

### (3) Outline of Soil Conservation Activities

The governmental agencies of Mali and NGOs have implemented various measures for soil conservation in the study area, such as stone ridges on contour lines, eye-brow terrace, zai and protection of useful plants in fields. Some of these cases are described in Table 3.8.2.

**Table 3.8.2 Cases of Soil Conservation Measures**

Implementing Agency	Village (Cercle)	Description	Problem
SG2000-DRAMR (under implementation)	Diakobougou (Ségou)	<ul style="list-style-type: none"> <li>Stone ridges on contour lines (2km or more) and eye-brow terrace</li> <li>Recovery of glacia farmlands by stone ridges and taro cultivation</li> <li>Stone ridges and fences for preventing water run-off</li> <li>Installation of compost layers</li> </ul>	<ul style="list-style-type: none"> <li>Water may run round the stone ridges to form another flow.</li> </ul>
JGRC aid project for environmental conservation measures such as prevention of desertification (under implementation)	Sakoibougou, Siradoba (Ségou)	<ul style="list-style-type: none"> <li>Stone ridges on contour lines (4km)</li> <li>Planting hedges of trees such as euphorbia and pourehere.</li> </ul>	<ul style="list-style-type: none"> <li>Prevention of stone theft</li> <li>Management after planting hedges</li> </ul>
	Dougoutiguibougou (Ségou)	<ul style="list-style-type: none"> <li>Measures for making stone piles to prevent water erosion and reinforcement by planting andropogon</li> </ul>	
DRAMR, DRAER (joint land development project, completed)	Sy (San)	<ul style="list-style-type: none"> <li>Zai</li> <li>Introduction of beans and sesame</li> </ul>	
Ségou Rice Office (under implementation)	Dioro (Ségou)	<ul style="list-style-type: none"> <li>Improvement of agricultural product cultivation methods</li> <li>Introduction of beans</li> <li>Use of organic fertilizer</li> <li>Consulting on renewal of germination in felled woods</li> </ul>	
CMDT-San (1986 - Now)	(CMDT/PDR activity area in San, Tominian, Macina, and Bla)	<ul style="list-style-type: none"> <li>Stone ridges on contour lines, stone lines</li> <li>Planting hedges of trees such as euphorbia and pourehere.</li> <li>Stone ridges and fences for preventing water run-off</li> <li>Installation of compost layers, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Problems include appropriate technology extension before implementation and management after implementation.</li> <li>Organization for joint work for stone ridges, etc. is required</li> </ul>
DRCN (Agro-forestry project funded by the Netherlands) (1989 - 1993)	Siratiguiwere (Baraouéli)	<ul style="list-style-type: none"> <li>Piling stones on contour lines (300m wide, 10 rows at 20m intervals) and planting trees along the rows of stones</li> </ul>	
	Soubabougou (Baraouéli)	<ul style="list-style-type: none"> <li>Construction of half-moon stone rows (approx. 300m) and planting of trees</li> </ul>	<ul style="list-style-type: none"> <li>Vegetation has recovered, but management after plantation is an issue to be settled.</li> </ul>
DRCN Soil conservation and recovery activities - water and soil conservation project (DRS-CES) (- Now)	Throughout Région Ségou	<p>The achievements made in 1999 are:</p> <ul style="list-style-type: none"> <li>Stone ridges 37,331 m, contour levees 1,465 m, vegetation band 22,923 m, protection by planting trees along stone ridges 5,160 m, mulching by branches 0.84 ha, eye-brow terrace method 10.3 ha, protection of dikes 2.5 ha, etc.</li> </ul>	

Source: DRAMR, DRCN, etc.

### (4) Factors impeding the development

Factors impeding the development of soil conservation are as follows.

- ① Residents have poor recognition on soil conservation. Therefore, the soil conservation activity that must be handled in the entire catchment area does not proceed.

- ② Due to the insufficient linkage of organizations on land use and agriculture, stock raising, and sylvicultural sector, the effects of soil conservation activity have not been generated.

### 3.9 Agriculture and Living Infrastructure

#### 3.9.1 Irrigation Facilities

##### (1) Paddy Field Irrigation

It is only along the Niger River and its tributary, the Bani River, that surface water is available all the year in the study area. The paddy fields are distributed in the flood plains along both rivers. Traditional paddy rice cultivation has been carried out since olden times. In recent years, the introduction of irrigation facilities has enhanced productivity in rice cultivation. The paddy field irrigation systems in the study area are described in Table 3.9.1.1.

**Table 3.9.1.1 Paddy Field Irrigation Systems**

Irrigation System	Description
Traditional irrigation system	Rice is cultivated in the flood plains and wetlands along the major rivers and depends on the water level which changes with the rise and fall of the river flow. The irrigation is left entirely to the course of nature and not controlled artificially. As the irrigation system depends upon the weather, the unit yield is lower than with modern systems
Modern irrigation system (controlled irrigation)	There are two types of system: one is the irrigation system for cultivated land in regions where traditional irrigation has been implemented, in which an embankment and sluice are constructed to control the water level for efficient irrigation. The other system is to construct intake facilities in the river and distribute water through irrigation channels for cultivation of new paddy fields.

In the development of modern irrigation facilities, two projects are being implemented along the Niger and Bani Rivers. Ségou Rice Office (ORS: Office Riz Ségou) was established on the right bank of the Niger River in 1972 to develop a paddy field zone in the flood plains. The developed paddy fields have an area of approximately 5,000 ha, and are provided with embankments and sluice gates to control the water level in the flood plains and enhance rice farm productivity. In the flood plains in the basin of the Bani River, the Program for Development of the Middle Bani River Basin (Program de mise en valeur des plaines du Moyen-Bani, hereafter called "PMB") is under implementation. Under this program, there are plans to develop 4,750 hectares of paddy fields.

Although it is not covered by this study, the Niger Development Corporation (ON: Office du Niger) is developing a paddy field zone of 60,000 hectares on the left bank of the Niger in Ségou Région. This work was started in 1935 and involves the construction of the Markala dam in the mainstream of the Niger River and three main canals, the development of paddy fields and support programs for rice farmers.

The Basic Plan for the Rural Development Sector (1992) is focused on the construction of modern irrigation facilities as described above.

##### (2) Irrigated Vegetable Cultivation

Vegetables are cultivated in fields extending along the Niger and Bani Rivers and in fields using wells and irrigation ponds around the villages. In most of the fields, irrigation is by manpower. In some of the vegetable fields along the major rivers, irrigation carried out using pumps. Each irrigated area

is small, mostly 1,000m<sup>2</sup> or less. The vegetable fields around the villages are provided with fences of thorny trees to protect the farm produce from livestock. Small-scale vegetable cultivation is highly desired by farmers because it is an effective way of earning cash income in the study area.

① Water source facilities

The present condition of the water source facilities for vegetable cultivation is described in Table 3.9.1.2.

**Table 3.9.1.2 Water Source Facilities for Vegetable Cultivation**

Water Source Facilities	Description	Irrigation Period
River	• Used in the fields along the Niger and Bani Rivers. River water is taken in directly, or undercurrent water is taken in by boring the riverbank. There are no special intake facilities. In case of flooding, the fields may be submerged. Compared with the use of wells and ponds, large areas can be farmed.	All the year
Wells	• Shallow wells are used in many cases. Farmers can construct shallow wells themselves. However, the water level is limited to at most about 20m below because much labor is required to draw irrigation water from the wells. • With IFAD assistance, boreholes have been constructed for irrigation. Hand pumps and solar pumps are used for pumping water, but there are many defective wells due to unsatisfactory maintenance.	All the year
Reservoirs	• Reservoirs formed in wadis or depressed ground are used as water source facilities. Water is stored in the rainy season and used in the dry season. There are extremely few ponds that can be used all the year. These reservoirs are used not only for vegetable cultivation but are also widely used for water for daily needs and livestock. Some reservoirs have excess water discharge facilities, simple embankments and footholds for intake.	April to December (depending upon individual facilities)

② Irrigation methods

It is common for water to be taken in from a water source, stored in a tank, conveyed to the fields and directly sprinkled by manpower. In some aid projects, water intake is by pump and the fields are irrigated by trickling or furrows. Examples of the usual irrigation methods are as follows:

- a. Bottle gourds or buckets are used (approximately 20 liters each)
- b. Water is sprinkled three times a day, and one gourd of water is used for a field area of 1 x 3m each.

**3.9.2 Multipurpose Reservoir Facilities**

In the study area which lacks sufficient water resources, reservoir facilities are as important a water source as wells. Reservoir facilities are categorized into two types as described in Table 3.9.2.1.

**Table 3.9.2.1 Form of Multipurpose Reservoir Facilities**

Form	Description
Marsh (Mare)	A pond formed on the bottomland of a wadi.
Dugout pond (Marigo)	A pond formed in depressed ground spontaneously or artificially.

The present condition of the reservoir facilities by form is shown in Table 3.9.2.2. An overwhelming majority of reservoir facilities take the form of marshes (mare). The area of the reservoirs ranges

from several hundred to several thousands of square meters. In general, a dugout pond (marigo) is small compared with a 'mare'. However, the dugout pond can be constructed in depressed ground anywhere in the study area even if there is no wadi. This is a potential method of constructing small water resources. However, there are 1,695 villages in the study area and only one village per 13 villages has a reservoir.

**Table 3.9.2.2 Present Condition of Multipurpose Reservoir Facilities**

	Baraouéli	Bla	Macina	San	Ségou	Tominian	Unit: Site Study Area
Marsh (Mare)	4	44	12	39	26	13	138
Dugout pond (Marigo)	-	-	-	3	4	-	7

Source: DRAER

The purposes of using reservoir facilities are described in Table 3.9.2.3. Their use for drinking water for livestock is overwhelmingly large. In IFAD and other aid projects, many marshes (mare) have recently been provided to promote vegetable cultivation.

**Table 3.9.2.3 Reservoir Facilities by Purpose**

	Baraouéli	Bla	Macina	San	Ségou	Tominian	Survey Area
Livestock	4	43	10	32	26	13	128
Vegetable cultivation	-	-	6	8	8	-	22
Paddy field	4	1	-	7	1	-	13
Fish farming	-	-	2	18	8	13	41

Note: The difference in figures from those in Table 3.10.2.2 is caused by the fact that one facility is used for several purposes.

Source: DRAER

### 3.9.3 Roads

#### (1) Road Classification

The roads in Mali are constructed and maintained in four classes as shown in Table 3.9.3.1.

**Table 3.9.3.1 Road Classification**

Class	Number of Routes	Name of Route	Function
National highway (route national)	4	R6, R12 to R14 Length: 700km	Arterial road within the country
Regional highway (route regional)	3	R23, R24, R25	Arterial road connecting main cities in a region
Local highway (route local)	5	RL41~45	Local road connecting main cities in a region
City road (route communal)			Road connecting Communes

Source: Results of interviews at Directorate of Public Works

#### (2) Conditions of Road Construction

Road construction is extremely slow. The national highways are constructed in accordance with set standards and as two-lane roads paved with asphalt on which large vehicles can run safely. The condition of regional highways and local highways differs by route, but they are paved with asphalt or

laterite. However, there are problems of defective pavements because of insufficient road maintenance, and water inflow because of lack of drainage facilities. Thus, safe traveling is not guaranteed in some parts of the routes though it is possible to travel on these highways even in the rainy season.

The city roads that are mostly used in rural areas fall furthest behind in terms of construction. Some roads are paved with laterite, but the maintenance of these roads is inadequate and many pools appear on the road surface in the rainy season necessitating a detour round adjacent fields. There are some points where you can't pass at all during the rainy season on the unpaved city roads.

### (3) Maintenance System

The administrative organization in charge of road construction and maintenance at regional level is the Regional Directorate of Public Works (DRTPT: Direction Regional Travaux Publics de la Topographie). This organization undertakes ① maintenance of national highways and ② construction and maintenance of regional highways and local highways. In the National Directorate, the Materials and Works Division (Div. Material et Travaux) and Topography Division (Div. Topographie) are in charge of implementation of individual works and formulation of work plans. As their sub-agencies, units are located in Ségou cercle and San cercle and their main responsibility is road maintenance.



Photograph: A road used for living after rainfall (There are many impassable places.)

Private construction companies implement the construction works, and the Directorate of Public Works awards contracts and supervises the construction works. It is a rule that the city roads are maintained by Commune. However, decentralization has just been enforced, the Communes are not fully established as the administrative system and the budget is not fully secured, so road construction and maintenance are rarely executed. There is also no organization or system for city road maintenance by the villagers.

### (4) Market Access Status

In the survey on village cadastres, the statuses of roads to markets which are used by villagers in the study area everyday were checked in the following two points:

- ① Market access status and distance (Table 3.9.3.2)
- ② Statuses of roads to markets (Table 3.9.3.3)

**Table 3.9.3.2 Number of Markets and Distances to Markets**

CERCLE	Does the village have a market?				Distances to markets (km)			
	YES		NO		Total	Moy.	Mini	maxi.
Number of villages	%	Number of villages	%					
Barouéli	7	18	31	82	17	21	2	70
Bla	11	32	23	68	30	18	2	65
Macina	2	10	17	90	17	12	2	35
San	18	27	49	73	47	19	1	80
Ségou	2	3	64	97	26	16	2	60
Tominian	7	14	44	86	31	16	2	70
<b>TOTAL CERCLE</b>	<b>47</b>	<b>17</b>	<b>228</b>	<b>83</b>	<b>168</b>	<b>17</b>		

Source: Survey on the production of village cadastres

**Table 3.9.3.3 Roads to Markets and Statuses of Roads**

CERCLE	Does the village have a road to a market?				Status of Road to Market			
	YES		NO		Good		Bad	
Number of villages	%	Number of villages	%	Number of villages	%	Number of villages	%	
Baraouéli	38	100	0	0	4	10	34	90
Bla	34	100	0	0	2	6	32	94
Macina	19	100	0	0	0	0	19	100
San	66	98	1	2	8	12	59	88
Ségou	66	100	0	0	8	12	58	88
Tominian	50	98	1	2	0	0	51	100
<b>TOTAL CERCLE</b>	<b>273</b>	<b>99</b>	<b>2</b>	<b>1</b>	<b>22</b>	<b>8</b>	<b>253</b>	<b>92</b>

Source: Survey on the production of village cadastres

According to the study result, 17% of villages in the study area have a market (approximately one per six villages) and a road to a market in another village is as diverse as 1 to 80 kilometers long or 17 kilometer long on the average. Such a road to a market is considered by 92% of villages to be in bad condition.

Not only do large-area roads, such as inter-commune roads, need improvement; even daily access roads to markets (inter-village roads) are likewise in extreme poor condition.

#### (5) Farm Roads

The roads in rural areas are not fully constructed, with the exception of ordinary local roads (routes local). Farm products and compost are transported mainly by carts or wagons. As many roads become impassable in the rainy season, it is necessary to make a detour in the cultivated fields.

Farm roads are spontaneously created and used by farmers. No roadbed materials are used, with the result that ponds form easily in the roads in the rainy season, making passage difficult. Since many materials and much labor are required for road construction and maintenance, the villagers in the study area do little construction work themselves.

### 3.9.4 Health and Sanitation Facilities

The health indices in the entire country of Mali are lower than in other sub-Saharan African countries,

as indicated in Table 3.9.4.1.

**Table 3.9.4.1 Indices for Health in Mali (1997)**

	Mean Life Expectancy (years)	Infant Mortality Rate (per 1,000 births)	Under-5 Mortality Rate (per 1,000 births)	Death Rate of Pregnant and Nursing Mothers (per 10,000 births)
Mali	53.3	145	239	1,200
Sub-Saharan Africa	48.9	105	169	979
LLDC	64.4	104	162	1,041

Source: UNDP

The main diseases occurring in Mali include malaria, diarrhea due to coliform bacilli, respiratory diseases, malnutrition, trachoma, osteomyelitis, measles and cholera. The situation is the same in the study area. The causes of these diseases are polluted drinking water, malnutrition and insufficient sanitation.

The health and sanitation facilities in the study area are indicated in Table 3.9.4.2. One of the government facilities that provides direct services in medical care and sanitation to villagers is the Commune Health Center (CSCOM). The Government plans to construct one Center in each Commune.

**Table 3.9.4.2 Condition of Health and Sanitation Facilities**

	Baraouéli	Bla	Macina	San	Ségou	Tominian	Study Area
Free clinic (Dispensaire)	18	19	7	18	25	19	106
Maternity hospital (Maternite)	19	25	5	9	24	15	97
Commune Health Center (CSCOM)	8	11	2	6	6	5	38
Pharmacy (Pharmacie)	13	23	11	15	23	9	94

Source: UNICEF

75% of the residents of Ségou region live within 15 km of CSCOM and receive health and medical services such as vaccination to children although insufficiently. In the CSCOMs, at least one health nurse, one midwife and one pharmacist are stationed to provide initial treatment and vaccinations for villagers.

At cercle level, a Cercle Health Center (CSC: Centre de Sante cercle) is set up with a total staff of about 30, including two doctors, to provide treatment and health services to villagers. However, the services are inadequate due to lack of funding, facilities, human resources and equipment.

In Bla cercle and San cercle, education in health and sanitation (Relais Souaux) including health care, prevention of diseases and improvement of sanitation has been started for villagers at the Cercle Health Center, but such education has not been started in other cercles. Thus, no health promotion activities at villager level are carried out except in some aid projects.

### 3.9.5 Other Public Facilities in the Village Level

In the survey on the production of village cadastres, the installation statuses of flour mills, meeting halls, and medical offices were surveyed. The result is shown in Table 3.9.5.1.

