

(3) Cross drain

The previous feasibility study proposes the rehabilitation of 21 cross drains. In the present study, construction of 12 additional drains is proposed owing to the provision of a new embankment on the right bank of the canal.

(4) Spillway

The previous feasibility study proposes 5 new spillways in addition to the existing 9 spillways with the aim to supplement the discharge capacity of the cross drains. However, in the present study, new construction is discarded for reason that, as a rule, the inflow of drainage water to the irrigation canal is prevented with the construction of the right bank embankment and drainage water is evacuated through an adequate number of cross drains to be provided additionally.

(5) Bridge

The previous feasibility study proposes to use the existing 14 bridges after repair and rehabilitation. However, since most have deteriorated, the present study proposes to replace all of them with new ones, which are to be made of pre-cast concrete beams supported by concrete gravity abutments and piers.

4.5.4 Secondary irrigation canal

Neither modification nor revision is needed for the secondary canals except in the change of the number and length of the canals to 54 and 62.6 km in total length, respectively. As regards the related structures, modifications are proposed for turnouts and crossing structure of the canal. The previous plan proposes a masonry type turnout. However, for the convenience in construction, the present study proposes to change it to a pre-cast concrete type and, besides, to equip it with a discharge measuring device. In addition, to facilitate

crossing of the canal, it is proposed to install a culvert type structure across the canal at appropriate intervals of about 600 m.

4.5.5 Main and secondary drains

No modification is needed for both main and secondary drains.

4.5.6 Tertiary canals and farm plot layout

Following the layout shown in Fig. 4.2, all the tertiary irrigation and drainage canals will be constructed newly together with the farm plot layout works.

Related to the farm plot layout works, reclamation works inclusive of land clearing and rough levelling will have to be executed for the area of 1,784 ha which now remain as grass land or upland field. Clearing works consist of removal of grass and shrubs, while the rough levelling works are to make the land surface almost level with a accuracy of + 10 cm. Minute levelling will be entrusted to farmers together with provision of plot borders and ridges.

5. PROJECT ORGANIZATION AND MANAGEMENT

5.1 Organization at the Project Implementation Stage

At the project implementation stage, the main duty of the organization would be to control the execution of the construction works. In view of its present activities in the area, the Baguineda Operation should need administrative cooperation from the Directorate of Rural Engineering, Directorate of Agriculture and Rural Economy Institute. Furthermore, it is proposed to create a Project Coordination Committee consisting of experts from these directorates and institute.

The proposed organization at the project implementation stage is presented in Fig.5.1. The actual project construction works would be controlled by the Construction and Inspection Division which would be established by extending the existing Rural Engineering Division. In view of the importance of accounting operations during the construction stage, the present Accounting Section in the Administration and Finance Division would be transformed into Finance Division. Besides, it would be necessary to add a Resettlement Section in the Administration Division.

5.2 Organization after Completion of the Construction Works

Upon completion of the project construction works, the Project Coordination Committee would be dissolved. The project operation and management would then be controlled by Directorate of Agriculture. The organization chart is presented in Fig.5.2. The organization of the Baguineda Operation after completion of construction works should be a reinforced organization based on the present structure.

The Construction and Inspection Division would be transformed into Operation and Maintenance Division which will undertake all maintenance and repair works for the irrigation system, structures, infrastructure, farm machinery, operational equipment, etc.

For smooth operation and commercialization of milk, a Livestock Section, under the Production Division would be promoted to Division status. In addition, the procurement of farm inputs and commercialization of agricultural products would be undertaken by the Procurement and Commercialization Division.

The Administration Division and Finance Division would be combined again into one Administration and Finance Division as before. The Division, however, would comprise two sections, i.e. Resettlement and Cooperative Section and Accounting and Loan Collection Section.

As stated in 4.3.4, in order to encourage incentives of farmers toward implementation of the Project, it is proposed to organize farmers' association at the level of each village and let it be involved in operation and maintenance of irrigation facilities, especially those below the tertiary level, and in preparation of animal farming schedule.

6. Project Implementation Schedule

6.1 Basic Consideration

The previous feasibility study proposes to implement the whole construction works in three years dividing the works into three stages i.e. the first stage for main canals, the second stage for secondary canals and development of Koba and Upper Baguineda areas of 1,112 ha and the third stage for the same kind of works for Lower Baguineda, Tanima and Sienkoro areas of 1,888 ha. The plan aims at the realization of all the major project works at first and then, proceeding to the minor works from the upstream to the downstream areas. It took a rather orthodox way of approach and assumes that all the fund requirement will be available from one foreign lending agency, supplemented by local finance from the Government, and that all the works are executed in one stroke under one package of contract.

The above-mentioned previous plan is rather difficult to follow at present in view of the current financial situation of the Malian Government and availability of financial assistance sources from abroad. The fund requirement is too big to be appropriated from a sole financial agency and, besides, it is concentrated overwhelmingly in the first stage. The plan needs modification with a view to decrease the fund requirement in the first stage, limiting the initial works to those of utmost importance and of urgent need. In addition, the following basic concepts should be applied:

- (1) Top priority should be accorded to the rehabilitation of the main irrigation canal especially to prevention works of the severe leakage portions of about 10 km.
- (2) Among the five sub-areas i.e. Koba 557 ha, Upper Baguineda 555 ha, Lower Baguineda 1,424 ha, Tanima 304 ha and Sienkoro 160 ha, priority in development should be given at first to Koba and Upper Baguineda of 1,112 ha. Development of other areas are put in second or third priorities because of their

locations, less socio-economic and agricultural activities and much higher per unit construction cost (see Table 6.1).

6.2 Implementation Schedule

Based on the above consideration, the implementation schedule of the Project is prepared as shown in Fig. 6.1. It aims basically at the earliest solution of the most serious problem of water shortage and proposes to execute leakage prevention works for the main canal in the first stage. The second stage works will involve rehabilitation of the remaining portion of the main canal for Koba and Upper Baguineda, together with development of these areas. The works necessary for Lower Baguineda, Tanima and Sienkoro will be carried over to the final and third stage. Since the leakage in the main canal is a problem of utmost importance and needing urgent treatment, the above development plan is expected to bring about the highest direct return to the project area.

More specifically, each of the stages will comprise the following works, for which it is to be noted that the development of a small part of the Upper Baguineda area, CSB-5 of 86 ha located nearest to the Baguineda Camp, is included in the first stage works for the purpose to demonstrate the construction and rehabilitation of secondary and tertiary facilities as well as practices of water management from the main to the terminal facilities.

Stage-I

- (i) Construction of a siphon across the Koba river (L = 91 m)
- (ii) Canal lining works (L = 7.5 km)
- (iii) Right bank embankment at the Koba river crossing portion (L = 1.7 km)
- (iv) Consolidation of farmland of 86 ha
- (v) Rehabilitation of major structures along the heavy leakage

portion and the upstream reach of the Sotuba canal

- (vi) Rehabilitation of a connection road from the highway RN-6 to Baguineda Camp (L = 4.3 km)

Stage-II

- (i) Rehabilitation of main canal from the head of the Sotuba to the end of the Lower Baguineda, excluding the heavy leakage portion constructed in the first stage (L = 29.3 km)
- (ii) Construction and rehabilitation of secondary irrigation canals for Koba and Upper Baguineda (L = 22.7 km)
- (iii) Construction and rehabilitation of secondary drainage canals for the above areas (L = 31.9 km)
- (iv) On-farm development including tertiary canals for the above areas, excluding the partially developed area in the first stage (1,026 ha).

Stage-III

- (i) Construction of the new Tanima main canal (L = 4.4 km)
- (ii) Construction and rehabilitation of secondary irrigation canals for Lower Baguineda, Tanima and Sienkoro (L = 42.2 km)
- (iii) Construction and rehabilitation of main and catch drains (L = 14 km)
- (iv) Construction and rehabilitation of secondary drainage canals for the above areas (L = 44.6 km)
- (v) On-farm development including tertiary canals for the above areas (1,888 ha)

The whole works will be executed in 55 months or about four and a half years including 6 months for the detail design and tender and awarding period.

The first stage works will be executed in 20 months in succession to the design and contract period utilizing two dry seasons each spanning over a period of about 6 months. Major works such as the Koba river crossing siphon and the related canal lining and right bank embankment will be executed in the first dry season, whereas partial land consolidation works and the remaining canal lining works will be carried out in the next dry season. Rehabilitation of the structures will be continued even in the rainy seasons. It is expected that the effect of the first stage works is felt immediately after its completion.

The second stage works will be carried out in 21 months involving 2 dry seasons. The works consist mainly of earthworks for canals and will be executed concentratedly in the dry seasons. On-farm works are proposed to be executed mainly by manpower and will be continued in both dry and rainy seasons, together with the structural works related to main and secondary canals.

The third stage works will be executed in 24 months intervened also by two dry seasons. Construction of the new Tanima canal will be mainly executed in the first dry season, while secondary canal construction and rehabilitation will be executed in two dry seasons.

As stated above, as a principle, construction works will be executed mainly during the dry season lest supply of irrigation water should be suspended during the rainy season.

7. COST ESTIMATE

7.1 General

The Project cost consists broadly of (i) civil works cost for the rehabilitation works and (ii) initial farm investment. These costs are estimated based on the preliminary design of the facilities and depending on the following conditions.

- (1) All the construction works are proposed to be executed by contractor(s) who are selected through international competitive biddings.
- (2) Construction equipment and materials, except those locally available, are imported by contractor(s) with exemption of any import duties and taxes. The equipment cost is estimated on a depreciation basis.
- (3) Locally available materials consist of cement, sand, gravel, stone, fuel and lubricant, etc.
- (4) Land necessary for construction is made available free of charge.
- (5) Workable days are 213 days/year for earth works and 267 days/year for other structural works, while workable hours are 8 hours/day.
- (6) Physical contingency is 10% of the direct construction cost, whereas the annual escalation rate is 3% for the foreign currency portion and 10% for the local currency portion.
- (7) The estimate is made at the price level in October 1985 with the then exchange rate of US\$ 1.0 = F CPA 426.

7.2 Civil Works Cost

The total cost for the civil works is estimated at US\$ 32.7 million including the foreign currency portion of US\$ 15.0 million and the local currency portion of F CFA 7,561 million. The breakdown of the estimation is shown in Table 7.1 and a summary is given as below:

Stage	Foreign Currency US\$ 103	Local Currency 106 F CFA	Total US\$ 103
I	2,139	1,272	5,126
II	3,898	1,547	7,530
III	4,883	1,591	8,618
Physical Contingency	1,092	441	2,127
Engineering Service	1,441	582	2,808
Price Contingency	1,527	2,128	6,520
Total	14,980	7,561	32,730

7.3 Initial Farm Investment

The initial farm investment covers such cost and expenses as; (i) construction of facilities for livestock development, (ii) procurement of agricultural machinery for fodder crops, (iii) purchase of milk cow, and (iv) construction of rice mills. It is estimated at US\$ 4.2 million in total comprising the followings:

Item	Foreign Currency	Local Currency	Total
	US\$ 103	106 F CFA	US\$ 103
(i) Facilities for livestock breeding	1,446	180	1,869
(ii) Agricultural machinery	428	0	428
(iii) Milk cow	1,267	0	1,267
(iv) Rice mills	160	8	176
(v) Price contingency	347	63	497
Total	3,648	251	4,237

7.4 Total Project Cost and Annual Fund Requirement

The total cost amounts to US\$ 37.0 million consisting of the foreign currency portion of US\$ 18.6 million and the local currency portion of F CFA 7,812 million.

