

5.3.3 Stability of Farmers' Incomes

1) Project to Supply Improved Rain-fed Farm Product Seeds and Fertilizers

Program Name	Project to Supply Improved Farm Product Seeds and Fertilizers	
Medium Goal	Enhancement and stabilization of crop productivity (sustainable development)	
Minor Goal	Acquisition and implementation by farmers of techniques to improve crop cultivation	
Background/Objective:		
<ul style="list-style-type: none"> • Ségou Region to which the study area belongs is the largest supply base for staple cereals in Mali. However, the increased demand for food due mainly to the high population growth rate has caused excessive land use, resulting in a decline in agricultural productivity and land degradation. The production of cereals in the study area is substantially higher than the self-supply level in the study area as a whole, but there is a great difference in food self-supply at farmer level. Farmers who do not achieve the self-supply level are apt to pursue excessive cultivation. • The climate conditions in the area, particularly rainfall and rainfall periods, fluctuate greatly from year to year, frequently causing good and bad harvests. Lack of food and debts when the crop is poor push farmers to excessive cultivation, giving further impetus to desertification. • In this project, measures to prevent excessive cultivation and land degradation and to establish sustainable farming methods are taken by enhancing land productivity and restoring normal land use. • One of these measures is the introduction and promotion of improved seeds. To contribute to improved land productivity, the improved seed varieties have a high yield, can withstand drought, and are resistant to disease as well as pest and weed damage, and to contribute to stable production, seeds with a strong capacity to resist climatic changes and a short growing period are introduced. • Another measure is the use of chemical fertilizers for higher unit yield and the use of natural phosphate rock powder (PNT) for physical and chemical improvement of the soil. Stress is placed on the latter as it is more effective in developing sustainable farming methods. PNT is domestically produced and is combined with easily available local resources such as farm product residue, wild grass and livestock excrement. The cost of this measure is low and it is feasible and sustainable by farmers. • To promote effective use of production goods as described above, the training of farmers in cultivation and fertilization improvement techniques is combined with promotion activities. 		
Expected Results:		
<ol style="list-style-type: none"> ① National level: Higher self-supply rate for food, and reduction of food imports and aid ② Regional level: Increase of staple cereal surplus, optimization of local resource conservation and management, and mitigation of and recovery from soil degradation ③ Residents level: Acquisition of cultivation improvement techniques, decline in food shortages, increase of income and stabilized living conditions 		
Activities:		
<ol style="list-style-type: none"> ① Monitoring of production and production environment through PRA survey and baseline survey ② Supply of seeds and fertilizers ③ Training in cultivation and fertilization techniques ④ Tracing of farm product growth yields and physicochemical changes of soil 		
Input: Project side		Input: Malian Government side
<ol style="list-style-type: none"> ① Expert in agricultural cultivation ② Expert in organizing residents ③ Project cost: 1,827 million Fcfa (Basis) 33,000 Fcfa x 96 UPA x 580 villages ④ Cost of training in cultivation techniques: 206 million Fcfa (Basis) 178,000 Fcfa x 1,159 villages 		<ol style="list-style-type: none"> ① C/P for agricultural cultivation ② C/P for organizing residents ③ Existing aid agencies (DRAMR, SLACAER, etc.)
		Input: Residents side
		<ol style="list-style-type: none"> ① Creation of micro-credit fund ② Provision of one field per village as base for technical promotion ③ Self-procurement of production materials
Considerations Based on Results of Verification Study		
<ol style="list-style-type: none"> ① Cultivation techniques should be made more adaptable to irregular rainfall. ② Cultivation techniques such as seeding amounts, thinning, intertillage and weeding are promoted and enforced. ③ The importance of soil improvement, in particular the use of organic materials and phosphate materials, is taught and promoted. 		

Specifications of Materials Used for the Project:

① Seeds

Millet or sorghum is chosen in consideration of rainfall distribution and the water holding ability of the soil. The main varieties and seeding amounts are as follows:

- Millet: Troniou C1, Souna, NKK Standard seeding amount: 6kg/ha
- Sorghum: CMS63E Standard seeding amount: 10kg/ha

② Chemical fertilizers and soil improving materials

The soil in the study area has a restraining effect on productivity in that it is generally short of phosphate content. The following materials are generally used:

- Ammonia phosphate: Standard fertilizing amount: 100kg/ha
- Urea (additional fertilizer) Standard fertilizing amount: 50kg/ha
- PNT (phosphate ore powder produced in Tilemusi) Standard fertilizing amount: 250kg/ha

Training Content:

① Fostering of leaders in the villages where training in cultivation techniques is provided.

- Fostering one village leader for technical promotion per village

② OJT in cultivation techniques

- Technical guidance is provided by C/P, DRAMR, SLACAER or extension workers in the cultivated fields just before seeding. After that, guidance tours should be made at each stage of growth. For this purpose, one field per village is provided as a technical promotion base (provided by residents at no cost).
- As for fertilization management, fertilizer retail companies may be used (by establishing rules for free after-service).

③ Main techniques to be taught

- Improved seed cultivation techniques (including pre-treatment of seeds and considerations at each growth stage), soil fertility improvement and conservation techniques (including improved manure production and manuring techniques), fertilizer and soil conditioner application techniques, and pest and weed control.
- Textbooks in Bambara and visual teaching aids such as videotapes by growth stage are prepared and used.

Project Implementation Criteria:

- Priority is given to villages with insufficient self-supply of food and villages that tend to show a decline in crop production.

Basis for Selection:

- It is estimated that 50% of the villages in the planned area are short of food and that 40% have tended to show a decline in production over the last 5 years. (Village register study)
- The fertilizer supply project is aimed at villages where production is falling or has stagnated (50% of all villages; 580 villages). The fertilizers used in this project are ammonia phosphate and urea.


<u>(Reference) Changes in crops production in last 5 years</u>		
<u>Change</u>	<u>Number of villages</u>	<u>Percentage</u>
Increase	91	50.3%
No change	17	9.4%
Decrease	73	40.3%
Total	181	1k%
Invalid answers	7	3.7%

Administration Method:

- ① The cereal bank functions as a seed bank as a means of promoting improved seeds.
- ② Production materials such as fertilizer tend to be purchased just before the start of cultivation, but as the price of fertilizer is lower after the harvest than before the start of cultivation, it is procured and stored just after the harvest.

2) Small-scale Vegetable Cultivation Project

Program Name	Small-scale Vegetable Cultivation Project	
Medium Goal	Stabilization of farmers' incomes	
Minor Goal	Enhanced agricultural production, stable supply of food and improved eating habits	
Background/Objective:		
<ul style="list-style-type: none"> • Income-producing activities for residents in the study area are very limited and residents have insufficient means of earning cash. • As a result, there is a shortage of commodities such as agricultural tools and medical supplies that are difficult to produce in the village. • To improve this situation, many residents wish to cultivate vegetables in the dry season, as this will enable them to earn a cash income in the slack season and improve their nutritive condition. • However, the study area has few rivers, lakes and marshes that could be used as water sources in the dry season and there are no irrigation facilities. Therefore, it is not easy to grow vegetables in the dry season. • In addition, vegetable fields require fences to keep out livestock, but materials for such fences are lacking due to the decline of forests. • To improve this situation, it is necessary to construct small-scale irrigation facilities combining wells as a source of water with metal fences to keep out livestock in order to cultivate vegetables in the dry season. 		
Expected Results:		
<ol style="list-style-type: none"> ① Increased income by appropriate vegetable cultivation in the dry season and improvement of nutritive condition ② Appropriate maintenance and management of small-scale irrigation facilities ③ Enhancement of vegetable cultivation techniques and ability to maintain and manage facilities 		
Activities:		
<ol style="list-style-type: none"> ① Investigation of actual conditions of dry-season vegetable cultivation through PRA and baseline surveys ② Decision by CGTV on whether or not to adopt the project ③ Construction of small-scale irrigation facilities with residents' participation ④ Establishment of a maintenance and management system for small-scale irrigation facilities by residents ⑤ Training in maintenance and management ⑥ Operation of the system by residents 		
Input: Project side		Input: Malian Government side
<ol style="list-style-type: none"> ① Expert in irrigation-based agriculture ② Expert in organizing residents ③ Cost of developing vegetable fields: 4,364 million Fcfa 		<ol style="list-style-type: none"> ① C/P for small-scale irrigation facilities construction ② C/P for agriculture ③ C/P for organizing residents
(Basis)		Input: Residents side
Irrigation wells:	7,337,000 Fcfa x 386 sites	① Unskilled labor: 10 persons/day/site
Fences to keep out livestock:	1,741,000 Fcfa x 773 sites	② Cash contribution: 300,000 Fcfa/site (well)
Training cost:	1,200,000 Fcfa x 155 sites	③ Cash contribution: 300,000 Fcfa/site (field)
		④ Provision of installation sites for small-scale irrigation facilities
Considerations Based on Results of Verification Study		
<ol style="list-style-type: none"> ① According to the results of the verification study, the construction of marshes as a water source for small-scale irrigation facilities requires almost double the cost of constructing wells and the period of use in the dry season is conspicuously shorter (approx. 3 months) than that of wells. The construction of marshes has therefore been excluded from the <i>Master Plan</i>. ② Construction of the facilities and training should be conducted during periods other than the busy farming season when farmers are very busy and the rainy season when the roads are muddy. ③ It is necessary to provide separate training in cultivation techniques for the dry season and for the rainy season and measures against insect pests must be taken at each growth stage. ④ The training should be conducted in the villages to allow women to participate. If it is conducted outside the villages, a means of transportation should be provided. 		

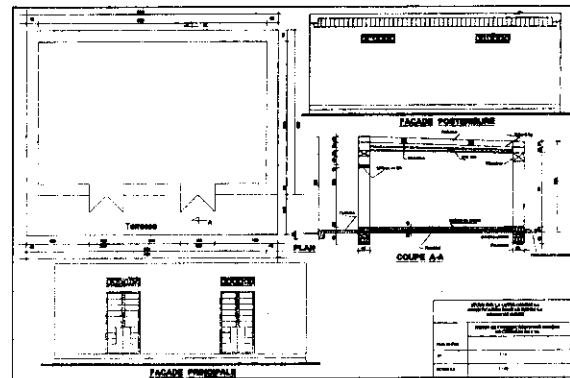
<p>Basic Structure:</p> <ol style="list-style-type: none"> ① The well is a modern large-aperture structure, the same as the wells for domestic use. ② 2 concrete water tanks are installed for each well. The tank size is 2m x 1m x 1m. ③ A fence to keep out livestock is built around each vegetable field. The fence is a combination of 1.5m high wire netting and iron poles. One entrance 3m wide is provided. ④ The area of vegetable fields per well is 0.25ha. 	<p>Photo: Vegetable field</p> 																					
<p>Project Implementation Criteria:</p> <ul style="list-style-type: none"> • As a rule, one vegetable field and new well per village are provided in villages where no small-scale irrigation facilities have been built. 																						
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<p>Training and Guidance Plan:</p> <ol style="list-style-type: none"> ① The vegetable cultivation groups are asked about what they want to grow and the training period, and a training schedule is drawn up. The training is divided into 3 levels: elementary, intermediate and advanced technical training. ② After completion of dry-season cultivation and rainy-season cultivation in the first year, the groups are asked about problems encountered. ③ Trainings to solve the problems are held before dry-season cultivation and rainy-season cultivation in the second year. ④ Technical training in vegetable field creation using local materials is held in the third year when vegetable cultivation techniques have improved. 																						
<p>Administration Method:</p> <p>CGTV and residents are encouraged to consider the following when creating new vegetable fields:</p> <ol style="list-style-type: none"> ① Many users can use water simultaneously from the water tank. ② The tank should be regularly cleaned and checked for damage. ③ An administrator is assigned on a rota basis to ensure that there is no infringement of the rules or intrusion by livestock. 																						

3) Cereal Bank Construction Project

Program Name	Cereal Bank Construction Project											
Medium Goal	Stabilization of farmers' incomes											
Minor Goal	Higher agricultural productivity and stable food supply											
Background/Objective:												
<ul style="list-style-type: none"> The main agricultural produce in the study area is cereals, especially millet, which are marketed at low prices (for example, 35 Fcfa/kg) at harvest time. Each farmer has to sell most of his produce at such prices in order to obtain cash. On the other hand, in the pre-harvest season (May to August) when food is short, millet is sold at a higher price (for example, 85 Fcfa/kg), and some farmers who lack food are buying millet at this price for cash. To correct this imbalance in village food supply and improve residents' incomes, cereal banks that are based in the villages will be constructed. <p>Cereal banks have short-term and long-term functions:</p> <ul style="list-style-type: none"> Short-term function: Cereals are lent to UPAs in the village that lack food in the pre-harvest season (May to August) and repayment is made in kind with interest (about 25%) in the harvesting season. This allows the village to supply its own food without needing to purchase cereals at high prices from the market. Long-term function: The cereal bank also has a collecting and shipping function, whereby after the short-term function has been attained, the surplus cereals in each village are collected at harvest time when the prices are low and sold jointly in the market in the pre-harvest season. This allows surplus cereals to be marketed at high prices and farmers' incomes to be improved. 												
Expected Results:												
<ol style="list-style-type: none"> Secure self-supply of food in the villages (short-term) Improvement of farmers' incomes (long-term) 												
Activities:												
<ol style="list-style-type: none"> Investigation of actual food self-supply conditions in the villages and sale and purchase of cereals through PRA and baseline surveys Decision by CGTV on whether or not to adopt the project Construction of cereal bank building with residents' participation Establishment of a maintenance and management system by residents Training in operation Securing of initial cereal stock by residents Operation and follow-up activities by residents 												
Input: Project side		Input: Malian Government side										
<ol style="list-style-type: none"> Expert in agriculture and living infrastructure Expert in organizing residents Cost of cereal bank project: 4,780 million Fcfa (Basis) 5,522,000 Fcfa x 865 sites <p>Unit cost breakdown</p> <table> <tr> <td>Building construction cost:</td> <td>3,038,000 Fcfa</td> </tr> <tr> <td>Cost of mill equipment:</td> <td>573,000 Fcfa</td> </tr> <tr> <td>Cost of initial stock:</td> <td>961,000 Fcfa</td> </tr> <tr> <td>Cost of training:</td> <td>950,000 Fcfa</td> </tr> <tr> <td>Total:</td> <td>5,522,000 Fcfa</td> </tr> </table>		Building construction cost:	3,038,000 Fcfa	Cost of mill equipment:	573,000 Fcfa	Cost of initial stock:	961,000 Fcfa	Cost of training:	950,000 Fcfa	Total:	5,522,000 Fcfa	<ol style="list-style-type: none"> C/P for living conditions improvement C/P for organizing residents
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Total:	5,522,000 Fcfa											
		Input: Residents side										
		<ol style="list-style-type: none"> Unskilled labor: 10 persons/day/unit Cash contribution: 300,000 Fcfa/unit Manufacture and provision of blocks for building construction Provision of land for building site 										
Considerations Based on Results of Verification Study												
<ul style="list-style-type: none"> The first condition for stable bank operation is to secure the initial stock, so emphasis is placed on guidance on procuring stock in the first year. 												