**Table 3.9.5.1 Public Facilities in Village Level**

Zone name	Number of villages	Villages with flour mills		Villages with meeting halls		Villages with medical offices	
		Number of villages	Ratio	Number of villages	Ratio	Number of villages	Ratio
Rain-fed farming zone	186	63	23.1%	13	6.9%	14	7.5%
Irrigated farming zone	32	12	37.5	3	9.3	3	9.3
Cotton cultivation zone	54	25	46.2	5	9.2	4	7.4
Total	272	100	36.3	21	7.7	21	7.7

Source: Survey on the production of village cadastres

For the present state of flour mills construction, the most desired facility for alleviation of labor of women, these exist in 36% of all the villages in the study area but only in 23% of villages in the rain-fed farming zone, far behind the other two zones. A higher ratio of flour mills exist in the cotton cultivation zone probably because the installation of flour mills was promoted by CMDT and other organizations. The construction state of meeting halls and medical offices is only in less than 10% of villages, showing almost no advancement in the village level.

### 3.9.6 Factors Impeding the Development

Factors impeding the development of the infrastructure of agricultural living are shown below.

- ① Non-improvement of roads and maintenance system
- ② Lack of small-scale irrigation facility
- ③ Lack of assembly hall and mill
- ④ Non-improvement of health and hygienic facilities and health education activities

### 3.10 Agricultural Support

The major organizations that perform research and extension activities of agricultural technologies in the study area include IER as the research organization and DRAMR, DRAER, DRCN, ORS, and CMDT as the extension organizations. The outlines of these organizations are as follows:

In addition to those mentioned above, there are projects by support organizations and NGOs as the support of farmers. The states of these activities are already described in Chapter 2, "Trend of Development Support".

#### (1) Research Organization

Rural Economy Institute (IER: Institut d'Economie Rurale)

##### 1) Organization

IER is an agricultural research organization belonging to the Ministry of Rural Development of Mali, has a research-related staff of 306 people (including 153 researchers) and a support staff of 344 people. IER has its headquarters in Bamako and has a total of 6 Regional Agricultural Research Centers (CRRAs), 9 Experimental Stations (Stations), and 13 Sub-stations (Sous-stations) in Mali.



## 2) Activities

IER performs technological development aimed at improving the production and productivity of agriculture, provides technological support for agricultural development and scientific and technological education and information to personnel engaged in agricultural research and development, and performs entrusted businesses in special fields. IER is not engaged in extension activities to farmers.

### (2) Organizations Related to Extension

The following organizations and their branches perform extension activities in the study area.

- ① Regional Directorate of Rural Support (DRAMR: Direction Régionale de l'Appui au Monde Rural)
- ② Regional Directorate of Rural Management and Equipment (DRAER: Direction Régionale de L'Aménagement et de l'Équipement Rural)
- ③ Regional Directorate of Natural Conservation (DRCN: Direction Régionale de la Conservation de la Nature)
- ④ Ségou Rice Office (ORS: Office Riz Ségou)
- ⑤ Malian Textile Development Company (CMDT: Compagnie Malienne de Développement des Textiles)

### 1) Activity fields

Table 3.10.1 shows the activity fields and the Région-level organization structures of the above organizations. One thing noteworthy is the overlap of activity fields between DRAMR/DRAER and CMDT. The activities of the organizations coexist in different districts.

**Table 3.10.1 Activity Fields and Organizations of Public Corporations Related to Agriculture**

Organization name	Activity fields	Organizations (Région level)
DRAMR	Agricultural production Stock production Extermination of pests on crops and domestic animals Support of rural organizations Promotion of industries related to agriculture Collection and management of statistical data of other extension organizations Supervision of NGO activities	Consists of the following five divisions and two bureaus: <ul style="list-style-type: none"> <li>• Agricultural extension division</li> <li>• Rural organization support division</li> <li>• Hazard prevention and flora and fauna conservation division</li> <li>• Related industry promotion division</li> <li>• Training division</li> <li>• Statistics, supervision, and evaluation bureau</li> <li>• Data and information communication bureau</li> </ul>
DRAER	Cultivation fishery Management of grassland Management of wells, etc. Extension of agricultural equipment Improvement of rural infrastructures	Consists of the following three bureaus and three divisions: <ul style="list-style-type: none"> <li>• Survey and planning division</li> <li>• Natural resources control and management division</li> <li>• Infrastructure and agricultural equipment division</li> <li>• Statistics, supervision, and evaluation bureau</li> <li>• Data and information communication bureau</li> <li>• Training bureau</li> </ul>
DRCN	Reforestation and forest protection Protection of wildlife (Supply of seedlings)	Consists of the following two divisions: <ul style="list-style-type: none"> <li>• Regulation and management division (Forest management, wildlife management)</li> <li>• Rural improvement division (Training, forest improvement, wildlife improvement)</li> </ul>
ORS	Irrigated rice cultivation Industries related to rice cultivation	Consists of the following four sections and one office: <ul style="list-style-type: none"> <li>• Planning and regulation evaluation office</li> <li>• Agricultural extension division</li> <li>• Rural organization promotion division</li> <li>• Infrastructure improvement division</li> <li>• Administration and finance division</li> </ul>
CMDT	Cotton cultivation and collection Agricultural support activities in general	(CMDT-Fana) Consists of the following divisions and sections: <ul style="list-style-type: none"> <li>• Rural development division (including statistics section, stock raising section, agricultural material section, research cooperation section, mechanization section, Training division, and Terroir Management section)</li> <li>• Industrial production division (closely related to cotton mills)</li> <li>• Administration and society division</li> <li>• Accounting division</li> </ul>

2) Structures of extension organizations by levels

Table 3.10.2 shows the relationship of extension-related organizations in each of the State, Region, Cercle, and former Arrondissement levels.

**Table 3.10.2 Relationship of Organizations Related to Extension (by Levels)**

State level	Ministry of Rural Development			Ministry of Equipment, Land Development, Environment and Urbanization	Malian Textile Development Company
	DNAMR		DNAER		
Région level	ORS	DRAMR	DRAER	DRCN	(Région CMDT)
Cercle level	(ORS Zone)	SLACAER		SCN	(Secteur CMDT)
Arrondissement level	(ORS Secteur)	AACAEER		ACN	(ZER), (ZAF), (ZAEER), (ZDR)

Note: An organization name enclosed in brackets means that the organization does not accurately correspond to either of the Région, Cercle, or Arrondissement level.

- ① DRAMR and DRAER are the branch offices in the Ségou Région of the National Directorate of Rural Support (DNAMR) and the National Directorate of Rural Management and Equipment (DNAER), respectively. DRAMR and DRAER share SLACAER (Service Local de l'Appui Conseil et Aménagement et Equipment Rural) as a branch office in the cercle level and AACAEER (Antenne de l'Appui Conseil et de l'Aménagement et Equipment Rural) in the arrondissement level (not commune). AACAEER stations extension workers perform extension activities in the village level. DRAER, DRAMR, and SLACAER in each cercle hold a meeting once a month to discuss the progress statuses and problems in the activities. Their secretariat is located in DRAMR.
- ② DRCN is a branch office in the Ségou Région of the National Directorate of Natural Conservation of the Ministry of Equipment, Land Development, Environment and Urbanization (DNCN). DRCN also has the Natural Conservation Service (SCN: Service Conservation de la Nature: in charge of forest management) in the cercle level and the Natural Conservation Agency Branch (ACN: Antenne Conservation Nature: in charge of farmer management) in the arrondissement (not commune) level.
- ③ ORS belongs to the Ministry of Rural Development and performs activities only in six communes and 234 villages along the Niger River in Ségou Région. The activity area is divided into three zones: Tamani, Dioro, and Sansanding (out of the study area). Each zone is divided into two to three sectors.
- ④ CMDT has its headquarters in Bamako and performs activities mainly in the cotton cultivation zone in the southern part of Mali. Their regional offices (Région CMDT) are in Koutiala, San, Fana, Sikasso, Bougouni, and Kita. Each regional office has branches (sectors).

### 3) Division of activity areas

The above public organizations related to agriculture divide the target areas for extension activities, except for DRCN that has little competition with other organizations in the activity fields. Table 3.10.3 shows the situation.

**Table 3.10.3 Division of Extension Activity Areas among Public Organizations related to Agriculture**

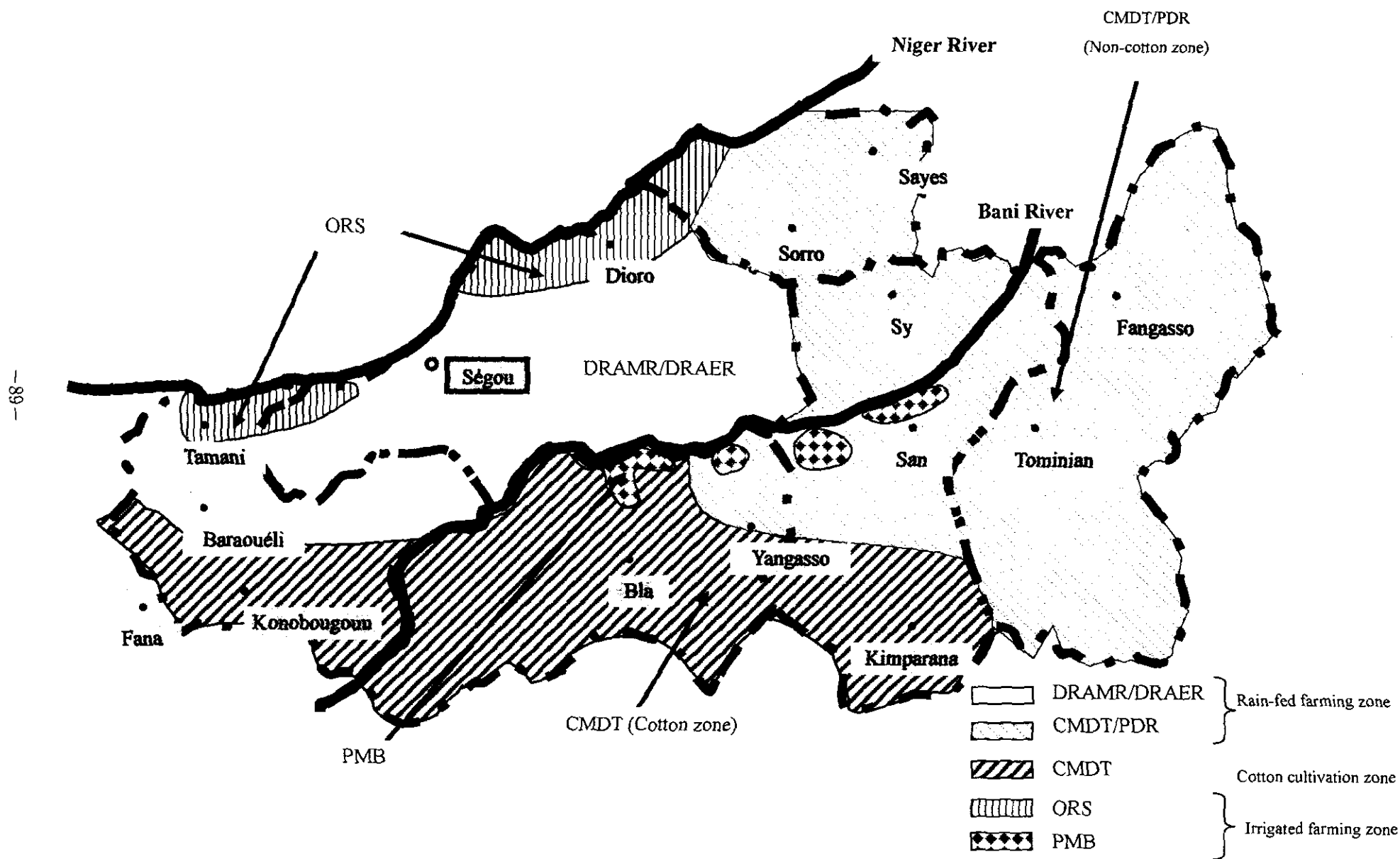
Organization name	Regional office name	Branch (sectuer) name	Target area (cercle)
CMDT (Malian Textile Development Company)	CMDT – San	San, Tomininan, Yangasso (part)	(PDR activity areas: Non-cotton rain-fed farming zone) Tominian (all), Macina (southern half), San (except southern part), Bla (northeastern part - around Yangasso)
		Yangasso (part), Kimparana, Bla	(Out of PDR activity area: Cotton zone) Bla (except northern part around Yangasso), San (southern part)
	(CMDT – Fana)	Konobougou※	(Out of PDR activity area: Cotton zone) Baraouéli (southern part)
DRAMR (Regional Directorate of Rural Support)/ DRAER (Regional Directorate of Rural Management and Equipment)			Elsewhere in Ségou and Baraouéli than activity areas of other organizations (rain-fed farming zone)
ORS (Ségou Rice Office)			Ségou, Baraouéli, and Macina (irrigated rice cultivation zone along the basin of the Niger River)

Note: The Konobougou branch of CMDT has an activity target area that includes other places than Ségou Région.

In the study area, CMDT has an activity area that mostly exists in the rain-fed farming zone where other crops than cotton are grown. There, the Income Diversification Program in Mali Sud Area (PDR) is being implemented based on financial support mainly from IFAD. The operation funds are provided by PDR and the extension activity is performed by CMDT. Additionally, the Program for Development of the Middle Bani River Basin (PMB) is being implemented along the Bani River in Bla and San cercles. Similarly, the operation funds are provided by PMB and the extension activity is undertaken by CMDT.

In the PDR implementation area, CMDT performs activities in two fields: ① organizing rural society and ② extension of agricultural technologies. CMDT also undertakes contract management such as repeated placement of orders for public undertaking for PDR. Figure 3.10.1 shows the classification of activity areas for DRAMR/DRAER, CMDT (including PDR project), ORS, and PMB in consideration of the above situation.

Figure 3.10.1 Classification of Activity Areas for Extension Organizations and Projects



4) Staff allocation and extension methods of organizations

(a) DRAMR/DRAER

Table 3.10.4 shows the number of extension workers of DRAMR/DRAER in Ségou Région.

**Table 3.10.4 Number of Extension Workers of DRAMR/DRAER  
(as of End of 1999)**

Cercle post	DRAMR headquarters	DRAER headquarters	Baraouéli	Bla	Macina ②	Niono ①	San	Ségou ②	Tominian	Total
Director	1	(Total of 15)								
Division chief	7									
Section chief	9									
Supervisor (Charges)	5									
SLACAER director			1	1	1	1	1	1	1	7
M&E, statistics specialist			1	1	1	1	1	1		6
Agricultural production specialist			1		1	1		1		4
Stock hygiene specialist			1	1	1	1	1	1		6
Vegetable cultivation specialist						1				1
Person in charge of natural resource management						1				1
Farmer organization specialist					1			2		3
Stock production specialist			1		1	1		1		4
Total for SLACAER			5	3	6	7	3	7	1	32
AACAER director			4	1	4	4	5	8	2	28
Person in charge of investigation			1	2	3	4	6	6	2	24
Stock hygiene specialist			2	1	1	3				7
<b>Extension workers (Conseillers Polyvalents)</b>			<b>8</b>	<b>0</b>	<b>12</b>	<b>18</b>	<b>0</b>	<b>42</b>	<b>0</b>	<b>80</b>
Person in charge of vegetable production						12	5			17
Person in charge of rural sensibilization				2	2		5	17	2	28
Total for AACAER			15	6	22	41	21	73	6	184

Source : Data obtained by DRAMR

Note : ① Out of the study area; ② Including areas other than the study area

The extension workers (Conseillers Polyvalents) indicated in bold characters in the above table refer to people who directly contact farmers and extend technologies. Although there used to be separate extension workers for each of the farming and stock raising fields, one extension worker handles all the fields (Polyvalent) now. This is because one extension worker can handle all the farmer-level technologies and, conversely, extension workers cannot handle tasks if different people were assigned to different fields. In the Bla, San, and Tominian cercles, no Conseillers Polyvalents exist because CMDT-San performs extension activities. In the areas where ORS performs activities in the Ségou, Baraouéli, and Macina cercles, no extension workers are stationed.

In the areas where CMDT and ORS perform activities, SLACAER/AACAER performs activities limited in the following fields:

- ① Collecting statistical data created by other agricultural organizations
- ② Participating in meetings for cooperation with other organizations in activities and joint missions with development partners
- ③ Directing extension workers as required
- ④ Handling the fields not covered by other organizations (especially flora and fauna conservation)

One extension worker is in charge of six to eight villages and is supposed to contact three to four groups of farmers per village regardless of the sizes of the villages. The size of a group varies depending on the size of a village. One group consists of 12 to 16 UPAs (Unites de Production Agricole/agricultural production units) normally or 24 UPAs at the maximum. While the chief of UPAs (who is also the chief of farming) sometimes becomes a representative, another person may be appointed if the UPA chief has a health problem or other problems. An extension worker gives guidance to these groups through training sessions, etc. A UPA representative gives technological guidance to UPA members and also gives guidance to UPAs not included in his group.

An extension worker performs activities according to an activity plan created through cooperation with the above groups. The activity is performed in a repetitious pattern of training -- visits (identification of problems), training, visits, and so forth. In the extension activity, importance is attached to a verification test in villages requiring farmers' participation. In the model demonstration farm in Cinzana, for example, sesames, peanuts, and millets were grown in three demonstration fields of 20m x 20m and, this year, millets were grown in all of the three demonstration fields and the yields were compared. A follow-up was performed by performing a verification test in cooperation with the Cinzana Experimental Station of IER.

(b) DRCN

The following table shows the number of staff members of DRCN-related organizations per cercle. The number of staff members per cercle does not vary so much because DRCN does not have contention of projects with other organizations.