Item	Foreign Currency	Local Currency	Total
	US\$ 103	106 F CFA	US\$ 103
(i) Civil works	14,980	7,561	32,730
(ii) Initial farm investment	3,648	251	4,237
Total	18,628	7,812	36,967

Per ha cost is estimated at US\$ 8,715 , while based on the

implementation schedule the annual fund requirement is estimated as below:

Year	Foreign Currency	Local Currency	Total
	US\$ 103	106 F CFA	US\$ 103
1st	264	168	659
2nd	2,741	1,363	5,942
3rd	5,113	2,225	10,336
4th	6,518	2,447	12,264
5th	3,991	1,607	7,764
Total	18,628	7,812	36,967

8. PROJECT EVALUATION

8.1 Economic Evaluation

The economic feasibility of the Project is evaluated in terms of the Internal Rate of Return (IRR) applying the sensibility analysis with regard to such items as cost increase and production decrease. The economic cost is obtained by deducting the provision for price escalation from the financial cost, while the economic benefit is estimated on the condition that: (i) the build-up period is 5 years, (ii) for products available in international market, the prices forecast by the World Bank for 1995 is referred to, and (iii) for agricultural inputs, custom duty and import tax of 13% are exempted. The economic benefit is summarized in Table 8.1.

From the cost-benefit flow given in Table 8.2, the IRR is estimated at 13.5% , which shows a rather high economic viability of the Project. It is confirmed by the result of the sensibility analysis.

(Unit: %)

Cost Increase	Benefit Decrease		1 Year Delay
	0	20	
0	13.5	11.0	12.1
10	12.4	10.0	11.2

8.2 Financial Evaluation

The financial evaluation is made from the viewpoints of farmers and the Operation, taking into account the farmers' capacity to pay for the operation and maintenance expenses for the former and the repayment capacity of the investment for the latter.

Table 8.3 shows a farm budget of the typical farmer holding a land of 1.2 ha. The annual gross income is US\$ 3,560 , equivalent to about 2.2 times of that of the without-Project condition. The annual outgo is US\$ 2,900, consisting of the farm expenses of US\$ 670 and the living expenses of US\$ 2,230 . Accordingly, the farmer can reserve US\$ 660 as the capacity to pay. Since the farmers are living at a subsistence level at present, these estimates demonstrate the attractiveness of the Project seen from the farmers' viewpoint.

The capacity of repayment of investment fund is studied by means of a cash flow which would be discounted on the basis of anticipated income and fund requirement of the Project. The net revenue would comprise water charge (or, in other words, O&M and replacement costs) and net income from milk production.

For the purpose of analysis of the repayment capacity, it is assumed that the investment fund required for project realization is provided under the following conditions:

- (1) The foreign currency component will be financed by a bilateral or international agency in the form of a loan with the following conditions: Service charge will be 0.75% per annum and repayment period will be 50 years including a 10-year grace period (Loan condition of African Development Bank)
- (2) The local currency component will be allocated from the national budget.

As shown in Table 8.4, the large portion of loan amount would be repaid by the Baguineda Operation in and after 1990. Only the service fee during the initial 5 years, when milk cow production has not started yet, has to be borne by the Government. Since the annual income of dairy products is estimated to be US\$ 934,000 at the full developed stage in 1997, the Baguineda Operation could make an annual net reserve of US\$ 240,000 to US\$ 578,000. Therefore the Project will have the repayment capacity to cover all the local currency component.

8.3 Socio-economic Impact

In addition to the direct benefit stipulated in the economic evaluation, favourable but intangible socio-economic benefits are expected from the implementation of the Project.

(1) Expansion of commerce and foreign trade

Considerable increase in rice production and other cereals as a result of the project realization would not only enable the Baguineda Perimeter to be self-sufficient in cereals but will also partly meet the regional food crops demand. Consequently, trade in cereal products in the country would be developed leading to the saving of foreign currency for imports of these products.

On the other hand, increase in vegetables and milk production upon completion of the Project would help expand both home business and foreign trade and would also stimulate agro-industrial development in the project area as well as in its vicinity.

(2) Socio economic impact

Owing to the increase in agricultural production, the net income of farm households would augment considerably, enabling them to improve their living standard. Moreover, this fact would have favourable effects on agricultural activities, and stabilize the rural economy and general welfare as a whole.

Development of road network under the Project would improve domestic transportation and communication means, thus facilitating agro-economic and rural development activities.

The realization of the Project would create employment opportunities both in construction works and in O&M of project facilities. Employment opportunities would also increase in the agro-industrial sector, in particular in farm products processing plants such as SOCAM, ULB, etc.

It should be mentioned also that in participating in construction and operation and maintenance of the Project, local inhabitants would gain more experience, technical knowledges and capability in undertaking the works in various sectors. They would constitute an experienced and skillful man-power which will be useful for development of Mali in future.

TABLES

Table 3.1 PRESENT CONDITION OF MAIN, SECONDARY IRRIGATION AND DRAINAGE CANALS

(1) Main Canal

Name	Length (km)	Longitudinal Gradient	Calculated Discharge (m ³ /sec)	Number of Structures						
				Turn-out	Cross Drain	Box Culvert	Gate Spillway	Side Spillway	Gate	Bridge
Sotuba Main Canal	19.0	1/20,000	10.4	11	12	1 ^{/2}	6 ^{/1}	1	1	4
Baguineda Main Canal	17.0	1/27,300	6.6	13	8	0	1	1	2	10
Tanima Main Canal	6.1	1/5,600	2.1	3	2	0	0	0	0	1
Total	43.0			27	22	1	7	2	3	15

(2) Secondary Canal

Sector	No. of Secondary Canal	Length (km)	Longitudinal Gradient	Calculated Discharge (m ³ /sec)	Number of Structures				
					Turn-out	Division Bos w/drop	Check	Drop	Cross Drain
Koba	11	8.9	1/150 - 1/1,000	0.6 - 0.7	130	0	43	1	2
Baguineda	14	19.9	1/220 - 1/2,000	0.7 - 0.9	43	12	1	0	1
Tanima	5	5.8	1/270 - 1/480	0.2 - 0.6	12	0	0	0	0
Total	29	34.6			185	12	44	1	1

(3) Koba Eiver, Para River and Tanima Main Drain

Sector	Length (km)	Longitudinal Gradient	Calculated Discharge (m ³ /sec)	Structures
Koba River	-	-	130	Bridge
Para River	-	-	23	-
Tanima Main Drain	72	1/750 - 1/1,000	2 - 5	Turnout and culvert

(4) Secondary Drain

Sector	No. of Secondary Drain	Length (km)	Longitudinal Gradient	Calculated Discharge (m ³ /sec)	Number of Structures					
					Drop	Aque-duct	Siphon	Bridge	Check	Turn-out
Koba	11	14.9	1/200 - 1/360	1.2 - 4.0	0	0	0	0	2	0
Baguineda	13	26.4	1/130 - 1/450	2.2 - 5.0	6	6	3	2	22	5
Tanima	6	7.2	1/220 - 1/660	1.0 - 2.0	0	0	0	0	0	0
Total	30	48.5			6	6	3	2	24	5

Remarks: /1: Out of six, two spillways are installed at the Koba crossing point of the Sotuba canal.

/2: This structure is provided to the Sotuba canal at the above-mentioned point.

Table 4.1 PROPOSED IRRIGATION AND DRAINAGE FACILITIES (1/2)

1. Main Canal										
A. Principal Feature										
Name	Length (km)	Discharge (m ³ /sec)	Longitudinal Gradient	Earthwork Length (km)	Concrete Lining Length (km)	Right Bank Embankment Length (km)	Remarks			
Sotuba Main Canal	19.0	10.3 - 8.5	1/5,000 - 1/1,500	*14.7	4.3	4.8	Existing Tanima main canal is abandoned.			
Baguineda Main Canal	17.9	8.5 - 0.9	1/11,000 - 1/6,400	11.9	6.0	0.7				
Tanima Main Canal	4.4	0.9 - 0.2	1/1,000	4.4	-	3.7	*including rock portion of 200 m.			
Total	41.3			31.0	10.3	9.2				
B. Structure										
Name	Turnout	Cross Drain	Number of Structure				Check Gate	Bridge	Washing Stop	
			Culvert	Spillway	Spillway	Spillway				
Sotuba Main Canal	17	13	7	6	2	6	6	3		
Baguineda Main Canal	27	8	0	1	5	10	6			
Tanima Main Canal	5	0	1	0	0	0	1			
Total	49	21	8	7	7	16	10			
2. Secondary Canal										
Sector	Nos. of Canal	Total Length (km)	Discharge (lit./sec)	Longitudinal Gradient	Structure (nos.)			Terminal Structure	Aqueduct	
					Turnout	Check	Drop			
Upper Koba Sector	10	8.9	40 - 256	1/1,500 - 1/500	57	48	11	22	9	0
Lower Koba Sector	6	3.3	25 - 204	1/1,500 - 1/500	27	24	6	4	3	0
Upper Baguineda Sector	10	11.9	13 - 295	1/1,000 - 1/300	81	73	12	24	8	0
Lower Baguineda Sector	16	27.3	123 - 515	1/1,500 - 1/400	182	166	18	55	16	0
Tanima Sector	7	7.1	85 - 206	1/1,000 - 1/300	47	40	20	14	7	0
Sienkoro Sector	5	7.7	16 - 102	1/1,500 - 1/400	30	25	13	11	5	1
Total	54	66.2			421	373	80	127	48	1

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Table 4.1 PROPOSED IRRIGATION FACILITIES (2/2)

3. Tertiary Canal				4. Tertiary Drain				
Sector	Nos. of Canal	Total Length (km)	Range of Discharge (lit./sec)	Structures Farm Inlet	Farm Access	Mos. of Canal	Total Length (km)	Range of Discharge (lit./sec)
Upper Koba Sector	57	19.1	10-30	319	87	6	19.1	12-48
Lower Koba Sector	27	8.8	10-30	146	49	4	6.5	12-48
Upper Baguineda Sector	85	27.6	20-40	461	142	5	20.4	24-96
Lower Baguineda Sector	218	71.2	20-40	1,188	356	0	52.7	24-96
Tanima Sector	47	15.2	10-40	253	76	5	11.2	12-96
Sienkoro Sector	25	8.0	10-30	133	40	2	5.9	12-48
Total	459	149.9		2,500	750	22	115.8	

