1976	4	0	58	52	141	185	131	87	143	131	54	15	1001	47.5
1977	14	0	16	76	61	130	164	133	186	35	121	0	936	46.7
1978	0	0	35	78	86	125	160	7	187	4	46	13	741	46.0
1979	11	1	17	102	110	131	123	42	63	85	76	45	806	58.0
1980	19	0	25	33	174	7	199	127	115	149	128	11	987	44.2
1981	5	0	0	9	155	170	108	118	124	94	134	3	920	49.1
1982	0	2	28	63	94	125	100	126	169	56	82	59	904	52.9
1983	16	12	9	11	100	72	155	128	58	126	15	2	704	52.6
1984	9	0	86	92	109	75	99	189	58	116	46	59	938	52.3
Average	11	4	26	68	128	129	152	131	130	99	85	35	998	46.8

* Ratio to the actual rainfall

Table 9.7 Potential Effective Rainfall

Station:NAYON

unit:mm/month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% *
1963	14	62	16	17	56	160	139	160	122	93	53	123	1015	49.9
1964	23	60	32	20	119	132	133	106	143	126	210	128	1232	47.5
1965	111	19	22	52	80	119	141	71	121	36	39	54	865	57.0
1966	16	28	27	35	138	113	77	126	14	36	172	124	906	51.0
1967	85	20	10	63	56	120	127	130	131	133	113	71	1059	55.6
1968	0	1	31	142	86	157	133	172	102	59	30	9	922	47.3
1969	11	7	22	17	95	56	62	69	86	64	57	109	655	60.0
1970	122	4	73	17	67	128	94	86	126	168	143	139	1167	50.8
1971	52	47	67	2	168	71	164	90	147	160	143	95	1206	46.1
1972	84	7	12	50	133	46	136	148	65	19	82	2	784	52.4
1973	1	25	42	0	96	126	57	187	94	149	130	9	916	48.2
1974	45	3	12	40	20	134	78	71	114	161	124	106	908	53.2
1975	103	29	20	3	75	49	82	54	82	80	71	124	772	59.4
1976	0	14	99	63	179	128	92	132	158	115	56	46	1082	49.3
1977	51	17	16	37	137	75	130	132	113	40	129	10	887	54.2
1978	2	22	19	89	80	111	104	135	143	161	78	60	1004	51.8
1979	20	0	24	89	128	152	124	107	136	132	118	33	1063	52.9
1980	0	21	110	55	127	14	130	106	129	154	138	34	1012	52.6
1981	13	26	0	128	168	148	172	109	143	132	105	11	1155	46.3
1982	12	0	120	138	149	105	132	130	120	50	72	31	1059	53.1
1983	27	0	12	6	40	44	63	87	111	146	5	6	547	54.8
1984	6	2	83	107	154	106	141	127	43	142	11	38	960	51.1
Average	36	19	40	53	107	104	114	115	111	107	95	62	963	52.0

Station:CONSUELO

unit:mm/month

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	% *
1963	18	26	3	10	100	206	89	111	166	15	25	91	860	45.9
1964	8	5	27	64	123	153	93	170	137	123	141	88	1132	49.0
1965	14	3	28	79	128	109	141	78	120	48	37	9	794	56.0
1966	18	13	45	20	210	87	115	134	143	39	168	54	1046	44.8
1967	4	6	2	49	30	14	136	164	165	143	148	19	880	44.8
1968	18	0	16	37	107	62	157	175	193	20	69	2	856	43.3
1969	2	3	0	24	110	82	180	145	147	120	70	31	914	48.2
1970	58	3	28	87	96	162	124	133	176	162	120	63	1212	47.6
1971	2	18	15	32	145	136	188	128	138	187	129	91	1209	44.5
1972	43	5	32	29	122	123	210	171	138	0	80	24	977	27.3
1973	16	11	14	44	81	122	111	117	156	199	120	24	1015	48.7
1974	18	3	51	0	107	144	142	0	121	210	190	120	1106	38.6
1975	63	0	18	17	133	82	82	137	142	131	25	88	918	52.9
1976	57	5	26	51	210	210	134	139	138	122	27	9	1129	31.8
1977	4	4	29	1	110	95	133	132	155	28	135	2	828	50.8
1978	1	2	16	21	58	92	129	209	172	192	79	58	1029	41.9
1979	3	0	27	50	85	152	128	124	134	135	35	22	895	51.5
1980	14	7	18	54	121	91	210	99	186	83	210	33	1126	35.1
1981	22	14	0	51	100	164	208	152	166	122	137	20	1156	43.0
1982	4	5	41	42	51	62	169	142	105	100	64	28	813	51.1
1983	43	3	7	1	25	33	155	151	94	148	45	0	705	47.4
1984	6	7	66	110	150	102	80	189	108	188	21	4	1031	45.4
Average	20	7	23	40	109	113	142	136	145	114	94	40	983	45.0

* Ratio to the actual rainfall

Table 10.1 Conditions for Irrigation Water Demand Calculation

Name of System/Scheme	Area Code/Base Point No.	Meteoro Station	Rain Gauge	Irrigation Service Area/Irrigation Area (ha)													
				1985			1990			1995			2000			2005		
				SA	W	D	SA	W	D	SA	W	D	SA	W	D	SA	W	D
CISs	UC-3	Consuelo	Consuelo	1,535	370	330	1,535	1,535	460	1,535	1,535	460	1,535	1,535	460	1,535	1,535	460
CIPs	"	"	"	-	-	-	630	630	189	630	630	189	630	630	189	630	630	189
CISs	UC-4	"	"	531	400	350	531	531	350	531	531	350	531	531	350	531	531	350
CISs	UC-5	"	"	445	110	100	445	445	135	445	445	135	445	445	135	445	445	134
CISs	UC-6B	Echague	Ilagan	1,541	1,220	250	1,541	1,541	462	1,541	1,541	462	1,541	1,541	462	1,541	1,541	462
Dabubu River IP	6	"	"	-	-	-	-	-	-	1,000	See Fig. 10.3		1,000	See Fig. 10.3		1,000	See Fig. 10.3	
CIPs		"	"	-	-	-	-	-	-	1,425	1,425	428	2,850	2,850	855	3,680	3,680	1,104
CISs	UC-7	"	"	2,797	780	680	2,797	2,797	840	2,797	2,797	840	2,797	2,797	840	2,797	2,797	840
CIPs	"	"	"	-	-	-	-	-	-	615	615	185	1,550	1,550	465	1,550	1,550	465
Guppal IP	8	"	"	-	-	-	-	-	-	-	-	-	4,400	See Fig. 10.3		4,400	See Fig. 10.3	
CIPs	UC-8B	"	"	-	-	-	-	-	-	-	-	-	480	480	144	1,050	1,050	315
CIPs	UC-9	"	"	-	-	-	-	-	-	-	-	-	-	-	-	300	300	100
Lulutan IP	15	"	"	-	-	-	-	-	-	-	-	-	2,950	See Fig. 10.3		2,950	See Fig. 10.3	
CISs	M-1	Consuelo, Sto Domingo	Consuelo	10,858	8,040	7,170	10,858	10,858	7,170	10,858	10,858	7,170	10,858	10,858	7,170	10,267	10,267	6,780
CIPs	"	"	"	-	-	-	370	370	111	370	370	111	370	370	111	370	370	111
Matuno IP (Manamtam)	10	Sto Domingo, Wacal, Baretbet	Nayon	-	-	-	-	-	-	-	-	-	-	-	-	1,090	See Fig. 10.3	
Matuno IP (Bayombong)	11	"	"	-	-	-	-	-	-	-	-	-	-	-	-	11,590	See Fig. 10.3	
CISs	M-2	Consuelo, Sto Domingo	"	208	90	110	208	208	110	208	208	110	208	208	110	208	208	110
CISs	M-3	Wacal, Baretbet	"	18,015	12,170	11,370	18,015	18,015	11,370	18,015	18,015	11,370	18,015	18,015	11,370	9,376	9,376	5,918
CIPs	"	"	"	-	-	-	200	200	60	1,000	1,000	300	1,000	1,000	300	1,000	1,000	300
Magat RIS	13	Baligatan, Echague	Ilagan	89,800	65,900	62,488	89,800	89,800	89,800	89,800	89,800	89,800	89,800	89,800	89,800	89,800	89,800	89,800
CISs	M-4	Baligatan	Nayon	1,991	860	1,040	1,991	1,991	1,041	1,991	1,991	1,041	1,991	1,991	1,040	1,991	1,991	1,040
CISs	M-5	"	"	110	50	60	110	110	60	110	110	60	110	110	60	110	110	60
Ilagan IP	18	Echague	Ilagan	-	-	-	-	-	-	-	-	-	3,200	See Fig. 10.3		3,200	See Fig. 10.3	
Tumauini IS (Ilagan)	18	"	"	-	-	-	-	-	-	-	-	-	-	-	-	2,300	2,300	2,300
CISs	I-3	"	"	200	160	30	200	200	60	200	200	60	200	200	60	200	200	60
CISs	I-4	"	"	590	470	100	590	590	177	530	530	160	530	530	160	530	530	160
CIPs	"	"	"	-	-	-	570	570	171	800	800	240	800	800	240	800	800	240