**Table 3.10.5 Number of DRCN Staff Members (as of End of 1999)**

Cercle post	DRCN headquarters	Baraouéli	Bla	Macina ②	Niono ①	San	Ségou ②	Tominian	Total
DRCN director	1								1
Division chief	2								2
Supervisor (Charges)	2								2
Person in charge of training	1								1
SCN director		1	1	1	1	1	1	1	7
Supervisor (Charges)		1	1			1	1	2	6
Total for SCN		2	2	1	1	2	2	3	13
ACN director		4	5	5	3	7	8	4	36
Supervisor (Charges)				1	2		2	1	6
Person in charge of branch (sectuer)					3		2		5
Total for ACN		4	5	6	8	7	12	5	47

Source : Data from DRCN Annual Report 1999 excluding contract employees and secretaries

Note : ① Out of the study area; ② Including areas other than the study area

(c) ORS

ORS performs activities in the regions of Dioro (Ségou and part of Macina), Tamani (part of Baraouéli), and Sansanding (part of Ségou and out of the study area) and has staff members stationed as shown below. Out of the staff, an Agent Conseil Rural (ACR) shown in bold characters directly provides technological extension directly to farmers.

**Table 3.10.6 Placement of ORS Staff (Excluding Support Staff)**

Post	ORS headquarters	Zone (activity area)			Total
		Dioro	Sansanding※	Tamani	
Agricultural engineer (Ingenieur)	12				
Financial administrator	1				
Agricultural technician (Technician)	13				
Civil engineering technician	1				
Social science technician	1				
Person in charge of accounting	2				
Clerical assistant	2				
Civil engineering extension worker	2				
<b>Total for ORS headquarters</b>	<b>34</b>				
<b>Chef de Zone</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>
<b>Charge des Operations Techniques</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>
<b>Agent de Promotion Rural</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>
<b>Chef Secteur</b>		<b>3</b>	<b>2</b>	<b>2</b>	<b>7</b>
<b>Adjoint Chef Secteur</b>		<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>
<b>Extension Worker (Agent Conseil Rural (ACR))</b>		<b>12</b>	<b>11</b>	<b>9</b>	<b>32</b>
<b>Enqueteur</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>
<b>Chef Centre de formation</b>		<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>Chef de Zone d'Alphab. (ZAF)</b>		<b>3</b>	<b>0</b>	<b>3</b>	<b>6</b>
<b>Animateur Rural (AR)</b>		<b>3</b>	<b>3</b>	<b>2</b>	<b>8</b>
<b>TOTAL</b>		<b>29</b>	<b>21</b>	<b>21</b>	<b>71</b>

Source : ORS Activity Report, 1999-2000

Note : Sansanding is out of this development study area.

An extension worker has the following duties:

- Investigating and recognizing producer training needed in a village
- Participating in meetings (held every ten days) and training sessions
- Providing extension activities through verification in the contact group level
- Visiting the UPA of farmers who are group members
- Providing producers with information on new technologies and performing education activities

Technologies are extended through a contact group consisting of ten producers (producteurs). An Agent Conseil Rural is in charge of eight villages and two or three contact groups per village. The extension worker contacts a farmer once in fifteen days by either visiting the farmer's house or providing training in the verification method. Thus, the extension method employed by ORS is similar to that of SLACAER/AACAER. Activities of an ACR are supervised by a Chef de Secteur. Additionally, the Agricultural extension division (Division Vulgarisation Agricole) of the ORS headquarters provides technological support.

#### (d) CMDT

The CMDT is continuing activities under commission from the PDR in the non-cotton cultivation zone. However, in view of the current financial situation the CMDT is tending to gradually withdraw from the non-cotton cultivation zone. In the area covered by the CMDT-San, there are five branches (Secteurs), namely, San, Kimparana, Tomininan, Yangasso and Bla.



**Table 3.10.7 Areas Covered by the Secteurs under the CMDT-San**

Secteur name	Area	Cotton zone/non-cotton zone
Tominian	Entire area of Tominian Cercle	Contains both
San	Northern part of San Cercle	Non-cotton zone
Kimparana	Southern part of San Cercle	Cotton zone
Yangasso	Eastern part of Bla Cercle	Contains both
Bla	Western part of Bla Cercle	Cotton-zone

Table 3.10.8 shows the number of CMDT staff assigned in the PDR district under CMDT-San

**Table 3.10.8 Assignment of CMDT Staff in the Branch Offices of PDR Implementation Districts (2000)**

	San	Yangasso	Tominian	Fangasso	Sayes	Total
Branch office manager	1	1	1	1	1	5
Technical advisor	1	1	1	1	1	5
Staff in charge of improvement	2	1	1	1	1	6
Staff in charge of women organization	1	1	1	1	1	5
Livestock expert	2	1	1	1	3	8
Staff in charge of ZAER		1	3			4
Staff in charge of ZER		2	5	4	5	16
Staff in charge of ZAF	5	2	5	3	5	20
Staff in charge of C/SB	4	6	16	17	22	65
Staff in charge of ZDR	24		1			25
Staff in charge of rice production area	1	1				2
Staff in charge of warehouse	1	1	1	1	1	5
Total	42	18	36	30	40	166

Source: Material obtained from CMDT-San

Extension departments, such as the Zone Expansion Rural (ZER), Zone Animation et Expansion Rurale (ZAER) and Zone de Développement Rural (ZDR) are established in each branch (Secteur) of the CMDT. The ZER/ZAER are set up in areas (mainly in the cotton zone) where every village has a village technical team. The ZDR is set up in areas (mainly in the non-cotton zone) where there are villages with no technical team. Five Chefs Secteur de Base (C/SB) were appointed under ZER and each C/SB was in charge of approximately ten villages.

Through the cooperative activities of ZAF and ZER, the farmers' organizations could be strengthened. When several farmers' organizations started to form a Federation, ZAF, ZER, and C/SB became disorganized at a so-called "graduation" stage, and ZAER was established. Each ZAER was in charge of five to ten villages while being in contact with the representatives of the Federation of farmers' organizations. Technologies could be extended to the Federation as a result.

The extension method of CMDT was not different from that of the above mentioned extension organizations. C/SB offered technical guidance and training activities in the respective villages for twenty days a month. It also put importance on the verification test in the villages. New technologies were transferred to the extension workers by the specialist of Region CMDT for each sector.

One ZDR is located in one Commune and is in charge of approximately forty villages. However the

ZDR cannot give instruction to all the villages, and so it organizes a village organization called a Societe Villageoise de développement (SVD), which concentrates its activities in that village.

### 5) Cooperative Relationships between Organizations

#### (a) Research and Extension

The Ségou regional technology committee (Comite Technique Régional de Ségou) holds meetings at the Niono Regional Agricultural Research Center of IER once a year, where the concerned persons of IER, DRAMR, etc. gather to discuss technological issues.

#### (b) DRAMR/DRAER and DRCN

DRAMR/DRAER and DRCN, basically having few cooperative relationships with each other, mostly act independently. In the level of farmers, however, it is not too much to say that these two organizations perform complimentary activities.

As a cooperative relationship between DRCN and DRAER, there is a "reforestation contest" system, in which farmers plant nursery trees and then a farmer (one per cercle) who has provided superior management is awarded with a loan to buy agricultural equipment. SLACAER and SCN work together to select the best farmers, one per cercle, from among those having a tree survival rate of 90% or more in one year (May to May next year). The best farmers can obtain an interest-free loan of 500,000 FCFA (including 250,000 FCFA for two cows and 250,000 FCFA for agricultural equipment). The loan contract is provided by DRAER. In the fiscal year 2000, 94 farmers participated in the contest and 42 farmers were awarded with loans due to assistance from a German aid organization.

#### (c) ORS and DRAMR/DRAER

Since the activities in the National Agricultural Extension Project (PNVA) were completed in 1998, ORS has been working independently of extension organizations related to DRAMR. In the ORS zone, DRAMR does not perform any extension activity. However, DRAMR does collect information on the extension activities of ORS in the region level. Additionally, ORS may freely use DRAMR specialists (stock raising, plant quarantine for vegetables, etc.) to solve a specific problem. ORS holds regular meetings with DRAMR to exchange information.

#### (d) CMDT and Other Organizations

In the CMDT activity area, CMDT regional offices and branches, SLACAER/AACAER, and SCN work together to establish a program. Every three months, a meeting for all the persons concerned is held. In a meeting, information is exchanged, activities are monitored, and programs are modified, as required. Thus, the cooperative relationships between CMDT and other organizations are relatively good.

### (3) Factors Impeding the Development

Impeding factors in the agricultural support sector are as follows.

#### 1) Staff of technological extension do not contact farmers sufficiently.

- ① Roads to villages are not kept in good condition (especially in the rainy season), making it difficult for extension workers to visit villages.
- ② Due to shortage of budget, the absolute number of extension workers is not sufficient and the extension activities are limited.

- 2) The extension system for a new technology is not sufficient.
  - Visually-appealing and practical extension tools are not widely used.
- 3) Farmers are not prepared to receive a new technology.
  - ① Low literacy rate of farmers
  - ② Insufficient understanding of concepts required to learn a technology such as areas and distances to limit technology transfer
  - ③ Insufficient organization of farmers and system to receive extension activities are not efficient
- 4) The extension workers can make achievements only in points, which do not readily expand
  - ① Insufficient exchange of opinions among extension workers
  - ② Insufficient contact and coordination with NGOs, etc.

### **3.11 Environmental Conservation**

Following issues are taken as example of environmental problems other than reduction of forest area.

#### **① Reduction of Fauna and Flora Resources**

Although there is no location designated in the Ramsar Treaty or as a World Heritage Site in Ségou Region, 16 forest protection districts are designated. These districts are rich in fauna and flora resources. In addition, varieties of mammals, birds, amphibians, fish and insects inhabit the basins of the Niger and Bani Rivers. However, fauna and flora resources are clearly reduced because of an increase of population.

#### **② Water Pollution**

Water pollution in the Niger River due to dyes, detergents, domestic sewage, and excrements of domestic animals is a big problem for Mali, which depends on the river for a considerable part of water resources. In the environment action plan in Ségou Région, water pollution is listed as one of the general environmental problems. Currently, however, water pollution is not recognized to be as an urgent issue as the decrease of forest resources or the deterioration of soil. No effective measures other than enlightening were taken. Due to lack of indoor toilet, unhygienic matters caused by the feces excreted around the house (contamination or generation of mosquitoes) were brought as an environmental issue in the agricultural area. The Hygiene Department of the Ministry of Environment is implementing an enlightening activity to promote the construction of indoor toilet.

#### **③ Contamination by living wastes**

As for the living wastes, the environmental deterioration caused by the waste vinyl and plastic was a problem. These wastes are conspicuous not only in the city area like Ségou City, but also in the rural area. As they are not biodegradable, there were adverse effects to the agricultural production when eaten by livestock or they impeded the crop growth by being scattered around. The Government established a rule on waste disposal including for farming villages. Under the administrative guidance by the Hygiene Department of the Ministry of Environment, Commune is issuing instructions regarding the collection of wastes by separating them according to the type of wastes. However, partly because of a lack of budget, the actual effects could be observed only in some parts of Ségou City.

### (1) Environmental Conservation Activity in the Agricultural Area

The efforts toward environmental conservation at national and regional levels have been described in Chapter 2. In response to these efforts, environmental conservation activities at cercle level (agricultural area) are being pursued, and examples of Baraouéli cercle case are described below. Similar efforts are also being made in other cercles in the study area.

#### 1) UN Convention to Combat Desertification (CCD)

At about the same time as Ségou Region formulated the Regional Action Program (PAR), Baraouéli cercle formulated the "Environmental Development Program". This corresponds to the Local Action Program (PAL) that are stipulated in the National Environmental Action Plan (NEAP). However, this program has in fact been implemented hardly because no approval has been issued by the Central Government and no external project funding has been provided.

#### 2) Present status of environmental conservation activities

The main target of environmental conservation activities is the forestry conservation. The Nature Conservation Service (SCN: Service Conservation de la nature) in Baraouéli is responsible for undertaking various environmental conservation activities including the enlightenment of residents in Koulala Forest Reserve in the Cercle. In the Koulala forest protection district, relatively many forest resources remain and wood is also supplied to Ségou. The problems are as follows:

- ① Insufficient control of cutting of trees for firewood (illegal cutting)
- ② Fires due to spontaneous combustion
- ③ Excessive grazing

Actually, the Natural Conservation Agency Branch (ACN) established in each arrondissement only gives farmers permission for cutting trees and collects tax concerning tree-cutting due to insufficient operation budgets. The operations of SCN are to coordinate the ACN operations based on activity reports submitted by ACN at the end of every month and to deliver tree-cutting tax collected by ACN to the National Treasury in bulk.

Table 3.11.1 shows an example of a forest growing activity in the forest reserve.

**Table 3.11.1 Forest Growing Activity in the Forest Reserve**

Description of activity	Problems and issues
<ul style="list-style-type: none"><li>• Farmers are permitted to grow millets between trees as long as they plant and manage young trees in some areas of the forest reserve where trees are sparse.</li></ul>	<ul style="list-style-type: none"><li>• Shortage of personnel and funds required for implementation</li></ul>
<ul style="list-style-type: none"><li>• Around the forest reserve, farmers were contracted to plant and manage baobabs and tamarinds (1992).</li></ul>	<ul style="list-style-type: none"><li>• Since fences for warding off domestic animals were stolen, tamarinds were eaten and only baobabs remained. Educational campaigns for villagers are necessary in order to teach them to sufficiently manage trees after planting them.</li></ul>
<ul style="list-style-type: none"><li>• In some areas of the wasteland in the forest reserve, a eucalyptus planting project was implemented as part of PGPRC (Forest protection Project Requiring Farmer Participation: donation of European Development Fund).</li></ul>	<ul style="list-style-type: none"><li>• The project was canceled due to shortage of funds although the farmers' awareness was high and an operation committee of farmers was formed.</li></ul>

Due to a lack of residents' participation and funds, the activities could not progress successfully.

**(2) Environmental Influence Evaluation**

As a law concerning environmental influence evaluation in Mali, there is the government ordinance No.99-189P-RM "Legal Procedures for Environmental Influence Survey" dated in 1999. According to this law, an environmental influence survey is required before implementing a project accompanied by "any work, maintenance or industrial, agricultural, mineral, handiwork, commercial, or transportation activities that may cause environmental pollution, public nuisance, or deterioration".

**(3) Main issues**

- ① The fauna and flora resources in the study area including forests are threatened by poaching, illegal tree cutting, or fire caused by careless handling.
- ② The rules on waste disposal and regulations on environmental conservation such as the one on tree cutting are not observed properly.
- ③ The environmental conservation activities need the understanding and participation of residents. However, as the effects of activities are not clearly demonstrated in a short period of time, the enlightenment activities to the residents do not proceed easily.
- ④ The development of environmental conservation activities that can be implemented at the autonomous level of residents (for example, formulation and observation of the natural resource conservation rule in the area based on the agreement of the related parties of present users of land) is necessary.



## **Master Plan**





## CHAPTER 4 BASIC POLICY OF MASTER PLAN

### 4.1 Background of the Project

The United Nations Convention to Combat Desertification (CCD: Convention des Nations Unies sur la lutte contre la Desertification) came into effect in 1994, in response to the growing call for international measures to combat desertification. The CCD is a treaty that takes as its basic strategy the bottom-up approach, placing importance on the promotion of residents' participation, in recognition of the fact that the large-scale top-down projects of the past, implemented with an enormous investment of funds, did not achieve the hoped-for results. The Government of Mali, as a signatory of the CCD, formulated its National Environmental Action Plan (PNAE) in 1998.

The south region of Ségou, which is the study area of the Project, is the main farming area of Mali. In the study area, with a background of growing population, the unit yield for crops is falling, firewood resources are declining, and pasture resources are insufficient, while at the same time desertification is advancing. Considering that the annual precipitation in the study area is 600 to 800 mm, with the comprehensive implementation of measures this area has the potential to prevent desertification.

The impeding factors of rural development in the study area, which were sorted out for each field in Chapter 3, are summarized in Table 4.1.1. For the settlement of sustainable agriculture, these impeding factors must be removed first.

**Table 4.1.1 Factors Impeding Rural Development in Study Area**

Sector	Factors impeding the development
Rural society	<ul style="list-style-type: none"> <li>① There are few educational opportunities and the basic educational level such as the literacy rate is low.</li> <li>② Metrology is not clear and the residents rarely have the concept of area and distance.</li> <li>③ These factors impede the organized agriculture and technology transfer.</li> <li>④ Burdens to women are excessive and the participation of women in rural development is insufficient.</li> </ul>
Rural economy	<ul style="list-style-type: none"> <li>① Lack of investment funds in all sectors</li> <li>② Lack of access measures to funds in farming villages</li> </ul>
Support of farmers	<ul style="list-style-type: none"> <li>① Unestablishment of resident participatory promotion method and system</li> <li>② Lack of extension tools (transportation measures or teaching materials for extension workers)</li> <li>③ The organization of farmers being inadequate, the effects of extension are not sufficient.</li> </ul>
Land use	<ul style="list-style-type: none"> <li>① Lands are not used under the ordered plan and regulation.</li> <li>② Traditionally residents rarely have the concept of land possession and are not motivated in improving the land use.</li> </ul>
Water resources	<ul style="list-style-type: none"> <li>① Lack of modern water source facilities and water use facilities</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>① Excessive cultivation accompanying the population growth, reduction of land productivity due to the enlargement of cultivated lands</li> <li>② Insufficient extension of technology to relieve the effects of vigorous weather change</li> <li>③ No improvement of the supply system of materials such as improved variety or fertilizer</li> <li>④ Increase of soil erosion caused by the factors outside the fields (upstream)</li> </ul>
Stock raising	<ul style="list-style-type: none"> <li>① As the nation's consciousness is low, there is no improvement of stock raising.</li> <li>② Stock raising for the purpose of saving is the main stream, which induces overgrazing due to the increased number of animals.</li> <li>③ Stock raising for the purpose of saving rather than for selling reduces the shipment rate, hindering thus the productivity.</li> <li>④ Due to the lack of stored feed and nutritious supplement feed, the productivity of stock raising is low.</li> <li>⑤ Due to lack of vaccination, wearing of livestock caused by diseases is severe.</li> </ul>

Sector	Factors impeding the development
Sylviculture	<ul style="list-style-type: none"> <li>① As the residents are rarely conscious of forest conservation or possession of trees, tree planting does not proceed.</li> <li>② Damage of vegetation eaten by livestock or caused by burning is serious.</li> <li>③ Disorderly tree cutting with the purpose to obtain cash through selling firewood increased.</li> </ul>
Market distribution	<ul style="list-style-type: none"> <li>① Market price of cereals fluctuates greatly being linked with the annual fluctuation of production.</li> <li>② Access roads to the market are not improved at village level.</li> <li>③ Lack of cereal storage facilities</li> </ul>

This Master Plan ranks PNAE of Mali as a high-graded program and aims at the prevention of desertification through the removal of impeding factors and the rural development shown in Table 4.1.1 based on the promotion of residents' participation.