5. Tanima Main Drain, River as Drainage Canal and Catch Drain									
Sector	Length (km)	Discharge (m ³ /sec)	Longitudinal Incline		Number of Structures			River Improvement	
			Bridge	Aqueduct	Junction	Drop	Drop	(m)	
Tanima Main Drain	7.2	30	1/2,000	1/700	0	0	13	4	-
Koba	-	140	-	-	1	0	0	0	-
Fara	-	24	-	-	0	0	0	0	320
Tanima Catch Drain	6.6	8.9	1/1,500	-	0	2	0	0	-
Total					1	2	13	4	320

6. Secondary Drain									
Sector	Nos. of Canal	Total Length (km)	Discharge (m ³ /sec)	Longitudinal Incline			Structures		
				Drop	Culvert	Aqueduct	Drop	Culvert	Aqueduct
Upper Koba Sector	14	14.0	0.02-8.13	1/2,000	1/300	8	19	28	0
Lower Koba Sector	5	4.8	0.3-3.43	1/1,000	1/150	3	12	9	0
Upper Baguineda Sector	8	12.2	0.01-9.67	1/1,500	1/300	4	18	35	1
Lower Baguineda Sector	17	34.6	-	1/2,000	1/400	8	17	71	0
Tanima Sector	7	5.8	0.11-0.60	1/1,500	1/150	1	5	11	0
Sienkoro Sector	3	4.2	0.03-0.87	1/2,000	1/200	0	5	3	2
Total	54	75.6				24	76	147	3

Table 4.2 ALTERNATIVES FOR CANAL LINING

Type of Lining and Thickness	Cost (\$/m ²)	Durability*	Water Losses* (m ³ /m ² /24 hrs)	Other Important Features
(Hard surface lining)				
1. Portland cement concrete, 10 cm	27.9	50 years	Below 0.03	Suitable for all size of canals, all topographical, climatical and operational conditions; firm subsoil required; availability of aggregates near the job site is essential.
2. Soil cement, dry mixed, 15 cm	21.9	25 years	0.03 - 0.06	Although less durable than portland cement concrete, low first cost makes this an economic lining, where suitable sandy soils are available from canal excavation or nearby.
(Buried membrane lining)				
3. Sublining of synthetic rubber sheeting under precast concrete, 5 cm	27.1	30 - 50 years is expected. 30 years recorded in the field.	Negligible if properly jointed and maintained.	Offers permanent seepage control if protected from physical damage; Precast concrete is set to relieve any hydrostatic pressures, concrete joints and cracks need not be sealed but eventually filled with material to protect the underlying membrane.
(Earth lining)				
4. Thick compacted earth lining, 90 cm	14.0	20 years	Below 0.08	Suitable soils (well-graded sand and gravel with a clay binder and clayey gravels, poor graded gravel-sand-clay mixture) from canal excavation or nearby borrow area is essential for economy.

* Source: Irrigation canal lining, FAO, 1971

Table 4.3 COST COMPARISON OF MAIN CANAL TURNOUT

(Unit: US\$)

Type	Initial Cost		Annual O & M Cost					Annual Cost	
	Total	Civil	Gate	Depreciation		Maintenance			Operation
				Civil Work	Gate	Painting	Greasing		
A	663,200	476,900	186,300	24,322	13,786	292	168	2,313	40,881
B	1,108,800	528,800	580,000	26,969	42,920	1,159	364	2,508	73,920
C	683,400	398,800	284,600	20,339	21,060	337	100	3,938	45,774

Table 6.1 COMPARISON OF SUB-AREAS

Item	Unit	Koba	Upper Baguineda	Lower Baguineda	Tanima/Sienkoro	Total
(1) Irrigation Area	ha	557	555	1,424	464	3,000
(2) Population	person	1,436	3,266	1,583	779	7,064
(3) Population Density	person/ha	2.6	5.9	1.1	1.7	2.4
(4) Nos. of household	nos.	172	523	112	70	877
(5) Planted Area	km	440	1,165	726	243	2,574
- In Operation	ha	90	370	222	65	747
- Outside	ha	350	795	504	178	1,827
(6) Required Cost/1	US\$10 ³	4,707	4,528	12,522	4,338	26,145
(7) Per ha Cost	US\$	8,450.6	8,158.6	8,793.5	9,349.1	8,715

Remarks: Cost of each area is obtained by allocating the main canal cost to each area in accordance with the acreage.

Table 7.1 SUMMARY OF CONSTRUCTION COST

Koba Sector A=557ha						
WORKS	UPPER Koba A=383ha			LOWER Koba A=174ha		
	L/C 10*6FCFA	F/C US\$ 10*3	Total US\$ 10*3	L/C 10*6FCFA	F/C US\$ 10*3	Total US\$ 10*3
I TEMPORARY WORKS	15	47	83	11	49	75
II MAIN IRRIGATION CANAL	239	794	1,354	763	1,269	3,050
III SECONDARY IRRIGATION CANAL	109	379	634	42	157	255
IV ON-FARM WORKS	119	326	605	55	150	279
V MAIN DRAINAGE CANALS	0	0	0	0	0	0
VI SECONDARY DRAINAGE CANALS	44	74	179	30	44	115
VII CONNECTION ROAD	0	0	0	0	0	0
Sub-total	526	1,620	2,855	902	1,667	3,784
IX PHYSICAL CONTINGENCY	53	182	285	90	167	378
Total Construction Cost	579	1,782	3,140	992	1,834	4,162
X ENGINEERING SERVICES						
TOTAL	579	1,782	3,140	992	1,834	4,162

BAGUINEDA Sector A=1979ha						
WORKS	UPPER BAGUINEDA A=555ha			LOWER BAGUINEDA A=1424ha		
	L/C 10*6FCFA	F/C US\$ 10*3	Total US\$ 10*3	L/C 10*6FCFA	F/C US\$ 10*3	Total US\$ 10*3
I TEMPORARY WORKS	33	59	137	39	119	211
II MAIN IRRIGATION CANAL	724	880	2,579	221	690	1,209
III SECONDARY IRRIGATION CANAL	138	500	624	311	1,134	1,864
IV ON-FARM WORKS	165	437	824	506	1,503	2,692
V MAIN DRAINAGE CANALS	2	5	9	147	386	731
VI SECONDARY DRAINAGE CANALS	71	124	290	125	292	585
VII CONNECTION ROAD	11	28	54	0	0	0
Sub-total	1,144	2,034	4,718	1,350	4,124	7,293
IX PHYSICAL CONTINGENCY	114	203	472	135	412	729
Total Construction Cost	1,258	2,237	5,190	1,485	4,536	8,022
X ENGINEERING SERVICES						
TOTAL	1,258	2,237	5,190	1,485	4,536	8,022

TANIMA & SIENKORO A=464ha						
WORKS	TANIMA & SIENKORO A=464ha			TOTAL A=3000ha		
	L/C 10*6FCFA	F/C US\$ 10*3	Total US\$ 10*3	L/C 10*6FCFA	F/C US\$ 10*3	Total US\$ 10*3
I TEMPORARY WORKS	14	43	75	113	317	582
II MAIN IRRIGATION CANAL	65	186	340	2,012	3,819	8,542
III SECONDARY IRRIGATION CANAL	161	568	946	761	2,737	4,523
IV ON-FARM WORKS	170	510	909	1,015	2,926	5,308
V MAIN DRAINAGE CANALS	39	114	205	187	506	946
VI SECONDARY DRAINAGE CANALS	20	49	97	291	583	1,266
VII CONNECTION ROAD	0	0	0	11	28	54
Sub-total	469	1,471	2,572	4,390	10,915	21,221
IX PHYSICAL CONTINGENCY	47	147	257	439	1,092	2,122
Total Construction Cost	516	1,618	2,829	4,829	12,007	23,343
X ENGINEERING SERVICES				580	1,441	2,801
TOTAL	516	1,618	2,829	5,409	13,448	26,145

Table 7.3 DISBURSEMENT SCHEDULE FOR INSTALLATION OF AGRICULTURAL FACILITIES

WORK ITEM	1986			1987			1988			1989			1990			Total	
	F/C US\$10*3	L/C 10*6FCFAUS\$10*3	Total US\$10*3	F/C US\$10*3	L/C 10*6FCFAUS\$10*3	Total US\$10*3	F/C US\$10*3	L/C 10*6FCFAUS\$10*3	Total US\$10*3	F/C US\$10*3	L/C 10*6FCFAUS\$10*3	Total US\$10*3	F/C US\$10*3	L/C 10*6FCFAUS\$10*3	Total US\$10*3	F/C	L/C
1 INSTALLATION OF COWSHED AND FACILITIES	482	50	523	482	50	523	482	50	523	482	50	523	482	50	523	1,446	180
2 FARM MACHINERY FOR FEEDER PRODUCTION	214	0	214	107	0	107	107	0	107	107	0	107	107	0	107	428	0
3 PROCUREMENT OF MILK COW (JERSEY)	16	1	18	423	0	423	422	0	422	422	0	422	422	0	422	1,257	0
4 INSTALLATION OF RICE MILL	712	61	855	64	2	69	80	4	89	80	4	89	80	4	89	180	8
SUB-TOTAL				1,076	52	1,222	1,091	64	1,241	1,241	64	1,241	1,241	64	1,241	3,301	188
PRICE CONTINGENCY	43	13	72	100	21	149	137	30	208	137	30	208	137	30	208	347	63
TOTAL	755	73	927	1,176	83	1,371	1,228	94	1,449	1,228	94	1,449	1,228	94	1,449	3,648	251