Basic Structure:

- ① The cereal bank building is made of banco and its dimensions are 5 x 8m.
- ② Banco are made by residents at no cost and materials that cannot be procured in the village such as the roof, windows and doors are provided by the Project side.
- ③ Construction is undertaken by residents and technical guidance is provided by the Project side.
- ④ Scales for weighing the cereals (1t) are provided.

Structural Diagram:**Project Implementation Criteria:**

- The village has no cereal bank at present and suffers from food shortages.

Basis for Calculation of Project Quantities:

Item	Quantity	Basis
Number of villages in the study area	1,694	Study results
Number of villages covered by the project	1,159	"
Villages with no cereal bank	562	1,159 x 0.485
Planned number of cereal banks	281	484 x 0.5 (percentage of villages that have not achieved self-supply)

Training and Guidance Plan:

- ① Training in the system and functions of the cereal bank, accounting and cereal storage is provided for the management group.
- ② A guidance tour is conducted for 2 years after the start of operation and OJT is provided in accounting and cereal storage.
- ③ Training in the long-term function of the bank is provided at the stage when bank operation has stabilized.
- ④ A cereal input/output control system is established.

Maintenance and Management System:

Operating Organization	<ol style="list-style-type: none"> ① The CGTV organizes a cereal bank management group and establishes management rules. ② The contribution repayment method is determined by mutual consent of the management group and management committee. Initially, over than half the profit is used for contributions. ③ The management group submits regular reports on the operation status to the CGTV for audit by the CGTV.
Short-term function (self-supply of food)	<ol style="list-style-type: none"> ① The residents and the Study Team bear 50% each of the cost of securing the initial stock. ② The bank lends cereals in the pre-harvest season (May to August) and the loans are repaid in kind to the bank with 25% interest in the harvesting season. ③ The activity described in ② is repeated each year until the village is able to supply itself with food and the cereal stock is increased.
Long-term function (Collecting and shipping facilities)	<ol style="list-style-type: none"> ① The surplus cereals in each UPA are collected at harvest time and stored in the bank in the name of the UPA. ② The stocks are sold jointly in the markets in the pre-harvest season and the profits obtained from the sales are distributed among the UPAs.

4) Vaccination Facilities Construction Project

Program Name	Vaccination Facilities Construction Project	
Medium Goal	Stabilization of farmers' incomes	
Minor Goal	Higher livestock productivity	
Background/Objective:		
<ul style="list-style-type: none"> Livestock losses caused by disease and internal and external parasites are high due to the lack of an animal health infrastructure and insufficient knowledge of vaccinations and sanitation among stock farmers. To control losses due to disease, it is essential to improve the vaccination rate. According to the results of the verification study, farmers want to implement vaccinations and the vaccination rate will improve if vaccination facilities are constructed nearby. Therefore, if stock breeders' knowledge of animal health is enhanced, more vaccination facilities will be built and a joint vaccination facilities management system will be established. 		
Expected Results:		
<ol style="list-style-type: none"> Reduction of livestock losses due to disease Establishment of vaccination facilities maintenance system 		
Activities:		
<ol style="list-style-type: none"> Investigation of actual conditions through PRA and baseline surveys Decision by CGTV on whether or not to adopt the project Formation of an Animal Breeding Group and establishment of rules for operating the vaccination facilities Training in animal health and OJT in maintenance of the vaccination facilities Construction of vaccination facilities with residents' participation Maintenance and operation of vaccination facilities by CGTV 		
Input: Project side	Input: Malian Government side	Input: Residents side
<ol style="list-style-type: none"> Expert in stock raising Cost of training: 28 million Fcfa (Basis) 90,000 Fcfa x 307 villages Cost of construction: 1,587 million Fcfa (Basis) 6,978,000 Fcfa x 61 sites 4,720,000 Fcfa x 246 sites 	<ol style="list-style-type: none"> C/P for stock raising 	<ol style="list-style-type: none"> Unskilled labor: 5 persons/day/unit Cash contribution: Type A: 150,000 Fcfa/unit Type B: 100,00 Fcfa/unit Cost of vaccination
Considerations Based on Results of Verification Study		
<ol style="list-style-type: none"> The structure of the vaccination facilities shall be such as to allow easy maintenance by farmers. The corral fence shall be a simple structure made of horse bars and no iron gate. The walls shall be made of concrete blocks, not banco, out of consideration for durability. 		
Main Structure:	Structural Diagram:	
<ol style="list-style-type: none"> Out of consideration for durability, the paddock and corral walls are made of concrete blocks and the poles are of reinforced concrete. The corral is made of iron horse bars. Type A has a 20m x 20m paddock and type B a 10m x 10m paddock, and the corral is 15m long. 	<p>The diagram illustrates the layout of a vaccination facility. It features a diamond-shaped paddock with two sides labeled '20m'. Attached to the top vertex of the diamond is a rectangular corral with a length of '15m'. The paddock is labeled 'Paddock' and the corral is labeled 'Corral'.</p>	

- Project Implementation Criteria:**
- ① The village has no existing facilities.
 - ② The construction rate in the verification study was 50%, and 50% of all the villages covered by the project will be provided with vaccination facilities.
 - ③ By category, type A is for villages of more than 500 UBT and type B for those of less than 500 UBT.
 - ④ According to the results of the verification study, type A is built in 20% of the villages and type B in 80%.


Basis for Calculation of Project Quantities:

Item	Quantity	Basis
Number of villages in the study area	1,659	
Number of villages covered by the project	1,159	
Number of existing facilities	398 sites	Results of UNICEF study
Percentage of villages with existing facilities	23.5%	$398 \div 1,695 \text{ villages} \times 100$
Target rate	50%	Area under Verification Study (one existing site and 5 new sites, 6 sites in total, 50% rate of villages with facilities)
Required number of facilities	307 sites	$1,159 \text{ villages} \times (50\% - 23.5\%)$
Type A	61 sites	20%
Type B	246 sites	80%

- Administration Method:**
- In maintaining and operating the vaccination facilities, the following points should be considered:
- ① Flat sites located near the pastures are selected for the facilities, and not sites in the villages.
 - ② The CGTV Animal Breeding Group draws up rules for using the facilities.
 - ③ The CGTV Animal Breeding Group assigns an administrator in charge of maintenance.
 - ④ The rules for using the facilities stipulate separate fees and vaccination charges for residents within the village and outside the village.
 - ⑤ The rules for using the facilities include a penalty clause for improper use.
 - ⑥ The iron parts undergo rustproofing on a regular basis.
 - ⑦ If the walls or corral are damaged, they are repaired at an early stage.

- Training and Guidance:**
- In this program, training and guidance are provided according to the following procedure:
- ① Visits are made to advanced areas to view implementation of vaccinations.
 - ② The effectiveness of vaccinations is taught in lectures using illustrations and video materials.
 - ③ Guidance in maintenance and operation is provided when the vaccination facilities are constructed.

5) Livestock Fattening Project

Program Name	Livestock Fattening Project	
Medium Goal	Stabilization of farmers' incomes	
Minor Goal	Higher livestock productivity	
Background/Objective:		
<ul style="list-style-type: none"> Livestock productivity in the planned area is low because of insufficient nutrition due to lack of fodder in the dry season. In addition to the shortfall in absolute fodder quantity, there is a lack of minerals and protein. Nutritive improvement using nutritional blocks with a high content of minerals and protein therefore leads to higher productivity. Sheep can be fattened effectively even in the dry season through the use of the nutritional blocks. Sheep fattening is profitable and is a particularly effective way for women to obtain a source of cash income. These measures will enable farmers to secure cash incomes and lead to improvement in the living environment. 		
Expected Results:		
<ol style="list-style-type: none"> The nutrition of livestock in the dry season can be improved by feeding them nutritional blocks. Sheep can be fattened effectively. 		
Activities:		
<ol style="list-style-type: none"> Investigation of actual fodder supply and sheep raising conditions through PRA and baseline surveys Establishment of CGTV Decision by CGTV on whether or not to adopt the project Training in nutritive improvement and sheep fattening, and OJT in block manufacture The project implementer supplies some of the equipment and materials for block manufacture and residents manufacture the blocks. The project implementer introduces the feeder stock for sheep fattening. Manufacture of nutritional blocks by residents Sheep fattening 		
Input: Project side		Input: Malian Government side
<ol style="list-style-type: none"> Expert in stock breeding Cost of training: 104 million Fcfa (Basis) 90,000 Fcfa x 1,159 villages Cost of provision of equipment and materials: 23 million Fcfa (Basis) Equipment and materials for manufacturing nutritional blocks (Equipment: 1 drum can, 10 bowls, 1 shovel, 1 bucket. Materials: cement 150kg, salt 100kg, molasses 286kg and urea 100kg) 98,000 Fcfa x 232 sets 		<ol style="list-style-type: none"> C/P for stock breeding
		Input: Residents side
		<ol style="list-style-type: none"> Manufacture of nutritional blocks by residents Materials (millet residue, water) Cash contribution: 30% of cost of purchasing equipment and materials Cost of feeder stock for sheep fattening (sheep before fattening)
Considerations Based on Results of Verification Study		
<ol style="list-style-type: none"> The feeder stock should always be introduced in the presence of residents. The feeder stock may die by accident during introduction. The responsibility for any accidental deaths should be clearly defined. 		
Proportion Design of Nutritional Blocks for Livestock:	Photo: Finished blocks	
Proportions of nutritional blocks Millet residue: 3.5kg (35%) Molasses: 3.5kg (35%) Urea: 1.0kg (10%) Cement: 1.5kg (15%) Salt: 0.5kg (5%) Total (block) 10.0kg (100%)		
Introduction and fattening of sheep		
<ol style="list-style-type: none"> Sahel and Bali-Bali breeds, or half-breeds of both may be used. The feeder stock are rams at least one year old and weighing 20kg or more. The fattening period is about 5 months, and the daily increase in weight should be 100g or more. 		
Project Implementation Criteria:		
<ol style="list-style-type: none"> The manufacture of nutritional blocks for livestock is positioned as a pilot project in each village, and 2 sets of manufacturing equipment and materials per village are introduced in 10% of the villages covered by the project. 		

② 20 head of feeder stock per village are introduced in each of the villages covered by the project and micro-credit is used for this.

Basis for Calculation of Project Quantities:

Item	Quantity	Basis
Number of villages in study area	1,659	
Number of villages covered by the project	1,159	
Equipment and materials for manufacturing nutritional blocks	232 sets	1,159 villages x 2 sets/village
Introduction of feeder stock	23,180 head	1,159 villages x 20 head


Administration Method:

- ① When using the facilities for manufacturing nutritional blocks and fattening sheep, the following points should be considered:
- ② The manufacturing facilities for nutritional blocks should be operated in accordance with the rules for use established by the CGTV and used jointly by residents.
- ③ Any surplus nutritional blocks can be sold and the revenue from the sales put toward the cost of procuring new equipment and materials.
- ④ When introducing feeder stock, the sheep should be vaccinated in advance.
- ⑤ Parasites should be eradicated regularly.

Training and Guidance:

- ① Training and guidance for this project are implemented as follows:
- ② Farmers visit advanced areas and realize the effectiveness of the project.
- ③ The farmers are taught the necessity and techniques of nutrition replenishment in the dry season through lectures and receive OJT in the manufacture and supply of nutritional blocks.
- ④ Guidance is provided in how to weigh the materials without using scales when manufacturing nutritional blocks. For example, millet residue can be measured with a tomato can, one canful being equivalent to 1kg, and salt can be measured with a metal bowl, one bowlful being equivalent to 1kg.