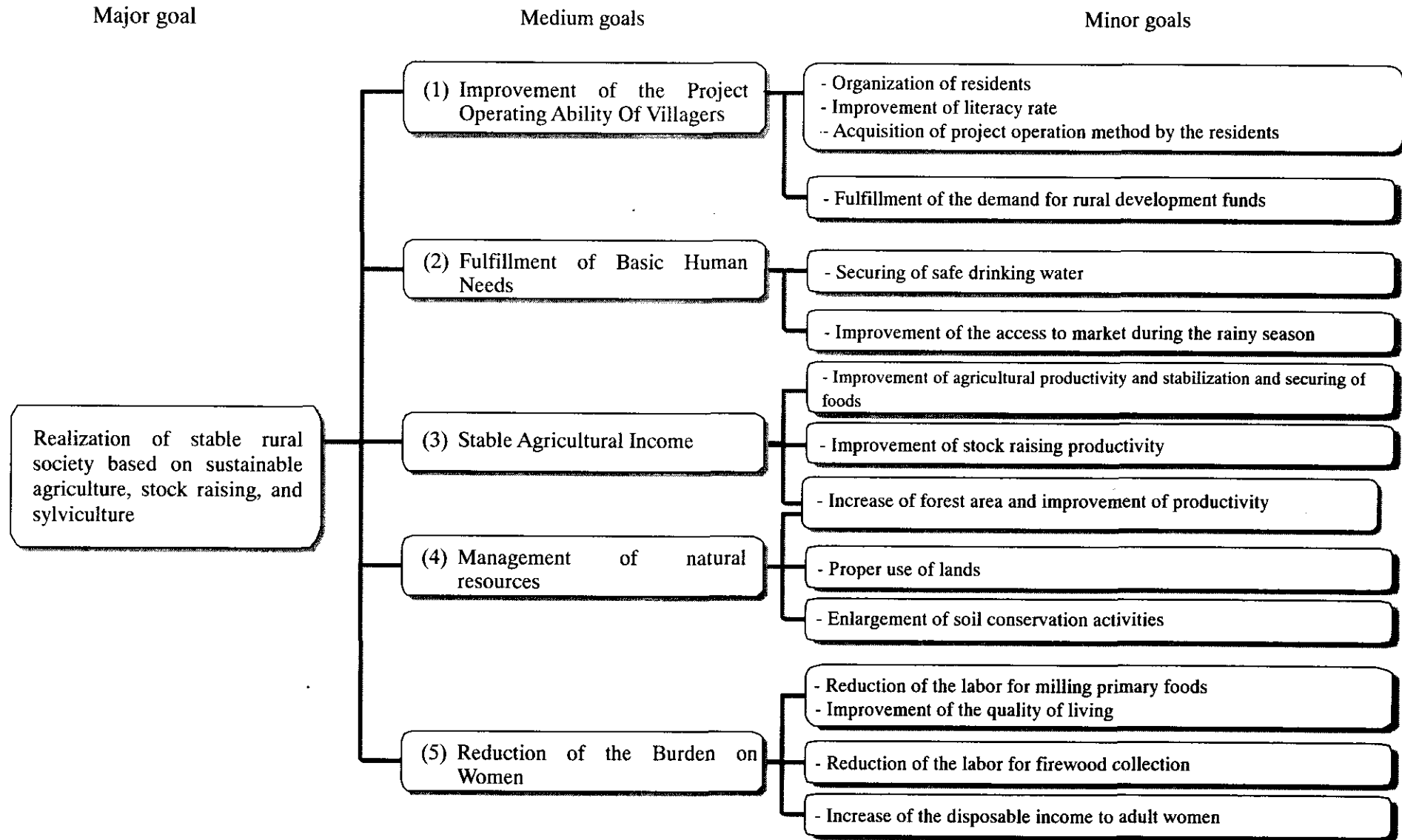
## 4.2 Development Strategy

### 4.2.1 Development Objectives

Desertification is caused by the exploitation of resources, mainly due to human factors. Population increase and poverty promote the non-regenerative exploitation of resources, and this leads to the advance of desertification. In order to prevent desertification, it is necessary to reduce poverty and prohibit the exploitation of resources.

The development objective of the Master Plan will be the "realization of a stable agricultural society based on development of sustainable agriculture, stock-raising and sylviculture". Beneath that objective the following medium and minor goals will be established.

Figure 4.2.1 System diagram of development objectives



## (1) Improvement of the Project Operating Ability Of Villagers

### ① Organization of villagers

The prevention of desertification cannot be continued unless the villagers who are both a cause of desertification and who are themselves negatively affected by desertification, recognize the necessity of desertification prevention and participate on their own initiative in prevention activities. In order for the villagers' activities to proceed smoothly, a realistic and efficient method is to formulate fixed rules for village organizations that share a common target, and to conduct activities based on these rules. Under the Master Plan the objective is to form villager organizations at the village level for the purpose of implementing desertification prevention activities.

### ② Improvement of literacy rate

The adult literacy rate in Mali is 31% (World Bank Factbook 1995). This figure is the average literacy rate of the entire country, including both urban and agricultural areas. The literacy rate in agricultural villages is considerably lower than the average. According to the questionnaire taken in 275 villages in the study area, the average literacy rate is 15%. Even this figure is slightly optimistic, backed up by the desire of the villagers to show themselves in as favorable a light as possible. The impression gained from the verification study is that "one out of thirty to forty farmers can read and write satisfactorily", which means that the literacy rate is 3% or so.

The establishment of a sustainable agriculture, stock-raising and silviculture requires technical skills gained from experience and theory. Such technical information is passed on as written information, based on the concepts of land area and weights and measures. Illiterate villagers have access to only limited information and limited means of transmission and acquisition of technology. This means that in the present situation the extension of new technical skills is difficult.

Improvement of the literacy rate in the local language (Bambara etc.) is an extremely important task for the establishment of sustainable agriculture, stock-raising and silviculture, and the promotion of desertification prevention activities. In addition, literacy is also indispensable for the drawing up of rules for villagers' organizations for the prevention of desertification to be described under ③ and ④ below, and the smooth operation of these organizations (such as the preservation of meeting records or accounting records). In the Master Plan the acquisition of literacy is ranked as the foundation for the acquisition of methods to carry out desertification prevention activities. Making one out of two villagers literate is given as the objective for the target year.

### ③ Acquisition by the villagers of project operation methods

In similar desertification prevention projects in the past, desertification prevention activities were scaled down as soon as the project supporters left the site. It is thought that the main cause of this was that the capacity building of the villagers insufficient. Through the setting up and establishment of a villager training system, the aim will be for the villagers to gain a sufficient mastery of project operation methods.

### ④ Settlement of small-scale financial system

Demands for funds by the residents of the villages in the study area are strong. In addition, the method for generating operating costs of project at village level represents an essential item for maintaining the organization activity mentioned in Item ① above and sustaining the projects planned in the Master Plan. In order to generate the said costs from which direct profits cannot be expected

(for example, literacy education mentioned in Item ③ above or costs for lecturers), it is possible to collect the costs from farmers each time. However requesting the costs directly from the farmers is not realistic due to the actual economic situation and the income and expenditure of farmers in the study area because the farmers do not have excess cash to spend all the year round. The most proper measure is to pay these costs as the public costs of a village from the operating profit of micro credit. This Master Plan has the objective to enable the access of all villages to small-scale financial system.

## (2) Fulfillment of Basic Human Needs

In order to bring about a stable rural village society, the fulfillment of basic human needs (BHN) is indispensable. When BHN are not satisfied, the villagers may lose the motivation to stay where they are and combat desertification. According to the results of the PRA, the BHN that the villagers of the study area most strongly feel are lacking are "water" and "roads".

### ① Securing of safe domestic water

In the study area, the number of modern wells enclosed by concrete casing is less than one tenth of the number of traditional wells without timbering. In addition, most of the borehole wells, which account for 60% of modern wells, cannot be used because of pump breakdown, etc., so that the securing of a stable supply of domestic water is difficult. The lack of a supply of safe domestic water damages the villagers' health, and in particular is one of the causes of infant mortality. High infant mortality leads to a high birth-rate, as a result of which women have fewer chances to participate in development and are forced to shoulder an increased burden.

The securing of a safe domestic water source for all households in the village will be an objective.

### ② Access to village markets during the rainy season

Within the study area there are many villages with no satisfactory access to nearby markets during the rainy season because of the lack of proper roads. In these villages, even the procurement of basic consumables becomes difficult, which makes daily life difficult. Year-round access to nearby markets for all villages will be an objective.

## (3) Stable Agricultural Income

### ① Improved productivity in agriculture, stock-raising and sylviculture

Population growth and poverty lie behind the advance of desertification. Production activities and consumer activities against a background of population increase lead to the expansion of cultivated areas and with that the shortening of the fallow period, an increase in livestock kept as a form of savings, and the reduction of the forest because of firewood gathering activities. These are the three big causes of desertification. Through the establishment of a sustainable agriculture, stock-raising and sylviculture, an attempt will be made to reduce these pressures as well as raise the farmers' income. The specific objectives in the field of agriculture, stock-raising and sylviculture are as follows.

#### 1) Improved crop productivity

In order to cope with the pressure of increased planting areas, the amount of food needed will be secured by increasing the unit yield through improved land productivity, and the expansion of the cultivated area will be kept in check. A 50% increase in productivity is considered quite possible from the results of verification tests carried out by several test organizations and the Study Team, and this will be the numerical objective.

Furthermore, through the improvement and establishment of cereal bank, the stabilization of spot-sale price at high level would improve the disadvantage of farmers to sell products at low price immediately after harvesting and buying them back at high price at the end of dry season.

#### 2) Improved stock-raising productivity

In the study area, stock raising is both a business occupation and a form of saving. Much of the pressure from the increase in head of grazing livestock arises from the saving activities of farmers. As a method of saving economic surplus from crop production, farmers start to think increasing the number of livestock kept. The pressure of increasing head of livestock will be dealt with by increasing the productivity of individual livestock in order to avoid excess grazing. By guiding villagers who are looking to increase their head of livestock as a means of saving to put the surplus funds into a micro-credit fund, the increase in the head of grazing livestock (excess grazing) will be kept in check. In stock-raising as a business occupation, the objective will be to improve productivity by 50% of present levels, from the results of the verification tests carried out by test organizations and others.

#### 3) Increase of forest area

The forest area in the present study area has been reduced to such an extent that circulatory regeneration is impossible. The silviculture of the study area is greatly limited by natural restrictions, and the forest has poor powers of self-restoration. In addition, room for improvement of productivity through external pressure is less than that of agriculture and silviculture. The increase of productivity by 10% through forest conservation measures, etc. is considered the target. On the other hand, the reforestation plan shall secure the supply matching to the tree demands in the future while extending the improved ovens and reducing the firewood consumption. For the circulatory-type silvicultural production, it is necessary to keep the increase of the present silvicultural production area by 10% as a goal.

#### ② Expansion of environment-friendly income gaining activities

In order to preserve the environment, the effective use of local natural resources and a focus on the reduction of the "waste from home consumption" are indispensable. The fattening of livestock not overly-dependent on grazing but making effective use of feed resources, the establishment of improved iron oven manufacture in order to reduce the consumption of firewood, and handicrafts production with regional resources contribute both to the preservation of the environment and at the same time to the increase of villagers' income. In the Master Plan the establishment and expansion of these income-gaining activities will be an objective.

As a results of the above mentioned Items ① and ②, the farmers' income will be stabilized.

#### (4) Management of natural resources

It is difficult for the farmers in the study area who are busy in their daily living to be aware of the needs to conserve natural resources from which short-term experience cannot be recognized easily. However, for those who produce fruits during the process of physical circulation originally using the solar energy and considering the soil and water as "assets", a proper conservation of natural resources is based on the maintenance of healthy production basis. Keeping in mind this standpoint in the process of the above mentioned Item (1) "Improvement of the project operating ability of residents", the following objectives will be achieved.

① Proper use of lands

In order to prohibit the excessive exploitation of resources and conserve the land resources, the above mentioned agricultural, stock raising, and silvicultural productivity will be improved, while the regulation of land use based on the agreement of related residents should be aimed. The land use in the study area would not concern the village, but should be extended to nearby or remote common lands for grazing or firewood collection. Under these circumstances, an agreement attained by all related villages using the land is necessary in order to establish an orderly land use. The plan aims at the establishment a system to promote long-term management of land use among related villages and the formulation of a land use regulation among villages based on the regulation on grazing and firewood collection through discussions.

② Enlargement of soil conservation activities

To prevent soil degradation, enlargement and strengthening of soil conservation activities in the entire catchment area is necessary. This Plan aims at the enlargement of the said activities by the organized handling of soil conservation in the entire catchment area mainly by preventing the soil erosion in the field of UPA by individual UPA and the fertility improvement measures.

(5) Reduction of the Burden on Women

In the agricultural society of the study area, women work over twelve hours a day refining and milling millet, the staple food, cooking, drawing and carrying water, collecting firewood, washing, caring for children, and carrying out various farming tasks, taking almost no rest. With the advance of desertification, the time women must spend collecting firewood and drawing water will increase. Therefore women are more affected by desertification than men. Getting women to participate actively in the desertification prevention activities is effective for the following reasons.

- ① As the women are more affected by desertification than men, they have a stronger motivation to participate in the prevention activities. Therefore sustained activities can be expected from women.
- ② Reduction of the labor burden on women and an increase in the disposable income of women will lead to the overall improvement of rural life, such as improved nutrition and more educational opportunities for children.

For this reason, the following goals are laid out to promote the participation of women in the desertification prevention activities through the reduction of the burden on women.

① Reduction of labor spent in the polishing and milling of millet, the staple food

Most of the labor carried out by women (approximately 50%) is the polishing and milling of millet. Each family spends about 3 hours a day polishing millet, and if this is reduced the time saved can be used for the cultivation of vegetables in the dry season, the production of handicrafts, or small business, with the aim of securing an income from these activities. The objective will be to reduce the time spent polishing and milling the staple food by half.

② *Reduction of firewood-collecting labor*

The time spent collecting firewood is not as long as that spent polishing and milling millet. In the past, firewood could be collected near the dwellings, but recently the situation with regard to the availability of firewood varies for each village. Therefore the time spent in firewood collection differs for each village. The time spent in firewood collection also varies according to the season. Generally, in the rainy season, less than an hour a day is spent in firewood collection. However, during the dry season, in many villages, women take a donkey cart several hours' ride away to collect firewood, and must spend several hours more there to collect enough firewood to last for several days. For the women in these villages, a reduction of the hours spent collecting firewood is important. The objective will be to reduce the time spent in firewood collection by half by promotion of tree plantation for firewood and improved ovens.

③ *Increase in disposable income*

The married women in the farmer's family are allowed to have money they can use freely. Women use the money to purchase clothes or cosmetics. However, most of the money is used to purchase seasoning for cooking at their own ovens for their husband and children, or to buy things that their children want. The disposable income of the women in the polygamous society is mainly used for family members (of the first degree of kinship). There is a strong possibility that an increase in the amount of disposable income will be used to improve the nutrition or education of children. The numerical objective will be to increase the disposable income from the present 15,000 FCFA to about 45,000 FCFA, through the establishment of income gaining activities such as vegetable cultivation.

#### **4.2.2 Specifications of the Project**

(1) *Base Year and Target Year of the Project*

The base year of the Project will be 2002. The year the Project commences will be 2004, the year following the drawing up of the Project. The Master Plan will start with education and literacy training in areas with a low literacy rate to promote residents' participation, and includes plans to establish wide-ranging improved techniques in agriculture, stock-raising and silviculture. Some time will be needed to carry out the project in its entirety and for the effects to show themselves. Thus, the project period will be set at 22 years and the project target year will be 2025.

On the basis of an evaluation of the state of formulation of the "Commune development plan" in each Commune, which is the smallest unit of administration, the Communes within the project area will be classified "high motivation", "average motivation", and "low motivation" Communes with regard to desertification prevention activities, and the Project will be implemented as a package project starting with those Communes with a higher motivation, from which good results can be expected.

(2) *Project Area*

The study area for this project covers an area of 3.3 million hectares in the south of the Ségou Cercle, but the area covered by the Master Plan project (the "project area") is the "rain-fed farming zone" (2.26 million hectares). As described in 2.1 of "Compilation of the Present Situation", agricultural development projects by existing aid-related agencies with objectives similar to the objectives of this project have been implemented in the "irrigated farming" and the "cotton cultivation" zones, and are beginning to obtain good results. In these areas unique project systems, including an extension support framework, have already been established or are in the process of being established; and the



agencies responsible for these areas have a clearly-defined concept for the project in the future. In order to avoid duplication and confusion, those zones are not included in the target area this project. From the survey for the production of village cadastres, it is estimated that the rain-fed farming zone of 2.26 million hectares contains 1,159 villages. Table 4.2.2.1 shows the land area of the rain-fed farming zone and the basis on which the number of villages was calculated.