(to be continued)

(continuation)

Name of System/Scheme	Area Code/Base Point No.	Meteoro Station	Rain Gauge	Irrigation Service Area/Irrigation Area (ha)													
				1985			1990			1995			2000			2005		
				SA	W	D	SA	W	D	SA	W	D	SA	W	D	SA	W	D
CISs	S-1	Baligatan	Nayon	967	600	840	967	967	840	967	967	840	967	967	840	967	967	840
SIFFU RIS	29	Baligatan, Echague	Ilagan	12,200	9,100	8,400	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200	12,200
CISs	S-3	Baligatan	Naneng	266	150	110	266	266	110	266	266	110	266	266	110	266	266	110
Mallig RIS	31	Alimanao, Tuguegarao	Ilagan	2,427	1,260	1,050	2,427	2,427	1,214	2,427	2,427	1,214	2,427	2,427	1,214	2,427	2,427	1,214
CISs	S-5	"	"	815	550	230	815	815	245	815	815	245	815	815	245	815	815	245
CIPs	"	"	"	-	-	-	570	570	171	1,600	1,600	480	1,600	1,600	480	1,600	1,600	480
CISs	C-1	Bontoc	Bontoc	1,916	1,300	1,860	1,916	1,916	1,860	1,916	1,916	1,860	1,916	1,916	1,860	1,916	1,916	1,860
CISs	C-2	"	Naneng	1,961	1,020	890	1,961	1,961	890	1,961	1,961	890	1,961	1,961	890	1,961	1,961	890
CISs	C-3	"	"	919	540	440	919	919	440	919	919	440	919	919	440	919	919	440
Chico RIS	23	Alimanao, Tuguegarao	Tuguegarao	18,484	11,210	6,970	18,484	18,484	18,484	18,484	18,484	18,484	18,484	18,484	18,484	18,484	18,484	18,484
Chico Mallig IP	30	"	"	-	-	-	-	-	-	31,200	See Fig. 10.3		31,200	See Fig. 10.3		31,200	See Fig. 10.3	
CISs	C-4	"	"	889	510	360	889	889	360	889	889	360	889	889	360	889	889	360
CISs	C-5	"	"	1,019	580	410	1,019	1,019	410	1,019	1,019	410	1,019	1,019	410	1,019	1,019	410
Chico RIS (Chico West)	25	"	Tuao	1,624	1,330	1,150	1,624	1,624	1,624	1,624	1,624	1,624	1,624	1,624	1,624	1,624	1,624	1,624
CISs	C-6	"	"	2,178	810	1,320	2,178	2,178	1,320	2,178	2,178	1,320	1,818	1,818	1,102	1,818	1,818	1,102
CIPs	"	"	"	-	-	-	570	570	171	1,995	1,995	599	2,350	2,350	705	2,350	2,350	705
CISs	LC-1	"	Ilagan	390	310	60	390	390	117	390	390	117	390	390	117	390	390	117
CIPs	"	"	"	-	-	-	200	200	60	200	200	60	200	200	60	200	200	60
Tumauini IS (Tumauini)	33	"	"	3,987	1,450	1,280	3,987	1,450	1,280	3,987	1,450	1,280	3,987	1,450	1,280	1,687	See Fig. 10.3	
San Pablo-Cabagan IS	34	"	Tuguegarao	2,890	60	50	2,890	2,890	1,445	2,890	2,890	1,445	2,890	2,890	1,445	2,890	2,890	1,445
Pinacanauan RIS	35	"	"	1,200	290	290	1,200	See Fig. 10.3		1,200	See Fig. 10.3		1,200	See Fig. 10.3		1,200	See Fig. 10.3	
CISs	LC-5	"	"	3,060	2,420	490	3,060	3,060	918	3,060	3,060	918	1,742	1,742	523	1,742	1,742	523
CIPs	"	"	"	-	-	-	290	290	87	1,715	1,715	515	3,100	3,100	930	3,100	3,100	930
Tuguegarao IP	36	"	"	-	-	-	-	-	-	-	-	-	1,400	See Fig. 10.3		1,400	See Fig. 10.3	
Sol-Tuguegarao IS	37	"	"	3,143	0	960	3,143	0	960	2,829	See Fig. 10.3		2,829	See Fig. 10.3		3,143	See Fig. 10.3	
AI-Amulung West IP	37	"	"	-	-	-	-	-	-	-	-	-	6,750	See Fig. 10.3		6,750	See Fig. 10.3	
CISs	LC-6	"	"	430	150	250	430	430	250	430	430	250	430	430	250	430	430	250
CIPs	"	"	"	-	-	-	-	-	-	1,175	1,175	353	1,220	1,220	366	1,220	1,220	366
CIADP (Iguig Area)	38	"	"	775	410	400	775	775	775	775	775	775	775	775	775	775	775	775
CISs	LC-7	"	"	482	160	280	482	482	280	482	482	280	60	60	35	60	60	35

(to be continued)

(continuation)

Name of System/Scheme	Area Code/Base Point No.	Meteoro Station	Rain Gauge	Irrigation Service Area/Irrigation Area (ha)														
				1985			1990			1995			2000			2005		
				SA	W	D	SA	W	D"	SA	W	D	SA	W	D	SA	W	D
CIPs	LC-7	Alimanao, Tuguegarao	Tuguegarao	-	-	-	-	-	-	375	375	113	1,800	1,800	540	3,650	3,650	1,095
CIADP (Alcala-Amulung Area)	39	"	"	2,350	1,160	1,180	2,350	2,350	2,350	2,350	2,350	2,350	2,350	2,350	2,350	2,350	2,350	2,350
Baggao IS (Pared Area)	40	"	"	549	460	450	549	460	450	549	460	450	549	460	450	549	See Fig. 10.3	
Baggao IS (Paranan Area)	42	"	"	1,263	850	610	1,263	850	610	1,263	850	610	1,263	850	610	1,263	See Fig. 10.3	
CISs	LC-10	"	"	1,981	670	1,130	1,981	1,981	1,130	1,981	1,981	1,130	1,981	1,981	1,130	1,981	1,981	1,130
CIPs	"	"	"	-	-	-	-	-	-	-	-	-	1,370	1,370	411	3,900	3,900	1,170
CISs	LC-11	"	Tuao	76	30	40	76	76	40	76	76	40	76	76	40	76	76	40
Zinundungan RIS	44	"	"	1,760	1,730	1,710	1,760	1,760	1,760	1,760	1,760	1,760	1,760	1,760	1,760	1,760	1,760	1,760
Zinundungan Ext. IP	44	"	"	-	-	-	-	-	-	-	-	-	-	-	-	1,750	See Fig. 10.3	
Dummun RIS	46	"	Aparri	2,070	1,440	1,370	2,070	1,440	1,370	2,070	1,440	1,370	2,070	1,440	1,370	2,070	See Fig. 10.3	
CIPs	LC-12	"	"	-	-	-	-	-	-	-	-	-	200	200	60	200	200	60
CISs	LC-13	"	"	1,340	460	770	1,340	1,340	770	1,190	1,190	684	1,190	1,190	684	1,190	1,190	684
CIPs	"	"	"	-	-	-	-	-	-	-	-	-	845	845	254	2,350	2,350	705
CIADP (Lower Cagayan Area)	47	"	"	10,875	270	60	10,875	10,875	10,875	10,875	10,875	10,875	10,875	10,875	10,875	10,875	10,875	10,875
CISs	LC-14	"	"	780	270	450	780	780	450	780	780	450	780	780	450	780	780	450
CIPs	"	"	"	-	-	-	-	-	-	-	-	-	-	-	-	650	650	195
Total				213,687			217,087			226,063			282,328			296,077		

Table 10.2 Present Irrigation Water Demand (1985)