6) Improved Poultry House Construction Project

Program Name	Improved Poultry House Construction Project																												
Medium Goal	Stabilization of farmers' incomes																												
Minor Goal	Higher livestock productivity																												
Background/Objective:																													
<ul style="list-style-type: none"> Domestic fowl in the planned area are raised by rough feeding outdoors with little or no vaccination or adoption of chick-raising practices, resulting in a high mortality rate of 50% or more in the present conditions. It is therefore planned to reduce the losses by raising fowl indoors through the construction of poultry houses and improving poultry farming through the introduction of disinfectant sprinklers. The fowl now raised are indigenous breeds with low meat and egg productivity. Rhode Island Red, Hy-Line and Isa Brown cocks will be introduced for crossbreeding with native breeds to create cross breeds and improve meat and egg productivity. Through these measures, the cash incomes of farmers can be secured and their living environment improved. 																													
Expected Results:																													
<ol style="list-style-type: none"> Poultry raising can be managed appropriately to reduce the mortality rate. Improved breeding can be implemented by residents. 																													
Activities:																													
<ol style="list-style-type: none"> Investigation of actual poultry raising conditions through PRA and baseline surveys Establishment of CGTV Decision by CGTV on whether to adopt the project Training in poultry raising and OJT in poultry house construction The project implementer provides some of the equipment and materials and residents build the poultry houses. The project implementer introduces breeding stock. Residents run poultry raising operations. 																													
Input: Project side		Input: Malian Government side																											
<ol style="list-style-type: none"> Expert in stock farming Cost of training: 104 million Fcfa (Basis) 90,000 Fcfa x 1,159 villages Cost of construction: 603 million Fcfa (Basis) Cost of equipment and materials for poultry house construction (incl. disinfecting equipment) 260,000 Fcfa x 2,318 sites 		<ol style="list-style-type: none"> C/P for stock farming 																											
		Input: Residents side																											
		<ol style="list-style-type: none"> Manufacture of banco and construction sites Poultry house construction by residents Cash contributions: 30% of the cost of purchasing equipment and materials 100% of the cost of introducing breeding stock 																											
Considerations Based on Results of Verification Study																													
<ol style="list-style-type: none"> In introducing improved breeding stock, consideration should be given to the increased supply of high-protein fodder and minerals compared with native breeds. It is vital to install sprinklers for common use in villages where poultry houses are constructed. 																													
Basic Structure:		Photo: Example of Improved Poultry House																											
<ol style="list-style-type: none"> The dimensions of the poultry house are 2m x 3m (6m²). It is provided with a chicken run with an iron fence. The structure of the poultry house is as follows: Walls: Banco (mortar finish) Roof: Galvanised iron Gate: Iron The run has a fence made of iron poles and wire netting. 																													
<table border="1"> <thead> <tr> <th colspan="4">Specifications of Poultry Productivity Plan</th> </tr> <tr> <th>Item</th> <th>Unit</th> <th>Current</th> <th>Planned</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Net weight of fowl</td> <td rowspan="2">kg</td> <td>♀ 2.0</td> <td>♀ 2.5</td> </tr> <tr> <td>♂ 2.5</td> <td>♂ 3.0</td> </tr> <tr> <td>Start of egg-laying</td> <td>Months</td> <td>6</td> <td>6</td> </tr> <tr> <td>Number of eggs laid</td> <td>Pc.</td> <td>48</td> <td>100</td> </tr> <tr> <td>Egg weight</td> <td>g</td> <td>35</td> <td>50</td> </tr> </tbody> </table>				Specifications of Poultry Productivity Plan				Item	Unit	Current	Planned	Net weight of fowl	kg	♀ 2.0	♀ 2.5	♂ 2.5	♂ 3.0	Start of egg-laying	Months	6	6	Number of eggs laid	Pc.	48	100	Egg weight	g	35	50
Specifications of Poultry Productivity Plan																													
Item	Unit	Current	Planned																										
Net weight of fowl	kg	♀ 2.0	♀ 2.5																										
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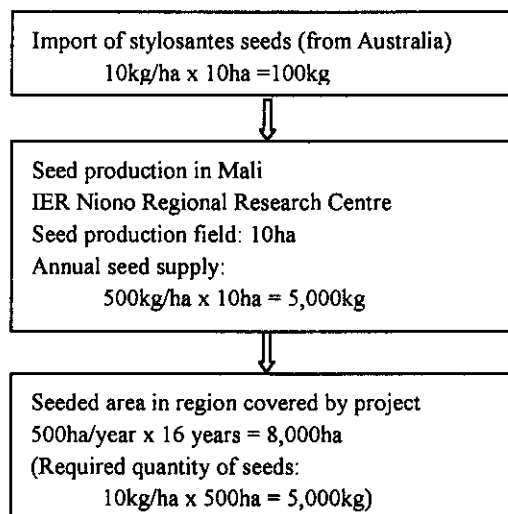
Project Implementation Criteria:		
① The basic facilities are positioned as a pilot project for each village and two poultry houses are constructed in each of the villages covered by the project		
② 3 improved breeding fowl are introduced in each poultry house.		
Basis for Calculation of Project Quantities:		
Item	Quantity	Basis
Number of villages in study area	1,659	
Number of villages covered by project	1,159	
Number of poultry houses to be constructed	2,318	2 houses per village as a pilot project.
Number of breeding fowl to be introduced	6,954	3 fowl per poultry house
Administration Method:		
① In using the improved poultry houses and raising improved breeds, the following points are considered:		
② In managing the facilities, the person in charge of use is more clearly defined in private use than in shared use.		
③ Each poultry house is equipped with an egg laying box, a feed bowl and a tick remover for improved poultry farming.		
④ It is essential to implement vaccinations and measures against external and internal parasites.		
⑤ It is necessary to improve the nutrition when raising improved breeds compared with native breeds.		
⑥ Poultry houses tend to be hotbeds for ticks and sanitary control by disinfecting is indispensable.		
Training and Guidance:		
① Training and guidance are conducted as follows:		
② Farmers visit advanced areas to see good examples of implementation of the project.		
③ Training in raising fowl in poultry houses and the effectiveness of improved breeds is provided in lectures using pictures and videotapes.		
④ OJT is conducted to teach poultry house construction techniques and how to make tools such as egg laying boxes, water bowls and feed bowls, and demonstrations are given of poultry house disinfecting and vaccinating.		

7) Improved Fodder Plant Introduction Project

Program Name	Improved Fodder Plant Introduction Project	
Medium Goal	Stabilization of farmers' incomes	
Minor Goal	Higher livestock productivity	
Background/Objective:		
<ul style="list-style-type: none"> • Growing desertification results from increased numbers of livestock regardless of the fodder supply available from pasture lands (grazing land). To develop sustainable livestock production while suppressing desertification, it is necessary to protect the land against the type of stock raising that exploits resources and change to recycling-based stock raising that promotes higher productivity. Natural grassland is covered with annual herbaceous grasses of low nutritious value in protein etc. There are no superior legume plants in the area covered by the project. Hay made from wild grass and millet stocks and leaves are sometimes preserved and stored in readiness for the dry season when fodder is short, but there are problems regarding the mixing method, resulting in high loss. • Therefore, an expanded project for fodder plant preservation and fodder production and storage is implemented with the following objectives: ① to make farmers aware of the limited stock-raising capacity of grazing land, establish grazing rules according to area and season at the terroir management subcommittee and enforce land use rules to ensure efficient use of the land, ② to expand fodder production through the introduction of improved fodder plants, expansion of the area used to cultivate fodder plants, soil conservation for vegetation recovery in pasture lands, and planting of fodder plants on transhumance paths, and ③ as measures to deal with fodder shortages in the dry season, to improve fodder storage and mixing procedures, including the manufacture of supplementary fodder with added molasses and storage of hay made from wild grass. 		
Expected Results:		
<ul style="list-style-type: none"> ① Appropriate maintenance of grasslands ② Increased production of grass and fodder products ③ Improved nutrition of cattle in the dry season ④ Establishment of a supply system for improved fodder plant seeds 		
Activities:		
<ul style="list-style-type: none"> ① Investigation of actual fodder production infrastructure through PRA and baseline surveys ② Establishment of CGTV stock raising sub-committee ③ Decision by CGTV on whether or not to adopt the project ④ Indoor and OJT training in fodder production and use ⑤ Establishment of grazing rules (Establishment of land use rules) ⑥ Seeding of improved fodder plants and fodder products with residents' participation ⑦ Manufacture by residents of supplementary fodder with added molasses ⑧ Construction by residents of facilities for using hay and farm produce residue ⑨ Establishment of a supply system for stylosantes seeds 		
Input: Project side	Input: Malian Government side	Input: Residents side
<ul style="list-style-type: none"> ① Expert in stock raising ② Cost of training: 104 million Fcfa (Basis) 90,000 Fcfa x 1,159 villages ③ Cost of supply system: 158 million Fcfa (Basis) Establishment of fodder plant seed supply system: 30 million Fcfa Supply of fodder plant seeds: 8,000 ha x 16,000 Fcfa = 128 million Fcfa 	<ul style="list-style-type: none"> ① C/P for stock raising ② Field for collecting fodder plant seeds (IER) 	<ul style="list-style-type: none"> ① Seeding of fodder plants and products ② Cash contribution 30% of cost of fodder plant seeds 100% of cost of fodder product seeds 100% of cost of construction materials for hay silo facilities 100% of cost of molasses
Considerations Based on Results of Verification Study		
<ul style="list-style-type: none"> • Establishment of a stylosantes seed supply system in Mali is a precondition for implementing the project to introduce improved fodder plants. 		

Fodder Demand and Supply Plan:
Unit: t

Cercle	Tropical Livestock Unit (UBT)	Required Quantity of Dry Products	Possible Fodder Supply			Demand and Supply Balance
			Grassland/Woodland/Fodder Products	Farm Product Residue	Total	
Baraoueli	42,672	85,670	88,955	258,737	173,067	169,782
Bla	50,736	101,853	298,963	99,569	398,532	296,679
Macina	71,779	144,095	38,216	48,456	86,672	-57,423
San	192,856	387,159	237,273	121,838	359,111	-28,048
Ségou	155,164	311,491	291,829	131,090	422,919	111,428
Tominian	76,932	154,441	136,625	50,316	186,941	32,500
Total	590,142	1,184,709	1,172,688	540,224	1,712,912	528,203

Fodder Plant Seed Supply System

Photo: Stylosantes

Project Implementation Criteria:

- ① The seeds of improved fodder plants are procured in Mali and the improved area as calculated from the possible seed supply is 500ha per year and the total improved area is set at 8,000ha.
- ② The mixed cropping rate for fodder products is increased by 50% from the current 10% to 20%. 50% of the seeded area is seed producing fields.
- ③ Hay storage in silos and supply of molasses-added supplementary fodder are already carried out in part of the study area, and they will be promoted by the use of micro credit. 6 sets of hay silo facilities per village and 3 sets of manufacturing equipment for molasses-added supplementary fodder per village will be introduced in 10% of the villages covered by the project.

Basis for Calculation of Project Quantities:		
Item	Quantity	Basis
(Improved Fodder Plant Seed Production) IER Niono Regional Research Centre (Seeded area of improved fodder plants) Number of villages in study area Number of villages covered by project Percentage of villages covered by project Estimated grassland area in study area Rate of improvement Seeded area for improved fodder plants (Area where fodder products introduced) Rain-fed cultivated area in project area Mixed cropping improvement rate Rate of improvement Area where fodder products introduced (Hay silo facilities and manufacture of molasses-added supplementary fodder) Number of villages covered by project Rate of improvement Hay silo facilities Manufacture of molasses-added supplementary fodder	<ul style="list-style-type: none"> • 1 set • 1,695 • 1,159 • 68% • 602,000 ha • 2.0% • 8,000 ha • 779,000 ha • 10% • 50% • 38,950 ha • 1,159 • 10% • 695 silos • 348 sets 	<p>10ha seed producing field</p> <p>Estimated from the yearly seed supply 602,000 x 68% x 2.0%</p> <p>The mixed cropping rate is increased from 10% to 20%. 50% is for home seed-raising</p> <p>779,000 ha x 50% x 10%</p> <p>1,159 villages x 10% x 6 sets/village 1,159 villages x 10% x 3 sets/village</p>
<p>Administration Method: In implementing this program, the following points should be taken into consideration with regard to management:</p> <ol style="list-style-type: none"> ① It is effective to conserve pastures in accordance with the land use control regulations. In particular, with regard to the introduction of improved fodder plants, controlled grazing should be established by setting grazing fees and grazing periods in accordance with the land use regulations. ② Stylosantes seeds should be introduced so that seeding takes place before the rainy season in consideration of growth after germination. 		
<p>Training and Guidance: In implementing this program, training and guidance are provided as follows:</p> <ol style="list-style-type: none"> ① Farmers visit advanced areas and recognize the effectiveness of this program. ② The key to introducing improved fodder plants is how to change farmers' view of livestock fodder as a free commodity. In addition to lectures using textbooks, OJT is provided in fodder plant seeding and grassland maintenance. ③ Time is also spent teaching residents the necessity of land use regulations and promoting their recognition of such necessity. 		
<p>Attached Materials: Anné M5.3.5.1-2 Estimation of Fodder Demand and Supply Plan</p>		

5.3.4 Natural Resource Conservation and Management

1) Mini-nursery Construction Project

Program Name	Mini-nursery Construction Project	
Medium Goal	Stabilization of farmers' incomes and conservation and management of natural resources	
Minor Goal	Stable forest area and higher productivity	
Background/Objective:		
<ul style="list-style-type: none"> • In the planned area, there are few villages that have their own seedling production facilities, so it is not easy to procure seedlings. • There are idle nursery facilities in some villages that were constructed in past aid projects, but no production is conducted due to damage of the facilities and lack of engineers. • However, there are also villages that carried out afforestation in the past and in general the residents want to plant both fast growing trees and fruit trees. • Therefore, nurseries will be established in villages where they are required to facilitate the production and supply of seedlings in the village. • Mini-nurseries will be constructed with residents' participation, and training will be conducted for residents and a maintenance and management system will be established to ensure appropriate maintenance and management of the nursery. • The seedlings grown in the mini-nurseries in each village are decided by the CGTV, and guidance is provided to ensure that several varieties of trees are selected which residents want and that are not technically difficult to grow. Guidance is also provided so that varieties that are technically difficult to grow or that are in special demand are procured in nursery markets in regional cities such as Ségou until the skills of the villagers become more advanced. 		
Expected Results:		
<ol style="list-style-type: none"> ① Establishment of autonomous nursery management by residents ② Improvement of residents' tree growing skills ③ Stable supply of seedlings in high demand in each village 		
Activities:		
<ol style="list-style-type: none"> ① Investigation of actual seedling procurement conditions through PRA survey ② Decision by CGTV on whether or not to adopt the project ③ Nursery construction with residents' participation ④ Establishment of nursery maintenance and operation system by residents ⑤ Training in nursery maintenance and operation (including seedling cultivation) 		
Input: Project side		Input: Malian Government side
<ol style="list-style-type: none"> ① Forestry expert ② Expert in organizing residents ③ Cost of nursery construction project: 696 million Fcfa (Basis) 800,000 Fcfa x 870 sites Breakdown of 800,000 Fcfa Construction of materials storehouse: 200,000 Fcfa (incl. 100,000 for entrance door) Construction of nurseries: 600,000 Fcfa (incl. fence, seeds, materials, etc.) ④ Cost of training in seedling production: 159 million Fcfa (Basis) 137,000 Fcfa x 1,159 villages 		<ol style="list-style-type: none"> ① C/P (extension worker) for forest conservation ② C/P (extension worker) for organizing residents
		Input: Residents side
		<ol style="list-style-type: none"> ① Unskilled labor: ca. 5 persons/day ② Manufacture and provision of banco for construction of materials storehouse ③ Cash contribution: 200,000 Fcfa ④ Provision of nursery sites

Basic Structure of Facilities:

- ① The nursery is surrounded by a 1.5m-high wire fence with an iron gate provided at one place.
- ② The supports of the fence are concrete and the foundations are embedded 30cm in the ground.
- ③ Ground preparation and roof construction are performed by residents using local materials.