Remark: Price escalation rates F/C=3% and L/C=10%

Table 8.1 ECONOMIC BENEFIT FLOW

Year	CROP PRODUCTION (I)				LIVESTOCK PRODUCTION (II)										TOTAL PROJECT BENEFIT US\$10*3 (16)			
	Rainy S. Crops		Dry S. Crops		With Project		Without Project		Increment		Milk		Meat			Product. Cost		Total Benefit
	Planted Area (ha)	Benefit 10*6FCFA	Planted Area (ha)	Benefit 10*6FCFA	Benefit 10*6FCFA	Benefit 10*6FCFA	Benefit 10*6FCFA	Benefit 10*6FCFA	Benefit 10*6FCFA	US\$10*3	k1	Benefit 10*6FCFA	Benefit 10*6FCFA	Benefit 10*6FCFA	10*6FCFA	10*6FCFA	10*6FCFA	US\$10*3
	(1)	(2)	(3)	(4)	(5)=(2+4)	(6)	(7)=(5-6)	(8)	(9)	(10)	(11)	(12)	(13)	(14)=(10+12-13)	(15)	(16)	(17)	(18)
1986	86	15.1	86	23.3	38.4	316.2	-277.9	(552)										
1987	982	177.9	982	275.4	453.3	316.2	137.1	322										
1988	982	243.6	2600	815.7	1059.3	316.2	743.1	1,744	390	92.8	0	0.0	29.34	63.5	149	(552)	322	1,893
1989	2600	581.1	2600	1044.3	1605.4	316.2	1289.2	3,025	790	188.0	0	0.0	70.58	177.3	275	1,893	3,302	3,302
1990	2600	706.8	2600	1185.2	1894.0	316.2	1577.8	3,704	1170	278.5	0	0.0	121.359	157.1	369	4,072	4,072	4,072
1991	2600	796.7	2600	1321.5	2118.2	316.2	1802.0	4,230	1310	311.8	0	0.0	169.369	142.4	324	4,564	4,564	4,564
1992	2600	853.4	2600	1409.2	2262.6	316.2	1946.3	4,569	1650	395.1	10	.8	220.047	175.8	413	4,982	4,982	4,982
1993	2600	910.0	2600	1409.2	2319.2	316.2	2003.0	4,702	2180	518.8	10	.8	254.056	255.6	600	5,302	5,302	5,302
1994	2600	910.0	2600	1409.2	2319.2	316.2	2003.0	4,702	2800	656.4	20	1.5	265.394	382.5	898	5,600	5,600	5,600
1995	2600	910.0	2600	1409.2	2319.2	316.2	2003.0	4,702	2800	656.4	220	15.9	265.394	397.9	934	5,636	5,636	5,636
2095	2600	910.0	2600	1409.2	2319.2	316.2	2003.0	4,702	2800	656.4	220	15.9	265.394	397.9	934	5,636	5,636	5,636

Table 8.2 ECONOMIC COST & BENEFIT FLOW

Unit: US\$10*3

Year in Order	Calendar Year	Project Cost			Project Benefit			
		Civil Works	Farm Invest.	O & M Cost	Total	Crop Product.	Milk & Meat	Total
1	1986	616	0	0	616	0	0	0
2	1987	4,375	0	12	4,387	0	0	0
3	1988	7,381	423	100	7,904	(652)	0	(652)
4	1989	8,474	422	247	9,143	175	0	175
5	1990	5,354	422	417	6,203	1,638	149	1,787
6	1991	.	.	524	524	2,974	275	3,249
7	1992	.	.	524	524	3,663	369	4,032
8	1993	.	.	524	524	4,189	334	4,523
9	1994	.	.	524	524	4,557	413	4,970
10	1995	.	.	524	524	4,702	600	5,302
11	1996	.	.	524	524	4,702	898	5,600
12	1997	.	.	524	524	4,702	934	5,636
50	2035	.	.	524	524	4,702	934	5,636

Table 8.3 TYPICAL FARM BUDGET UNDER
WITH PROJECT CONDITION

Item	Planted Area (ha)	Unit Yield (t/ha)	Produc- tion (t)	Price (F CFA/t)	Total (10 ³ FCFA)
(1) Income					
1) Agricultural production					
- Rice	1.11	2.6	2.89	170	491
- Maize	0.74	3.0	2.22	55	111
- Sorghum & Millet	0.09	2.0	0.18	55	10
- French beans	0.05	2.0	0.10	190	19
- Tomato	0.16	25.0	4.00	75	300
- Watermelon	0.04	20.0	0.80	110	88
- Onion	0.06	25.0	1.50	168	252
- Potato	0.06	8.0	0.48	150	72
- Okra	0.06	4.0	0.24	70	17
- Groundnuts	0.04	1.5	0.06	100	60
- Mango	0.37	3.0	1.11	70	78
- Meat (kg)			80 kg	220	18
<u>Total</u>					<u>1,516</u>
2. Outgo					
1) Crop production cost					
- Seed					27
- Fertilizer					
. Urea	610 kg				79
. TSP	440 kg				51
. KCl	310 kg				27
- Agro-chemicals					
. Insecticide	5.0 lit.				7
. Fungicide	2.8 lit.				6
- Farm machinery					62
- Milling charge of paddy (4.44 t x F CFA3,000)					13
- Others (5% of direct cost)					13
2) Living expense					950
<u>Total</u>					<u>1,235</u>
3. Net Reserve					
					281

Table 8.4 FINANCIAL CASHFLOW STATEMENT

(Unit: US\$10³)

Year	in Order	Cash Outflow						Cash Inflow					Bal- ance	
		Capital Cost		Loan Repayment/ ¹				Project Revenue			Govern- ment Subsidy			
		Civil Works	Farm Invest- ment	Sub- total	Princi- pal	Service Fee	O&M Cost	Total	Loan	Farm- ers		Baguineda Operation		
1986	1	256	-	256	-	2	-	258	256	-	-	2	258	-
1987	2	1,872	755	2,627	-	22	12	2,661	2,627	10	-	23	2,660	-
1988	3	3,603	1,176	4,779	-	57	100	4,936	4,779	87	-	71	4,937	-
1989	4	4,700	1,228	5,928	-	102	247	6,277	5,928	214	-	135	6,277	-
1990	5	3,021	489	3,510	-	128	417	4,055	3,510	361	149	35	4,055	-
1991	6	-	-	-	-	128	524	652	-	454	275	-	729	77
1992	7	-	-	-	-	128	524	652	-	454	369	-	823	171
1993	8	-	-	-	-	128	524	652	-	454	334	-	788	136
1994	9	-	-	-	-	128	524	652	-	454	413	-	867	215
1995	10	-	-	-	-	128	524	652	-	454	600	-	1,054	402
1996	11	-	-	-	171	127	524	822	-	454	898	-	1,352	530
1997	12	-	-	-	171	126	524	821	-	454	934	-	1,388	567
1998	13	-	-	-	171	124	524	819	-	454	934	-	1,388	569
1999	14	-	-	-	171	123	524	818	-	454	934	-	1,388	570
2000	15	-	-	-	171	122	524	817	-	454	923	-	1,388	571
2001	16	-	-	-	171	121	524	816	-	454	934	-	1,388	573
2002	17	-	-	-	171	119	524	814	-	454	934	-	1,388	574
2003	18	-	-	-	171	118	524	813	-	454	934	-	1,388	575
2004	19	-	-	-	171	117	524	812	-	454	934	-	1,388	576
2005	20	-	-	-	171	115	524	810	-	454	934	-	1,388	578
2006	21	-	-	-	513	112	524	1,149	-	454	934	-	1,388	240
2007	22	-	-	-	513	108	524	1,145	-	454	934	-	1,388	243
2008	23	-	-	-	513	104	524	1,141	-	454	934	-	1,388	247
2009	24	-	-	-	513	100	524	1,137	-	454	934	-	1,388	251
2010	25	-	-	-	513	96	524	1,133	-	454	934	-	1,388	255
2011	26	-	-	-	513	92	524	1,129	-	454	934	-	1,388	259
2012	27	-	-	-	513	88	524	1,125	-	454	934	-	1,388	263
2013	28	-	-	-	513	85	524	1,122	-	454	934	-	1,388	266
2014	29	-	-	-	513	81	524	1,118	-	454	934	-	1,388	270
2015	30	-	-	-	513	77	524	1,114	-	454	934	-	1,388	274
2016	31	-	-	-	513	73	524	1,110	-	454	934	-	1,388	278
2017	32	-	-	-	513	69	524	1,106	-	454	934	-	1,388	282
2018	33	-	-	-	513	65	524	1,102	-	454	934	-	1,388	286
2019	34	-	-	-	513	62	524	1,099	-	454	934	-	1,388	290
2020	35	-	-	-	513	58	524	1,095	-	454	934	-	1,388	293
2021	36	-	-	-	513	54	524	1,091	-	454	934	-	1,388	297
2022	37	-	-	-	513	50	524	1,087	-	454	934	-	1,388	301
2023	38	-	-	-	513	46	524	1,083	-	454	934	-	1,388	305
2024	39	-	-	-	513	42	524	1,079	-	454	934	-	1,388	309
2025	40	-	-	-	513	38	524	1,075	-	454	934	-	1,388	313
2026	41	-	-	-	513	35	524	1,072	-	454	934	-	1,388	317
2027	42	-	-	-	513	31	524	1,068	-	454	934	-	1,388	320
2028	43	-	-	-	513	27	524	1,064	-	454	934	-	1,388	324
2029	44	-	-	-	513	23	524	1,060	-	454	934	-	1,388	328
2030	45	-	-	-	513	19	524	1,056	-	454	934	-	1,388	332
2031	46	-	-	-	513	15	524	1,052	-	454	934	-	1,388	336
2032	47	-	-	-	513	12	524	1,049	-	454	934	-	1,388	340
2033	48	-	-	-	513	8	524	1,045	-	454	934	-	1,388	343
2034	49	-	-	-	513	4	524	1,041	-	454	934	-	1,388	347
2035	50	-	-	-	513	-	524	1,037	-	454	934	-	1,388	351

Remarks: ¹: Service Fee; 0.75% of loan amount
 Repayment Period; 50 years including 10 years of grace period
 Repayment Schedule; 1% of the total loan amount per year during first 10 years
 and 3% during last 30 years