UNIT: M^3/S

NAME OF SYSTEM	AREA CODE/ BASE POINT NO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
I. UPPER CAGAYAN BASIN													
CISs	UC-3	0.38	0.46	0.50	0.29	0.11	0.31	0.33	0.18	0.20	0.06	0.00	0.17
CISs	UC-4	0.40	0.49	0.53	0.30	0.12	0.33	0.36	0.19	0.22	0.06	0.00	0.18
CISs	UC-5	0.11	0.14	0.15	0.09	0.03	0.09	0.10	0.05	0.06	0.02	0.00	0.05
CISs	UC-6R	0.25	0.30	0.39	0.21	0.29	1.00	1.50	1.08	0.89	0.21	0.00	0.10
CISs	UC-7	0.69	0.80	1.06	0.56	0.23	0.64	0.96	0.69	0.57	0.13	0.00	0.28
SUB TOTAL		1.83	2.19	2.63	1.45	0.78	2.37	3.25	2.19	1.94	0.48	0.00	0.78
II. MAGAT BASIN													
CISs	M-1	8.52	10.50	11.80	6.87	2.35	7.01	7.79	5.95	5.65	1.93	0.00	3.91
CISs	M-2	0.12	0.15	0.17	0.10	0.03	0.08	0.11	0.08	0.08	0.02	0.00	0.06
CISs	M-3	11.54	20.21	16.66	9.19	3.59	11.30	14.86	13.63	9.85	3.33	0.00	5.47
MAGAT RIS	13	65.07	73.24	14.80	32.19	101.98	71.56	87.84	37.63	0.00	0.00	46.01	37.09
CISs	M-4	1.12	1.36	1.66	1.03	0.30	0.79	1.04	0.90	0.74	0.24	0.00	0.51
CISs	M-5	0.06	0.08	0.10	0.06	0.02	0.05	0.06	0.05	0.04	0.01	0.00	0.03
SUB TOTAL		86.43	105.54	45.19	49.44	108.27	90.79	111.70	58.24	16.36	5.53	46.01	47.07
III. ILAGAN BASIN													
CISs	I-3	0.03	0.04	0.05	0.02	0.04	0.13	0.20	0.14	0.12	0.03	0.00	0.01
CISs	I-4	0.10	0.12	0.16	0.08	0.11	0.39	0.58	0.41	0.34	0.08	0.00	0.04
SUB TOTAL		0.13	0.16	0.21	0.10	0.15	0.52	0.78	0.55	0.46	0.11	0.00	0.05
IV. SIFFU, MALLIG BASIN													
CISs	S-1	0.90	1.10	1.34	0.84	0.22	0.55	0.73	0.63	0.51	0.17	0.00	0.41
SIFFU RIS	29	8.75	9.85	1.99	4.45	14.08	9.88	12.13	5.20	0.00	0.00	6.19	4.99
CISs	S-3	0.12	0.15	0.18	0.11	0.04	0.12	0.16	0.14	0.12	0.04	0.00	0.05
MALLIG RIS	31	1.20	1.56	0.18	0.27	1.63	1.45	1.66	1.40	1.19	0.15	0.77	0.64
CISs	S-5	0.25	0.32	0.39	0.23	0.15	0.50	0.76	0.59	0.43	0.13	0.00	0.10
SUB TOTAL		11.22	12.98	4.08	5.90	16.12	12.50	15.44	7.96	2.25	0.49	6.96	6.19
V. CHICO BASIN													
CISs	C-1	2.30	2.55	2.32	1.01	0.30	0.83	0.52	0.46	0.52	0.24	0.00	0.99
CISs	C-2	1.00	1.16	1.10	0.56	0.24	0.64	0.45	0.39	0.45	0.13	0.00	0.42
CISs	C-3	0.50	0.58	0.54	0.28	0.13	0.34	0.24	0.20	0.24	0.07	0.00	0.21
CHICO RIS	22	9.13	10.33	11.65	1.85	0.00	0.00	4.59	7.57	11.37	8.69	6.90	7.74
CISs	C-4	0.44	0.52	0.63	0.37	0.16	0.50	0.67	0.51	0.41	0.12	0.00	0.18
CISs	C-5	0.50	0.59	0.72	0.42	0.18	0.57	0.76	0.57	0.47	0.14	0.00	0.20
CHICO WEST	25	1.45	1.69	1.91	0.29	0.00	0.00	0.52	0.87	1.35	1.06	0.86	0.86
CISs	C-6	1.56	1.89	2.29	1.29	0.31	0.73	0.99	0.77	0.66	0.15	0.00	0.64
SUB TOTAL		16.88	19.31	21.16	6.07	1.32	3.61	8.74	11.34	15.47	10.64	7.76	11.24
VI. LOWER CAGAYAN BASIN													
CISs	LC-1	0.07	0.08	0.10	0.06	0.08	0.28	0.43	0.33	0.24	0.07	0.00	0.03
TUMAUINI IS	33	1.46	1.90	2.20	0.33	1.87	1.67	1.91	1.61	1.37	0.17	0.94	0.79
S/PAB.CAGA. IS	34	0.06	0.08	0.09	0.01	0.08	0.08	0.07	0.06	0.06	0.01	0.04	0.04
PINACANAUAN RIS	35	0.38	0.45	0.51	0.08	0.39	0.38	0.36	0.30	0.28	0.03	0.22	0.26
CISs	LC-5	0.60	0.71	0.86	0.50	0.62	2.36	3.19	2.40	1.97	0.57	0.00	0.24
S/TUGUEGARAO IS	37	1.24	1.50	1.69	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.85
CISs	LC-6	0.31	0.36	0.44	0.26	0.06	0.15	0.20	0.15	0.12	0.04	0.00	0.12
CIADP(LGUIG)	38	0.52	0.62	0.70	0.11	0.55	0.53	0.51	0.42	0.40	0.05	0.31	0.35
CISs	LC-7	0.34	0.40	0.49	0.29	0.07	0.16	0.21	0.16	0.13	0.04	0.00	0.14
CIADP(A/AMULU)	39	1.53	1.84	2.07	0.32	1.55	1.51	1.45	1.20	1.13	0.14	0.91	1.04
BAGGAO(PARED)	40	0.58	0.70	0.79	0.12	0.61	0.60	0.57	0.48	0.45	0.05	0.35	0.40
BAGGAO(PARANAN)	42	0.79	0.95	1.07	0.17	1.13	1.10	1.06	0.88	0.83	0.10	0.47	0.54
CISs	LC-10	1.38	1.63	1.97	1.16	0.28	0.65	0.88	0.66	0.54	0.16	0.00	0.56
CISs	LC-11	0.05	0.06	0.07	0.04	0.01	0.03	0.04	0.03	0.02	0.01	0.00	0.02
ZINUNDUNGAN RIS	44	2.12	2.64	2.99	0.44	2.16	2.01	2.00	1.72	1.69	0.21	1.35	1.41
DUMMUN RIS	46	1.19	1.88	2.31	0.38	2.01	1.89	1.96	1.62	1.20	0.14	0.94	0.74
CISs	LC-13	0.70	0.97	1.29	0.81	0.20	0.45	0.66	0.50	0.32	0.09	0.00	0.31
CIADP(L/CAGA.)	47	0.05	0.08	0.10	0.02	0.38	0.36	0.37	0.30	0.23	0.03	0.04	0.03
CISs	LC-14	0.41	0.57	0.75	0.47	0.12	0.27	0.38	0.29	0.19	0.05	0.00	0.18
SUB TOTAL		13.78	17.42	20.49	5.83	12.17	14.48	16.25	13.11	11.17	1.96	6.31	8.05
TOTAL		130.27	157.60	93.76	68.79	138.81	124.27	156.16	93.39	47.65	19.21	67.04	73.38

Table 10.3 Future Irrigation Water Demand (1990)