Training Items:

- ① Training is provided according to a 10-day curriculum in the form of a combination of OJT and lectures in the principal villages in each Commune.
- ② Training includes seed raising, drying and preserving, furrowing, sowing, soil mixing proportions, pot filling and transplanting, measures against disease and insect pests, and visits to advanced nurseries. Illustrated textbooks and videotapes are used for training.

Structural Diagram:

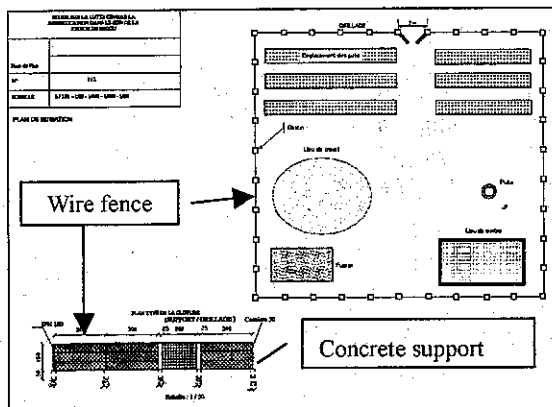


Photo: Raising seedlings in pots

Project Implementation Criteria:

- Mini-nurseries are established in all the villages where no nurseries have been created in the past and there are no alternative facilities.
- In principle, training in seedling production is provided for all the villages in the planned area.

Basis for Calculation of Project Quantities:

Item	Quantity	Basis
Number of villages in verification study area	12	
Number of villages with existing nursery facilities	3	
Rate of nursery construction in verification study	75%	
Total number of villages in the planned area	1,159	
Number of villages planning mini-nursery construction	870	1,159 x 0.75
Villages where training in seedling production is held	1,159	All villages in planned area

Administration method:

- ① In constructing, operating and managing mini-nurseries, the following points should be considered with regard to extension and enlightening:
- ② Locations near water sources are selected for the nursery sites.
- ③ The CGTV appoints a nursery administrator and defines his role and remuneration.
- ④ The role and responsibilities of residents other than the nursery administrator are defined and penalty rules for infringement are determined
- ⑤ The costs of nursery maintenance and operation are disclosed at CGTV meetings on a regular basis.
- ⑥ If the remuneration of the nursery administrator cannot be paid from the expenses for nursery operation at the initial stage, another method such as payment from the interest on the CGTV fund or micro-credit operation should be discussed in the CGTV.

2) Afforestation Promotion Project

Program Name	Afforestation Promotion Program	
Medium Goal	Stabilization of farmers' incomes and conservation and management of natural resources	
Minor Goal	Increase of forest area and higher productivity	
Background/Objective:		
<ul style="list-style-type: none"> • Villagers are free to collect firewood in the forests within the planned area, and women in particular collect firewood for the year in the dry season in a more or less unplanned manner. • The pressure of firewood collection is growing against the background of population growth and degradation of resources. • On the other hand, most villages have little or no experience in planting activities with only fruit trees grown by individual residents in some villages. • Therefore, competition for firewood and the need to go to increasingly distant places are accelerating the decline of forests due to resource exploitation. • The decline of forests not only causes problems in the supply of firewood for fuel, but also results in degradation of natural resources in general, such as soil deterioration due to the decline in soil fertility and surface soil outflow, decline in the water holding capacity of the soil and reduction in animal resources. • To prevent these problems, afforestation is promoted in all the villages in the planned area mainly using seedlings grown in the village mini-nurseries. • Simultaneously, maintenance of the afforested land is established among residents in conjunction with the "establishment of land use regulations" described above. 		
Expected Results:		
<ol style="list-style-type: none"> ① Increase of forest area (10% of the current area in the target year of development) ② Increase of 10% in forest productivity (Current annual growth 1.0 → Goal 1.1m³/ha) ③ Stable supply of firewood fuel ④ General conservation of natural resources including forest resources 		
Activities:		
<ol style="list-style-type: none"> ① Investigation of actual forest resources through PRA survey ② Decision by CGTV on whether or not to adopt the project ③ Training in afforestation ④ Establishment of an afforested land maintenance system by residents' authority ⑤ Afforestation by residents 		
Input: Project side		Input: Malian Government side
Cost of technical training in planting: 225 million Fcfa (Basis) 97,000 Fcfa x 2 times x 1,159 villages		<ol style="list-style-type: none"> ① C/P (extension worker) for forest conservation ① C/P (extension worker) for organizing residents
		Input: Residents side
		<ol style="list-style-type: none"> ① Unskilled labor: ca 20 persons/ha/day ② Provision by residents of all materials and labor for construction of protective fences ③ Provision of afforestation sites
Afforestation Site Protection:		Conceptual Diagram of Afforestation Site using Collective Protection:
<ol style="list-style-type: none"> ① Afforested land is divided into common and private plantations, and for both, collective protection rather than single seedling protection is recommended from the viewpoint of protection against livestock. Training Content: <ol style="list-style-type: none"> ① OJT is provided in each village based on a 3-day curriculum by dispatch of instructors. ② Training includes selection of tree varieties, afforestation planning, digging of holes for transplantation, irrigation method, maintenance after transplantation and management of the facilities. 		
Project Implementation Criteria:		
<ul style="list-style-type: none"> • This project is implemented in all 1,159 villages in the planned area. 		

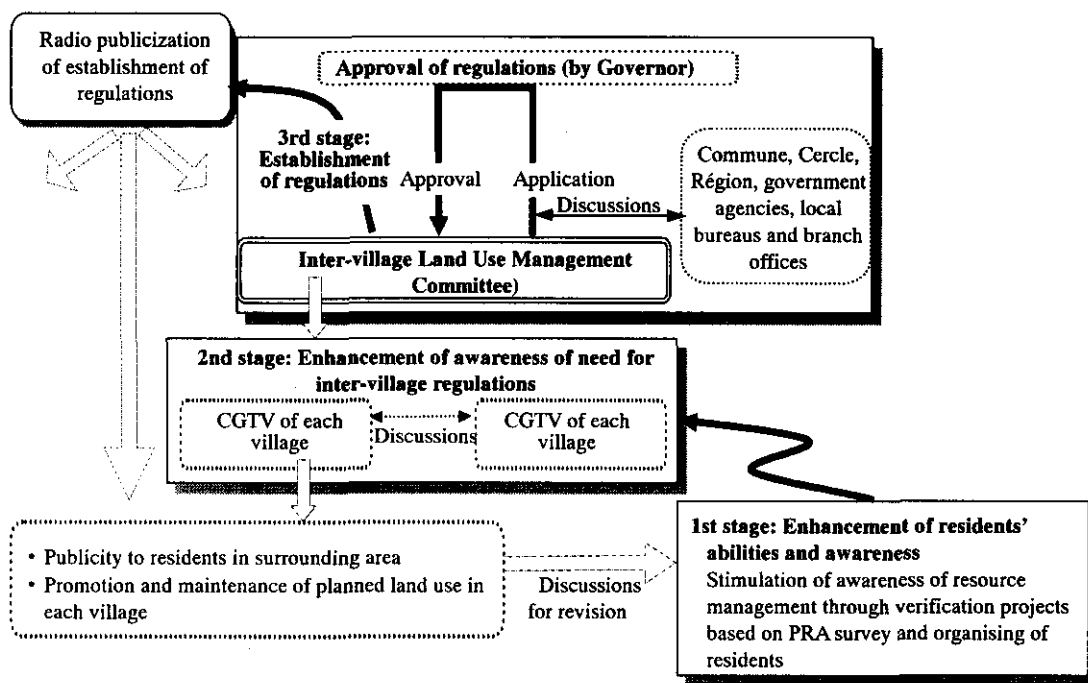
Administration Method:

- ① In promoting and managing afforestation, the following points should be considered:
- ② A long-term afforestation plan (tree varieties and afforestation area) is determined through extensive discussions among CGTV participants.
- ③ In selecting afforestation sites, sites that are a long way from a water source are avoided.
- ④ An accountability system for management after planting is defined and penalty provisions for breach of responsibility are laid down.
- ⑤ Establishment of the concept of private tree ownership is promoted among residents and private afforestation is recommended.
- ⑥ A guidance tour to check the best time for planting seedlings is made at Commune level as part of the training.

3) Project to Establish Land Use Regulations

Program Name	Land Use Regulations Establishment Project	
Medium Goal	Conservation and management of natural resources	
Minor Goal	Optimal land use	
Background/Objective:		
<ul style="list-style-type: none"> • Desertification is progressing year by year in the study area mainly as the result of exploitive use of resources exceeding the natural recovery of soil fertility through repeated excessive cultivation, overgrazing, excessive tree felling and burning. Many farmers already recognize the current degradation of resources resulting from the decline of grasslands and trees, but they have no grasp of how they should deal with it. • A number of land use projects have been implemented in the past, but few have demonstrated a sustainable effect because of residents' lack of managing and operating ability. • In the verification study, a separate project "to enhance residents' ability to run projects" was implemented to promote capacity-building among residents by executing projects related to improvement of the agricultural, pastoral and silvicultural infrastructures, and reflecting the results of the project, the villages in the verification study now actively engage in activities to establish land use regulations. • The Master Plan is therefore aimed at establishing planned land use in order to conserve natural resources by improving residents' awareness, and at effectively promoting the establishment of land use regulations in conjunction with other projects (such as enhancement of residents' ability to run projects, BHN fulfillment, stabilization of farmers' incomes, conservation and management of natural resources and reduction of women's burden). 		
Expected Results:		
<ol style="list-style-type: none"> ① Residents' recognition of the need for land use (natural resource) management through the PRA survey ② Establishment of external regulations relating to land/resources in and among villages ③ Establishment of appropriate land/resource management in and among villages ④ Alleviation of the decline in various resources 		
Activities:		
<ol style="list-style-type: none"> ① Investigation of actual land use conditions through PRA and baseline surveys ② Enlightening of CGTVs on the relation between related verification projects and effective use of land ③ Promotion of the establishment of a land use management committee or committee member as an internal CGTV organization. ④ Advice and guidance on forming an inter-village examination committee for land use management with residents' participation ⑤ Promotion of the establishment of an inter-village land use (natural resource) management committee (CIVGRN: Comité Inter Villageois de Gestion des Ressources Naturelles) ⑥ Promotion of the establishment of inter-village land use management regulations by residents (promotion of independent discussions with CIVGRN, Commune, Cercle and Région and local agencies of related ministries) 		
Input: Project side		Input: Malian Government side
<ol style="list-style-type: none"> ① Expert in land use ② Expert in organizing residents ③ Cost of establishing land use management system ④ Cost of holding conferences to promote establishment of regulations (Basis) 50,000 Fcfa x 5 times x 80 venues = 20 million Fcfa ⑤ Cost of radio publicity relating to establishment of regulations (Basis) 200,000 Fcfa x 1 time x 80 venues = 16 million Fcfa ⑥ Cost of managing land resource maps (Basis) 2,500,000 Fcfa x 6 Cercles = 15 million Fcfa 		<ol style="list-style-type: none"> ① C/P for land use ② C/P for organizing residents ③ Related agencies at Commune, Cercle and Région levels and ministerial branch officials
Total: 41 million Fcfa		Input: Residents side
		<ol style="list-style-type: none"> ① Dispatch of CGTV delegates to CIVGRN ② Contribution of 30% of the cost of publicizing the establishment of land use regulations and of purchasing materials
Considerations Based on Results of Verification Study		
<ol style="list-style-type: none"> ① It is preferable to promote the establishment of land use regulations for an association of villages in a certain area because otherwise disputes are apt to arise with neighboring villages if land use regulations are established in each village. ② Some areas may establish detailed provisions in their prohibition and penalty clauses, but it is important for residents to establish a common framework for land use that did not exist in the past on their own initiative. ③ It is preferable to start with less severe regulations and gradually revise them through discussions with the local bureaus of related ministries. 		