FIGURES

FIGURE 2.1 LOCATION MAP OF MALI

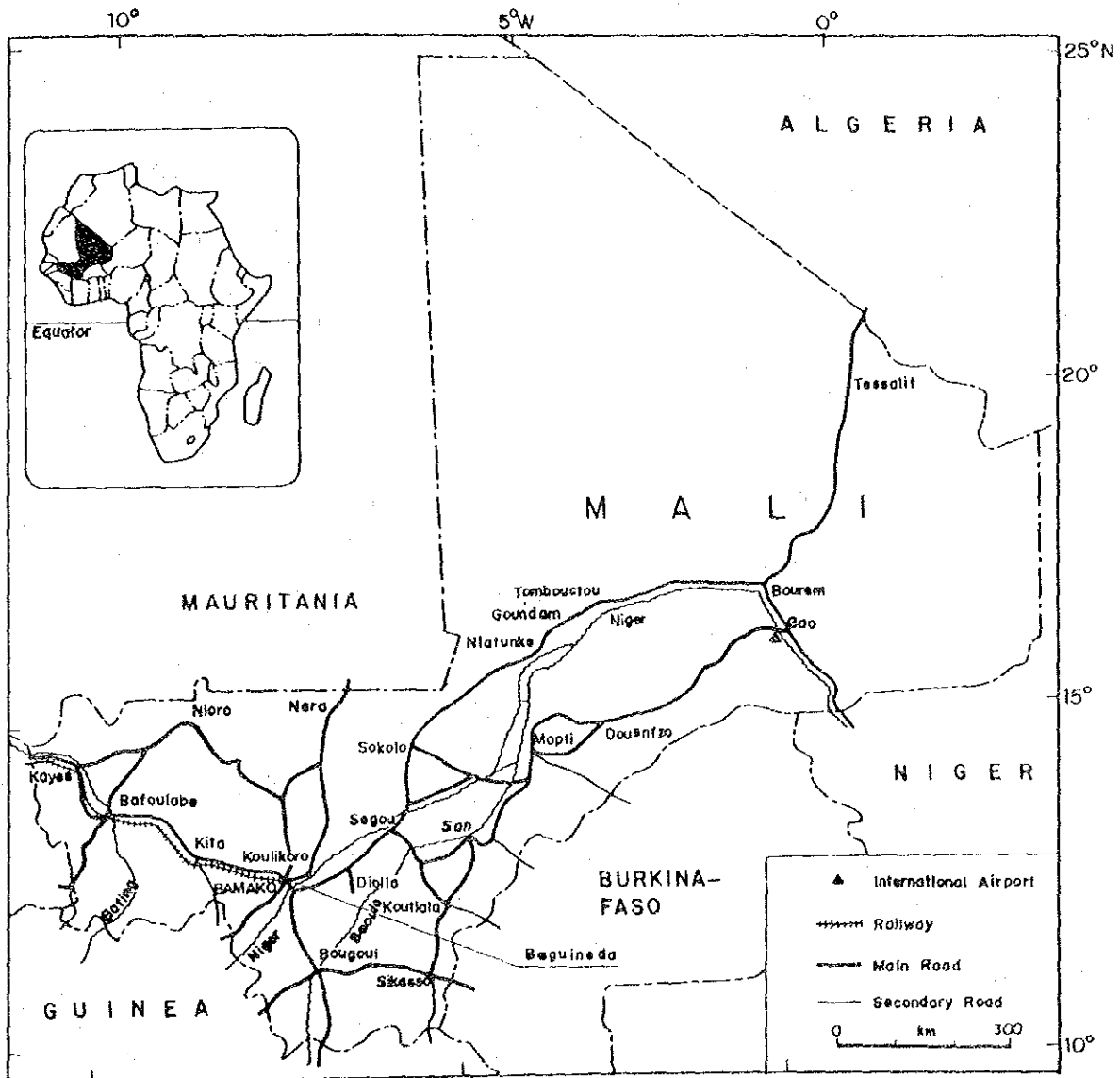


FIGURE 3.1 LOCATION MAP OF GAUGES IN UPPER NIGER

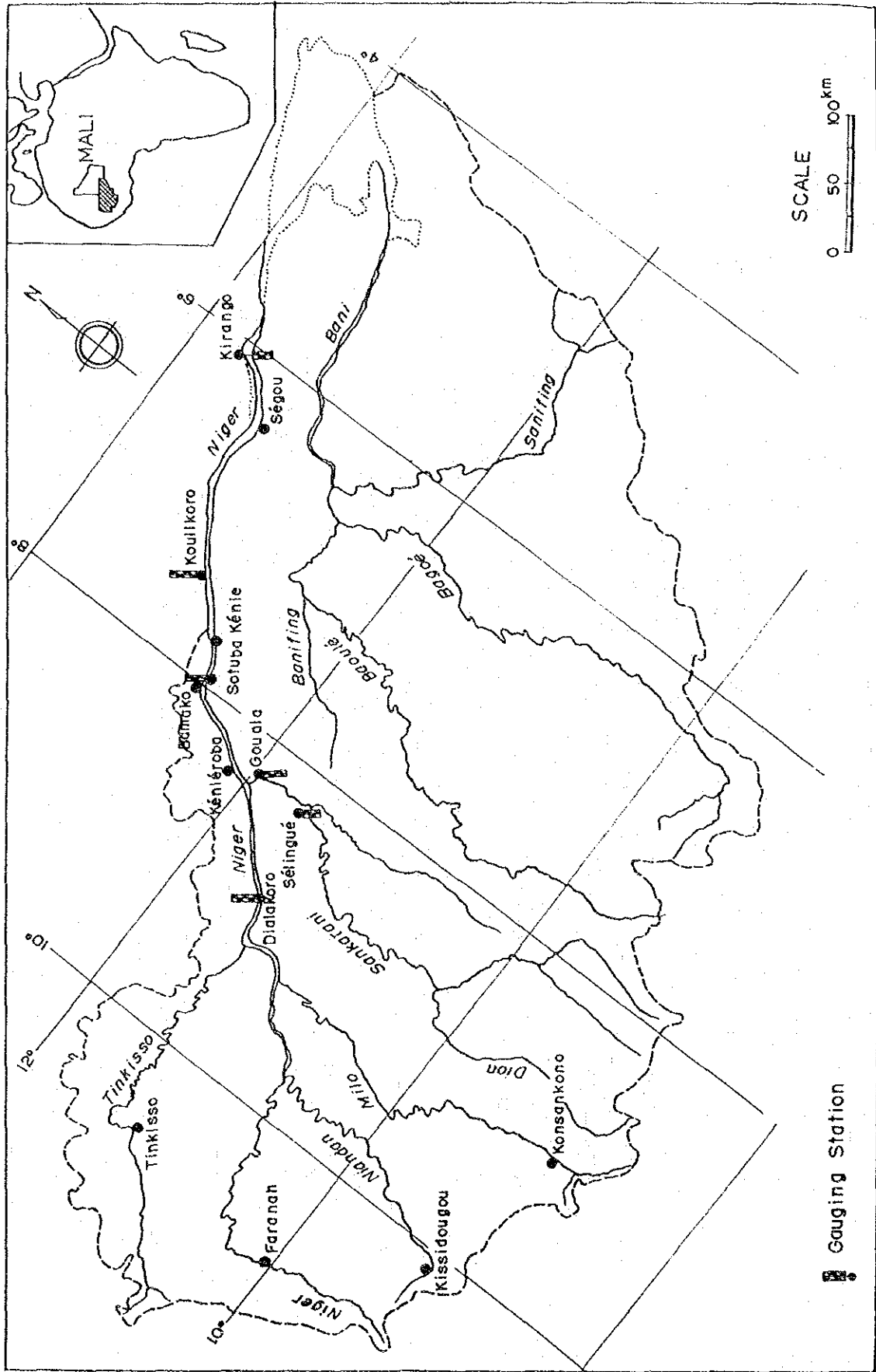
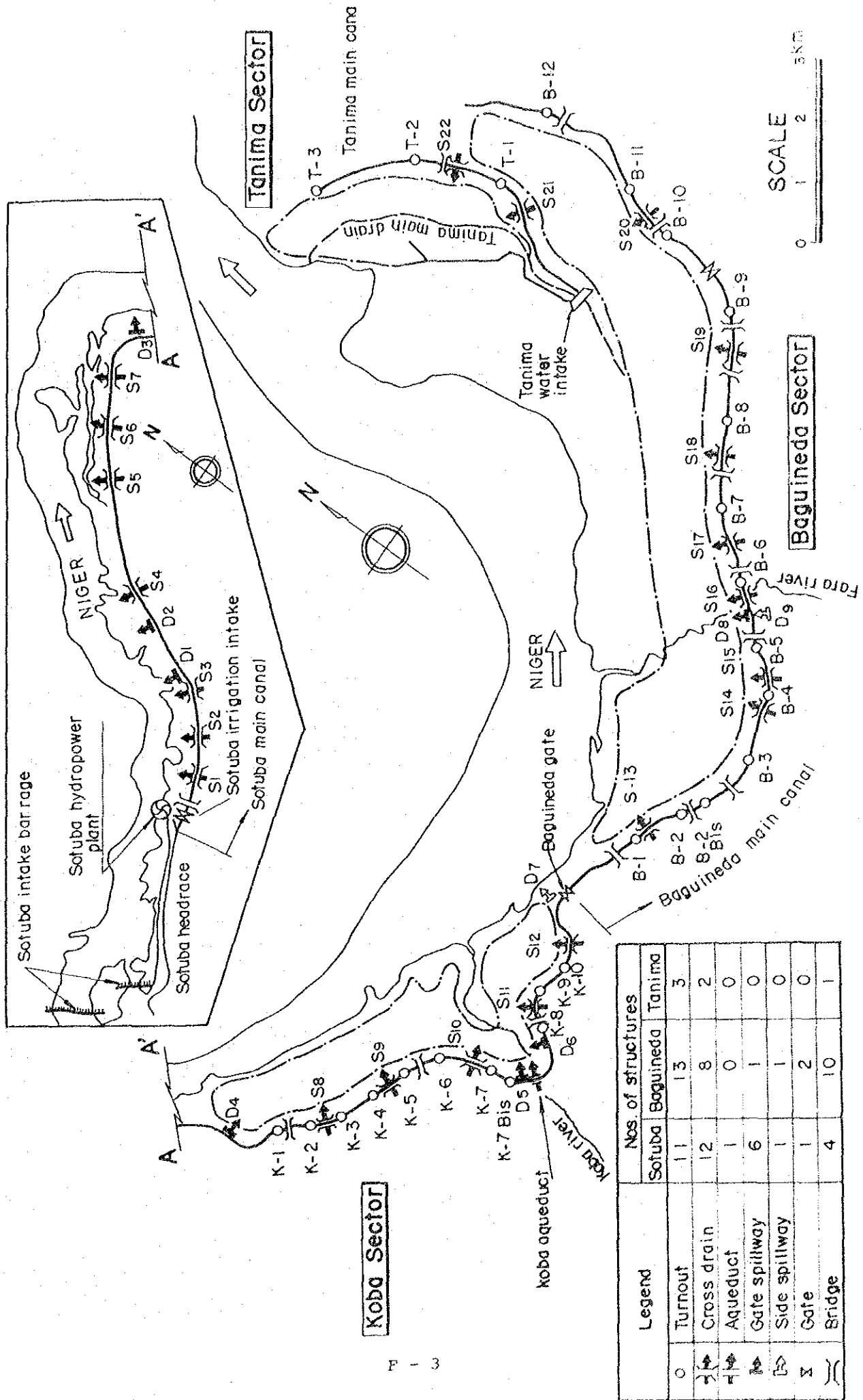


FIGURE 3.2 LOCATION OF STRUCTURES IN MAIN CANAL



Legend	Nos. of structures	
	Sotuba	Tanima
○	11	3
⌋	12	2
⌋	1	0
⌋	6	0
⌋	1	0
⌋	1	0
⌋	4	1