UNIT: M^3/S

NAME OF SYSTEM	AREA CODE/ BASE POINT NO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
I. UPPER CAGAYAN BASIN													
CISs	UC-3	0.52	0.64	0.70	0.40	0.37	1.28	1.38	0.73	0.85	0.25	0.00	0.24
CIPs	UC-3	0.22	0.26	0.29	0.16	0.15	0.53	0.56	0.30	0.35	0.10	0.00	0.10
CISs	UC-4	0.40	0.49	0.53	0.30	0.14	0.44	0.48	0.25	0.29	0.09	0.00	0.18
CISs	UC-5	0.15	0.19	0.20	0.12	0.11	0.37	0.40	0.21	0.25	0.07	0.00	0.07
CISs	UC-6B	0.47	0.54	0.72	0.38	0.38	1.27	1.90	1.36	1.12	0.26	0.00	0.19
CISs	UC-7	0.85	0.99	1.31	0.70	0.70	2.30	3.44	2.47	2.04	0.48	0.00	0.35
SUB TOTAL		2.61	3.11	3.75	2.06	1.85	6.19	8.16	5.32	4.90	1.25	0.00	1.13
II. MAGAT BASIN													
CISs	M-1	8.52	10.50	11.80	6.87	2.96	9.47	10.52	8.03	7.63	2.61	0.00	3.91
CIPs	M-1	0.13	0.16	0.18	0.11	0.09	0.32	0.36	0.27	0.26	0.09	0.00	0.06
CISs	M-2	0.12	0.15	0.17	0.10	0.05	0.19	0.25	0.19	0.19	0.05	0.00	0.05
CISs	M-3	11.54	20.21	16.66	9.19	4.86	16.73	22.00	20.17	14.59	4.94	0.00	5.47
CIPs	M-3	0.06	0.11	0.09	0.05	0.05	0.19	0.24	0.22	0.16	0.05	0.00	0.03
MAGAT RIS	13	117.84	119.74	84.29	55.75	111.00	98.31	142.29	74.11	41.17	29.95	48.87	90.91
CISs	M-4	1.12	1.36	1.66	1.03	0.55	1.83	2.42	2.08	1.70	0.56	0.00	0.51
CISs	M-5	0.06	0.08	0.10	0.06	0.03	0.10	0.13	0.11	0.09	0.03	0.00	0.03
SUB TOTAL		139.39	151.31	114.95	73.16	119.59	127.14	178.21	105.18	65.79	38.28	48.87	100.98
III. ILAGAN BASIN													
CISs	I-3	0.06	0.07	0.09	0.05	0.05	0.17	0.25	0.18	0.15	0.03	0.00	0.03
CISs	I-4	0.18	0.21	0.28	0.15	0.15	0.49	0.73	0.52	0.43	0.10	0.00	0.07
CIPs	I-4	0.17	0.20	0.27	0.14	0.14	0.47	0.70	0.50	0.42	0.10	0.00	0.07
SUB TOTAL		0.41	0.48	0.64	0.34	0.34	1.13	1.68	1.20	1.00	0.23	0.00	0.17
IV. SIFFU, MALLIG BASIN													
CISs	S-1	0.91	1.10	1.34	0.83	0.30	0.89	1.17	1.01	0.83	0.27	0.00	0.41
SIFFU RIS	29	13.68	15.97	16.70	5.50	5.22	14.90	16.90	8.22	7.42	4.79	3.43	11.79
CISs	S-3	0.12	0.15	0.18	0.11	0.07	0.22	0.28	0.25	0.21	0.07	0.00	0.05
MALLIG RIS	31	1.36	1.78	0.84	0.00	1.11	3.25	3.10	2.66	0.92	0.00	0.35	1.03
CISs	S-5	0.27	0.34	0.42	0.24	0.21	0.73	1.13	0.87	0.64	0.19	0.00	0.11
CIPs	S-5	0.19	0.23	0.29	0.17	0.15	0.51	0.79	0.61	0.45	0.13	0.00	0.07
SUB TOTAL		16.53	19.57	19.77	6.85	7.06	20.50	23.37	13.62	10.47	5.45	3.78	13.46
V. CHICO BASIN													
CISs	C-1	2.30	2.55	2.32	1.01	0.42	1.23	0.76	0.68	0.76	0.35	0.00	0.99
CISs	C-2	1.00	1.17	1.10	0.56	0.44	1.24	0.87	0.74	0.86	0.25	0.00	0.42
CISs	C-3	0.50	0.58	0.54	0.28	0.21	0.58	0.41	0.35	0.40	0.12	0.00	0.21
CHICO RIS	23	23.60	28.43	12.99	0.00	8.66	27.08	22.25	18.89	7.19	0.00	5.52	20.07
CISs	C-4	0.44	0.52	0.63	0.37	0.25	0.87	1.17	0.88	0.72	0.21	0.00	0.18
CISs	C-5	0.50	0.59	0.71	0.42	0.28	0.99	1.34	1.01	0.83	0.24	0.00	0.20
CHICO WEST	25	1.99	2.47	1.14	0.00	0.73	2.19	1.81	1.59	0.63	0.00	0.49	1.69
CISs	C-6	1.56	1.89	2.29	1.29	0.62	1.98	2.67	2.07	1.77	0.52	0.00	0.64
CIPs	C-6	0.20	0.25	0.30	0.17	0.15	0.52	0.70	0.54	0.46	0.14	0.00	0.08
SUB TOTAL		32.09	38.45	22.02	4.10	11.76	36.68	31.98	26.74	13.62	1.83	6.01	24.48
VI. LOWER CAGAYAN BASIN													
CISs	LC-1	0.13	0.16	0.20	0.12	0.10	0.35	0.54	0.42	0.31	0.09	0.00	0.05
CIPs	LC-1	0.07	0.08	0.10	0.06	0.05	0.18	0.28	0.21	0.16	0.05	0.00	0.03
TUMAUINI IS	33	1.46	1.90	2.20	0.33	1.87	1.67	1.91	1.61	1.37	0.17	0.94	0.79
S/PAB.CAGA. IS	34	1.84	2.22	1.02	0.00	1.35	4.23	3.48	2.95	1.12	0.00	0.43	1.57
PINACANAUAN RIS	35	1.57	1.78	1.79	0.15	1.60	1.56	1.50	0.97	0.32	0.26	0.11	1.21
CISs	LC-5	1.12	1.33	1.60	0.94	0.81	2.99	4.03	3.03	2.49	0.72	0.00	0.46
CIPs	LC-5	0.11	0.13	0.15	0.09	0.08	0.28	0.38	0.29	0.24	0.07	0.00	0.04
S/TUGUEGARAO IS	37	1.24	1.50	1.69	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.85
CISs	LC-6	0.30	0.36	0.44	0.26	0.13	0.42	0.57	0.43	0.35	0.10	0.00	0.13
CIADP(LGUIG)	38	1.01	1.15	1.15	0.10	1.03	1.01	0.97	0.63	0.05	0.00	0.00	0.74
CISs	LC-7	0.34	0.40	0.49	0.29	0.14	0.47	0.64	0.48	0.39	0.11	0.00	0.14
CIADP(A/AMULU)	39	3.08	3.48	3.50	0.30	3.14	3.05	2.93	1.90	0.16	0.00	0.00	2.24
BAGGAO(PARED)	40	0.58	0.70	0.79	0.12	0.61	0.60	0.57	0.48	0.45	0.05	0.35	0.40
BAGGAO(PARANAN)	42	0.79	0.95	1.07	0.17	1.13	1.10	1.06	0.88	0.83	0.10	0.47	0.54
CISs	LC-10	1.38	1.63	1.97	1.16	0.58	1.93	2.61	1.96	1.61	0.47	0.00	0.56
CISs	LC-11	0.05	0.06	0.07	0.04	0.02	0.07	0.09	0.07	0.06	0.02	0.00	0.02
ZINUNDUNGAN RIS	44	2.21	2.58	2.61	0.21	2.20	2.05	2.03	1.36	0.12	0.00	0.00	1.63
DUMMUN RIS	46	1.19	1.68	2.31	0.38	2.01	1.89	1.96	1.62	1.20	0.14	0.94	0.74
CISs	LC-13	0.70	0.97	1.29	0.81	0.41	1.32	1.91	1.45	0.93	0.26	0.00	0.31
CIADP(L/CAGA.)	47	9.63	14.08	15.52	1.41	15.20	14.31	14.79	9.57	0.62	0.00	0.00	8.52
CISs	LC-14	0.41	0.57	0.75	0.47	0.24	0.77	1.11	0.85	0.54	0.15	0.00	0.18
SUB TOTAL		29.21	37.91	40.71	7.67	32.70	40.25	43.36	31.16	13.32	2.76	3.98	21.15
TOTAL		220.24	250.83	201.84	94.18	173.30	231.89	286.76	183.22	109.10	49.80	62.64	161.37

Table 10.4 Future Irrigation Water Demand (1995)