Flowchart of Establishment and Maintenance of Land Use Management Regulations:



Main Items of Land Use Regulations:

- Definition of scope of the regulations (including village and hamlet names)
- Definition of laws and regulations related to provisions
- Forest management: Definition of protected tree varieties. Provisions related to tree felling for commercial purposes other than self-consumption. Provisions related to burning and land reclamation.
- Livestock management: Establishment of transhumance paths. Provisions related to use of pasture lands.
- Provisions related to use of fallow land
- Penalty clause: Provisions related to fines system for infringement of management clauses
- Provisions relating to organization and functions of CIVGRN

Project Implementation Criteria:

- As a rule, the establishment of an inter-village land use management committee is promoted in a fixed area where the villagers share a sense of community based on normal intercourse, and the establishment of inter-village land use regulations (inter-village natural resource management agreement) is encouraged. In establishing the committee, priority is given to villages that have existing agreements or use shared land.

Basis for Calculation of Project Quantities:

Item	Quantity	Basis
① Number of villages before setting the planned area	1,159	
② Number of planned areas for land use regulations	80	1,159/14.5 = 80 (each area consists of about 14.5 villages according to results of verification study)
③ Number of meetings held in each area to establish land use regulations	5	Meetings with Commune, Cercle and local bureaus of related governmental agencies
④ Number of radio broadcasts in each area where regulations were established	1	At time of establishment of regulations

Administration Method:

When establishing and maintaining the inter-village regulations to ensure proper management of land use, consideration for the following points should be promoted to CGTVs and residents:

- ① Selection of the villages that become the nucleus for establishing regulations
- ② Adjustment of the contents of the regulations through meetings held with CIVGRN and officials of administrative agencies
- ③ Regular supervision of land
- ④ Regular polarization of amendments to the regulations to the surrounding villages after establishing the regulations

Attached Materials: Annexé M.5.3.4 – Case study of Cinzana Area Land Use Regulations

4) Soil Conservation Project

Program Name	Soil Conservation Project	
Medium Goal	Conservation of natural resources and stabilization of farmers' incomes	
Minor Goal	Expansion of soil conservation activities	
Background/Objective:		
<ul style="list-style-type: none"> • In the planned area, soil degradation is advancing as a result of excessive cultivation, overgrazing and decline of forests against the background of population growth. • The main factors in soil degradation are the decline in grassland vegetation and landslides as well as water and wind erosion in fields and fallow land, and in some places scouring around wadis (seasonal rivers). • Training in soil conservation activities is provided through the agreement and participation of all residents in the entire basin area in order to conserve the soil on agricultural land as the basis of agricultural production. • In addition, support is given to some villages where local residents have difficulty procuring the materials necessary for the activities. 		
Expected Results:		
<ol style="list-style-type: none"> ① Implementation of soil conservation and establishment of farm land management ② Stable incomes for farmers through farm land conservation and the resulting long-time effect of increased farm land productivity ③ Conservation of natural resources 		
Activities:		
<ol style="list-style-type: none"> ① Investigation of actual state of agricultural land degradation through PRA survey ② Decision by CGTV on whether or not to adopt the project ③ Training in soil conservation technology ④ Establishment of a system for running farm land conservation activities by residents ⑤ Development of soil conservation activities by residents 		
Input: Project side	Input: Malian Government side	
	<ol style="list-style-type: none"> ① C/P (extension worker) for agriculture ② C/P (extension worker) for organizing residents 	
<ol style="list-style-type: none"> ① Agricultural expert ② Expert in organizing residents ③ Cost of procurement of materials: 10 million Fcfa (Basis) Sandbags 190,000 Fcfa x 50 sites Vegetation belt seeds 1,800 Fcfa x 290 sites ④ Cost of training 241 million Fcfa (Basis) 208,000 Fcfa x 1,159 villages ⑤ Cost of equipment 41 million Fcfa (Basis) 70,000 Fcfa x 2 sets x 290 sites 		Input: Residents side
		<ol style="list-style-type: none"> ① Provision of all labor ② Provision of local materials such as stones for ridges and brushwood for fences, and equipment ③ Contribution of 30% of the cost of equipment and materials to support the project

Soil Conservation Activities:

The following activities are planned depending upon the state of soil degradation and the condition of the site where the activity is planned:

- ① Vegetation recovery on eroded land
- ② Prevention of soil erosion in fields
- ③ Improvement of soil fertility in fields

The detailed contents of the soil conservation techniques and their expected effects as well as applicable sites are shown in the table.

Training Content:

- ① Training focusing on OJT is provided based on a 5-day curriculum in the principal village of each village group formed in each Commune.
- ② Training includes not only promotion of soil conservation techniques, but land management of common land after soil conservation through joint operations, as well as regular soil checks and an accountability system.
- ③ The training uses illustrated textbooks and videotapes.

Photo 1: Stone piling for stone ridges



Photo 2: Planting a hedge in a field



Project Implementation Criteria:

- Training is provided in all the villages covered by the project. Support for procuring materials is only provided for those villages that require the relevant technology.

Basis for Calculation of Project Quantities:

Item	Quantity	Basis
① Percentage of villages in the village register study requiring common soil conservation measures	25%	1,159 x 0.25 villages introducing seeds for vegetation zones according to the verification study 15% of the above villages according to the verification study
② Number of villages in the planned area	1,159	
③ Number of villages planning common soil conservation activities	290	
④ Number of villages with difficulty in procuring ridge stones (or alternatively, sandbags)	50	
⑤ Villages to be provided with training in seedling production technology	1,159	

Administration Method:

In operating the farm land conservation activities, consideration for the following points should be promoted:

- ① When implementing soil conservation activities on common land, a system for checking the effects after starting the activities should be established.
- ② As a lot of labor is required for stone ridge work and other tasks, rules of labor provision and penalty clauses should be established and made known to residents in advance.
- ③ To promote soil conservation in private fields, less developed farmers visit advanced farms in the CGTV (in the same village).

5.3.5 Reduction of Women's Burden

1) Mill Construction Project

Program Name	Mill Construction Project									
Medium Goal	Reduction of Women's Burden									
Minor Goal	Alleviation of milling labor of staple food and improvement of women's living conditions									
Background/Objective:										
<ul style="list-style-type: none"> • The job of milling millet occupies over 5 hours a day of domestic labor and is one the main causes of women's overwork. In addition, production of shea butter extracted from karite nuts prevails in the study area and is one of the few sources of women's cash income. However, the extraction of this butter requires long hours of labor. • Therefore, the construction of a common mill (which can also be used for karite butter extraction) serves to shorten the long hours spent in the home milling cereals and extracting butter from karite nuts. 										
Expected Results:										
<ul style="list-style-type: none"> ① Shortened hours of milling work by women through introduction of mill ② Increase in women's incomes through karite butter manufacture 										
Activities:										
<ul style="list-style-type: none"> ① Investigation of actual labor conditions of women in terms of milling hours through PRA and baseline surveys ② Decision by CGTV on whether or not to adopt the project ③ Construction of mill with residents' participation ④ Establishment of operation and maintenance system by residents ⑤ Training in operation ⑥ Operation by residents and follow-up guidance (guidance tour) 										
Input: Project side		Input: Malian Government side								
<ul style="list-style-type: none"> ① Expert in livelihood improvement ② Expert in organizing residents ③ Cost of mill construction project: 3,088 million Fcfa (Basis) 		<ul style="list-style-type: none"> ① C/P for livelihood improvement ② C/P for organizing residents 								
Type A: 4,680,000 Fcfa x 276 sites = 1,292 million Fcfa Type B: 4,414,000 Fcfa x 407 sites = 1,796 million Fcfa Unit cost breakdown (Type B 10hp) <table style="margin-left: 20px;"> <tr> <td>Cost of building construction:</td> <td>2,329,000 Fcfa</td> </tr> <tr> <td>Cost of milling equipment:</td> <td>1,135,000 Fcfa</td> </tr> <tr> <td>Cost of training:</td> <td>950,000 Fcfa</td> </tr> <tr> <td>Total:</td> <td>4,414,000 Fcfa</td> </tr> </table>		Cost of building construction:	2,329,000 Fcfa	Cost of milling equipment:	1,135,000 Fcfa	Cost of training:	950,000 Fcfa	Total:	4,414,000 Fcfa	Input: Residents side
Cost of building construction:	2,329,000 Fcfa									
Cost of milling equipment:	1,135,000 Fcfa									
Cost of training:	950,000 Fcfa									
Total:	4,414,000 Fcfa									
		<ul style="list-style-type: none"> ① Unskilled labor: 10 persons/day/unit ② Cash contribution: 300,000 Fcfa/unit ③ Provision of mill building sites 								
Considerations Based on Results of Verification Study										
<ul style="list-style-type: none"> ① A villager with literacy ability is assigned to be in charge of accounting in each management group, and accounting skills are established through the guidance tour. ② Guidance for residents to acquire machine repair skills is reinforced. 										

Basic Structure:

- ① The mill building is made of banco.
- ② Banco are manufactured by residents at no cost, and the roof, windows and doors that cannot be procured in the village are provided by the Project side.
- ③ Construction is carried out by residents and technical guidance is provided by the Project side.
- ④ Mill equipment is introduced by the Project side.

Photo: Milling**Project Implementation Criteria:**

- The cost of maintaining and operating the mills is covered by charges for using the mill, so a certain number of users are required. Therefore, the mills are divided into Type A and Type B depending upon the population of the village.
- As it is financially difficult to operate mills in villages with a population of 500 or less, joint use of mills is planned with neighboring villages. In this case, the distance to the mill shall be less than 3km and the number of residents per mill shall be over 500.

Mill Type	Village Population	Specifications
A	700 or more	15m ² building, 10hp milling machine
B	Less than 700	15m ² building, 8hp milling machine

Basis for Calculation of Project Quantities:

Item	Quantity	Basis
① Number of villages covered by project	1,159	Results of village study
② Villages with no mill	891	1,159 x 0.769 (results of village study)
③ Planned number of mills	683	
④ Type A (10hp)	276	891 x 0.31 (percentage of villages with population of 700 or more)
⑤ Type B (8hp)	407	891 x 0.16 (percentage of villages with population of 500-699) + 891 x 0.53 (percentage of villages with population of less than 500) x 0.56 0.56 = 281 (average population of villages of less than 500)/500

Training and Guidance:


- ① Training in the mechanism and functions of mills, accounting procedures and machine operation and repair procedures is provided for management groups.
- ② For 2 years after the start of operation, a guidance tour is made to provide OTJ guidance in daily accounting procedures and machine maintenance.
- ③ When operation has stabilized, guidance is provided to ensure that a salary is paid to the person in charge of machine operation.
- ④ An auditing system for daily cash accounting operations is established.

Operation Plan:

Operating Organization	<ul style="list-style-type: none"> • The CGTV establishes a mill management group. • An accountant and machine operator are appointed within the management group. • The accountant and the machine operator take charge of daily management. 	
Operation Plan	Income	• The fee for using the mill is 15 Fcfa/kg and a volume of 200-400kg per day is estimated (approx. 70% rate of use).
	Expenditure	• Cost of fuel, mill repairs and personnel (for operation and maintenance)
	Profit	• Annual net profit: 400,000-800,000 Fcfa

2) Project to Promote Manufacture of Improved Ovens

Program Name	Project to Promote Manufacture of Improved Ovens	
Medium Goal	Reduction of women's burden and conservation of natural resources	
Minor Goal	Alleviation of firewood collecting labor and reduction of firewood consumption	
Background/Objective:		
<ul style="list-style-type: none"> • Simple 3-stone ovens consisting of stones arranged in a traditional way are generally used among households in rural areas. • Traditional ovens have low thermal efficiency and high consumption of firewood as fuel. This is one of the main factors in the decline of forests due to excessive tree felling. • Improved earthen ovens have already been introduced in some villages in the planned area, but their use is limited to those residents who have received training. • The thermal efficiency of earthen ovens is 50% higher than traditional ovens, and iron ovens have double the thermal efficiency of traditional ovens. • Therefore, the introduction of improved ovens can substantially reduce firewood consumption and alleviate the labor of collecting firewood. • The banco of which improved earthen ovens are made and the drum cans of which improved iron ovens are made can easily be procured in the planned area. For the manufacture of iron ovens, however, there must be a blacksmith in the village and the blacksmith must master the manufacturing procedures through training. • In this project, training of rural women in the manufacture and use of improved earthen ovens and the use of iron ovens and technical training of village blacksmiths in the manufacture of iron ovens are provided and iron oven manufacturing tools are introduced. 		
Expected Results:		
<ol style="list-style-type: none"> ① Reduced firewood consumption (Estimating the diffusion rate of improved ovens (earthen and iron ovens) at 80%), fuel consumption is expected to fall to two-thirds of the present level in the target year) ② Alleviation of women's firewood collecting labor (expected in the target year to fall to one-third of the present level and to 50% of present labor through new afforestation in neighboring forests and establishment of land use regulations among residents) ③ Conservation through reduced load on forest resources 		
Activities:		
<ol style="list-style-type: none"> ① Investigation of actual conditions of fuel consumption and forest decline through PRA survey ② Decision by CGTV on whether or not to adopt the project ③ Establishment by residents of a maintenance and operation system for the manufacturing tools for iron ovens ④ Training in manufacture and use of improved ovens ⑤ Manufacture of earthen ovens by residents and manufacture and sale of iron ovens by blacksmiths ⑥ Use of improved ovens and promotion of improved ovens by residents 		
Input: Project side		Input: Malian Government side
<ol style="list-style-type: none"> ① Expert in organizing residents ② Cost of iron oven manufacturing tools: 143 million Fcfa (Basis) 212,000 Fcfa x 672 villages ③ Cost of training in use and manufacture: 711 million Fcfa (Basis) Earthen ovens: 340,000 Fcfa x 1,159 villages Iron ovens: 471,000 Fcfa x 672 villages 		<ol style="list-style-type: none"> ① C/P (extension worker) for forest conservation ② C/P (extension worker) for organizing residents
		Input: Residents side
		<ol style="list-style-type: none"> ① Manufacture and provision of banco for manufacture of earthen ovens ② Contribution of 30% of the cost of materials for manufacture of iron ovens

<p>Iron Oven Manufacturing Tools: Training content:</p> <ol style="list-style-type: none"> ① Technical training in iron oven manufacture is provided for blacksmiths in each Commune based on a 10-day curriculum in the form of OJT combined with lectures in the principal village of the Commune. ② Training in the manufacture and use of earthen ovens is provided mainly for women in each village based on a 3-day curriculum. A demonstration of how to use iron ovens is also given in each village at the same time. ③ The training uses illustrated textbooks and videotapes. 	<p>Photo: Finished Iron Ovens</p> 
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Project Implementation Criteria:

- Training in the manufacture and use of earthen ovens is provided in all the villages in the planned area and technical training in the manufacture of iron ovens is provided in the villages where there are blacksmiths who are willing.