FIGURE 4.1 PROPOSED CROPPING PATTERN

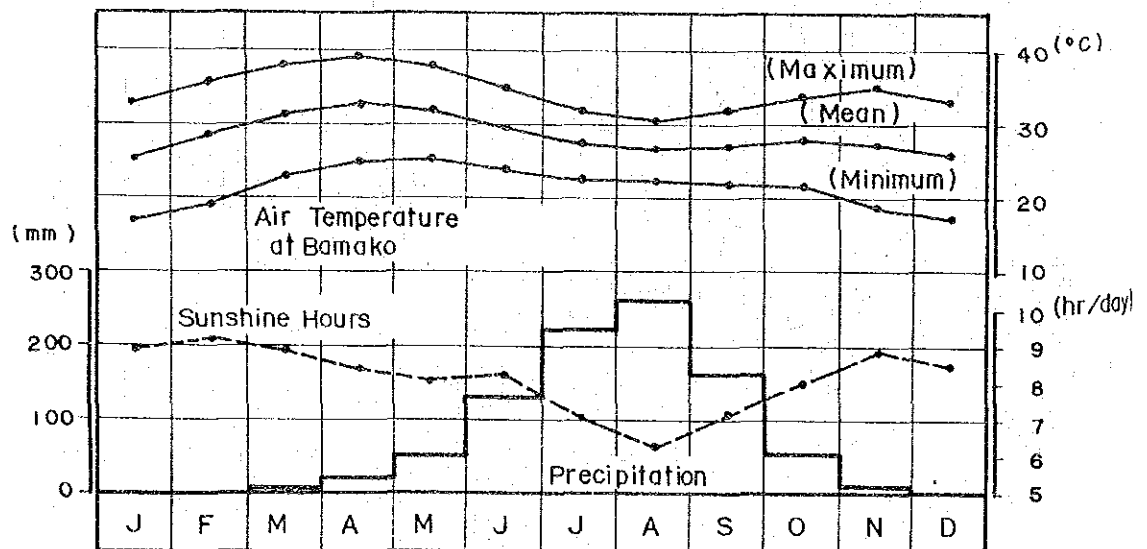
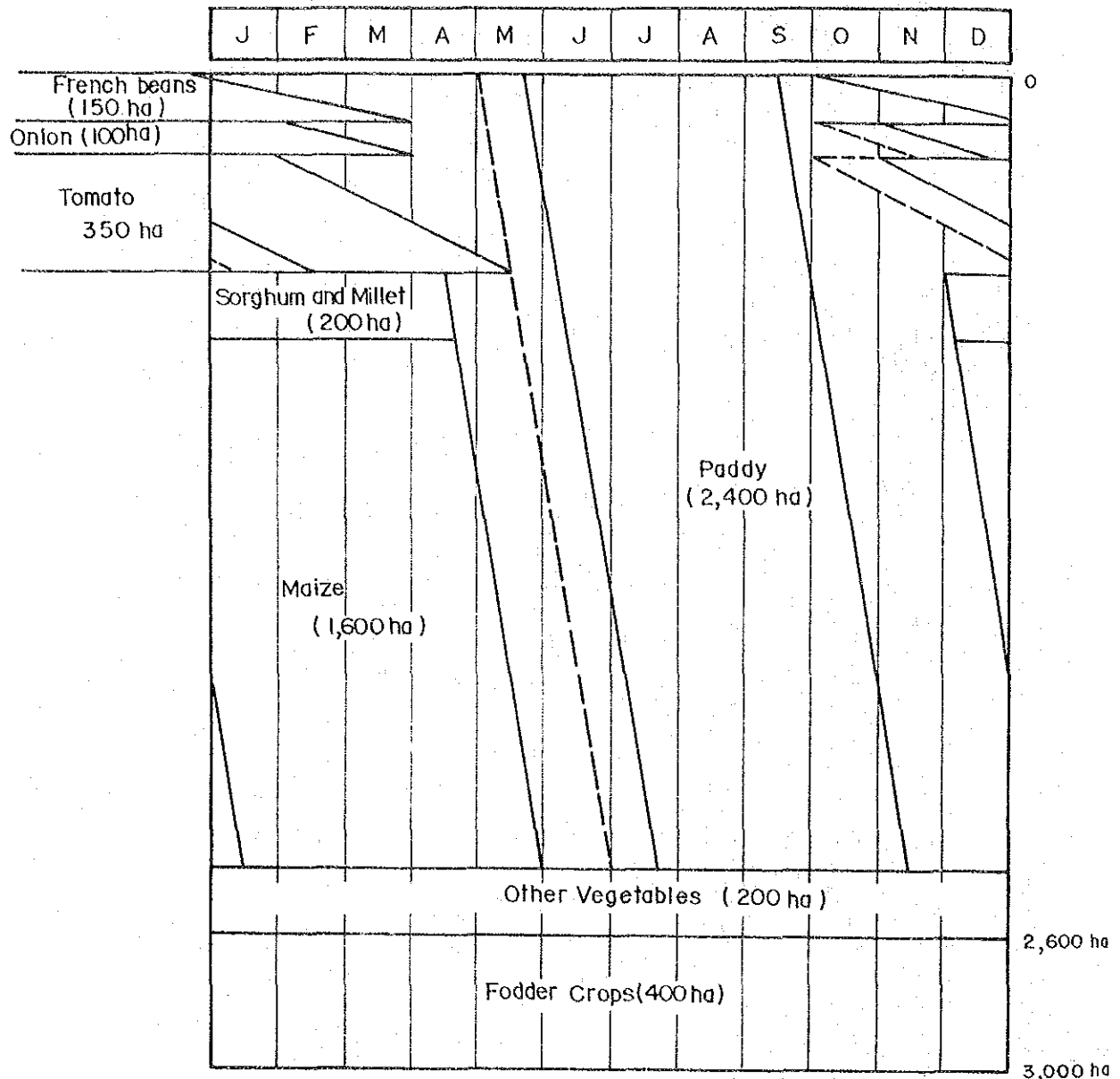
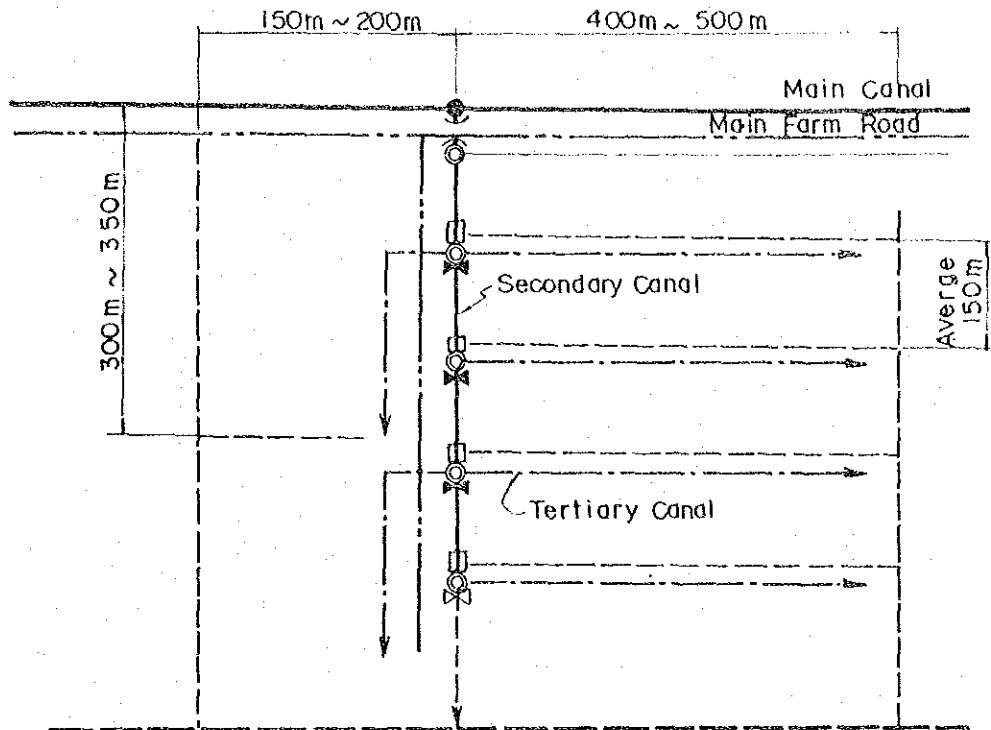
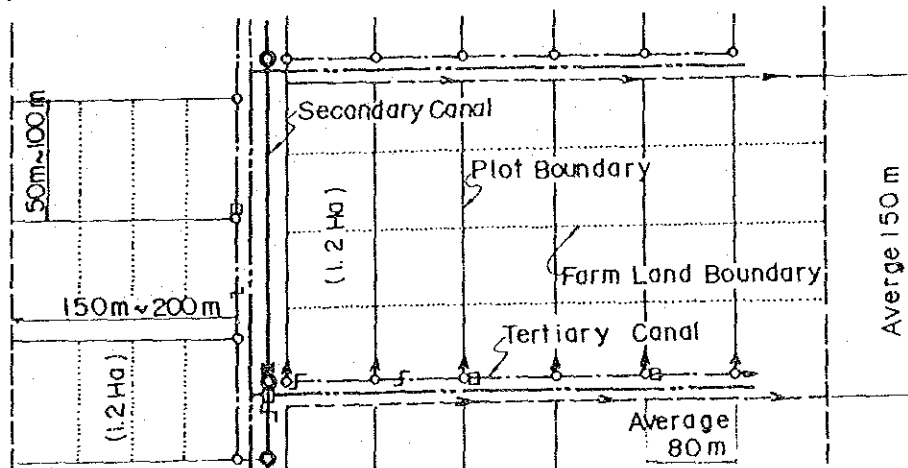


FIGURE 4.2 IRRIGATION UNIT

1. Secondary Unit



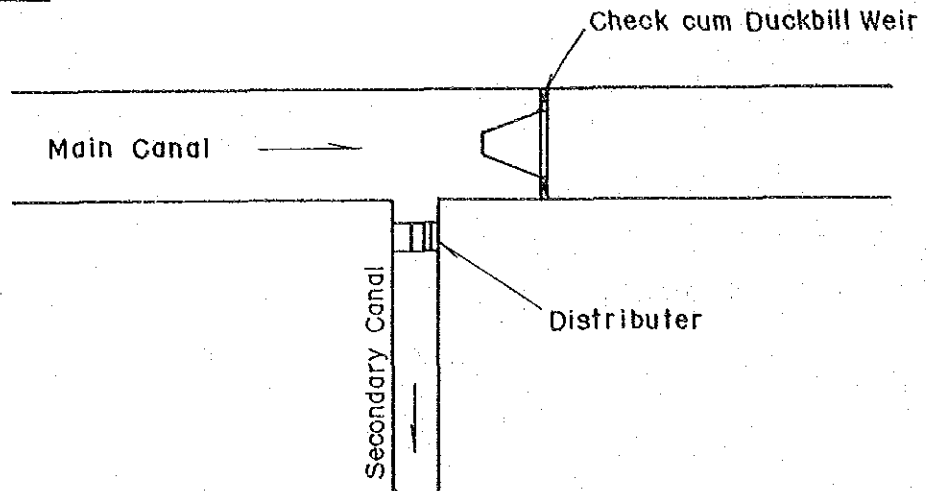
2. Tertiary Unit



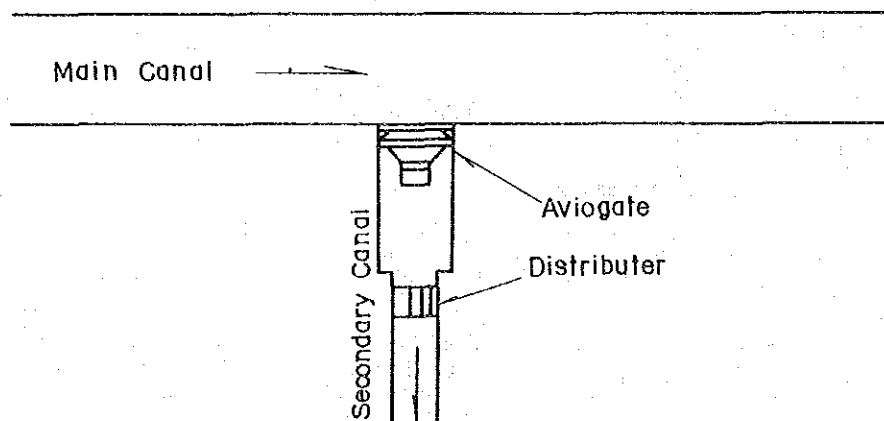
LEGEND			
—————	Main Canal	—○—	Turnout (Main)
- - - - -	Secondary Canal	—○—	Turnout (Secondary)
- - - - -	Tertiary Canal	—X—	Check
- - - - -	Main and Secondary Drain	—□—	Culvert
- - - - -	Tertiary Drain	—X—	Terminal Structure
- - - - -	Farm Road	—J—	Drop
		—○—	Farm Inlet
		—□—	Farm Access