**Table 4.2.2.1 Area of Rain-Fed Farming Zone and Number of Villages**

Item	Value	Remarks
Area of Study Area	3,300,000 ha	
Number of villages in Study Area	1,695 villages	
Percentage of villages in the rain-fed farming zone according to the survey for the production of village cadastres	68.4%	Percentage of villages in rain-fed farming zone in random sampling = 188 villages/275 villages = 0.684
Area of project area	2,260,000 ha	3,300,000 ha x 0.684
Number of villages in project area (Number of target villages)	1,159 villages	1,695 x 0.684

### (3) Population Growth Rate

The population growth rate in the project area up until the target year was estimated at 2.2 %, based on "Mali 2025", the long-term forecast by the Government of Mali (National Forecasts until 2025, issued by the Presidential Office in June 1999). The latest population growth rates for the project area as a whole could not be obtained, but the population growth rate for the last 5 years in 12 villages covered by the verification study (estimated from data in the SLACAER study) was a yearly average of 2.23 %. From this it was deemed reasonable to estimate the population growth rate in the project area at 2.2 %.

## 4.3 Development Method

### 4.3.1 Basic Development Policy

The following three points will constitute the basic policy for accomplishing the development objectives.

- ① The promotion of residents' participation at all stages of the desertification prevention activities
- ② The construction of a villager activity support system (Terroir Management system) and, via this system, the continuation of residents' participation
- ③ The use of appropriate technologies and methods existing in West Africa, or adaptations of the same.

In order for the local residents to recognize the necessity for desertification prevention activities and to tackle the activities under their own initiative, it is necessary to introduce an arrangement through which the villagers can participate on their own initiative in all processes, including analysis of the present situation at village level, selection of measures, and the formulation, implementation, and maintenance of plans. Through the process of this participation, the ownership and the empowerment of villagers will mature. For this reason, under the Project the method of promoting residents' participation employed will be "the maturing of villager ownership in desertification prevention measures ? voluntary establishment by the villagers of an organization to implement measures ? operation and management of the measures spearheaded by the villager organization" (hereafter

referred to as "Terroir Management"). The Terroir Management method also means the organization method.

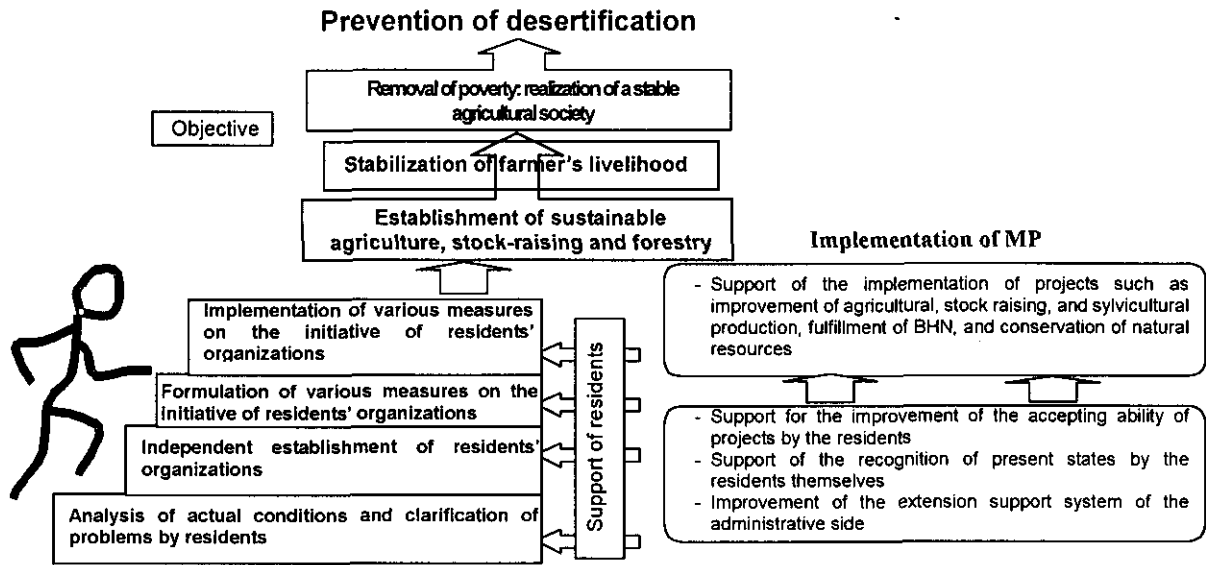
Many of the technologies and methods for desertification prevention exist in the study area, and there are some successful cases to be found. However in the agricultural villages in the study area where there are fewer opportunities for the exchange of information, the successful cases are no more than 'points' within the unit of the village or within an agricultural production unit in the village; they have not gone so far as to expand laterally. What should be proposed in this Master Plan is how to combine organically the existing technologies and methods used in the "point" successful cases, and to expand and develop them laterally so as to be sustainable. Know-how is available on the protection and operation of organization similar to the Japanese "social ostracism" generated by the necessity for the village mayor to uniformly operate the village. However, this system has a different purpose from the bottom-up organization based on the residents' participation.

In the Master Plan, the establishment and strengthening of a farmers' organization, Terroir Management Committee is set as the central proposition on the basis of promotion of residents' participation. Improvement of an operation ability of Terroir Management Committee is planned through the projects in soft sector. Building on this foundation, various measures for the improvement of agriculture, stock-raising and sylviculture will be taken that are adaptations of existing techniques. The Master Plan will consist of a "farmers' support program" that aims to improve villager awareness, organize the villagers and strengthen the villagers' ability to carry out desertification prevention activities; and, based on this, an "agriculture, stock-raising and sylviculture improvement program" that combines measures from the field of agriculture, stock-raising and sylviculture, and the field of living infrastructure improvement. (See Figure 4.3.1.1.)

In order to introduce and establish the Terroir Management method with which villagers are not familiar, it is essential to start from the education of villagers, give technical support at the implementation stage, and put in place a system to do this. The "farmer support program" clearly indicates the role to be played by administrative support both at the start of the villager organization and in the implementation of measures, as well as the support system that will center mainly on the department of local government in charge of extension.

A conceptual chart of objectives to be achieved through implementation of the Master Plan is shown in Figure 4.3.1.1.

**Figure 4.3.1.1 Conceptual Chart of Objectives to be Achieved through Implementation of the Master Plan**



#### 4.3.2 Terroir Management

As described above, the Master Plan will be formulated on the prerequisite that the “Terroir Management” as the promotion scheme for the residents’ participation will be adopted for implementation of concrete programs against desertification. Various activities against desertification will be operated and managed under the leadership of Terroir Management Committee. The basic concept of the Terroir Management will be described below.

##### (1) Processes of Terroir Management Implementation

The Processes of implementing the Terroir Management are basically as follows:

- ① Creating mutual trust between the project implementing body and villagers.
- ② Creating villagers’ consciousness for present status analysis and implementation of programs on villagers’ initiative (It should be defined what problems the villagers are anxious about and what solutions to those problems they think are needed. The Participatory Rural Appraisal (PRA) will be used to implement the study.
- ③ Formation of Terroir Management Committee by villagers themselves (The Terroir Management Committee will be the main body for planning, implementation, management and evaluation of various activities against desertification.)
- ④ Preparation of the activity plans under the leadership of the Terroir Management Committee (Depending upon the activity structure, specialized groups per field will be organized as the sub-committees under the Terroir Management Committee.)
- ⑤ Discussions and agreement between the Terroir Management Committee and the project supporters on the activities.
- ⑥ Execution of the activities under the leadership of Terroir Management Committee.
- ⑦ Management and evaluation of the activities by the Terroir Management Committee → Reflection of future project implementations

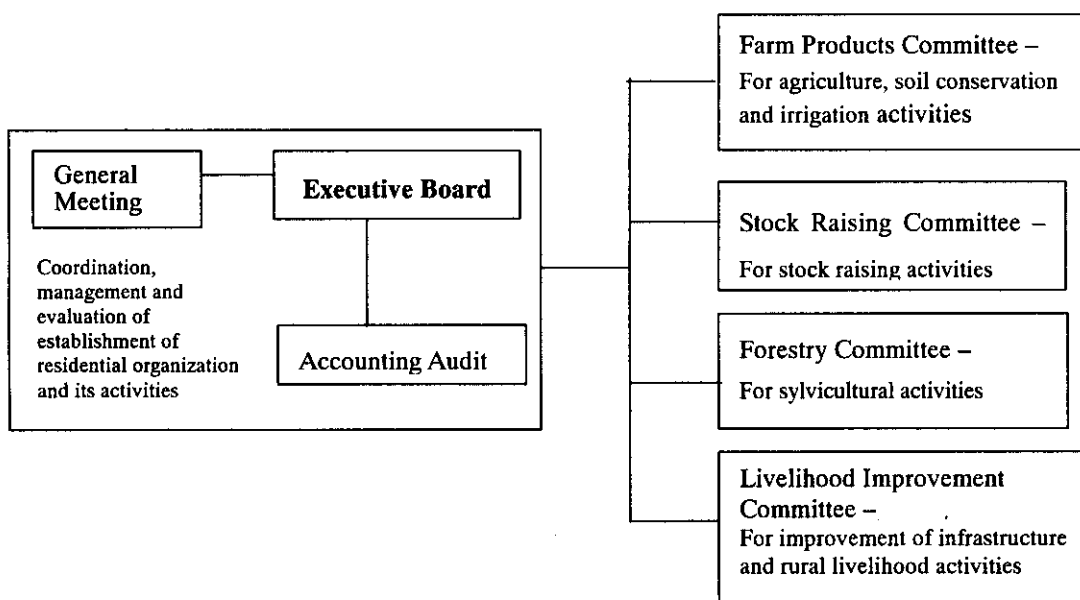
## (2) Organization and Rules of Terroir Management Committees

The basic organization of a Terroir Management Committee is shown in Figure 4.3.2.1. Examples of Terroir Management Committee's rules are described in the Annex 4.3.2.

## (3) Support of Terroir Management

The support measures of the administration to maintain the Terroir Management activities of village level include the construction of system for the daily support activities of farmers by the administration (by the staff of AACAER under the Rural Support Department of Rural Development Ministry, that is the extension worker) and the plan to support the holding of mutual exchange meetings among Terroir Management Committees. Residents listen to the experiences of successful cases by the local residents in the same situation more eagerly than the words of guidance and enlightenment by outsiders who have different educational and cultural backgrounds. In the mutual exchange among Terroir Management Committees, the maintenance of Terroir Management activities must be supported by continuously exchanging information on how the Terroir Management Committees handled the impeding factors of development and how they solved their problems.

**Figure 4.3.2.1 Organizational Concept of Terroir Management Committee**



## 4.3.3 Increase of Villagers' Awareness

The projects planned under this Master Plan are divided into those to be carried out at the village level with residents' participation, and those to be carried out at the administrative level, to support activities at village-level. As a general rule all the projects at village level require the villagers to shoulder a burden (in terms of the provision of materials, labor, money) as far as is acceptable: this will also help enhance their sense of Ownership. The set-up will be for these projects to be carried out on the initiative of the villagers, with support from the administration and others. When the villagers' burden is to be monetary, funds will be reserved as a fund of the Terroir Management Committee, and the Terroir Management Committee will promote the use of this fund as maintenance costs for the project facilities and as micro-credit capital. The returns from the project money provided by the villagers are not sufficient to provide capital for the micro-credit fund for which there is a strong desire in the villages. Therefore, the demand for funds in each village will be estimated and a plan formulated to

beef up micro-credit funds. Table 4.3.3.1 shows the principles of villager's burden.

**Table 4.3.3.1 Principles of Villager's Burden**

Project item	Type	Villager's burden
Training	Literacy education	Cost of teachers and stationary only
	Other	No burden except stationary
Works of a highly public nature	Building, road, well	Provision of simple labor and materials on site plus 300,000FCFA per site
	Building (such as vaccination stations)	Provision of simple labor and materials on site plus 150,000FCFA per large-scale site and 100,000FCFA per small-scale site
Projects directly contributing to an increase in farming income	Technologies already established in the community.	80% of equipment cost
	Technologies not fully established.	30%
Equipment for common use	Mill, road improvement equipment etc.	30%

#### 4.4 Outline of the Project Plan

Outline of the project plan in the main agriculture, stock raising, and silviculture field is as follows.

##### ① Agriculture

While the expansion of farmland goes ahead as population increase puts pressure on the cultivation of land, agricultural productivity has fallen because of the erosion and deterioration of the soil and the reduction in organic resources; and at the present time the area under cultivation is increasing. The project will aim to improve matters by keeping the area of farmland at present levels and raising unit productivity. The expansion of cultivated land is not planned. Out of consideration of the low capital stock of local residents, low-cost activities that can be easily accepted by the villagers will be planned. Factors that have the greatest effect on productivity are the fertility of the soil, seeds, and rainfall patterns. The plan includes the use of improved compost to improve the soil; the implementation of soil conservation measures matching the features of the land (placing of stone ridges or hedges); the introduction and regular replenishment of short growing period varieties not greatly affected by climatic changes; and the supply of phosphorus and nitrogen, which are especially lacking.

##### ② Stock-raising

In consideration of the present situation, in which the advance of desertification is caused by excessive livestock grazing, the project will not plan to increase the number of head of livestock, but to improve the productivity of each animal, mainly through the effective use of feed resources. With the introduction of legume grass to the grasslands near the villages and feed crops to the cultivated land, the amount of feed supply to support the productivity of stock-raising will be increased.

The establishment of vaccination stations at village level are planned in order to bring about the "reduction of loss caused by livestock disease", which is considered the most serious problem by the villagers, together with the securing of feed resources.

### ③ Forestry

Local forestry resources will be cultivated through the supply of plants from nurseries established at village level. In this case, in combination with the production of trees for planting (trees for construction material, hedges, windbreak and sand break forests, and agro forestry), seedlings of trees that will directly contribute to the increase of villagers' income, such as fruit trees, will be actively produced, and forestry resources will be cultivated through the planting of trees in existing forests and around the villages and farmland.

Table 4.4.1 shows an outline of the outline of the Master Plan

**Table 4.4.1 Outline of the Master Plan**

Item	Detail / content	Description
Target year	2022	Project period of 20 years
Project area	Rain-fed agricultural area	1,159 villages, 2.26 million hectares (study area: 3.3 million hectares)
Development objective	Establishment of sustainable agriculture, stock-raising and sylviculture Increase in farming income	Preservation of natural resources through the development of sustainable agriculture, stock-raising and sylviculture. Stable living of local residents, who will shoulder the burden, is important.
Body responsible for projects under the plan	Village level	Villagers making up the Terroir Management Committee
	Administrative level	Project office organized by the staff of the Regional Directorate of Rural Support, etc.
Framework of the project	Residents' participation at all stages	Part of the project operation and management by the Terroir Management Committee will be borne by the villagers as a rule.
	Micro-credit	Terroir Management Committee will operate and manage the project
Project by field	Improvement of the project operating ability of residents	Support for organizing residents, construction of literacy classroom
		Support of the establishment of financial system
	Fulfillment of BHN	Improvement of modern well
		Road improvement
	Stabilization of farmers' income	Improvement of the land productivity of rainfed agriculture, promotion of small-scale vegetable cultivation, establishment of cereal bank
		Promotion of stock raising, introduction of improved poultry, construction of vaccination facility
		Establishment of mini-nursery, promotion of tree planting
	Conservation and management of natural resources	Settlement of land use regulations
		Promotion of soil conservation
	Reduction of burdens to women	Installation of mill, training of the improvement of living
Extension of improved oven		
Extension of handicrafts		

## CHAPTER 5 MASTER PLAN

### 5.1 Structure of the Project

The goal for development of this Master Plan must be the "realization of stable rural society based on the sustainable agriculture, stock raising, and silviculture" and the lower level objectives shown in Table 5.1.1 has been formulated. A project program was established for each objective as shown in the Table. In Item 5.3, the contents will be explained in the comprehensive table format for each project program.

**Table 5.1.1 Programs Corresponding to the Project Objectives**

Medium goals	Minor goals	Project programs
(1) Improvement of the project operating ability of residents	<ol style="list-style-type: none"> <li>① Establishment of support system for Terroir Management Committee</li> <li>② Support for organizing residents</li> <li>③ Improvement of literacy rate</li> <li>④ Acquisition of project operating method by the residents</li> <li>⑤ Fulfillment of the demands for funds for the rural development</li> </ol>	<ul style="list-style-type: none"> <li>• Establishment of support system for Terroir Management Committee</li> <li>• Support for organizing residents</li> <li>• Improvement of literacy rate</li> <li>• Improvement of the residents' project implementation ability</li> <li>• Establishment of small-scale financial system</li> </ul>
(2) Fulfillment of BHN	<ol style="list-style-type: none"> <li>① Securing of the water source for safe drinking water</li> <li>② Improvement of the access to the market during the rainy season</li> </ol>	<ul style="list-style-type: none"> <li>• Improvement of modern well</li> <li>• Road improvement</li> </ul>
(3) Stabilization of farmers' income (Improvement of production in agriculture, stock raising and silviculture)	<ol style="list-style-type: none"> <li>① Improvement of agricultural productivity</li> <li>② Stabilization and securing of foods</li> <li>③ Improvement of stock raising productivity</li> </ol>	<ul style="list-style-type: none"> <li>• Provision of fertilizer for rainfed crop</li> <li>• Small-scale vegetable cultivation</li> <li>• Construction of cereal bank</li> <li>• Construction of vaccination facility</li> <li>• Stock raising</li> <li>• Construction of improved poultry houses</li> <li>• Introduction of improved fodder plants</li> </ul>
(4) Conservation and management of natural resources	<ol style="list-style-type: none"> <li>④ Increase of forest area and improvement of productivity</li> <li>① Proper use of lands</li> <li>② Enlargement of soil conservation activities</li> </ol>	<ul style="list-style-type: none"> <li>• Improvement of mini-nursery</li> <li>• Tree planting</li> <li>• Land use regulations establishment</li> <li>• Soil conservation</li> </ul>
(5) Reduction of burdens to women	<ol style="list-style-type: none"> <li>① Reduction of the labor for milling primary foods</li> <li>② Reduction of the labor for firewood collection</li> <li>③ Increase of disposable income</li> <li>④ Improvement of living</li> </ol>	<ul style="list-style-type: none"> <li>• Construction of mill</li> <li>• Extension of the manufacturing of improved oven</li> <li>• Extension of the manufacturing of handicrafts</li> <li>• Training of nutrition, preservation of mother and child health</li> </ul>

The project programs in the medium goal (1) of "Improvement of residents' project operating ability" have the characteristic to be implemented with priority in the first stage of this Master Plan as measures for the medium goals mentioned in below Item (2).