Basis for Calculation of Project Quantities:

Item	Quantity	Basis
① Number of villages in the verification study	12	
② Number of villages where there are blacksmiths who are willing	7	
③ Rate of participation in manufacture of iron ovens	58%	
④ Total number of villages in the planned area	1,159	
⑤ Number of villages planning to introduce iron ovens	672	1,159 x 0.58 (results of verification study)
⑥ Number of villages for training in manufacture and use of earthen ovens	1,159	All villages in the planned area

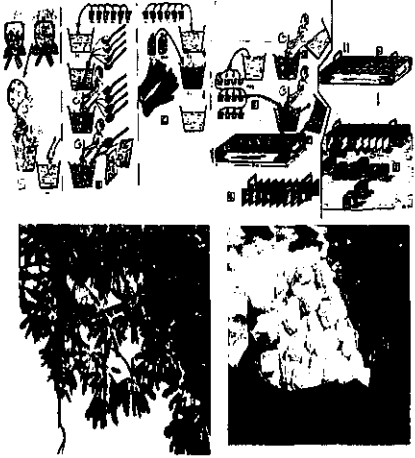
Program operation and management method:

In implementing this project, the following points should be promoted:

- ① Whether the control of iron oven manufacturing tools is entrusted to the CGTV or to the blacksmiths is determined in advance.
- ② The selling price of iron ovens and the profit distribution (how it is apportioned between the CGTV and the blacksmiths) are defined in advance.
- ③ The CGTV promotes the transfer of know-how relating to the manufacture and use of earthen ovens from trained residents to other residents.

3) Handicraft Manufacture Promotion Project

Program Name	Handicraft Manufacture Promotion Project	
Medium Goal	Reduction of Women's Burden	
Minor Goal	Increase of women's disposable income	
Background/Objective:		
<ul style="list-style-type: none"> • Residents in the planned area have few opportunities to earn cash. The main opportunity to earn cash is the sale of agricultural produce. The only other means of earning cash in the vicinity of the village is the sale of firewood and charcoal. • In particular, women are very busy with farming work, domestic work and firewood collection and have little free time to spare. They have virtually no opportunity to earn cash. • Increasing the disposable income of women will lead to improvement of their social position and reduce the existing means of earning cash (sale of firewood). • In the planned area, profits earned by women from cottage industry activities are customarily recognized by the head of the family as belonging to the woman in question. (This is not recognized for adult men whose income has to be handed to the head of the family.) • Therefore, women's disposable income can be increased by promoting the manufacture of handicrafts using simple techniques and local materials. 		
Expected Results:		
<ol style="list-style-type: none"> ① Establishment of handicraft industry by women's groups ② Increase of women's disposable income ③ Forest conservation through alleviation of the pressure causing the decline of forest resources 		
Activities:		
<ol style="list-style-type: none"> ① Decision by women's group in CGTV on whether or not to adopt the project ② Training in handicrafts ③ Formation of operation plan by handicraft type and establishment of profit distribution rules ④ Manufacture and sale of handicraft products 		
Input: Project side <ol style="list-style-type: none"> ① Expert in women's development ② Expert in organizing residents ③ Cost of training: 695 million Fcfa (Basis) Manufacture of soap, bisap, ointments and 4 dyes: 150,000 Fcfa x 4 products x 1,159 villages 	Input: Malian Government side <ol style="list-style-type: none"> ① C/P (extension worker) for women's development ② C/P (extension worker) for organizing residents 	
	Input: Residents side <ol style="list-style-type: none"> ① Provision of all materials and labor ② Contribution of 30% of the cost of the manufacturing equipment and training materials 	

<p>Types of Handicraft to be Introduced:</p> <ol style="list-style-type: none"> ① Manufacture of soap using karite butter as the basic material ② Manufacture of bisap juice that is popular in the whole of West Africa ③ Manufacture of cosmetic ointments using karite butter as the basic material ④ Manufacture of four kinds of traditional dye ⑤ There is great demand for these products in local markets. <p>Training Content:</p> <ol style="list-style-type: none"> ① A number of groups are formed in each Commune and training is provided in the principal village of each group based on a 3-day curriculum per product mainly in the form of OJT. ② The training covers management of materials and profit distribution. ③ The training uses illustrated textbooks and videotapes. 	<p>Photo: Manufacture of soap from the oil in karite nuts</p> 
<p>Project Implementation Criteria:</p> <ul style="list-style-type: none"> • Training is provided for all the villages in the planned area. 	
<p>Administration Method:</p> <p>When manufacturing handicrafts, consideration for the following points is promoted:</p> <ol style="list-style-type: none"> ① Each women's group runs its own activity. For this reason, the activity may fail easily if the roles within the group and the profit distribution rules are not clearly and fairly defined. As the literacy rate and accounting ability of women are low, the participation of women in literacy and accounting training is promoted before the start of the project. ② Soap manufacture is the most popular among residents. Karite butter and caustic soda are required as the raw materials. However, these materials are difficult to procure in rural markets. Therefore, it is necessary to procure these materials systematically in city markets and stock them appropriately. 	

5.4 Improvement Goals of Farming Operation

5.4.1 Guidelines for Operation Improvement

In the planned area, efforts to combat desertification will be unsuccessful without cooperation in the agricultural, pastoral and silvicultural fields. Similarly, there will be no prospect of improving farmers' incomes through higher productivity in each field. The measures for enhancing productivity in the agricultural, pastoral and silvicultural fields described below are taken in order to improve farming operation through strengthened organic agro-sylvo-pastoral tie-ups and sustainable development.

① Higher productivity by contribution from agricultural field to pastoral field

Farm produce residue (stalks and leaves) generated in the agricultural field is used as fodder for livestock. In particular, nutritional blocks can be manufactured by using the lees from pulverized millet, and the residue from milled cereals and rice and from oil-making can be used as fodder for livestock.

② Higher productivity by contribution from pastoral field to agricultural field

Animal excrement generated as a by-product in the pastoral field is effectively fed back to the agricultural field. More precisely, it is planned to feed back animal excrement by the use of parcentage¹ for collecting the manure by installing livestock enclosures, and to set up simple compost yards.

③ Higher productivity by contribution from silvicultural field to pastoral field

Fodder plants are planted within the framework of afforestation activities. The transhumance paths are fixed and trees are planted along them.

(1) Agricultural Field

In rain-fed agriculture, the production of cereals, especially millet, is boosted and cash-earning farm produce such as peanuts, bambara legumes, corn and cassavas are expanded. For this purpose, new varieties are introduced and various measures including improvement of agricultural laws and conservation of agricultural land are implemented. Through these measures, it is aimed to increase the unit yield of millet from the present 870kg/ha to 1,300kg/ha. (The basis of the target value is shown in Annexé M5.4.1.)

In addition, vegetable fields using small-scale irrigation are provided in the villages or in the neighborhood of the villages. The items farmed are vegetables and fruit trees, which are cultivated and managed using wells from the rainy season through the dry season. The products not only serve as self-supply foods for improvement of eating habits but also increase cash incomes through the sale of surplus products.

The goal of improving farm produce production costs through this program is shown in Table 5.4.1. (The original unit quantity is shown in Annexé M5.4.1.2.)

¹ Parcentage (enclosure): The stalks and leaves of cereals are left in the fields after harvesting and livestock are pastured in the fields for a certain period. By this means, animal excrement is discharged and fed back to the fields as organic nutrients, and cereals are again cultivated.

Table 5.4.1 Millet Production Costs per Hectare

Model No.		Without Project	With Project	(Reference) USAID Estimation	
Agricultural type		Livestock, millet	Fertilizer (exc. PNT)	Conventional varieties and fertilizers	
Operation scale (ha)		5	5	5	
Unit yield (kg/ha)		870	1,300	3,000	
Expenditure	Cash Expenditure	Employment wages	-	-	
		Seeds	700	700	700
		Fertilizer	8,000	20,000	24,000
		Agricultural chemicals and sprays	50	50	50
		Manual tools (consumables)	1,000	1,000	1,000
		Working cattle management	4,265	4,265	4,985
		Repair of agricultural tools	723	723	945
		Lending of agricultural tools			
		Interest payable	1,824	1,824	2,830
		Taxes and duties			
		Distribution and shipment			
		Total cash expenditure	16,562	28,562	34,510
	Non-cash Expenditure	Self wages	40,000	40,800	106,320
		Equipment depreciation cost	5,284	5,284	6,685
		Working cattle depreciation cost	2,000	2,000	2,430
		Earnings on equity @ 12%	6,680	6,680	8,395
		Total non-cash expenditure	53,964	54,764	123,830
Total expenditure		70,526	83,326	158,340	
Income	Cash Income	Sales to governmental agencies	2,000	2,000	5,460
		Sales to private markets	30,000	61,000	176,540
		Sales of by-products			
		Total cash income	32,900	63,000	182,000
	Non-cash Income	Self-consumption amount appraised	28,000	28,000	28,000
		Farm by-product use amount appraised	2,000	2,000	2,000
		Total non-cash income	30,000	30,000	30,000
Total income		62,960	93,000	212,000	
Operational Index per ha	Total cash income		32,900	63,000	182,000
	Total cash expenditure		16,562	28,562	34,510
	Cash income		16,338	34,438	147,490
	Total income		62,900	93,000	212,000
	Total expenditure		70,526	83,326	158,340
	Net profit		-7,626	9,674	53,660
	Total earnings		32,374	50,474	159,980
	Increase in net profit		-	17,300	61,286
	Increase in earnings		-	18,100	127,606

(2) Pastoral field

In the pastoral field, livestock productivity per head is improved through the effective use of fodder resources. Measures for fodder production and improvement of stock-raising management and livestock productivity are taken to enhance livestock productivity and improve farmers' incomes.

In this program, the target values of higher livestock productivity are set as shown in Table 5.4.2. Substantial improvement in the accident rate and higher productivity per head are expected by implementing measures for sanitation, improvement of the fodder supply and breed improvement.

Table 5.4.2 Target Values for Higher Livestock Productivity

Productivity Item	Unit	Cows		Sheep		Goats		Poultry	
		Present	Planned	Present	Planned	Present	Planned	Present	Planned
Live weight	kg	♀ 250~	♀ 350	♀ 30	♀ 45	♀ 30	♀ 30	♀ 2.0	♀ 2.5
		♂ 350	♂ 400	♂ 40	♂ 50	♂ 40	♂ 40	♂ 2.5	♂ 3.0
Delivery interval	Months	18	16	12	12	6.5	6.5		
Start of breeding	Months	38	30	23	23	10	10		
Service life	Years	12	10	♀ 8	♀ 8	♀ 6	♀ 6		
No. of deliveries during life	Head	5	6	6	6	11	11		
Weight of young	kg	12~14	♀ 14	3~3.5	♀ 3.5	3~3.5	♀ 3.5		
Accident rate of young	%	14 or more	10	20	12	10~20	10		
Yearly milk production	kg	400~500	600	40~50	60	50~60	80		
Egg laying start	Months							6	6
No. of eggs	Eggs							48	100
Egg weight	g							35	50

A comparison of present and planned profitability is shown in Table 5.4.3. The basis of profitability calculations is shown in Annexé M5.4.1-6. The amount of earnings per head is expected to increase about 50% for cows and goats and 20% for sheep. The profitability of poultry is estimated by egg production. It is possible to increase income to more than double the present amount per hen by a substantial increase in egg weight and quantity of eggs.

Table 5.4.3 Profitability of Livestock

Unit: Fcfa

Livestock	Unit	Gross Income		Expenditure		Net Income	
		Present	Planned	Present	Planned	Present	Planned
Cows	Per head	26,378	41,641	10,297	17,273	16,081	24,368
Sheep	Per head	12,514	15,683	4,299	5,635	8,215	10,048
Goats	Per head	5,552	7,926	2,811	3,795	2,740	4,130
Poultry	Per head	2,078	5,736	1,330	3,594	748	2,142

(3) Sylvicultural field

The M/P is aimed at stabilizing the balance between demand and supply in the sylvicultural field. (For details, refer to the next section.) As seen from the aspect of farming operation, no major effect on income can be expected by implementing forestry-related projects. In this project, however, private planting, especially the cultivation of trees with high added value (such as mango and papaya, and henna as a cosmetic material) is promoted in the afforestation promotion project, aimed at securing an income of 20,000 Fcfa (equivalent to the income from 5 fruit trees) in the sylvicultural field.

5.4.2 UPA Income in the Target Year

In the countries of West Africa, the population is increasing at an annual growth rate of almost 3%. This high rate of increase in population is the major cause of the vicious cycle of irreversible consumption or degeneration of natural resources, the decline of agricultural, pastoral and silvicultural production capacity, the advance of desertification and the increase in the number of poor.