UNIT: M^3/S

NAME OF SYSTEM	AREA CODE/ BASE POINT NO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
I. UPPER CAGAYAN BASIN													
CISs	UC-3	0.52	0.64	0.70	0.40	0.37	1.28	1.38	0.73	0.85	0.25	0.00	0.24
CIPs	UC-3	0.22	0.26	0.29	0.16	0.15	0.53	0.56	0.30	0.35	0.10	0.00	0.10
CISs	UC-4	0.40	0.49	0.53	0.30	0.14	0.44	0.48	0.25	0.29	0.09	0.00	0.18
CISs	UC-5	0.15	0.19	0.20	0.12	0.11	0.37	0.40	0.21	0.25	0.07	0.00	0.07
CISs	UC-6B	0.47	0.54	0.72	0.38	0.38	1.27	1.90	1.36	1.12	0.26	0.00	0.19
DABUBU IP	6	0.66	0.91	1.09	0.14	0.81	0.56	0.73	0.46	0.21	0.13	0.06	0.59
CIPs	UC-6	0.43	0.51	0.67	0.35	0.36	1.17	1.75	1.26	1.04	0.24	0.00	0.18
CISs	UC-7	0.85	0.99	1.31	0.70	0.70	2.30	3.44	2.47	2.04	0.48	0.00	0.35
CIPs	UC-7	0.19	0.22	0.29	0.15	0.15	0.51	0.76	0.54	0.45	0.10	0.00	0.08
SUB TOTAL		3.89	4.75	5.80	2.70	3.17	8.43	11.40	7.58	6.60	1.72	0.06	1.98
II. MAGAT BASIN													
CISs	M-1	8.52	10.50	11.80	6.87	2.96	9.47	10.52	8.03	7.63	2.61	0.00	3.91
CIPs	M-1	0.13	0.16	0.18	0.11	0.09	0.32	0.36	0.27	0.26	0.09	0.00	0.06
CISs	M-2	0.12	0.15	0.17	0.10	0.05	0.19	0.25	0.19	0.19	0.05	0.00	0.06
CISs	M-3	11.54	20.21	16.66	9.19	4.86	16.73	22.00	20.17	14.59	4.94	0.00	5.47
CIPs	M-3	0.30	0.53	0.44	0.24	0.24	0.93	1.22	1.12	0.81	0.27	0.00	0.15
MAGAT RIS	13	117.84	118.74	84.29	35.75	111.00	98.31	142.29	74.11	41.17	29.95	48.87	90.91
CISs	M-4	1.12	1.36	1.66	1.03	0.55	1.83	2.42	2.08	1.70	0.56	0.00	0.51
CISs	M-5	0.06	0.08	0.10	0.06	0.03	0.10	0.13	0.11	0.09	0.03	0.00	0.03
SUB TOTAL		139.63	151.73	115.30	73.35	119.78	127.88	179.19	106.08	66.44	38.50	48.87	101.10
III. ILAGAN BASIN													
CISs	I-3	0.06	0.07	0.09	0.05	0.05	0.17	0.25	0.18	0.15	0.03	0.00	0.03
CISs	I-4	0.16	0.19	0.25	0.13	0.13	0.44	0.65	0.47	0.39	0.09	0.00	0.07
CIPs	I-4	0.24	0.28	0.38	0.20	0.20	0.66	0.98	0.71	0.58	0.14	0.00	0.10
SUB TOTAL		0.46	0.54	0.72	0.38	0.38	1.27	1.88	1.36	1.12	0.26	0.00	0.20
IV. SIFFU, MALLIG BASIN													
CISs	S-1	0.91	1.10	1.34	0.83	0.30	0.89	1.17	1.01	0.83	0.27	0.00	0.41
SIFFU RIS	29	13.68	15.97	16.70	5.50	5.22	14.90	16.90	8.22	7.42	4.79	3.43	11.79
CISs	S-3	0.12	0.15	0.18	0.11	0.07	0.22	0.28	0.25	0.21	0.07	0.00	0.05
MALLIG RIS	31	1.36	1.78	0.84	0.00	1.11	3.25	3.10	2.66	0.92	0.00	0.35	1.03
CISs	S-5	0.27	0.34	0.42	0.24	0.21	0.73	1.13	0.87	0.64	0.19	0.00	0.11
CIPs	S-5	0.53	0.66	0.82	0.47	0.42	1.44	2.22	1.71	1.26	0.37	0.00	0.21
SUB TOTAL		16.87	20.00	20.30	7.15	7.33	21.43	24.80	14.72	11.28	5.69	3.78	13.60
V. CHICO BASIN													
CISs	C-1	2.30	2.55	2.32	1.01	0.42	1.23	0.76	0.68	0.76	0.35	0.00	0.99
CISs	C-2	1.00	1.17	1.10	0.56	0.44	1.24	0.87	0.74	0.86	0.25	0.00	0.42
CISs	C-3	0.50	0.58	0.54	0.28	0.21	0.58	0.41	0.35	0.40	0.12	0.00	0.21
CHICO RIS	22	23.60	28.43	12.99	0.00	8.66	27.08	22.25	18.88	7.19	0.00	5.52	20.07
CHICO MALLIG	30	38.25	44.19	44.76	4.36	38.41	36.93	35.95	23.25	7.88	6.39	2.93	29.44
CISs	C-4	0.44	0.52	0.63	0.37	0.25	0.87	1.17	0.88	0.72	0.21	0.00	0.18
CISs	C-5	0.50	0.59	0.71	0.42	0.28	0.99	1.34	1.01	0.83	0.24	0.00	0.20
CHICO WEST	25	1.99	2.47	1.14	0.00	0.72	2.19	1.81	1.59	0.63	0.00	0.49	1.69
CISs	C-6	1.56	1.89	2.29	1.29	0.62	1.98	2.67	2.07	1.77	0.52	0.00	0.64
CIPs	C-6	0.71	0.86	1.04	0.58	0.51	1.81	2.45	1.89	1.63	0.48	0.00	0.29
SUB TOTAL		70.85	83.25	67.52	8.87	50.53	74.90	69.68	51.34	22.67	8.56	8.94	54.13
VI. LOWER CAGAYAN BASIN													
CISs	LC-1	0.13	0.16	0.20	0.12	0.10	0.35	0.54	0.42	0.31	0.09	0.00	0.05
CIPs	LC-1	0.07	0.08	0.10	0.06	0.05	0.18	0.28	0.21	0.16	0.05	0.00	0.03
TUMAUINI IS	33	1.46	1.90	2.20	0.33	1.87	1.67	1.91	1.61	1.37	0.17	0.94	0.79
S/PAB.CAGA. IS	34	1.84	2.22	1.02	0.00	1.35	4.23	3.48	2.93	1.12	0.00	0.43	1.57
PINACANAUAN RIS	35	1.57	1.78	1.79	0.15	1.60	1.56	1.50	0.97	0.32	0.26	0.11	1.21
CISs	LC-5	1.12	1.33	1.60	0.94	0.81	2.99	4.03	3.03	2.49	0.72	0.00	0.46
CIPs	LC-5	0.63	0.75	0.90	0.53	0.46	1.67	2.26	1.70	1.39	0.40	0.00	0.26
S/TUGUEGARAO IS	37	3.71	4.19	4.22	0.36	3.78	3.67	3.53	2.29	0.74	0.61	0.26	2.86
CISs	LC-6	0.30	0.36	0.44	0.26	0.13	0.42	0.57	0.43	0.35	0.10	0.00	0.13
CIPs	LC-6	0.43	0.51	0.62	0.36	0.31	1.15	1.55	1.16	0.95	0.28	0.00	0.18
CIADP(LGUIG)	38	1.01	1.15	1.15	0.10	1.03	1.01	0.97	0.63	0.05	0.00	0.00	0.74
CISs	LC-7	0.34	0.40	0.49	0.29	0.14	0.47	0.64	0.48	0.39	0.11	0.00	0.14
CIPs	LC-7	0.14	0.16	0.20	0.12	0.10	0.36	0.49	0.37	0.31	0.09	0.00	0.06
CIADP(A/AMULU)	39	3.08	3.48	3.50	0.30	3.14	3.05	2.93	1.90	0.16	0.00	0.00	2.24
BAGGAO(PAPED)	40	0.58	0.70	0.79	0.12	0.61	0.60	0.57	0.48	0.45	0.05	0.35	0.40
BAGGAO(PARANAN)	42	0.79	0.95	1.07	0.17	1.13	1.10	1.06	0.88	0.83	0.10	0.47	0.54
CISs	LC-10	1.38	1.63	1.97	1.16	0.58	1.93	2.61	1.96	1.61	0.47	0.00	0.56
CISs	LC-11	0.05	0.06	0.07	0.04	0.02	0.07	0.09	0.07	0.06	0.02	0.00	0.02
ZINUNDUNGAN RIS	44	2.21	2.58	2.61	0.21	2.20	2.05	2.03	1.36	0.12	0.00	0.00	1.63
DUMMUN RIS	46	1.19	1.88	2.31	0.38	2.01	1.89	1.96	1.62	1.20	0.14	0.94	0.74
CISs	LC-13	0.62	0.86	1.14	0.72	0.37	1.17	1.70	1.29	0.83	0.23	0.00	0.28
CIADP(L/CAGA.)	47	9.63	14.08	15.52	1.41	15.20	14.31	14.79	9.57	0.62	0.00	0.00	8.52
CISs	LC-14	0.41	0.57	0.75	0.47	0.24	0.77	1.11	0.85	0.54	0.15	0.00	0.18
SUB TOTAL		32.69	41.78	44.66	8.60	37.23	46.67	50.60	36.23	16.37	4.04	3.50	23.59
TOTAL		264.39	302.05	254.30	101.05	218.42	280.58	337.55	217.31	124.48	58.77	65.15	194.60

Table 10.5 Future Irrigation Water Demand (2000)