FIGURE 4.3 COMPARATIVE STUDY OF TURNOUT

TYPE-A : Check cum Duckbill Weir + Distributer



TYPE-B : Aviogate + Distributer



TYPE-C : Sluice Gate + Measuring Weir

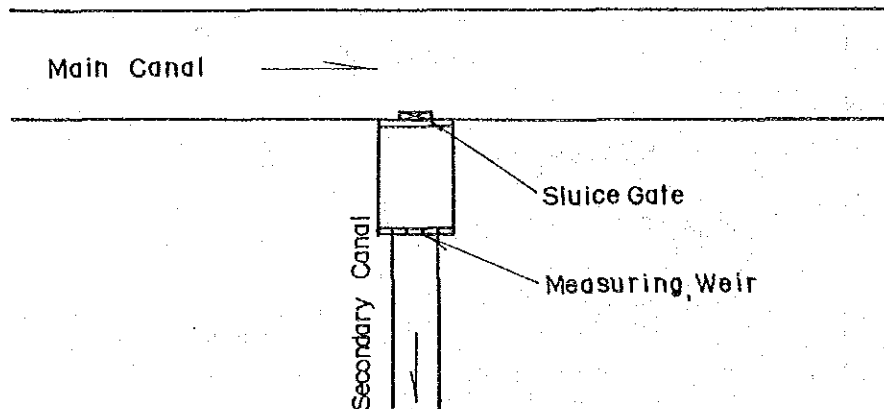


FIGURE 5.1 ORGANIZATION CHART AT THE PROJECT IMPLEMENTATION STAGE

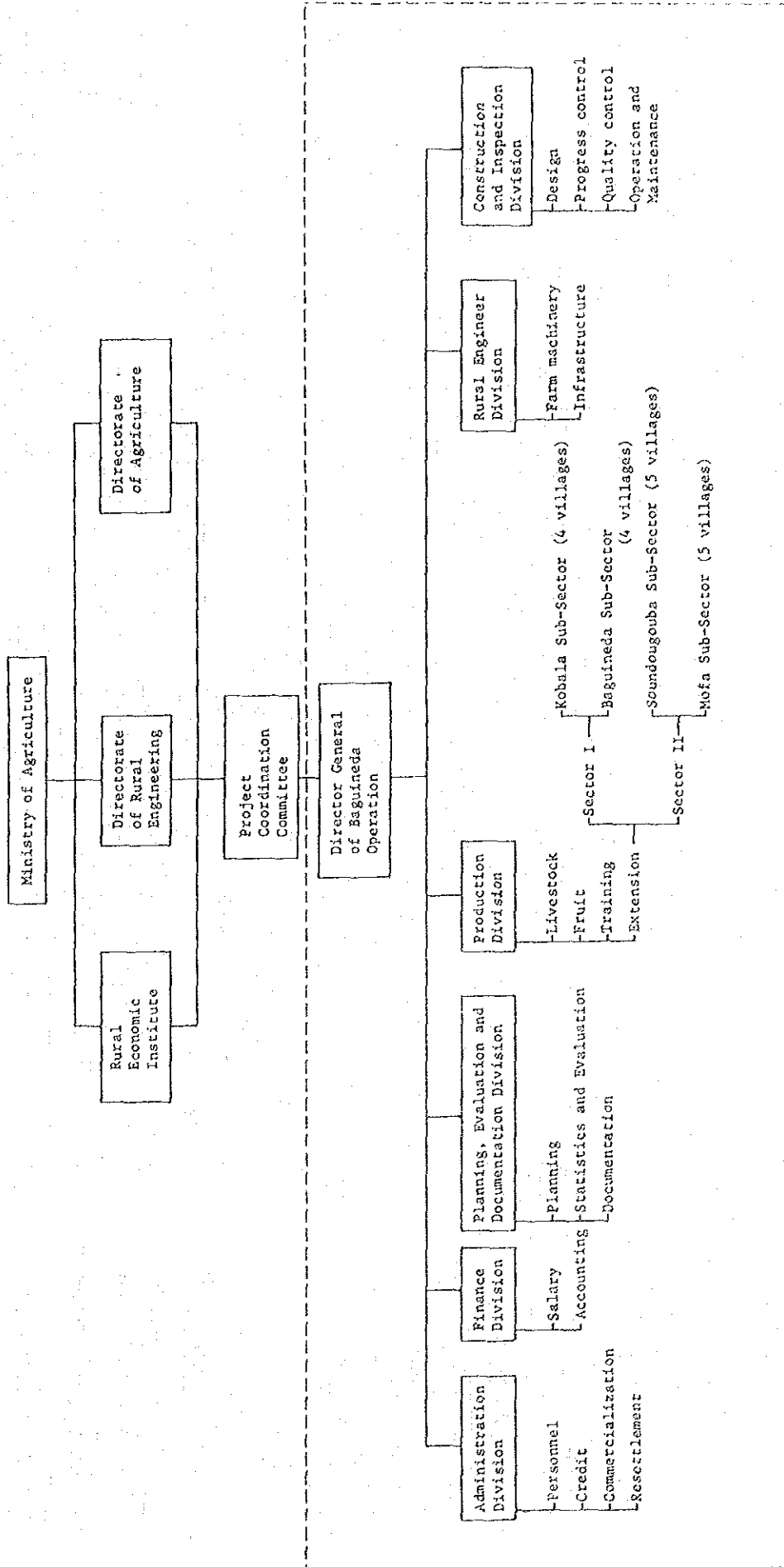


FIGURE 5.2 ORGANIZATION CHART AFTER COMPLETION OF THE CONSTRUCTION WORKS

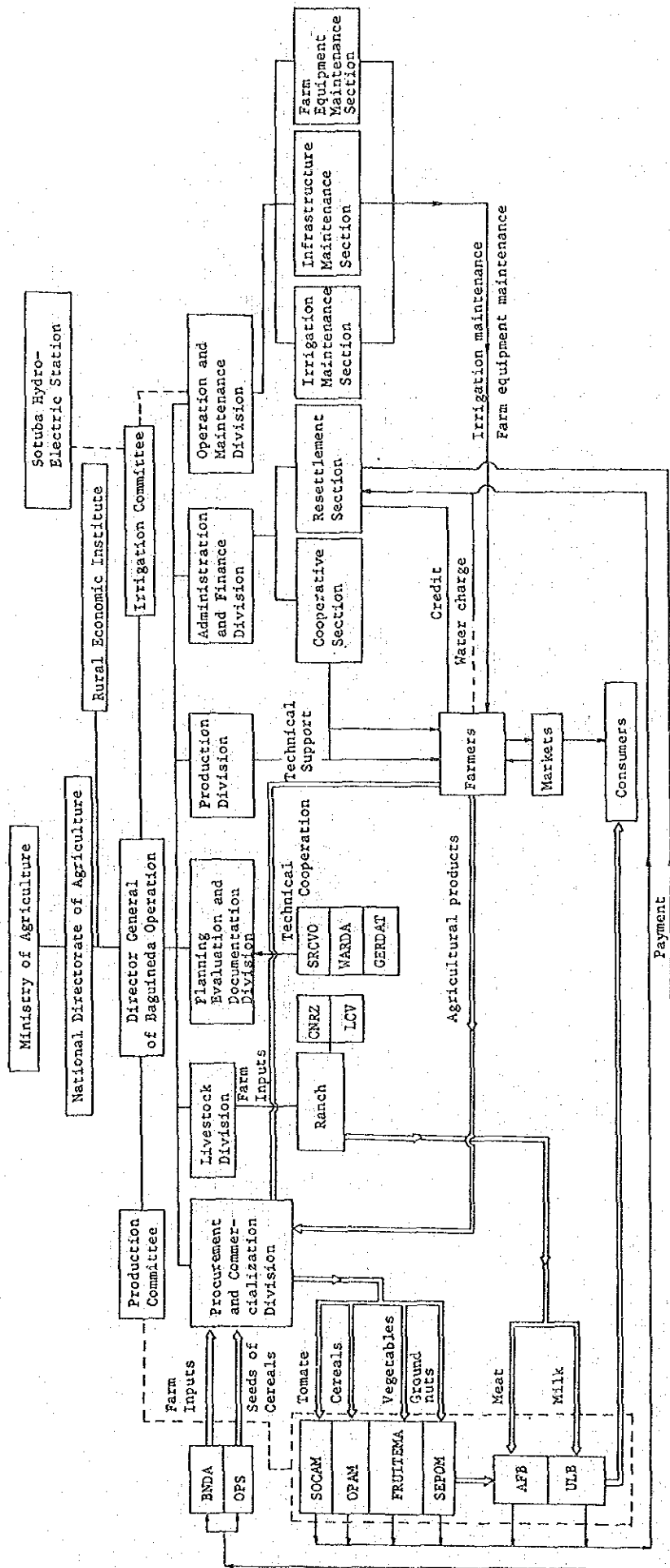
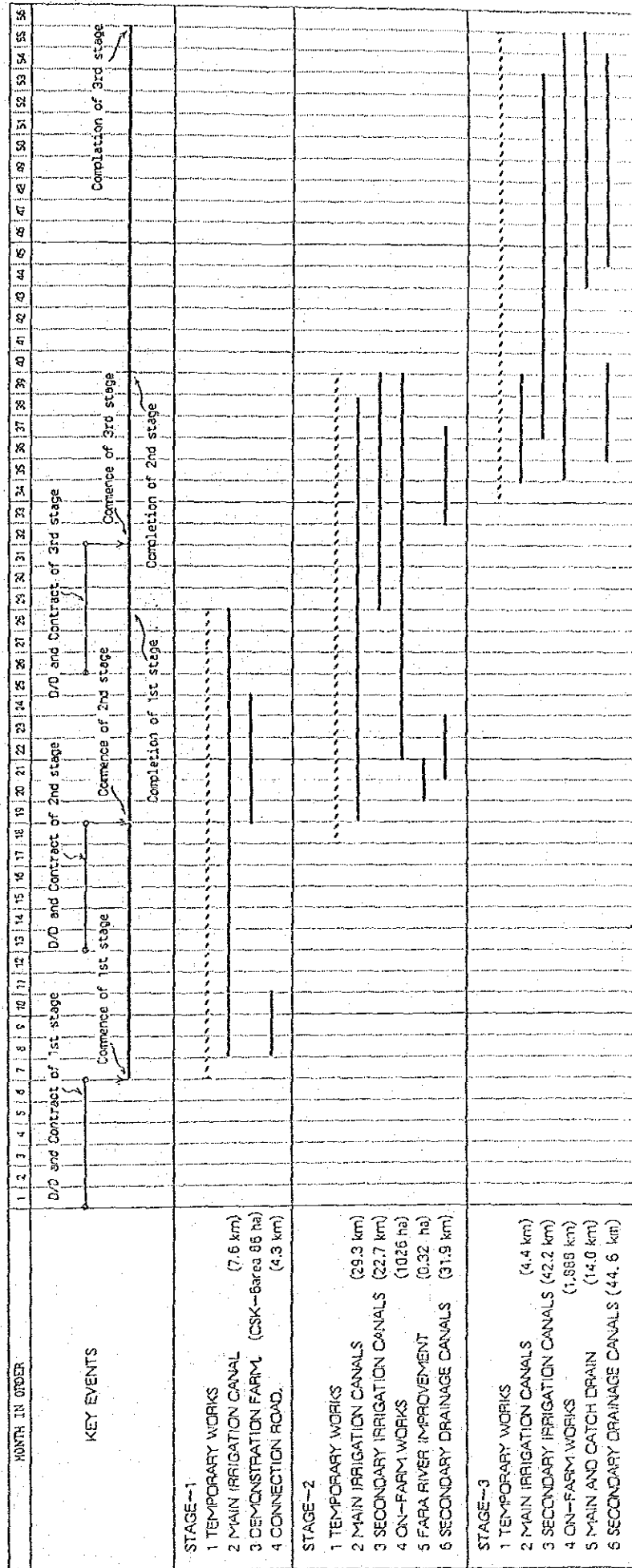