The future population growth rate in the planned area is estimated to be 2.2%, and if it increases at this rate, the population in the target year will be more than 1.6 times the present population. So for instance, for UPA income in the target year to double, an increase of 3 times the present income or more will have to be realized. Even if the increase in income is more moderate, it is considerably difficult to meet the necessary conditions sufficiently to realize both the prevention of desertification and a substantial increase in residents' incomes at the present population growth rate, considering the cost of the measures and the sustainability of the activities.

In this plan, the goal of improving operation was set under the following requisite conditions:

- ① The highest priority should be given to alleviating the degradation of natural resources and land and the progress of desertification, and the cultivated area of farm produce and the number of livestock raised should not exceed the present level.
- ② In this plan, the measures for improvement of agricultural, pastoral and silvicultural technology, enhancement of land fertility, improvement of land use for the cultivation of biomass in aggravated lands, woodlands and grasslands, conservation of land and resources, improvement of grassland and afforestation should be reinforced.
- ③ Under these conditions, productivity would be enhanced and an increase in income could be expected. However, it would be difficult to realize a substantial increase in income at the planned population growth rate of 2.2% (scenario 1). Therefore, this plan is positioned at preventing a decline in income per UPA (per person) due to population growth and stabilizing income.
- ④ For this purpose, alternative proposals in the case of suppressing population growth to 2.0% (scenario 2) and 1.5% (scenario 3) were prepared and a comparison made.
- ⑤ Scenario 4 was prepared assuming the social mobility of the rural population. Migration from the rural area to the cities (social mobility) is a common trend seen in many developing countries, and Mali and the project area are no exception. Over the past 30 years or so, the share of the total population accounted for by the rural population has declined from 87% to 70%. Rural population growth is approximately 0.7 points lower than the average annual growth in the whole of Mali and 3.2 points lower than in the cities. The contribution to total population growth provided by the rural population fell from 70% in the late 1960s to less than 50% by 2000. (Table 5.4.2.1, Fig. 5.4.2.1)

As this trend is likely to continue in future and allowing for the fact that that most of the project area is in the rural area, population growth in scenario 4 was set at an annual rate of 1.6%.

In terms of population shift, Ségou, the principal city in the project area, is very much a transit point between the eastern region and the capital of Bamako and it is hard to imagine the inflowing population from other regions settling there and creating major social population growth in Ségou.

- ⑥ The number of UPAs in the target year was estimated to be the same as the present, assuming that the number of UPA members did not change. The cultivated area of farm produce and the head of livestock and poultry raised per UPA were obtained by dividing the present cultivated area and head of livestock and poultry by the number of UPAs in the target year.

Table 5.4.2.1 Differences in Urban and Rural Population Growth in Mali

Unit: 1,000 people

Year	Total Population	Rural Population	Urban Population	Rural Population as Share of Total Population	Annual Population Growth Rate			Rate of Total Population Growth Accounted for by Rural Population
					National	Rural	Urban	
1968	5,249	4,535	714	86.4%	2.1%	1.7%	4.7%	70.6%
1970	5,484	4,699	785	85.7%	2.3%	1.8%	4.9%	69.4%
1975	6,169	5,169	1,000	83.8%	2.3%	1.8%	4.9%	65.7%
1980	6,837	5,575	1,262	81.5%	2.2%	1.6%	4.8%	60.0%
1985	7,716	6,095	1,621	79.0%	2.6%	1.9%	5.3%	58.0%
1990	8,778	6,689	2,089	76.2%	2.6%	1.8%	5.1%	53.9%
1995	9,928	7,264	2,664	73.2%	2.6%	1.7%	5.0%	48.6%
2000	11,351	7,941	3,410	70.0%	2.8%	1.9%	5.1%	46.8%
2001	11,677							
Annual Average Population Growth	National				2.43%	1.77%	5.00%	
	Project area				2.20%	1.61%	-	

Resource : FAO Year Book (2002)

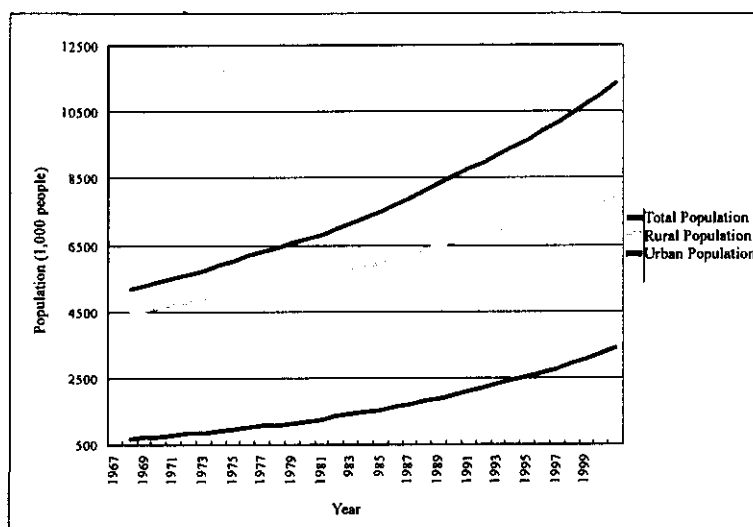


Figure 5.4.2.1 Population Trends in Mali

Under the requisite conditions described above, the effect of the measures was calculated and the income of the average UPA in the planned area was also estimated to obtain the target values. The income of the UPA at the present time and in the target year is described below. (Refer to Table 5.4.2.2)

- ① Assuming that the planned population growth is 2.2%, UPA income in the target year will remain at a level at which the present income can be maintained (approximately 650,000 Fcfa) even if various agricultural measures are taken (“with project”) and no substantial improvement can be expected (scenario 1). An increase of 2.5% can be obtained in the case of scenario 2 and an increase of nearly 17% above the present income can just be obtained in the case of scenario 3.
- ② In the case of scenario 4 assuming the social mobility of the rural population to the cities, the increase in income is 14%. As migration to the cities is accelerating in Mali and there is a clear downward trend in the contribution of the rural population to total population growth, this may actually be an appropriate scenario.
- ③ This means that it will be difficult to satisfy both conditions, namely alleviating desertification and improving the income of residents, if the population growth cannot be suppressed to about 1.5% or people will not migrate from rural area to the outside of project area like cities. In the event of being “with project” as described above, however, the village lands and natural resources can be conserved and cultivated and desertification can be alleviated in each of the above cases. In the case of scenario 3, GDP per person can be improved from the present \$82 to \$93.
- ④ In the event that no measures are taken and the present conditions remain (“without project”), however, the present income in scenario 1 will drastically fall almost 38% to 400,000 Fcfa, resulting in an increase in those living in poverty. Under scenarios 3 and 4 income will fall almost 30%, creating similar serious conditions. In reality, the degeneration of resources and the further desertification may progress and have a synergistic effect (vicious circle), resulting in a greater drop in income.
- ⑤ Income will not increase greatly even in the case of “with project”, but the drop in income can be alleviated 38 points in scenario 1 in comparison with the case of “without project” and an improved effect on residents’ incomes of approximately 45 points in total can be secured in scenario 3 and 4. From the viewpoint of amount, implementing the project will have the effect of avoiding a decline in income of about 250,000 Fcfa per UPA in the target year (approximately 300,000 Fcfa in scenario 3 and 4, Figure 5.4.2.2).

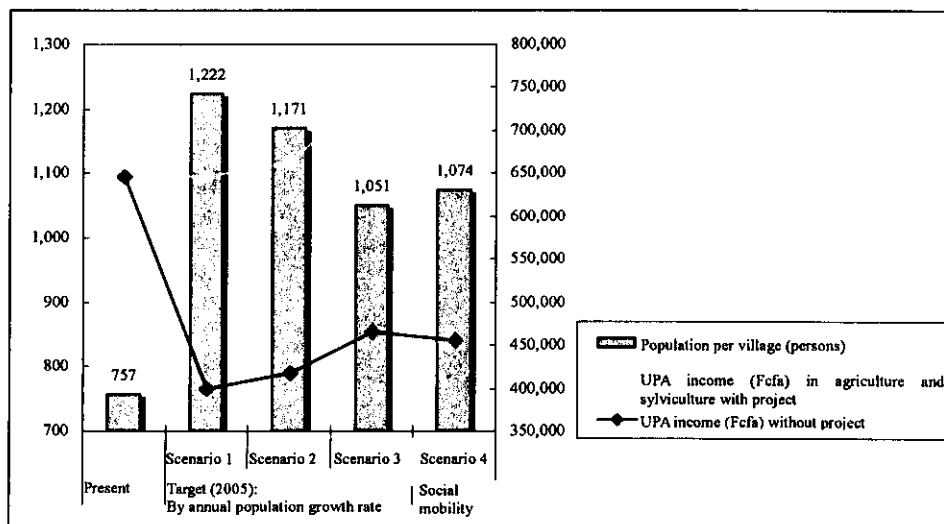


Figure 5.4.2.2 Difference in UPA Income With and Without Project

Table 5.4.2.2 Estimation of UPA Operation in the Target Year

Index	Present	Target year (2025): by annual population growth			Social mobility	Remarks
		Scenario 1	Scenario 2	Scenario 3	Scenario 4	
		2.2%	2.0%	1.5%	1.6%	
Population per village (persons)	757	1,222	1,171	1,051	1,074	Average figures for 275 villages in the village register survey
Number of UPAs per village	59.2	95.5	91.5	82.1	83.9	
Population per UPA (persons)	12.8	12.8	12.8	12.8	12.8	
Cultivated area for farm produce (ha) per UPA	11.5	7.0	7.4	8.2	8.1	Same as above
Cereals (ha)	9.5	5.9	6.2	6.9	6.7	
Others (ha)	2.0	1.1	1.2	1.4	1.4	
Head of livestock and poultry						
Cows	8.4	5.2	5.1	6.1	5.9	The average figures for the 12 villages in the verification project are used for the present number of livestock and poultry because the figures recorded in the village register survey were too small.
Goats and sheep	18.4	11.4	11.2	13.3	13.0	
Poultry	3.5	2.2	2.1	2.5	2.5	
Income from farm produce (Fcfa)	356,153	364,161	384,427	432,127	420,439	
Cereals (Fcfa)	288,553	297,797	312,939	348,271	338,166	Represented by millet
Others (Fcfa)	67,600	66,364	71,488	83,856	82,273	Represented by peanuts including vegetables (10,000 Fcfa) in plan
Income from stock-raising (Fcfa)	289,444	246,561	242,087	286,808	280,662	
Cows (Fcfa)	135,670	127,371	124,796	148,162	144,987	
Goats and sheep (Fcfa)	151,156	114,545	112,720	133,243	130,387	Represented by sheep
Poultry (Fcfa)	2,618	4,645	4,571	5,403	5,287	
Income from sylviculture		20,000	20,000	20,000	20,000	Estimated income equivalent to 5 fruit trees
Income from sale of handicrafts		15,000	15,000	15,000	15,000	100 pc of soap x 25 Fcfa/pc x 0.6 income rate
UPA income from agriculture and stock-raising with project (Fcfa)	645,597	645,722	661,514	753,935	736,101	
Income per UPA member (Fcfa)	50,437	50,447	51,681	58,901	57,508	
GDP per person (US \$)	82	82	84	95	93	Conversion rate: 656Fcfa/EU and US\$1.062/EU
Comparison with present income	100.0%	100.0%	102.5%	116.8%	114.0%	
UPA income without project (Fcfa)	645,597	399,983	417,597	465,274	455,302	
Income per UPA member (Fcfa)	50,437	31,249	32,625	36,350	35,570	
GDP per person (US \$)	82	51	53	59	58	Same as above
Comparison with present income	100%	62.0%	64.7%	72.1%	70.5%	

5.5 Target Demand and Supply of Products

5.5.1 Character of Target

The target values adopted in this project are set at levels that are expected to be attained if the measures verified through the verification project, namely measures that are deemed to be realistically acceptable to residents and feasible in a sustainable way, are taken.

5.5.2 Target by Sector

A summary of the demand and supply targets of agricultural, pastoral and silvicultural products is shown in Table 5.5.1. Production and supply/demand by sector in the target year are as follows:

(1) Cereal production

The target cultivated area of farm produce is 780,000 ha, the same figure as for 2001, of which cereals are expected to account for 85% or 660,000 ha. So cereal production of 858,000t (1.5 times present production) is expected in the target year as estimated at the planned unit yield of 1.3t/ha.

On the other hand, the population of the planned area was estimated to be 877,000 in 2000 (from the results of the village register survey) and will increase at an annual growth of 2.2% to 1,416,000 persons (1.6 times the present level). Assuming that annual cereal consumption per person is 250kg, the cereal self-sufficiency rate is estimated to be about 242% in the target year. This means that the self-sufficiency rate will decline about 20 points compared with at present, but a surplus of about 500,000t (enough for 2 million people) can be appropriated to supply other areas outside the planned area. The capacity to supply cereals to other areas stands at 350,000t at present and is expected to increase 150,000t in the target year.

(2) Livestock production

The planned number of livestock will not be increased above the present level out of consideration for fodder resources. Cattle, sheep and goat production will be substantially increased as shown in Table 5.5.2, by taking the following measures: ① increase of grasslands and fodder plant production through the development of a fodder production infrastructure; ② increase of the turnover rate of livestock through shipment at the appropriate time; ③ enforcement of health measures by vaccination; and ④ improvement of livestock nutrition in the dry season by the supply of nutritional blocks and hay adjustment. Poultry production will be increased as shown in Table 5.5.2 by taking the following measures: ① breeding in improved poultry houses; ② enforcement of vaccination measures and protection against internal and external parasites; and ③ nutritional improvement by the supply of shells, fish powder, termites and millet lees.