UNIT: M^3/S

NAME OF SYSTEM	AREA CODE/ BASE POINT NO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
I. UPPER CAGAYAN BASIN													
CISs	UC-3	0.52	0.64	0.70	0.40	0.37	1.28	1.38	0.73	0.85	0.25	0.00	0.24
CIPs	UC-3	0.22	0.26	0.29	0.16	0.15	0.53	0.56	0.30	0.35	0.10	0.00	0.10
CISs	UC-4	0.40	0.49	0.53	0.30	0.14	0.44	0.48	0.25	0.29	0.09	0.00	0.18
CISs	UC-5	0.15	0.19	0.20	0.12	0.11	0.37	0.40	0.21	0.25	0.07	0.00	0.07
CISs	UC-6B	0.47	0.54	0.72	0.38	0.38	1.27	1.90	1.36	1.12	0.26	0.00	0.19
DABUBU IP	6	0.66	0.91	1.09	0.14	0.81	0.56	0.73	0.46	0.21	0.13	0.06	0.59
CIPs	UC-6	0.87	1.01	1.33	0.71	0.71	2.34	3.51	2.52	2.08	0.49	0.00	0.36
CISs	UC-7	0.85	0.99	1.31	0.70	0.70	2.30	3.44	2.47	2.04	0.48	0.00	0.35
CIPs	UC-7	0.47	0.55	0.72	0.39	0.39	1.27	1.91	1.37	1.13	0.26	0.00	0.19
GAPPAL IP	8	3.58	4.55	5.26	0.54	4.37	3.16	3.94	2.51	1.01	0.66	0.24	3.06
CIPs	UC-8B	0.15	0.17	0.22	0.12	0.12	0.39	0.59	0.42	0.35	0.08	0.00	0.06
LULUTAN IP	15	2.55	3.17	3.63	0.34	3.12	2.28	2.81	1.80	0.70	0.46	0.15	2.16
SUB TOTAL		10.89	13.47	16.00	4.30	11.37	16.19	21.65	14.40	10.38	3.33	0.45	7.55
II. MAGAT BASIN													
CISs	M-1	8.52	10.50	11.80	6.87	2.96	9.47	10.52	8.03	7.63	2.61	0.00	3.91
CIPs	M-1	0.13	0.16	0.18	0.11	0.09	0.32	0.36	0.27	0.26	0.09	0.00	0.06
CISs	M-2	0.12	0.15	0.17	0.10	0.05	0.19	0.25	0.19	0.19	0.05	0.00	0.06
CISs	M-3	11.54	20.21	16.66	9.19	4.86	16.73	22.00	20.17	14.59	4.94	0.00	5.47
CIPs	M-3	0.30	0.53	0.44	0.24	0.24	0.93	1.22	1.12	0.81	0.27	0.00	0.15
MAGAT RIS	13	117.84	118.74	84.29	55.75	111.00	98.31	142.29	74.11	41.17	29.95	48.87	90.91
CISs	M-4	1.12	1.36	1.66	1.03	0.55	1.83	2.42	2.08	1.70	0.56	0.00	0.51
CISs	M-5	0.06	0.08	0.10	0.06	0.03	0.10	0.13	0.11	0.09	0.03	0.00	0.03
SUB TOTAL		139.63	151.73	115.30	73.35	119.78	127.88	179.19	106.08	66.44	38.50	48.87	101.10
III. ILAGAN BASIN													
ILAGAN IP	18	0.90	1.93	2.64	0.56	1.13	0.54	0.98	0.55	0.48	0.30	0.27	1.02
CISs	I-3	0.06	0.07	0.09	0.05	0.05	0.17	0.25	0.18	0.15	0.03	0.00	0.03
CISs	I-4	0.16	0.19	0.25	0.13	0.13	0.44	0.65	0.47	0.39	0.09	0.00	0.07
CIPs	I-4	0.24	0.28	0.38	0.20	0.20	0.66	0.98	0.71	0.58	0.14	0.00	0.10
SUB TOTAL		1.36	2.47	3.36	0.94	1.51	1.81	2.86	1.91	1.60	0.56	0.27	1.22
IV. SIFFU, MALLIG BASIN													
CISs	S-1	0.91	1.10	1.34	0.83	0.30	0.89	1.17	1.01	0.83	0.27	0.00	0.41
SIFFU RIS	29	13.68	15.97	16.70	5.50	5.22	14.90	16.90	8.22	7.42	4.79	3.43	11.79
CISs	S-3	0.12	0.15	0.18	0.11	0.07	0.22	0.28	0.25	0.21	0.07	0.00	0.05
MALLIG RIS	31	1.36	1.78	0.84	0.00	1.11	3.25	3.10	2.66	0.92	0.00	0.35	1.03
CISs	S-5	0.27	0.34	0.42	0.24	0.21	0.73	1.13	0.87	0.64	0.19	0.00	0.11
CIPs	S-5	0.53	0.66	0.82	0.47	0.42	1.44	2.22	1.71	1.26	0.37	0.00	0.21
SUB TOTAL		16.87	20.00	20.30	7.15	7.33	21.43	24.80	14.72	11.28	5.69	3.78	13.60
V. CHICO BASIN													
CISs	C-1	2.30	2.55	2.32	1.01	0.42	1.23	0.76	0.68	0.76	0.35	0.00	0.99
CISs	C-2	1.00	1.17	1.10	0.56	0.44	1.24	0.87	0.74	0.86	0.25	0.00	0.42
CISs	C-3	0.50	0.58	0.54	0.28	0.21	0.58	0.41	0.35	0.40	0.12	0.00	0.21
CHICO RIS	25	25.60	28.43	12.99	0.00	8.66	27.09	22.25	18.89	7.19	0.00	5.52	20.07
CHICO MALLIG	30	38.25	44.19	44.76	4.36	38.41	36.93	35.95	23.25	7.88	6.39	2.93	29.44
CISs	C-4	0.44	0.52	0.63	0.37	0.25	0.87	1.17	0.88	0.72	0.21	0.00	0.18
CISs	C-5	0.50	0.59	0.71	0.42	0.28	0.99	1.34	1.01	0.83	0.24	0.00	0.20
CHICO WEST	25	1.99	2.47	1.14	0.00	0.73	2.19	1.81	1.59	0.63	0.00	0.49	1.69
CISs	C-6	1.30	1.58	1.91	1.07	0.52	1.65	2.23	1.72	1.48	0.44	0.00	0.53
CIPs	C-6	0.83	1.01	1.22	0.69	0.60	2.13	2.88	2.23	1.92	0.56	0.00	0.34
SUB TOTAL		70.71	83.09	67.32	8.76	50.52	74.89	69.67	51.33	22.67	8.56	8.94	54.07
VI. LOWER CAGAYAN BASIN													
CISs	LC-1	0.13	0.16	0.20	0.12	0.10	0.35	0.54	0.42	0.31	0.09	0.00	0.05
CIPs	LC-1	0.07	0.08	0.10	0.06	0.05	0.18	0.28	0.21	0.16	0.05	0.00	0.03
TUMAUINI IS	33	1.46	1.90	2.20	0.33	1.87	1.67	1.91	1.61	1.37	0.17	0.94	0.79
S/PAB.CAGA. IS	34	1.84	2.22	1.02	0.00	1.35	4.23	3.48	2.95	1.12	0.00	0.43	1.57
PINACANAUAN RIS	35	1.57	1.78	1.79	0.15	1.60	1.56	1.50	0.97	0.32	0.26	0.11	1.21
CISs	LC-5	0.64	0.75	0.91	0.53	0.46	1.70	2.29	1.73	1.42	0.41	0.00	0.26
CIPs	LC-5	1.14	1.34	1.62	0.95	0.83	3.02	4.08	3.07	2.52	0.73	0.00	0.46
TUGUEGARAO IP	36	0.88	1.33	1.46	0.32	0.69	0.52	0.67	0.42	0.25	0.19	0.15	0.65
S/TUGUEGARAO IS	37	3.71	4.19	4.22	0.36	3.78	3.67	3.53	2.29	0.74	0.61	0.26	2.66
A/AMUL.WEST IS	37	6.44	8.13	8.47	1.22	6.05	5.49	5.71	3.65	1.48	1.16	0.68	4.89
CISs	LC-6	0.30	0.36	0.44	0.26	0.13	0.42	0.57	0.43	0.35	0.10	0.00	0.13
CIPs	LC-6	0.45	0.53	0.64	0.37	0.32	1.19	1.61	1.21	0.99	0.29	0.00	0.18
CIADP(LGUIG)	38	1.01	1.15	1.15	0.10	1.03	1.01	0.97	0.63	0.05	0.00	0.00	0.74
CISs	LC-7	0.04	0.05	0.06	0.04	0.01	0.06	0.08	0.06	0.05	0.01	0.00	0.02
CIPs	LC-7	0.66	0.78	0.94	0.55	0.48	1.76	2.37	1.78	1.46	0.42	0.00	0.27
CIADP(A/AMULU)	39	3.08	3.48	3.50	0.30	3.14	3.05	2.93	1.90	0.16	0.00	0.00	2.24
BAGGAO(PARED)	40	0.58	0.70	0.79	0.12	0.61	0.60	0.57	0.48	0.45	0.05	0.35	0.40
BAGGAO(PARANAN)	42	0.79	0.95	1.07	0.17	1.13	1.10	1.06	0.88	0.83	0.10	0.47	0.54
CISs	LC-10	1.38	1.63	1.97	1.16	0.58	1.93	2.61	1.96	1.61	0.47	0.00	0.56
CIPs	LC-10	0.50	0.59	0.72	0.42	0.37	1.34	1.80	1.36	1.11	0.32	0.00	0.39
CISs	LC-11	0.05	0.06	0.07	0.04	0.02	0.07	0.09	0.07	0.06	0.02	0.00	0.02
ZINUNDUNGAN RIS	44	2.21	2.58	2.61	0.21	2.20	2.05	2.03	1.36	0.12	0.00	0.00	1.63
DUMMUN RIS	46	1.19	1.38	2.31	0.38	2.01	1.89	1.96	1.62	1.20	0.14	0.94	0.74
CIPs	LC-12	0.05	0.08	0.10	0.06	0.06	0.20	0.29	0.22	0.14	0.04	0.00	0.02
CISs	LC-13	0.62	0.86	1.14	0.72	0.37	1.17	1.70	1.29	0.83	0.23	0.00	0.28
CIPs	LC-13	0.23	0.32	0.42	0.27	0.23	0.83	1.20	0.92	0.59	0.16	0.00	0.10
CIADP(L/CAGA.)	47	9.63	14.08	15.52	1.41	15.20	14.31	14.79	9.57	0.62	0.00	0.00	8.52
CISs	LC-14	0.41	0.57	0.75	0.47	0.24	0.77	1.11	0.85	0.54	0.15	0.00	0.18
SUB TOTAL		41.06	52.53	56.19	11.09	44.91	56.14	61.73	43.91	20.85	6.17	4.33	29.54
TOTAL		280.52	323.29	278.47	105.59	235.42	298.34	359.90	232.35	133.22	62.81	66.64	207.08