### 5.2 Concept on Land Use

#### (1) Basic Policy

Excessive cultivation (repeated cultivation before the land has a chance to recover), which is a cause

of soil deterioration, and excessive livestock-raising, which causes the retrogression of vegetation, and the excessive felling and burning of the forest, all promote desertification. The basic policy in the drawing up of a plan to gradually reduce these activities and promote a sustainable and rational land use is as follows.

- ① From the analysis of the present state, the area and type of using "cultivated land" and "pasture land", for which it was determined that the surface increase would cause further desertification, should not be changed significantly. Productivity of land must be improved.
- ② As for "silviculture", the area must be increased and productivity be improved.
- ③ Among the villages using lands under the present state, "land use regulations" must be formulated and observed at the residents' autonomous level according to the basic concept of the prevention of degradation, conservation and growth of cultivated land, pastureland, and forest.
- ④ Item ③ above, which is difficult to be implemented only by the residents, must be supported also by the administration.

## (2) Area of land use plan

The demands for agricultural, stock raising, and silvicultural products (cereal, livestock products, woods) to be required to the study area in the future (target year of project) can be handled by improving productivity and reducing loss in resource consumption in the agricultural, stock raising, and silvicultural field without significant change of the present type of land use or the size of the area other than the increase of forest area. (Details on this matter must be described in Item 5.5.) The concept on land use for each purpose of agriculture, stock raising, and silviculture is shown below.

### 1) Agricultural use

The land use in agriculture must be planned by dividing the planted lands for the planned crops into the permanent farmlands and the rotational fields according to the following concept.

- ① Land use in the project area traditionally follows a cycle of forest clearance (crop cultivation) → fallow (grassland → woodland) → clearance (crop cultivation). The fallow period is about four times the length of the crop cultivation period. This type of farmland is locally called "*koungoforo*" (rotational field). This is a system that makes use of the power of the land to recover naturally, that has usually been implemented on land at some distance from the village.
- ② On the agricultural land close to the villages, the fallow system is not used, and crops are cultivated continually. This is called "*soforo*" (usual field: permanent field), and the land is cultivated intensively, with the use of fertilizers. In the past *koungoforo* was predominant, but with technical advances and a growing demand for food because of population increase, about 60 % of the land at present under cultivation has changed into *soforo*.
- ③ It has been estimated that the total amount of bare land, grassland and woodland (exclusive of protected forests) currently available for rotational cultivation is 1,372 thousand hectares. One-fifth of this area was estimated to be *koungoforo*, and the area remaining after subtracting this from the present agricultural land was estimated to be *soforo*.



2) Use in stock raising

The supply amount must be increased by promoting the planting of crops such as “niébé” and “dolique” by farmers (crops whose stems and leaves can be used for livestock feed) for the increase of the feed demand constituting the basis for the improvement of individual productivity of livestock, while suppressing the number of the raised animals. The present area of pastureland and the traditional use style of pastureland shall not be changed.

3) Use in silviculture

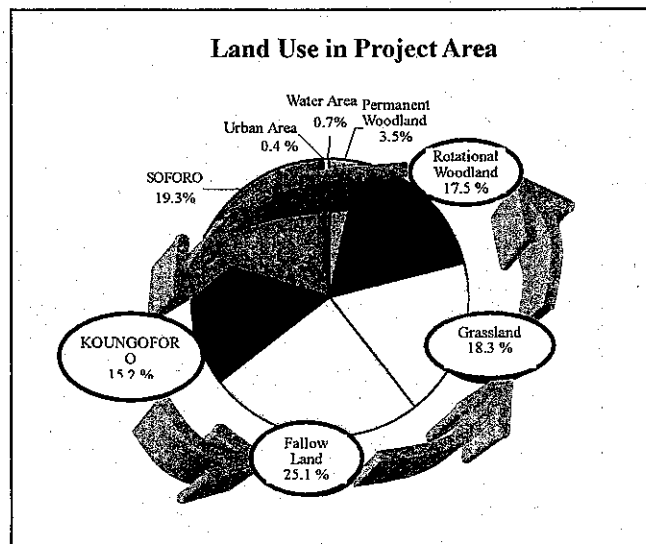
The consciousness of possessing trees by individual and the responsible management system of reforestation lands must be settled through the promotion of individual tree planting. The present productivity must be increased by 10% and the forest area must be increased by 10% through the forest conservation by penetrating the observation of land use regulations and promoting the joint tree planting in the present forest land and nearby area which are being degraded.

The area covered by the land-use program is shown in Table 5.2.1. An image of land use in the villages is shown in Figure 5.2.1.

**Table 5.2.1 Area Covered by Land-Use Program**

	Total Area (1000 ha)		Land Use under the Program (1000 ha)										(Reference)	
	Study Area	Project Area	Forest			Grassland (rotational)	Fallow Land (rotational)	Farmland			Urban Area	Water Area	Total Rotational Land	
			Total	Permanent Woodland	Rotational Woodland			Total	Permanent	Rotational				
Present Conditions	Forest	695	475	515	80	466								466
	Grassland	602	412				412							412
	Bare Land	827	565					525						494
	Farmland	1,139	779						779	436	343			343
	Urban Area	13	9									9		
	Water Area	22	15										15	
	<b>Total</b>	<b>3,298</b>	<b>2,255</b>	<b>515</b>	<b>80</b>	<b>466</b>	<b>412</b>	<b>525</b>	<b>779</b>	<b>436</b>	<b>343</b>	<b>9</b>	<b>15</b>	<b>1,715</b>
		100.0 %	24.2 %	3.5 %	20.7 %	18.3 %	21.8 %	34.6 %	19.3 %	15.2 %	0.4 %	0.7 %	76.1 %	

**Figure 5.2.1 Image of Land Use in Project Area**



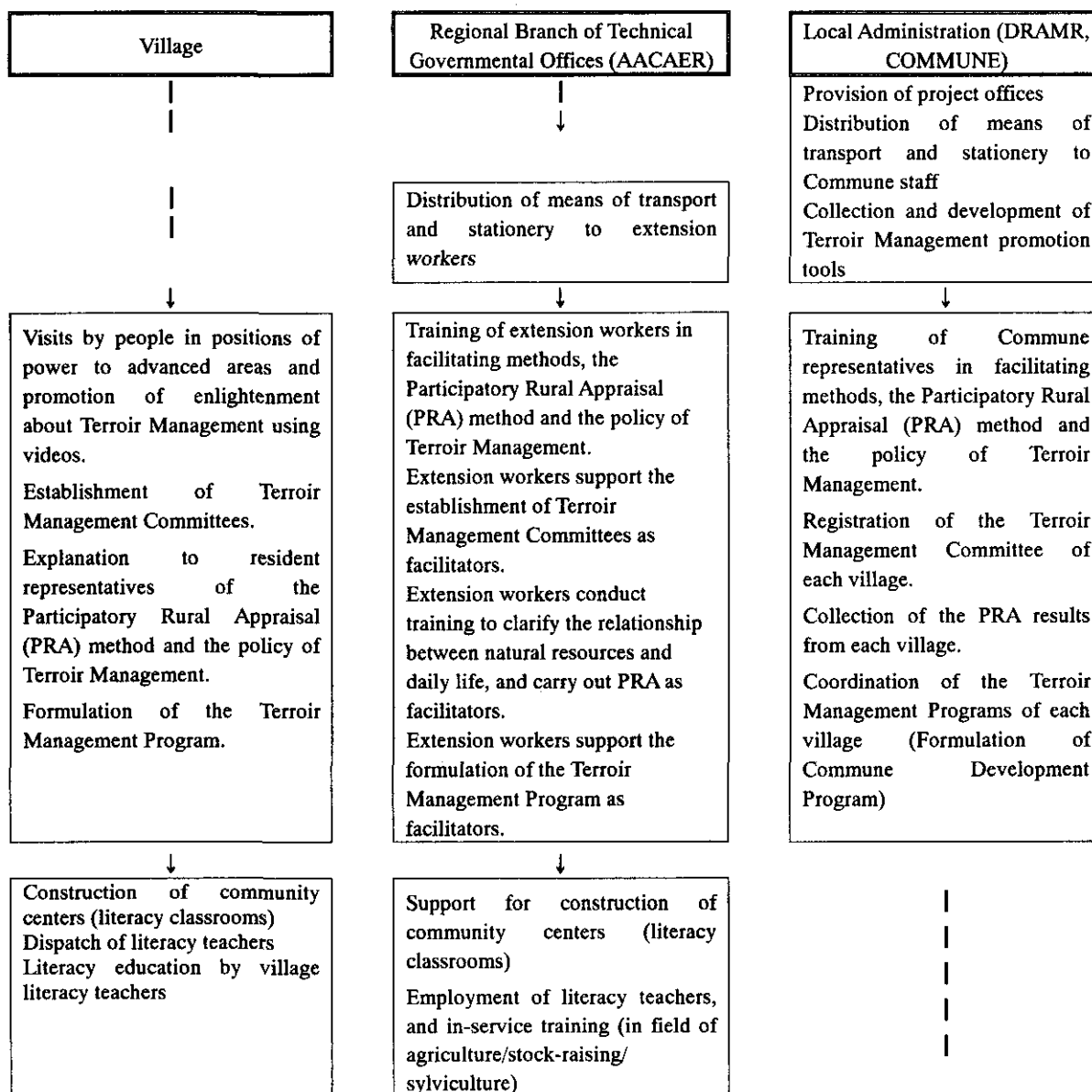
## 5.3 Project Details

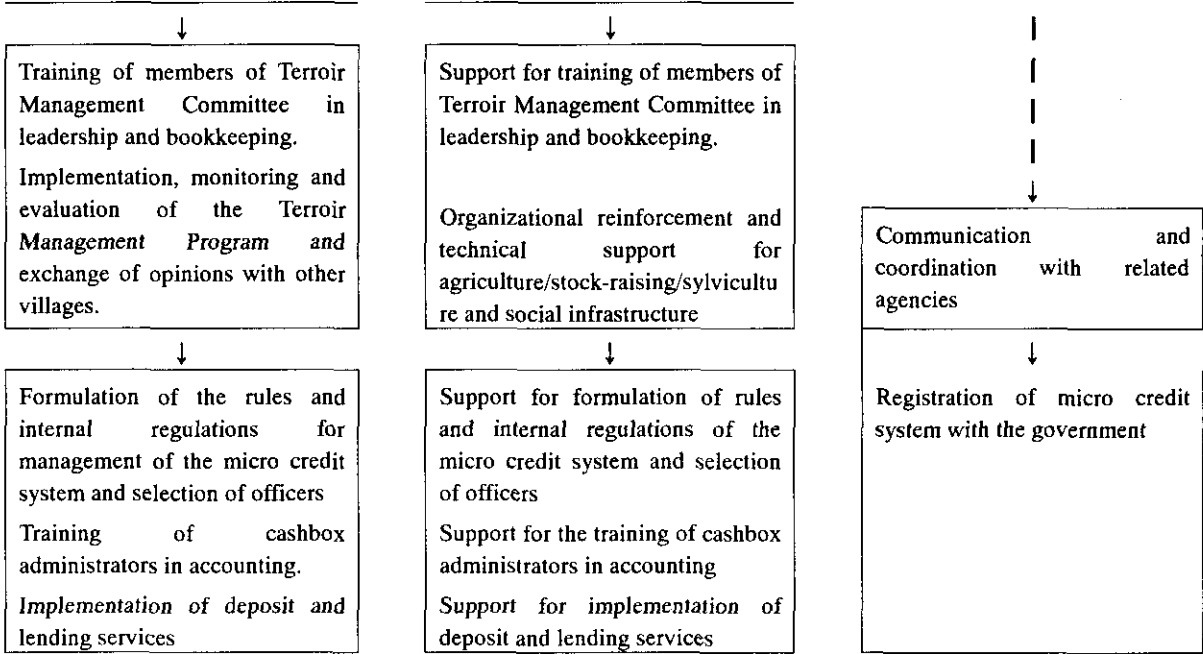
### 5.3.1 Improvement of Residents' Ability to Run Projects

The major cause of the unsuccessful activities against desertification undertaken by aid organizations in the past was the lack of initiative among local residents to participate in those activities.

The method adopted in formulating the project plan to promote residents' participation is the method generally known as the "Terroir Management Method" in the French-speaking area of West Africa. Most of the terroir management methods previously adopted in West Africa were aimed at management of natural resources. However, this project is intended to manage all the resources including human resources, social resources (organization, system, customs and various types of infrastructure), and financial resources. Figure 5.3.1.1 shows the flow of the plan to improve residents' ability to run projects.

**Figure 5.3.1.1 Flow of Program to Improve residents' Project Operation Ability**





A summary of each project is given in the tables below.

1) Project to Establish a Terroir Management Support System

<b>Program Name</b>	Project to Establish Terroir Management Support System							
<b>Medium Goal</b>	Improvement of residents' ability to run projects							
<b>Minor Goal</b>	Establishment of terroir management support system							
<b>Background/Objective:</b>								
• The objective of this project is to establish a system on the administration side to support terroir management by residents.								
<b>Expected Results:</b>								
① Efficient promotion of terroir management and establishment of a management system in the entire area covered by the Master Plan								
<b>Activities:</b>								
① Establishment and maintenance of project offices (headquarters and branches)								
② Provision of means of transport and stationery to administration extension workers and Commune representatives								
③ Collection of training textbooks and videotapes for lending								
<b>Input: Project side</b>					<b>Input: Malian Government side</b>			
① 1 expert in terroir management					① 1 C/P for terroir management			
② Cost of establishment and operation of project office (headquarters) 597,715,000 Fcfa x 1 office					② 189 extension workers			
③ Cost of establishment and running of project offices (branches) 152,965,000 Fcfa x 6 branches = 918 million Fcfa					③ 55 Commune representatives			
④ Cost of procurement and operation of materials and equipment to support extension workers and Commune staff 4,180,000 Fcfa x 246 persons = 1,028 million Fcfa					④ Provision of project offices			
<b>Considerations Based on Results of Verification Study</b>								
① Extension workers should first be instructed in the form and frequency of regular reports to be submitted to the project offices.								
② 80cc on-road type motorcycles should be used. Users should be responsible for maintaining their motorcycles through a system enabling them to buy their motorcycles in monthly installments.								
<b>Project Structure:</b>								
<b>Item</b>	<b>Description</b>						<b>Quantity</b>	
Establishment and, maintenance of project offices (HQ and branches)	Deployment of vehicles, OA equipment and audio-visual equipment, payment of maintenance costs, distribution of terroir management training textbooks and videotapes, and assignment of experts and project managers						1 HQ office (in Ségou) 6 offices (in each Cercle)	
Provision of facilities to support the activities of extension workers and Commune representatives	Provision of means of transport and stationery						244 persons (189 + 55)	
<b>Project Implementation Criteria:</b>								
• Extension workers and Commune representatives shall agree with the policies of the terroir management program and promise to take active part in various projects.								
<b>Basis for Calculation of Project Quantities</b>								
<b>CERCLE</b>	Baraoueli	Bla	Macina	San	Ségou	Tominian	Total	Remarks
Project Office Headquarters					1		1	
Project Office Branch	1	1	1	1	1	1	6	
① Number of villages	232	207	118	416	406	316	1,695	
② Number of samples in village register study	38	34	19	67	66	51	275	
③ Number of villages in rain-fed agricultural zone	14	13	19	47	44	51	188	
④ Number of villages covered by project	85	79	118	291	270	316	1159	①×③/②
⑤ AACAEER extension workers	8	0	12	0	42	0	62	
⑥ PDR extension workers	0	12	27	34	0	54	127	
⑦ Number of extension workers by Cercle	8	12	39	34	42	54	189	⑤+⑥
⑧ Number of villages per extension worker	10.6	6.6	3.0	8.6	6.4	5.9	6.1	④/⑦
⑨ Number of Communes	4	4	8	16	11	12	55	
Sources: ① Cartographie du Mali (UNICEF:1996) ② and ③ Results of village register study (JICA Study Team) ⑤ Hearing from Ségou DRAMAR ⑥ PROPOSITION DE PROGRAM PDR 2001 (CMDT SAN)								
<b>Administration method:</b>								
① Making entries in the goods ledger and equipment lending ledger is rigorously enforced.								
② The dates of regular meetings are fixed and daily and monthly reports are submitted to the project office.								