FIGURE 6.1 IMPLEMENTATION SCHEDULE



ATTACHMENT

ATTACHMENT

ATTACHMENT 1 SCOPE OF WORK
FOR
UPDATING FEASIBILITY STUDY
ON
BAGUINEDA AGRICULTURAL DEVELOPMENT PROJECT

I. INTRODUCTION

In response to the request of the Government of the Republic of Mali, the Government of Japan, in accordance with the relevant laws and regulation in force in Japan, has decided to conduct the updating feasibility study on the Banguineda Agricultural Development Project in the Republic of Mali (hereinafter referred to as "the Study").

The Japan International Cooperation Agency (hereinafter referred to as "the JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will carry out the Study in close cooperation with the Government and the authorities concerned of the Republic of Mali.

The present document sets forth the Scope of Work for the Study.

II. OBJECTIVES OF THE STUDY

The objectives of the study are

- i) to review and update the technical and economic feasibility of the project on the basis of current situation in Mali;
- ii) to formulate stepwise development plan; and
- iii) to undertake on-the-job training of the counterpart personnel in the course of the Study.

III. STUDY AREA

The study area is located at about 30 to 40 km east of Bamako, capital of Mali, and covers Baguineda Agricultural Development area of 4,500 ha in gross under the management of Baguineda Integrated Development Operation, slenderly extending along the right bank of the Niger river.

IV. SCOPE OF THE STUDY

The activities to be undertaken by the Japanese Study Team (hereinafter referred to as "the Study Team") will be broadly divided into two categories as shown below.

Work-I : Additional data collection, supplemental field survey and (Work in Mali) investigation, and review of the basic concept of the project

Work-II : Review of the previous development plan of the project and (Work in Japan) preparation of updating feasibility study report

Each Work consists of the following work items.

Work I (Work in Mali)

- (1) To collect and review the additional data and information relevant to the study on the following items.
 - i) Meteorology
 - ii) Hydrology
 - iii) Irrigation and drainage
 - iv) Agriculture
 - v) Agro and regional economy and institution
 - vi) Infrastructure
 - vii) Others

- (2) To execute the supplemental field survey and investigation on the following items.
 - i) Irrigation and drainage survey
 - ii) Longitudinal and cross sectional survey of the existing main canal to be included in the first stage development of the project

- iii) Agricultural survey
 - iv) Construction material and cost survey
 - v) Other surveys
- (3) To review the previously established basic concept of the project
- i) Delineation of the project area
 - ii) Agricultural development plan
 - iii) Basic layout of irrigation and drainage facilities
 - iv) Formulation of stepwise development plan

Work-II (Work in Japan)

- (1) To review and update, if necessary, development plan of the project formulated in the previous feasibility study, based on the results of supplemental field survey and investigation.
- i) Final delineation of the project area
 - ii) Agricultural development plan including land use, cropping pattern, farming practice, input and output, farm settlement, livestock, etc.
 - iii) Estimate of irrigation and drainage water requirement
 - iv) Layout and feasibility study level design of the proposed facilities
 - v) Organization plan for operation and maintenance
 - vi) Implementation plan and schedule
 - vii) Benefit and cost estimate
 - viii) Economic and financial analysis
- (2) To carry out preliminary design of the proposed facilities to be included in the first stage development.
- (3) To prepare the feasibility report.

V. REPORT

The Study Team will prepare the following reports in English with French summary and submit them to the Government of Mali.

- (1) Plan of Operation : Twenty (20) copies at the beginning of field work in Mali
- (2) Interim Report : Twenty (20) copies at the end of field work in Mali
- (3) Draft Final Report : Twenty (20) copies at the end of home office work in Japan
- (4) Final Report : Fifty (50) copies within two (2) months after receiving comments of the Government of Mali on the Draft Final Report

VI. STUDY SCHEDULE

The study, in principle, will be carried out in accordance with the attached Tentative Work Schedule.

VII. UNDERTAKING OF THE GOVERNMENT OF THE REPUBLIC OF MALI

1. To facilitate the smooth implementation of the Study, the Government of the Republic of Mali shall take necessary measures.
 - (1) to secure the safety of the Study Team,
 - (2) to permit the members of the Study Team to enter, leave and sojourn in Mali for duration of their assignment therein, and exempt them from alien registration requirements and consular fees.
 - (3) to exempt the members of the Study Team from taxes, duties and other charges on equipment, machinery and other materials brought into Mali for the implementation of the Study,
 - (4) to exempt the members of the Study Team from income tax and other charges imposed on or in connection with any emolument or allowance paid to the members of the Study Team for their services in connection with the implementation of the Study.

- (5) to provide necessary facilities to the Study Team for remuneration as well as utilization of funds introduced into Mali from Japan in connection with the implementation of the Study,
- (6) to secure permission for the study Team to take all data and documents (including photographs) related to the Study,
- (7) to let the Study Team receive medical care without any hindrance as necessary, provided that any expenses shall be borne by the Study Team, and
- (8) to secure permission for the entry into private properties or restricted areas, if any, for the conduct of the Study.

2. The Ministry of Agriculture, the Republic of Mali (hereinafter referred to as "MOA") shall act as counterpart body to the Study Team and also as coordinating body to other relevant organizations for the smooth implementation of the study.

3. MOA shall, at its own expense, provide the study Team with the following, in cooperation with other relevant organizations:

- (1) available data and information related to the Study,
- (2) counterpart personnel to assist the Study Team and participate in the various activities for the study,
- (3) suitable office space with necessary equipment in Bamako,
- (4) credentials or identification cards to the members of the Study Team, and
- (5) appropriate number of vehicles with drivers.

4. The Government of the Republic of Mali shall bear claims, if any arises against the members of the Study Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Study Team.

VIII. UNDERTAKING OF JICA

For the implementation of the study, JICA shall take the following measures:

- (1) to send, at its own expense, the study Team to the Republic of Mali,
- (2) to perform technology transfer to the counterpart personnel in the course of the Study in Mali, and
- (3) to arrange, at its own expense, equipment and machinery necessary for the Study.

1st July 1985

Bamako 1-July-1985

YANAGUCHI Yasumi
Head of the JICA Team

For the Mali Government
Embassador MAKI K.A. TALL
General Director, International Corps.



for

INITIATIVE WORK SCHEDULE

Description	Month					
	1	2	3	4	5	6
<u>I. First Stage (work in Mall)</u>						
1) Data Collection & Review	▬					
2) Field Survey & Investigation	▬					
3) Basic Concept Review		▬				
<u>II. Second Stage (work in JAPAN)</u>						
1) Review & Updating of Previous Study		▬	▬	▬		
2) Preliminary Design for First Stage Development		▬	▬	▬		
3) Preparation of Draft Report				▬		
<u>III. Report</u>						
1) Plan of Operation					▬	
2) Interim Report					▬	
3) Draft Final Report				▬		
4) Final Report						▬

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ATTACHMENT 2

LIST OF COUNTERPART, MALI GOVERNMENT OFFICIALS CONCERNED
AND JICA SURVEY TEAM

COUNTERPART AND MALI GOVERNMENT OFFICIALS CONCERNED

1. EL HASSAN DRAVE : Technical Counciller, Ministry of Agriculture
2. CHEICK B. BATHILY : Director of Rural Engineering, Ministry of Agriculture
3. ALIOU BAMBA : Rural Engineering, Ministry of Agriculture
4. OUARAZON DEMBELLE : Rural Engineering, Ministry of Agriculture
5. SAMBALLA DIALLO : National Directorate of Agriculture, Ministry of Agriculture
6. N'FALY DEMBELLE : Institute of Rural Economy, Ministry of Agriculture
7. GAGNY TIMBO : State Ministry of Natural Resources and Animal Husbandry
8. SORY KAMISSOKO : Division Chief, State Ministry of Planning
9. ZEINI MOULAYE : Chief of Bilateral Cooperation, Ministry of Foreign Affairs and International Cooperation
10. AMADAGA DJIMDE : Chief of Baguineda Operation
11. AMADOU DIAKITE : Production Division Chief, Baguineda Operation
12. ABDOULAYE KOUYATE : Rural Engineering, Baguineda Operation
13. KOUNTOUN CISSE : Rural Engineering, Baguineda Operation
14. ALY N. DEMBELLE : State Ministry of Industrial Development and Tourism

JICA SURVEY TEAM

1. TETSUO YAGUCHI : Team Leader
2. TOSHINORI KAWAMURA : Irrigation, Drainage and Water Management
3. ETSUJI YAMAUCHI : Planning and Design of Facilities
4. CHIKASHI ODA : Agricultural Economy
5. MASAYUKI KOHYAMA : Agriculture and Agronomy
6. KIYOSHI KIMURA : Survey and Design

JICA