Table 10.6 Future Irrigation Water Demand (2005)

UNIT: M^3/S

NAME OF SYSTEM	AREA CODE/ BASE POINT NO	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
I. UPPER CAGAYAN BASIN													
CISs	UC-3	0.52	0.64	0.70	0.40	0.37	1.28	1.38	0.73	0.85	0.25	0.00	0.24
CIPs	UC-3	0.22	0.26	0.29	0.16	0.15	0.53	0.56	0.30	0.35	0.10	0.00	0.10
CISs	UC-4	0.40	0.49	0.53	0.30	0.14	0.44	0.48	0.25	0.29	0.09	0.00	0.18
CISs	UC-5	0.15	0.19	0.20	0.12	0.11	0.37	0.40	0.21	0.25	0.07	0.00	0.07
CISs	UC-6B	0.47	0.54	0.72	0.38	0.38	1.27	1.90	1.36	1.12	0.26	0.00	0.19
DABUBU IP	6	0.66	0.91	1.09	0.14	0.81	0.56	0.73	0.46	0.21	0.13	0.06	0.59
CIPs	UC-6	1.12	1.30	1.72	0.91	0.92	3.03	4.53	3.25	2.69	0.63	0.00	0.46
CISs	UC-7	0.85	0.99	1.31	0.70	0.70	2.30	3.44	2.47	2.04	0.48	0.00	0.35
CIPs	UC-7	0.47	0.55	0.72	0.39	0.39	1.27	1.91	1.37	1.13	0.26	0.00	0.19
GAPPAL IP	8	3.58	4.55	5.26	0.54	4.37	3.16	3.94	2.51	1.01	0.66	0.24	3.06
CIPs	UC-8B	0.32	0.37	0.49	0.26	0.26	0.86	1.29	0.93	0.77	0.18	0.00	0.13
CIPs	UC-9	0.10	0.12	0.16	0.08	0.08	0.25	0.37	0.27	0.22	0.05	0.00	0.04
LULUTAN IP	15	2.55	3.17	3.63	0.34	3.12	2.28	2.81	1.80	0.70	0.46	0.15	2.16
SUB TOTAL		11.41	14.08	16.82	4.72	11.80	17.60	23.74	15.91	11.62	3.62	0.45	7.76
II. MAGAT BASIN													
CISs	M-1	8.06	9.93	11.16	6.50	2.80	8.95	9.95	7.60	7.22	2.47	0.00	3.69
CIPs	M-1	0.13	0.16	0.18	0.11	0.09	0.32	0.36	0.27	0.26	0.09	0.00	0.06
MATUNO (MANAM.)	10	1.08	1.28	1.36	0.13	1.17	1.21	1.14	0.91	0.27	0.22	0.14	1.02
MATUNO (BAYOM.)	11	11.47	13.57	14.34	1.35	12.39	12.82	12.10	9.65	2.87	2.32	1.44	10.78
CISs	M-2	0.12	0.15	0.17	0.10	0.05	0.19	0.25	0.19	0.19	0.05	0.00	0.06
CISs	M-3	6.01	10.52	8.67	4.79	2.53	8.71	11.45	10.50	7.59	2.57	0.00	2.85
CIPs	M-3	0.30	0.53	0.44	0.24	0.24	0.93	1.22	1.12	0.81	0.27	0.00	0.15
MAGAT RIS	13	117.84	118.74	84.29	55.75	111.00	98.31	142.29	74.11	41.17	29.95	48.87	90.91
CISs	M-4	1.12	1.36	1.66	1.03	0.55	1.83	2.42	2.08	1.70	0.56	0.00	0.51
CISs	M-5	0.06	0.08	0.10	0.06	0.03	0.10	0.13	0.11	0.09	0.03	0.00	0.03
SUB TOTAL		146.19	156.32	122.37	70.06	130.85	133.37	181.31	106.54	62.17	38.53	50.45	110.06
III. ILAGAN BASIN													
ILAGAN IP	18	0.90	1.93	2.64	0.56	1.13	0.54	0.98	0.55	0.48	0.30	0.27	1.02
TUMAUINI(ILA.)	18	2.65	3.24	3.35	0.28	2.97	2.65	3.04	2.00	0.15	0.00	0.00	1.89
CISs	I-3	0.06	0.07	0.09	0.05	0.05	0.17	0.25	0.18	0.15	0.03	0.00	0.03
CISs	I-4	0.16	0.19	0.25	0.13	0.13	0.44	0.65	0.47	0.39	0.09	0.00	0.07
CIPs	I-4	0.24	0.28	0.38	0.20	0.20	0.66	0.98	0.71	0.58	0.14	0.00	0.10
SUB TOTAL		4.01	5.71	6.71	1.22	4.48	4.46	5.90	3.91	1.75	0.56	0.27	3.11
IV. SIFFU, MALLIG BASIN													
CISs	S-1	0.91	1.10	1.34	0.83	0.30	0.89	1.17	1.01	0.83	0.27	0.00	0.41
SIFFU RIS	29	13.68	15.97	16.70	5.50	5.22	14.90	16.90	8.22	7.42	4.79	3.43	11.79
CISs	S-3	0.12	0.15	0.18	0.11	0.07	0.22	0.28	0.25	0.21	0.07	0.00	0.05
MALLIG RIS	31	1.36	1.78	0.84	0.00	1.11	3.25	3.10	2.66	0.92	0.00	0.35	1.03
CISs	S-5	0.27	0.34	0.42	0.24	0.21	0.73	1.13	0.87	0.64	0.19	0.00	0.11
CIPs	S-5	0.53	0.66	0.82	0.47	0.42	1.44	2.22	1.71	1.26	0.37	0.00	0.21
SUB TOTAL		16.87	20.00	20.30	7.15	7.33	21.43	24.80	14.72	11.28	5.69	3.78	13.60
V. CHICO BASIN													
CISs	C-1	2.30	2.55	2.32	1.01	0.42	1.23	0.76	0.68	0.76	0.35	0.00	0.99
CISs	C-2	1.00	1.17	1.10	0.56	0.44	1.24	0.87	0.74	0.86	0.25	0.00	0.42
CISs	C-3	0.50	0.58	0.54	0.28	0.21	0.58	0.41	0.35	0.40	0.12	0.00	0.21
CHICO RIS	23	23.60	28.43	12.99	0.00	8.66	27.08	22.25	18.88	7.19	0.00	5.52	20.07
CHICO MALLIG	30	38.25	44.19	44.76	4.36	38.41	36.93	35.95	23.25	7.88	6.39	2.93	29.44
CISs	C-4	0.44	0.52	0.63	0.37	0.25	0.87	1.17	0.88	0.72	0.21	0.00	0.18
CISs	C-5	0.50	0.59	0.71	0.42	0.28	0.99	1.34	1.01	0.83	0.24	0.00	0.20
CHICO WEST	25	1.99	2.47	1.14	0.00	0.73	2.19	1.81	1.59	0.63	0.00	0.49	1.69
CISs	C-6	1.30	1.58	1.91	1.07	0.52	1.65	2.23	1.72	1.48	0.44	0.00	0.53
CIPs	C-6	0.83	1.01	1.22	0.69	0.60	2.13	2.88	2.23	1.92	0.56	0.00	0.34
SUB TOTAL		70.71	83.09	67.32	8.76	50.52	74.89	69.67	51.33	22.67	8.56	8.94	54.07
VI. LOWER CAGAYAN BASIN													
CISs	LC-1	0.13	0.16	0.20	0.12	0.10	0.35	0.54	0.42	0.31	0.09	0.00	0.05
CIPs	LC-1	0.07	0.08	0.10	0.06	0.05	0.18	0.28	0.21	0.16	0.05	0.00	0.03
TUMAUINI IS	33	0.99	1.21	1.25	0.11	1.84	1.65	1.89	1.24	0.87	0.70	0.22	0.82
S/PAB.CAGA. IS	34	1.84	2.22	1.02	0.00	1.35	4.23	3.48	2.95	1.12	0.00	0.43	1.57
PINACANAUAN RIS	35	1.57	1.78	1.79	0.15	1.60	1.56	1.50	0.97	0.32	0.26	0.11	1.21
CISs	LC-5	0.64	0.75	0.91	0.53	0.46	1.70	2.29	1.73	1.42	0.41	0.00	0.26
CIPs	LC-5	1.14	1.34	1.62	0.95	0.83	3.02	4.08	3.07	2.52	0.73	0.00	0.46
TUGUEGARAO IP	36	0.88	1.33	1.46	0.32	0.69	0.52	0.67	0.42	0.25	0.19	0.15	0.65
S/TUGUEGARAO IS	37	3.71	4.19	4.22	0.36	3.78	3.67	3.53	2.29	0.74	0.61	0.26	2.86
A/AMUL.WEST IS	37	6.44	8.13	8.47	1.22	6.05	5.49	5.71	3.65	1.48	1.16	0.68	4.89
CISs	LC-6	0.30	0.36	0.44	0.26	0.13	0.42	0.57	0.43	0.35	0.10	0.00	0.13
CIPs	LC-6	0.45	0.53	0.64	0.37	0.32	1.19	1.61	1.21	0.99	0.29	0.00	0.18
CIADP(LGU1G)	38	1.01	1.15	1.15	0.10	1.03	1.01	0.97	0.63	0.05	0.00	0.00	0.74
CISs	LC-7	0.04	0.05	0.06	0.04	0.01	0.06	0.08	0.06	0.05	0.01	0.00	0.02
CIPs	LC-7	1.34	1.58	1.91	1.12	0.97	3.56	4.80	3.62	2.97	0.86	0.00	0.55
CIADP(A/AMULU)	39	3.08	3.48	3.50	0.30	3.14	3.05	2.93	1.90	0.16	0.00	0.00	2.24
BAGGAO(PARED)	40	0.63	0.71	0.72	0.06	0.73	0.71	0.68	0.44	0.14	0.12	0.05	0.49
BAGGAO(PARANAN)	42	1.65	1.87	1.88	0.16	1.69	1.64	1.58	1.02	0.33	0.27	0.12	1.28
CISs	LC-10	1.38	1.63	1.97	1.16	0.58	1.93	2.61	1.96	1.61	0.47	0.00	0.56
CIPs	LC-10	1.43	1.69	2.04	1.20	1.04	3.81	5.13	3.87	3.17	0.92	0.00	0.58
CISs	LC-11	0.05	0.06	0.07	0.04	0.02	0.07	0.09	0.07	0.06	0.02	0.00	0.02
ZINUNDUNGAN RIS	44	2.21	2.58	2.61	0.21	2.20	2.05	2.03	1.36	0.12	0.00	0.00	1.63
ZINUN. EXTEN.	44	1.95	2.37	2.43	0.24	1.90	1.72	1.73	1.17	0.43	0.36	0.17	1.50
DUMMUN RIS	46	1.83	2.68	2.95	0.27	2.89	2.72	2.82	1.82	0.52	0.31	0.13	1.67
CIPs	LC-12	0.05	0.08	0.10	0.06	0.06	0.20	0.29	0.22	0.14	0.04	0.00	0.02
CISs	LC-13	0.62	0.86	1.14	0.72	0.37	1.17	1.70	1.29	0.83	0.23	0.00	0.28
CIPs	LC-13	0.64	0.89	1.18	0.74	0.65	2.31	3.35	2.55	1.63	0.45	0.00	0.28
CIADP(L/CAGA.)	47	9.63	14.08	15.52	1.41	15.20	14.31	14.79	9.57	0.62	0.00	0.00	8.52
CISs	LC-14	0.41	0.57	0.75	0.47	0.24	0.77	1.11	0.85	0.54	0.15	0.00	0.18
CIPs	LC-14	0.18	0.25	0.33	0.20	0.18	0.64	0.93	0.70	0.45	0.12	0.00	0.08
SUB TOTAL		46.29	58.66	62.43	12.95	50.10	65.71	75.77	51.69	24.35	8.92	2.32	33.75
TOTAL		295.48	337.86	295.95	104.86	255.08	317.46	379.19	244.10	133.84	65.88	66.21	222.35