## 2) Project to Support Organizing of Residents

<b>Program Name</b>	Project to Support Organizing of Residents	
<b>Medium Goal</b>	Improvement of residents' ability to run projects	
<b>Minor Goal</b>	Establishment of support system for organizing residents	
<b>Background/Objective:</b>		
<ul style="list-style-type: none"> <li>The objective of this project is to provide training for administrative extension workers and Commune staff in terroir management, to organize the residents after training and to formulate a terroir management plan.</li> </ul>		
<b>Expected Results:</b>		
<ol style="list-style-type: none"> <li>Improvement of facilitating ability of extension workers and Commune staff with regard to residents</li> <li>Encouragement of local residents' willingness to introduce terroir management</li> <li>Formulation by local residents of a plan for managing all resources including social, economic and natural resources (hereafter called "terroir management")</li> </ol>		
<b>Activities:</b>		
<ol style="list-style-type: none"> <li>Training of extension workers and Commune staff in terroir management</li> <li>Training of extension workers and Commune staff in facilitating (including participatory rural appraisal (PRA) surveys)</li> <li>Enlightenment of those in positions of power (village headmen and elders) on importance of terroir management (including visits to advanced areas and use of audio-visual equipment)</li> <li>Formulation of terroir management rules, appointment of officers and notification of Commune</li> <li>Execution of participatory rural appraisal (PRA) survey</li> <li>Formulation of terroir management plan</li> </ol>		
<b>Input: Project side</b>		<b>Input: Malian Government side</b>
<ol style="list-style-type: none"> <li>1 expert in terroir management</li> <li>Cost of PRA training: 245,000 Fcfa x 246 persons = 60 million Fcfa</li> <li>Visits to advanced areas: 325,000 Fcfa x 1,159 persons = 377 million Fcfa</li> <li>Cost of PRA survey: 197,000 Fcfa x 1,159 persons = 228 million Fcfa</li> <li>Establishment of CGTV and formulation of development plan: 147,000 Fcfa x 1,159 persons = 170 million Fcfa</li> </ol>		<ol style="list-style-type: none"> <li>1 C/P for terroir management</li> <li>189 extension workers</li> <li>55 Commune representatives</li> <li>Provision of project offices</li> </ol>
<b>Considerations Based on Results of Verification Study</b>		
<ol style="list-style-type: none"> <li>Initial training to improve the facilitating ability of extension workers and Commune representatives should be conducted because the performance of the CGTV depends upon their facilitating ability.</li> <li>As there are many extension workers and Commune representatives who do not know the concept of terroir management in terms of residents managing the local resources, adequate training in terroir management should be conducted in advance.</li> <li>CGTVs should be established as soon as possible and the number of officers should be determined according to the scale of the village.</li> <li>The purpose of the PRA survey and ways of using the survey results should be fully discussed with the CGTV before the survey is conducted so that the CGTV can make continuous use of the survey results.</li> <li>The person in charge of looking after the audio-visual equipment should be clearly defined and a plan for use of the equipment should be drawn up.</li> <li>Participants in visits to advanced areas should be required to submit an evaluation of the visited areas and report the results of visits.</li> <li>The post-training duties and responsibilities of the participants in various training courses should fully be explained to them and their consent obtained in order to improve the rate of participation in trainings and ensure utilization of the results.</li> <li>The land use plan (SAT), development project plan (PAT) and agreements among project implementers should initially be prepared in Bambara, and distributed and publicized to residents.</li> <li>Residents should also be taught the necessity of drawing up future land use agreements when formulating the SAT.</li> <li>It should be stipulated in the agreements among project implementers that the CGTV monitors and evaluates the progress of the plans, especially the payment of contributions and cashbox deposits, on a regular basis.</li> </ol>		

<b>Project Structure:</b>								
Item	Description						Quantity	
Training in terroir management	Training of extension workers and Commune representatives in terroir management						244 persons (189 + 55)	
Training to foster facilitators	Training of extension workers and Commune representatives in the role of facilitators and facilitating methods (including PRA survey)						244 persons (189 + 55)	
Activities for enlightening persons in positions of power	Training and visits to advanced areas: Village delegates (village headmen, elders, female representatives and young representatives) visit areas where various activities have already been conducted with residents' participation. Enlightenment is conducted using audio-visual equipment.						1,159 villages	
Support for establishment of Terroir Management Committees	Support for the establishment of CGTV as the parent organization for promoting rural development activities						1,159 villages	
Support for execution of the Participatory Rural Appraisal (PRA) survey and formulation of a development plan	Ascertainment and analysis of the present condition and problems relating to the social, economic and natural resources in each village, and support for the formulation of a village development plan						1,159 villages	
<b>Project Implementation Criteria:</b>								
• The village has no Terroir Management Committee and residents are willing to organize and manage local resources. (In principle, all villages in the planned area)								
<b>Basis for Calculation of Project Quantities</b>								
CERCLE	Baraoueli	Bla	Macina	San	Ségou	Tominian	Total	Remarks
① Number of villages	232	207	118	416	406	316	1,695	
② Number of samples in village register study	38	34	19	67	66	51	275	
③ Number of villages in rain-fed agricultural zone	14	13	19	47	44	51	188	
④ Number of villages covered by project	85	79	118	291	270	316	1159	①×③/②
⑤ AACAEER extension workers	8	0	12	0	42	0	62	
⑥ PDR extension workers	0	12	27	34	0	54	127	
⑦ Number of extension workers by Cercle	8	12	39	34	42	54	189	⑤+⑥
⑧ Number of villages per extension worker	10.6	6.6	3.0	8.6	6.4	5.9	6.1	④/⑦
⑨ Number of Communes	4	4	8	16	11	12	55	
Sources: ① Cartographie du Mali (UNICEF:1996) ② and ③ Results of village register study (JICA Study Team) ⑤ Hearing from Ségou DRAMAR ⑥ PROPOSITION DE PROGRAM PDR 2001(CMDT SAN)								
<b>Administration method:</b>								
① The CGTV posts the PRA results in the community centre and other places where they will be seen.								
② The CGTV monitors the progress of the land use plan (SAT) and development project plan (PAT) and revises the contents as needed on a regular basis. Revision of the plans requires consultation with extension workers and Commune representatives.								

### 3) Literacy Rate Improvement Project

<b>Program Name</b>	Literacy Rate Improvement Project	
<b>Medium Goal</b>	Enhancement of residents' ability to run projects	
<b>Minor Goal</b>	Improvement of the literacy rate	
<b>Background/Objective:</b>		
<ul style="list-style-type: none"> <li>The objective of this project is to raise the literacy level of residents in order to improve their farming and fund-handling abilities.</li> </ul>		
<b>Expected Results:</b>		
① Improvement of literacy and basic calculating skills		
<b>Activities:</b>		
① Construction of community centers (literacy classrooms) ② Appointment of literacy instructors for dispatch to villages and training in the use of practical (agricultural/pastoral/sylvicultural) textbooks ③ Fostering of village literacy teachers ④ Monitoring of literacy education by village literacy teachers		
<b>Input: Project side</b>		<b>Input: Malian Government side</b>
① 1 expert in terroir management ② Construction cost of community centers Type A: 3,495,000 Fcfa x 344 villages = 1,202 million Fcfa Type B: 2,908,000 Fcfa x 745 villages = 2,166 million Fcfa ③ Appointment and training of literacy instructors 425,000 Fcfa x 1,159 villages = 493 million Fcfa ④ Village literacy education training 242,000 Fcfa x 1,159 villages = 280 million Fcfa		① 1 C/P for terroir management ② 189 extension workers ③ 55 Commune representatives ④ Provision of project offices
		<b>Input: Residents side</b>
		① Provision of sun-dried bricks and unskilled labor for construction of community centers ② Contribution of 300,000 Fcfa ③ Cost of literacy textbooks
<b>Considerations Based on Results of Verification Study</b>		
① It is more efficient to dispatch instructors to each village to conduct literacy training. The standard period spent in one village is 90 days. ② The salary of the village literacy teachers appointed from among the participants in the training should be agreed in advance between the participants and the CGTV. ③ The village literacy teachers shall be participants who achieved literacy level 1 according to Ministry of Education standards. ④ The employment conditions for village literacy teachers should be agreed in advance among the CGTV, teachers and participants. ⑤ Each participant in the training should be required to promise in advance to bear part of the training cost, participate in the evaluation tests before and after the training, attend the training and obtain their family's consent.		
<b>Project Structure:</b>		
Literacy Classroom		
<b>Basic structure and building method:</b> ⑥ The building is a simple construction of banco (sun-dried bricks), and building materials such as the roof, doors and cement are subsidized by the project side. ⑦ The building has a concrete foundation and the walls are made of banco blocks with a mortar finish. ⑧ The roof is made of galvanized iron sheets, and the doors and windows have iron fittings. ⑨ The building work is conducted by residents' own labor and the project side provides technical guidance. ⑩ Building technology guidance includes training in building procedures using banco blocks and fostering of plasterers for whom there is a particular need for building work in the villages. ⑪ Equipment including desks, chairs and blackboards necessary for literacy education and CGTV meetings is provided. ⑫ There are two types of floor area, 52m <sup>2</sup> and 39m <sup>2</sup> , in accordance with literacy classroom standards in Mali. The community centre is equipped with toilets.		<b>Structure of community centers</b> 

<b>Project Structure:</b>										
Item	Description	Quantity								
Building of community centers (literacy classrooms)	Type A: 1,079 x 0.31 (percentage of villages with a population of 700 or more) = 344 villages.	344 villages								
	Type B: 1,079 x 0.69 (percentage of villages with a population of less than 700) = 745 villages	745 villages								
Dispatch of literacy instructors	Training and dispatch of literacy instructors (90 days)	1,159 villages								
Monitoring of literacy training of village teachers	Monitoring of sustainability of literacy education by trained village teachers	1,159 villages								
<b>Project Implementation Criteria:</b>										
• The villages are willing to provide continuous literacy education.										
<b>Basis for Calculation of Project Quantities</b>										
CERCLE	Baraoueli	Bla	Macina	San	Ségou	Tominian	Total	Remarks		
Project Office Headquarters										
Project Office Branch										
① Number of villages	232	207	118	416	406	316	1,695			
② Number of samples in village register study	38	34	19	67	66	51	275			
③ Number of villages in rain-fed agricultural zone	14	13	19	47	44	51	188			
④ Number of villages covered by project	85	79	118	291	270	316	1159	①×③/②		
⑤ AACAEER extension workers	8	0	12	0	42	0	62			
⑥ PDR extension workers	0	12	27	34	0	54	127			
⑦ Number of extension workers by Cercle	8	12	39	34	42	54	189	⑤+⑥		
⑧ Number of villages per extension worker	10.6	6.6	3.0	8.6	6.4	5.9	6.1	④/⑦		
⑨ Number of Communes	4	4	8	16	11	12	55			
Sources: ① Cartographie du Mali (UNICEF:1996) ② and ③ Results of village register study (JICA Study Team) ⑤ Hearing from Ségou DRAMAR ⑥ PROPOSITION DE PROGRAM PDR 2001(CMDT SAN)										
Villages with no community centre: 1,159 x 0.931 = 1,079 (from results of village register study)										
<b>Administration method:</b>										
① The CGTV organizes a community centre management group and establishes management rules.										
② The management group administers the community centre facilities in accordance with the management rules.										
③ Special attention is paid to cracks in the mortar and annual repairs are made.										



#### 4) Project to Improve Residents' Ability to Implement Projects

<b>Program Name</b>	Project to Enhance Residents' Ability to Implement Projects	
<b>Medium Goal</b>	Enhancement of residents' ability to run projects	
<b>Minor Goal</b>	Acquisition of project operating methods by residents	
<b>Background/Objective:</b>		
<ul style="list-style-type: none"> <li>The objective of this project is to enhance residents' ability to manage projects.</li> </ul>		
<b>Expected Results:</b>		
① Enhancement of the project operation ability of the Terroir Management Committee		
<b>Activities:</b>		
① Leadership training and bookkeeping training courses are held for extension workers and Commune representatives.		
② Leadership training and bookkeeping training is provided by the extension workers for the officers of the Terroir Management Committee.		
③ Support is provided for the implementation, monitoring and evaluation of the terroir management plan by residents.		
④ Support is provided for the collection and management of contributions for various projects and for depositing the contributions as fixed deposits in a micro credit system.		
⑤ Meetings to exchange experiences are held.		
<b>Input: Project side</b>		<b>Input: Malian Government side</b>
① 1 expert in terroir management		① 1 C/P for terroir management
② Cost of bookkeeping training for extension workers 82,000 Fcfa x 246 persons = 20 million Fcfa		② 189 extension workers
③ Cost of leadership training 555,000 Fcfa x 1,159 villages = 643 million Fcfa		③ 55 Commune representatives
④ Bookkeeping training for CGTV officers 177,000 Fcfa x 1,159 villages = 205 million Fcfa		④ Provision of project offices
⑤ Leadership training for women 85,000 Fcfa x 1,159 villages = 99 million Fcfa		
⑥ Cost of holding meetings to exchange experiences 231,000 Fcfa x 1,159 villages = 268 million Fcfa		
<b>Considerations Based on Results of Verification Study</b>		
① Post-training duties and responsibilities should be fully explained to the participants in the various training courses and their agreement obtained in order to enhance the rate of participation and ensure full use of the results of training.		
② Participants in leadership training shall have literacy level II or higher according to Ministry of Education standards.		
③ Collection and management of contributions and their deposit as fixed deposits should be well established to prevent fraud.		
<b>Project Structure:</b>		
<b>Item</b>	<b>Description</b>	<b>Quantity</b>
Leadership training and fostering of teachers	Leadership training and bookkeeping training for extension workers and Commune representatives	185 extension workers 55 Commune representatives
Leadership training	Training of CGTV officers by trained extension workers	1,159 villages
Holding of meetings to exchange experiences	Exchange of experiences in performance of CGTV activities	1,159 villages
Implementation and monitoring of various projects	Refer to related projects.	1,159 villages

**Project Implementation Criteria:**

- The village has no Terroir Management Committee and is willing to organize the residents to manage local resources.

**Basis for Calculation of Project Quantities**

CERCLE	Baraoueli	Bla	Macina	San	Ségou	Tominian	Total	Remarks
① Number of villages	232	207	118	416	406	316	1,695	
② Number of samples in village register study	38	34	19	67	66	51	275	
③ Number of villages in rain-fed agricultural zone	14	13	19	47	44	51	188	
④ Number of villages covered by project	85	79	118	291	270	316	1159	①×③/②
⑤ AACAER extension workers	8	0	12	0	42	0	62	
⑥ PDR extension workers	0	12	27	34	0	54	127	
⑦ Number of extension workers by Cercle	8	12	39	34	42	54	189	⑤+⑥
⑧ Number of villages per extension worker	10.6	6.6	3.0	8.6	6.4	5.9	6.1	④/⑦
⑨ Number of Communes	4	4	8	16	11	12	55	

Sources: ① Cartographie du Mali (UNICEF:1996) ② and ③ Results of village register study (JICA Study Team) ⑤ Hearing from Ségou DRAMAR ⑥ PROPOSITION DE PROGRAM PDR 2001(CMDT SAN)

**Administration method:**

- ① For collection of contributions, a contributions collection ledger is prepared in duplicate for each UPA in which the program name, amount of contribution, amount paid and acknowledgement of receipt are noted, and each time a payment is made, the ledgers are signed by the UPA and the recipient, each keeping a copy.
- ② After collection, the contributions are put together and deposited as fixed deposits in the micro credit system in the name of the CGTV.
- ③ The administrative cost of any project that is of a public nature and yields no individual profit is subsidized from the interest generated by the fixed deposits.
- ④ For payment of subsidies, an annual expenditure plan is drawn up for approval by the CGTV general meeting.