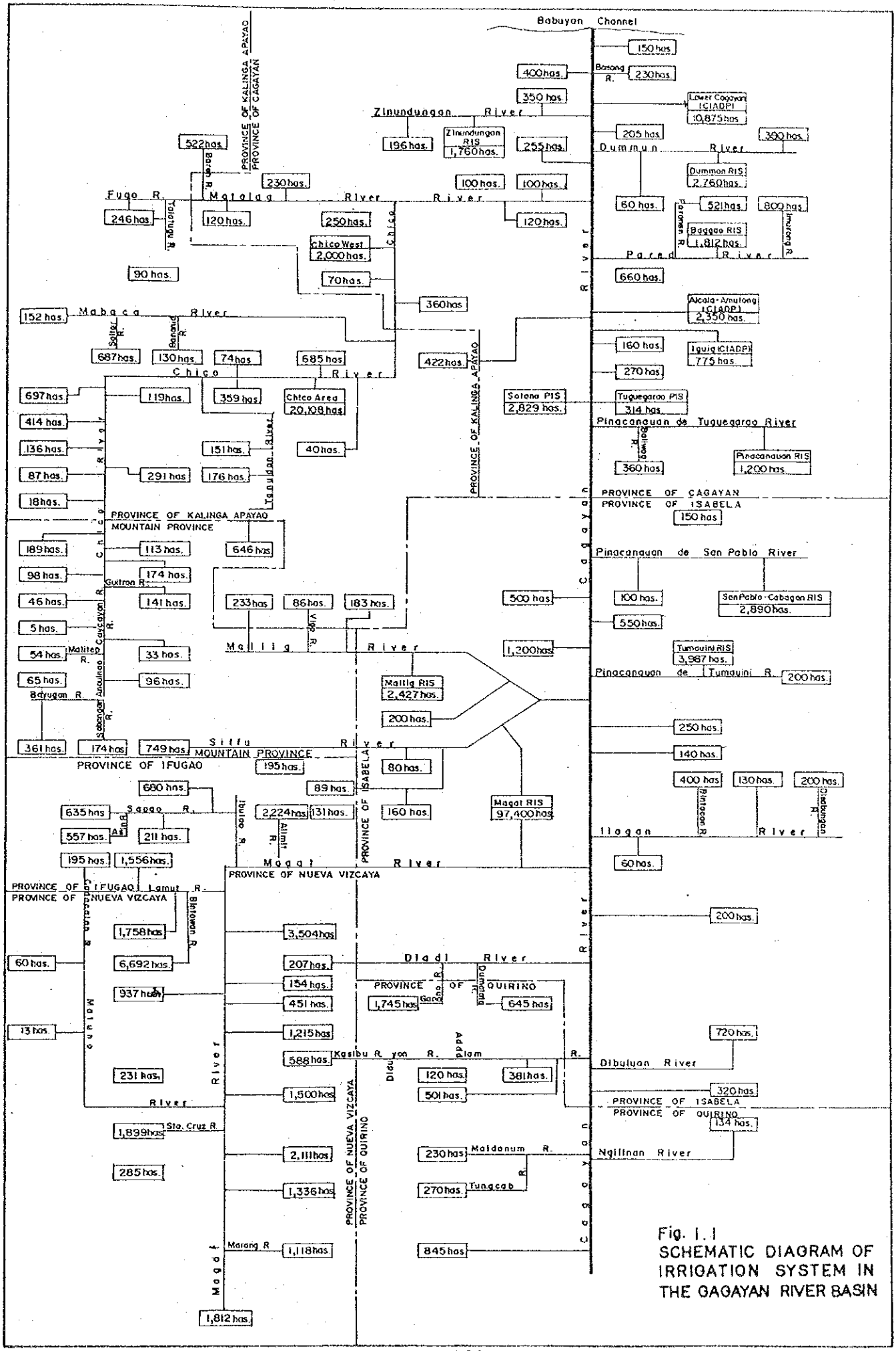

Fig. 1.1
SCHEMATIC DIAGRAM OF IRRIGATION SYSTEM IN THE CAGAYAN RIVER BASIN