### 5) Project to Support Establishment of a Micro Credit System

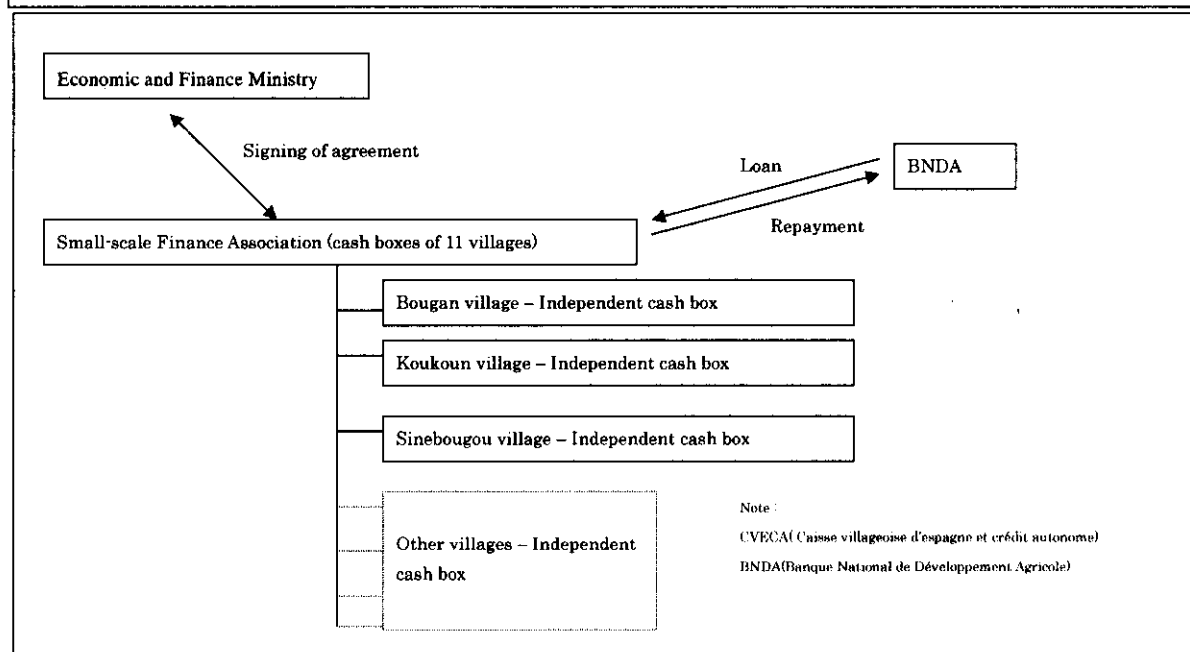
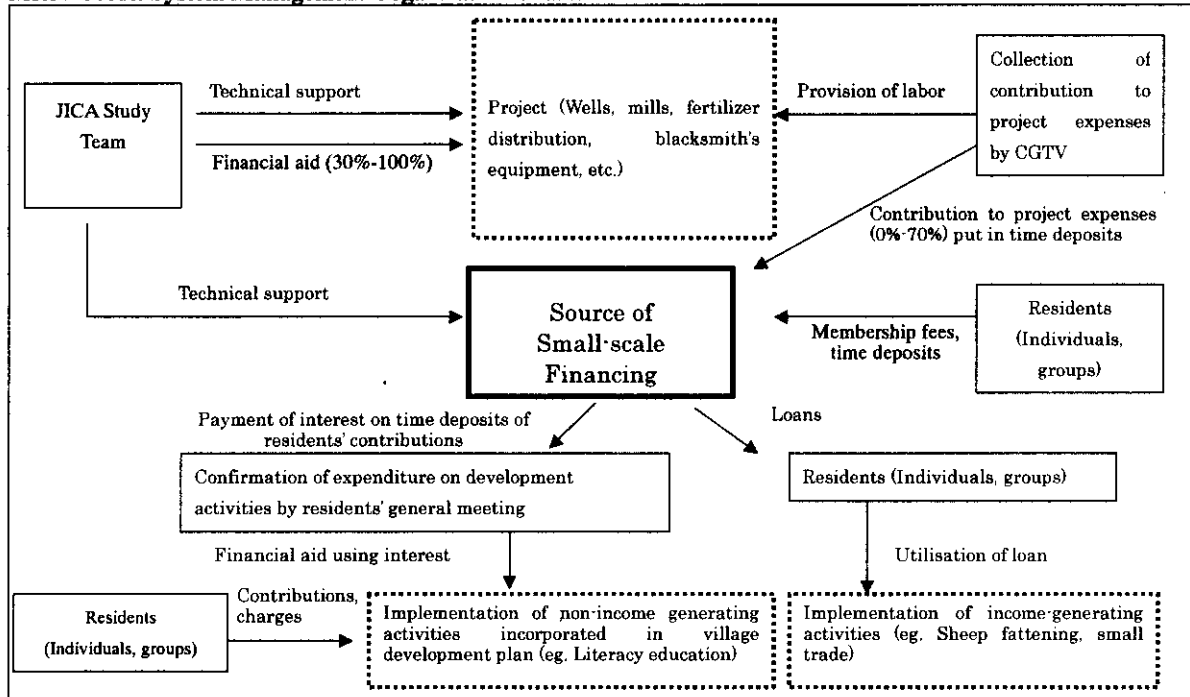
<b>Program Name</b>	Project to Support the Establishment of a Micro Credit System	
<b>Medium Goal</b>	Enhancement of residents' ability to run projects	
<b>Minor Goal</b>	Fulfillment of demand for agricultural development funds	
<b>Background/Objective:</b>		
<ul style="list-style-type: none"> <li>• There is a high demand among residents for micro credit to purchase and retail agricultural materials and equipment and small-scale livestock within the planned area, but there are not enough financing organizations in rural areas. Therefore, it is planned to establish micro credit systems. There are two objectives for this:</li> <li>• To meet residents' demands for funding for development activities.</li> <li>• To improve the project planning, implementation and management abilities of residents as fund users.</li> <li>• The micro credit system planned here is different from existing small-scale financing operations in that residents' contributions to various support projects serve as the resources for micro credit. This system has the following two advantages:</li> <li>• Residents' willingness to pay their contributions as promised works to secure funds.</li> <li>• Funds are raised faster than those secured only from membership fees and deposits.</li> </ul>		
<b>Expected Results:</b>		
<ol style="list-style-type: none"> <li>① Access by residents in rural areas to the financial system is improved.</li> <li>② Demand for development funds is satisfied.</li> <li>③ Residents' ability to manage projects is enhanced through lending and borrowing operations.</li> </ol>		
<b>Activities:</b>		
<ol style="list-style-type: none"> <li>① Formulation of rules and internal rules for managing the micro credit system and appointment of officers</li> <li>② Distribution of cashboxes, membership registration certificates and account books</li> <li>③ Accounting training for managers</li> <li>④ Regular management guidance</li> </ol>		
<b>Input: Project side</b>		<b>Input: Malian Government side</b>
<ol style="list-style-type: none"> <li>① 1 expert in terroir management</li> <li>② Cost of supporting the establishment of micro credit system 4,376,000 Fcfa x 197 villages = 862 million Fcfa</li> </ol>		<ol style="list-style-type: none"> <li>① 1 C/P in charge of micro credit</li> <li>② 189 extension workers</li> <li>③ 55 Commune representatives</li> </ol>
		<b>Input: Residents side</b>
		<ol style="list-style-type: none"> <li>① Contribution of 20% of the cost of purchasing cashbox</li> <li>② Provision of a place to keep the cashbox</li> </ol>
<b>Considerations Based on Results of Verification Study</b>		
<ol style="list-style-type: none"> <li>① The operation status (amount of lending, number of loans, number of members and amount of deposits) should be reported regularly at the general meeting of residents.</li> <li>② All residents' contributions should be deposited in the cashboxes as fixed deposits and the internal rules should stipulate that the CGTV collect separately any expenses necessary for facility maintenance and operation and for activities that yield no revenue until the fixed deposits accrue interest.</li> <li>③ Cashboxes should be managed by establishing an association (self-governing depository or village loan marketing association) and registering the representative with the administration.</li> <li>④ Guidance in bookkeeping skills should be provided continuously until the skills are mastered by bookkeeping managers.</li> <li>⑤ The pay of bookkeeping managers should be determined in advance.</li> </ol>		
<b>Project Structure:</b>		
	Item/Description	Quantity
	Support for establishing a self-governing savings and loan bank per village: Cashboxes, rules and internal rules of management, appointment of officers, registration of the rules and officers with the Commune, implementation of bookkeeping training and continuous support	197
	Support for establishing a self-governing village savings and loan bank association: Rules and internal rules of management, appointment of officers, notification of the rules and officers to the Ministry of Finance, opening of an account at BNDA and conclusion of a loan agreement, and continuous technical support for the association officers	6
<b>Project Implementation Criteria:</b>		
<ol style="list-style-type: none"> <li>① There is no existing village bank in the village or neighboring villages. However, a lot of time, money and effort are needed to foster villagers with bookkeeping ability in all the villages. One micro credit system for several villages should be established as the loan fund per village is small.</li> <li>② Access shall be possible on foot, by bicycle or by donkey wagon and the selected villages shall have a market that is regularly accessed by villagers.</li> <li>③ It shall be agreed among the surrounding villages including the village where the market is held that the micro credit system will be established in the village where the market is held.</li> <li>④ The system shall be established based on agreement that the contributions collected by the CGTV in each village are deposited as fixed deposits at the above bank.</li> </ol>		

Basis for Calculation of Project Quantities	
Item/Description	Quantity/Basis
Support for establishment of self-governing village savings and loan bank	197 banks at 197 markets in the planned area (Cartographie du Mali (UNICEF: 1996))
Support for establishment of self-governing village savings and loan bank association	6 banks, one per Cercle

**Administration method:**

- ① The CGTV establishes the bank management rules, appoints the managers, receives the deposits on a fixed day every week and conducts lending operations.
- ② The number of members, amount of loans, amount of fixed deposits, interest payments and repayment rate are announced regularly at the monthly CGTV general meeting.

**Micro Credit System Management Organization Chart:**



### 5.3.2 Fulfillment of BHN

#### 1) Modern Well Construction Project

<b>Program Name</b>	Project to Construct Wells for Drinking Water	
<b>Medium Goal</b>	Fulfillment of BHN	
<b>Minor Goal</b>	Securing of safe drinking water	
<b>Background/Objective:</b>		
<ul style="list-style-type: none"> <li>• The most urgent requirement to maintain the health of residents is the assurance of safe drinking water. This will be achieved by building wells as they are the source of drinking water in most of the study area. Modern large aperture wells and deep wells are being constructed in the study area by international aid organizations, but not every village has a well yet.</li> <li>• Therefore, new modern large aperture wells will be constructed and traditional wells will be rehabilitated. In addition, a well maintenance and management system will be promoted to conduct appropriate maintenance and operation of the wells, ensure sustainable use and conduct enlightenment activities aimed at residents.</li> <li>• The development of groundwater by wells is aimed at unconfined groundwater in the shallow layer. The unconfined groundwater in the shallow layer has a high circulating capacity and there is no risk of it drying up even estimating the amount that will be drawn in the future due to population growth. If an appropriate quantity of water is drawn, the groundwater can be used permanently.</li> </ul>		
<b>Expected Results:</b>		
<ol style="list-style-type: none"> <li>① Securing of safe drinking water</li> <li>② Establishment of a well management system</li> <li>③ Reduction of labor time spent in drawing water</li> </ol>		
<b>Activities:</b>		
<ol style="list-style-type: none"> <li>① Investigation of the actual conditions of domestic wells through PRA survey and baseline survey</li> <li>② Decision by CGTV on whether or not to adopt the project</li> <li>③ Well construction with residents' participation</li> <li>④ Establishment of well management system by residents</li> <li>⑤ Training in well management</li> </ol>		
<b>Input: Project side</b>		<b>Input: Malian Government side</b>
<ol style="list-style-type: none"> <li>① Expert in agricultural and social infrastructures</li> <li>② Expert in organizing residents</li> <li>③ Cost of well construction project: 6,378 million Fcfa</li> </ol>		<ol style="list-style-type: none"> <li>① C/P for well construction</li> <li>② C/P for organizing residents</li> </ol>
(Basis)		<b>Input: Residents side</b>
Cost of construction: 7,333,000 Fcfa x 865 sites = 6,343 million Fcfa		<ol style="list-style-type: none"> <li>① Unskilled labor: 5 persons/day/well</li> <li>② Cash contribution: 300,000 Fcfa/well</li> <li>③ Provision of land for well construction</li> </ol>
Cost of training: 20,000 Fcfa x 2 times x 865 sites = 35 million Fcfa		
<b>Considerations Based on Results of Verification Study</b>		
<ol style="list-style-type: none"> <li>① When building wells with the participation of residents, the period of construction should be carefully coordinated.</li> <li>② As modern large aperture wells are virtually maintenance-free, guidance in well management should include instructions that the surrounds of the well be kept clean.</li> </ol>		

<p><b>Basic Structure:</b></p> <ol style="list-style-type: none"> <li>① The inner diameter of the well is about 1.8m and the depth is about 5m below the water level.</li> <li>② The inside of the well hole is provided with a 10cm-thick reinforced concrete casing down to the bottom.</li> <li>③ The strainer is provided with a sufficient number of holes to permit at least 1m<sup>3</sup>/hr of water per 1m strainer length to pass through. The filter between the strainer and the bore has adequate water permeability and is capable of preventing fine particles from getting into the well. Full consideration is given to the material and grading of the filter.</li> <li>④ The well part above the ground is provided with a casing part about 1m high and the surrounding floor is paved with concrete for a distance of about 2m from the well wall to facilitate hygienic management. In addition, a protective wall to keep out livestock is constructed around the well.</li> <li>⑤ An iron support for drawing water is installed. The iron support is provided with 4 holes for hanging pulleys from to enable 4 persons to draw water at once.</li> </ol>	<p><b>Structural Diagram:</b></p>
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**Project Implementation Criteria:**

- As a rule, one modern well is constructed for every 500 people. Priority is given to villages with no modern well. If residents request that their existing traditional well be modified into a modern large aperture well, such modification is performed.

Basis for Calculation of Project Quantities		
Item	Quantity	Basis
Number of villages covered by village register study	• 275	Results of village register study
Total population of villages in village register study	• 208,270	- " -
Number of villages in rain-fed agricultural area	• 188	- " -
Total population of villages in rain-fed agricultural area	• 132,373	- " -
Number of wells required in villages in rain-fed agricultural area	• 153	Attached material (calculated from results of village register study)
Total population of the study area	• 1,177,890	153 x 1,177,890/208,270
Number of wells required in the planned area	• 865	

**Administration method:**

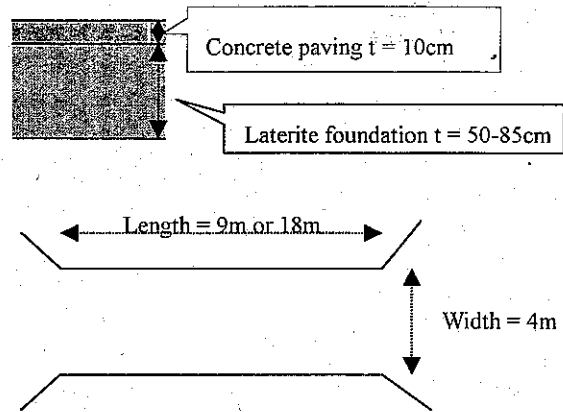
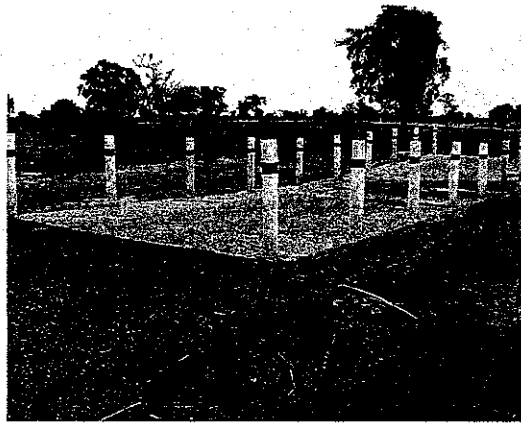
- ① When building and modifying wells in order to improve the quality of the well water, the following points should be considered and promoted to CGTVs and residents:
- ② It is desirable to use water from domestic wells for domestic use only, and not for livestock. A wall should be built around the well to keep out livestock and the watering place for livestock should be located away from the well.
- ③ The equipment for drawing water (rubber bags and rope) should not be put directly on the ground.
- ④ The concrete floor should be cleaned regularly.
- ⑤ The surrounding area of the well should be cleaned regularly and dirty water not allowed to accumulate.

## 2) Road Improvement Project

<b>Program Name</b>	Road Improvement Project	
<b>Medium Goal</b>	Fulfillment of BHN	
<b>Minor Goal</b>	Improvement of access to markets during the rainy season	
<b>Background/Objective:</b>		
<ul style="list-style-type: none"> <li>Improvement of agricultural roads for access to markets and other villages during the rainy season, for smooth transportation of equipment and materials for agricultural production and for shipment of agricultural and livestock products is an urgent issue. The topography of the planned area features few slopes and a low density of wadis. The greatest obstacle to traveling on the agricultural roads is the pools that form on the road surface after rainfall. Water is apt to collect in the surrounding hollows, particularly where the earth has a high clay content. The impassable sections of those roads will therefore be improved, but no new route construction is planned.</li> </ul>		
<b>Expected Results:</b>		
<ol style="list-style-type: none"> <li>Improvement in transportation of agricultural products to and from villages</li> <li>Securing of roads for getting to and from school</li> <li>Reduced traveling time to markets</li> </ol>		
<b>Activities:</b>		
<ol style="list-style-type: none"> <li>Investigation of actual road conditions through PRA survey and baseline survey</li> <li>Decision by CGTV on whether or not to adopt the project</li> <li>Road construction with residents' participation</li> <li>Provision of equipment and materials for road management</li> <li>Establishment of road management system by residents</li> <li>Training in road management</li> </ol>		
<b>Input: Project side</b>		<b>Input: Malian Government side</b>
<ol style="list-style-type: none"> <li>Expert in living environment improvement</li> <li>Expert in organizing residents</li> <li>Cost of road improvement project: 18,055 million Fcfa</li> </ol>		<ol style="list-style-type: none"> <li>C/P for road improvement</li> <li>C/P for organizing residents</li> </ol>
(Basis) Cost of construction: 5,978,000 Fcfa/km x 3,013,km = 18,012 million Fcfa Cost of training: 20,000 Fcfa x 2 times x 1,066 villages = 43 million Fcfa		<b>Input: Residents side</b>
		<ol style="list-style-type: none"> <li>Unskilled labor: 10 persons/day/unit</li> <li>Contribution: 3k00 Fcfa/unit</li> <li>Provision of land for roads</li> </ol>
<b>Basic Structure:</b>		
<ul style="list-style-type: none"> <li>The road width is set to 4m to ensure that large vehicles and carts can pass each other.</li> <li>Laterite paving commonly found in the area is used with a thickness of 10cm on firm foundation ground where rainwater does not collect and 20cm on soft ground.</li> <li>In general, the road is built higher than the surrounding ground to prevent water running from the roadside and collecting on the road. The roadside ditches are simple unlined ditches.</li> </ul>		
Standard sectional view		
<p>The diagram illustrates a standard sectional view of a road. It shows a central road surface with a width of 4 meters, indicated by a dashed line with arrows. The road surface has a 1.5% slope, shown by a line with an arrow pointing downwards from the center. The road is paved with laterite, with a thickness (t) of 10-20 cm. On either side of the road, there are unlined ditches. The road is built higher than the surrounding ground to prevent water from running off the roadside and collecting on the road surface.</p>		

**Crossing Work**

- A crossing in the form of a sunken bridge is built at points where rainwater is apt to collect.
- The crossing is paved with concrete 10cm thick and 9m or 18m long depending upon the flow.



**Project Implementation Criteria:**

- Priority is given to roads from the villages to markets, especially those in poor condition that become impassable in the rainy season.

**Basis for Calculation of Project Quantities**

- It is estimated that 20% of the existing access roads to markets have impassable sections in the rainy season. This figure is taken as the planned improvement rate. The length of the road improvement project is 3,013km in the entire planned area.

Length	Basis
① Improvement of 2.6km/village	• Average distance to market: 17km (From results of village register study)
② $17 \times 6 \times 0.92 \times 0.2 = 2.6\text{km}$	• One market for every 6 villages ( “ )
	• Road condition: 92% poor ( “ )
	• Planned road improvement rate: 20%
Improved length in entire planned area:	• 2.6km x 1,159 villages
3,013km	

**Administration method:**

- ① The CGTV organizes a road management group and establishes road management rules.
- ② The road management group monitors the roads in accordance with the rules and if repairs are required, the group reports to the CGTV.
- ③ CGTV undertakes repair of the road surface and cleaning of the roadside ditches on a regular basis.