The construction rate for the facilities in the project is not 100%. Therefore, the increase in livestock was estimated by setting the facilities construction rate to 50% for cattle, sheep and goats and 10% for poultry. As a result, beef, mutton and goat meat is expected to increase by 40%, milk by 16%, eggs by 17% and chicken by 11%. The indices for the livestock production program are shown in Annexé M5.5.1-5.

As a result, livestock production is expected to increase by 22% compared with the present level to

89,000 tons. The self-sufficiency rate is 113%, maintaining the standard level, but it cannot cover the increase in population. So it is predicted that the self-sufficiency rate will drop 36.5 points below the present rate.

Table 5.5.1 Demand and Supply of Agricultural/Pastoral/Sylvicultural Products

Index	Unit	Base Year	Target year	Balance	Remarks		
(Basic Value)							
M/P planned area	1000 ha	2,260	2,260	-	Processed from data in the village register survey (2000)		
Number of villages		1,159	1,159	-	It is assumed that the number of villages will be unchanged in the target year.		
Population		877	1,416	1.614	Planned population growth =2.2%		
Agricultural land per village	ha	673	673	-	The following are the average figures from the data in the village register survey and are assumed to be the same in the target year		
Cereals	ha	538	538	-			
Head of cattle		261	261	-			
Head of sheep and goats		567	567	-			
Head of poultry		207	207	-			
(Agriculture)							
Agricultural area	1000 ha	780	780	-	The cultivated area is not increased from the present level.		
Cereals	1000 t	660	660	-	Same as above		
Unit yield of cereal	kg/ha	870	1,300	1.494			
Cereal production	1000 t	574	858	1.494	Present unit yield: 870kg/ha, planned unit yield: 1,300/kg/ha		
Cereal consumption	1000 t	219	354	1.614	250kg/person/year		
Cereal self-sufficiency rate	%	261.8%	242.4%	-19.4 points			
(Stock Raising)							
Head of livestock					The number of livestock is not increased.		
Cattle		468	468	-			
Sheep		538	538	-			
Goats		715	715	-			
Poultry		1,410	1,410	-			
Livestock production	t	72,744	88,821	1.221	Livestock consumption (Person/Year)		
Meat	t	18,325	25,681	1.401	Item	Unit	Consumption
Milk/milk products	t	52,056	60,386	1.160	Beef	kg	8.4
Eggs	t	2,045	2,401	1.174	Mutton/goat meat	kg	5.1
Chicken	t	318	353	1.110	Total meat	kg	13.5
Livestock consumption	t	48,518	78,311	1.614	Chicken	kg	2.6
Meat	t	11,844	19,118	1.614	Cow's milk	l	13.1
Milk/milk products	t	33,428	53,954	1.614	Goat's milk	l	16
Eggs	t	965	1,558	1.614	Sheep's milk	l	9.3
Chicken	t	2,281	3,682	1.614	Total milk	l	38.1
Livestock self-sufficiency rate	%	149.9%	113.4%	-36.5 points	Eggs	kg	1.1
(Sylviculture)							
Forest area	1000 ha	475	682	1.437			
Sylvicultural production	1000 m ³	523	751	1.437	Annual growth = 1.1 %/year		
Sylvicultural consumption	1000 m ³	762	751	0.985	Present annual consumption = 1kg/person/day x 365 days + 0.42?/kg = 0.869?/person/year		
					Planned annual consumption = Present consumption x 0.61		
Sylvicultural self-sufficiency rate	%	68.5%	100.0%	+31.5 points	(Target striven for, but difficult to realize.)		

Table 5.5.2 Livestock Production Plan

Item	Type	Head	Livestock Products (t)				Remarks
			Meat	Milk	Eggs	Chicken	
Present	Cattle	467,543	9,195	32,627			
	Sheep	537,929	4,354	11,483			
	Goats	715,161	4,776	7,946			
	Poultry	1,409,630			2,045	318	
	Total			18,325	52,056	2,045	318
Planned	Cattle	467,543	15,010	38,790			
	Sheep	537,929	5,206	12,959			
	Goats	715,161	5,465	8,637			
	Poultry	1,409,630			2,401	353	
	Total			25,681	60,386	2,401	353
Increase rate			40%	16%	17%	11%	

(3) Sylviculture

Sylviculture in the planned area consists mainly of wood resources for firewood collection and this basic structure will remain unchanged in the future. The M/P is aimed at promoting improved ovens and enhancing the diffusion rate from the present 5% for earthen ovens to 90% for iron ovens and 95% for earthen ovens in order to suppress the demand for firewood.

On the other hand, the mini-nursery construction project and the afforestation promotion project are aimed at balancing demand and supply in sylviculture by increasing the forest area by 10% compared with the present level (from 475,000 ha at present to the goal of 682,000 ha) and sylviculture productivity by 10% (from the present forest reproduction level of 1t/ha to the goal of 1.1ton/ha). Annexé M5.5.4 shows the basis of the sylvicultural demand and supply balance calculated for the target year.

5.5.3 Impact of Population Growth on Supply and Demand for Agricultural, Stock Raising and Sylvicultural Products

Supply and demand in each scenario in 5.4.2 is described below.

- ① Self-supply in cereals can be achieved “without project”, but the self-supply rate will drop 100 points and there will be a conspicuous decline in the ability to supply other areas. Cereals are not only residents’ staple food, but the principal source of income and they have a major impact on residents’ incomes. Under scenario 2 “with project”, self-supply close to the present level can be maintained, and under scenarios 3 and 4 a large increase in the ability to supply other areas can be expected (approx. 200,000t compared with the present level).
- ② As productivity growth in livestock products falls below population growth in every scenario, self-supply can be maintained, but at a lower rate. Under scenarios 3 and 4 the current level of supply capacity is achieved. However, self-supply becomes impossible in the case of “without project” (the self-supply rate declines to 93%). Stock raising is a major source of income for farmers and at the same time stock is highly valued as savings and assets and can be expected to exert considerable influence not only on the rural economy but also on mental well-being and living conditions.
- ③ Even in its present state, forestry products have fallen over 30% below self-supply level.

Forestry products, especially firewood, are a basic necessity of life for residents and “without project” consumption of forest resources will expand rapidly, leading to depletion. Estimates show that this state will be reached in 2016. In other words, the self-supply rate in the target year “without project” is zero. In scenarios 2 and 3 “with project”, a surplus is produced, and focusing on self-supply, pressure on the forests is relieved, contributing to conservation and nurturing of forest resources.

Table 5.5.3 Self-supply Rate by Population Growth Scenario in the Target Year

Index		Present condition	Without Project (2.2%)	Scenario 1 (2.2%)	Scenario 2 (2.0%)	Scenario 3 (1.5%)	Scenario 4 (1.6%)
Population	Actual figure (1000 persons)	877	1,416	1,416	1,356	1,217	1,244
	Index	1.000	1.614	1.614	1.546	1.388	1.418
Self-supply Rate	Cereals	261.8%	162.2%	242.4%	253.1%	282.0%	275.9%
	Livestock Products	149.9%	92.9%	113.4%	118.4%	131.9%	129.1%
	Forestry Products	68.5%	-	100.0%	104.4%	116.3%	113.8%
Surplus	Cereals (1000t)	355	220	504	519	554	547
	Livestock Products (t)	24,226	-5,567	10,510	13,813	21,499	20,025
	Forestry Products (1000m ³)	-239	-228	0	32	105	91

5.6 Assessment of Initial Impact on Environment

The purpose of formulating the Master Plan is to conserve natural resources and the environment through the establishment of sustainable agriculture.

(1) Items Requiring Evaluation of Environmental Impact

The main development actions in the projects are as follows:

- Improvement of agricultural roads
- Construction of new wells
- Development of vegetable fields
- Seeding natural pastures
- Development of forest
- Soil conservation

Since each of these development actions is of small-scale and it is anticipated that there will be no adverse impact on the environment within the study area, it is considered unnecessary to carry out an evaluation of the environmental impact, except for the effect of the groundwater drying up because of the increased volume of water pumped from the wells.

(2) Impact on Volume of Groundwater

In order to look into the impact on the volume of groundwater, the supply and demand for groundwater in the study area was estimated as shown in Table 5.6.1.

Table 5.6.1 Estimate of Supply and Demand for Groundwater in the Study Area

	Type of well	Number in study area (unit)	Pumping rate per day (m ³ /day)	Total Pumping rate (m ³ /day)	Pumping rate per year (A) (m ³ /year)
Demand	Modern wells (existing)	2,700	15	40,500	
	Traditional wells (existing)	30,000	2	60,000	
	Wells for drinking water (newly constructed)	865	10	8,650	
	Wells for irrigation (newly constructed)	700	12	4,632	
	Total			113,782	
Reserve	Area studied (hectares)	Yearly rainfall (mm)	Proportion of rainwater percolating underground	Volume of groundwater reserve per year (B) (m ³ /year)	
	3,300,000	600	5%	990,000,000	
Rate A/B = 4.2%					

Note: The pumping rate per day is estimated from the survey on the use of wells in the verification study zones. The minimum values from the results of the JGRC study are taken for the proportion of rainwater percolation underground.

As described above, the yearly demand for groundwater in the study area is about 4.2% of the yearly reserve, an extremely low figure. Thus, it can be judged that there is no possibility at all of the groundwater drying up because of the increase in the volume of water pumped under this project.

(3) Conclusion

The Master Plan gives precedence to the Plan National d'Action Environnementale et Programs d'Actions Nationaux de la Convention contre la Deserrification (PNAE/PANCD) and is consistent with these programs. Thus, it is considered that the Master Plan will make an effective contribution to environmental conservation in the study area.

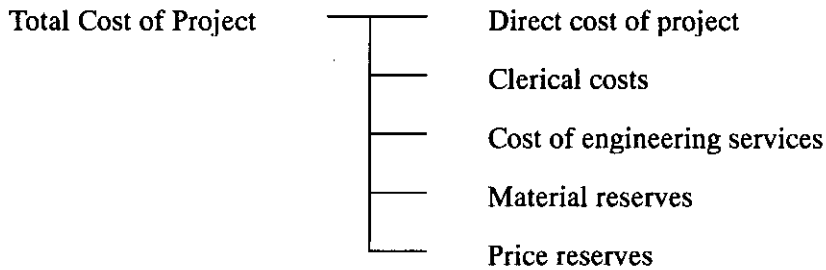
Implementation Plan

CHAPTER 6 EVALUATION OF PROJECT

6.1 Estimate of Cost of Project

(1) Total Cost of Project

The total cost structure of the project is as shown below. Maintenance costs are not included as these will be met from charges collected from the users by the maintenance organization. The costs of programs to be implemented by the Government as public services are included in the cost of the project.



1) Direct cost of project

The cost of construction works as a part of the direct cost of the project includes contractors' expenses.

2) Clerical costs

10% of the direct cost of the project is appropriated as operational expenses necessary for the implementing organization to carry out the project.

3) Cost of engineering services

15% of the direct cost of the project is appropriated as costs covering surveys, tests, design and construction management.

4) Material reserves

10% of the direct cost of the project is appropriated to cover increases in the cost of the project due to unexpected incidents, such as design changes or changes in weather conditions.

5) Price reserves

10% of the direct cost of the project is appropriated to cover price fluctuations during the period of implementation of the project.

6) Base year for estimates

The base year for estimates is 2002.

7) Foreign exchange rate

The foreign exchange rate used is 1FCFA = ¥0.2002 (1\$ = ¥121.20, 1EU=¥131.33, 1EU = 655.957FCFA), as of March 31, 2003.

The total cost of the project, estimated on the basis of (1) above, is shown in Table 6.1.1.

Table 6.1.1 Total Cost of Project

Field and Program Name	Project Cost (million FCFA)	1 st phase	2 nd phase	3 rd phase	4 th phase
1. Program to Improve Residents' Ability to Run Projects	9,617	1,036	2,436	3,175	2,970
1) Project to Establish Terroir Management Support System	2,544	676	605	734	529
2) Project to Support Organizing of Residents	835	43	216	288	288
3) Literacy Rate Improvement Project	4,141	211	1,072	1,429	1,429
4) Project to Improve Residents' Ability to Implement Projects	1,235	63	320	426	426
5) Project to Support Establishment of Micro Credit System	862	43	223	298	298
2. BHN Fulfillment Program	24,433	1,245	6,324	8,432	8,432
1) Modern Well Construction Project	6,378	325	1,651	2,201	2,201
2) Road Construction Project	18,055	920	4,673	6,231	6,231
3. Farmers' Income Stabilization Program	13,682	696	3,542	4,722	4,722
1) Project to Supply Improved Rain-fed Product Seeds and Fertilizer	1,827	92	473	631	631
2) Small-scale Vegetable Cultivation Project	4,364	222	1,130	1,506	1,506
3) Cereal Bank Construction Project	4,780	243	1,237	1,650	1,650
4) Vaccination Facility Construction Project	1,615	83	418	557	557
5) Livestock Fattening Project	127	6	33	44	44
6) Improved Poultry House Construction Project	707	36	183	244	244
7) Project to Introduce Improved Fodder Plants	262	14	68	90	90
4. Natural Resource Conservation and Management Program	1,413	71	366	488	488
1) Mini-nursery Construction Project	855	44	221	295	295
2) Afforestation Promotion Project	225	11	58	78	78
3) Project to Establish Land Use Rules	41	2	11	14	14
4) Soil Conservation Project	292	14	76	101	101
5. Program to Relieve Burden on Women	4,637	235	1,200	1,601	1,601
1) Mill Construction Project	3,088	157	799	1,066	1,066
2) Project to Promote Manufacture of Improved Ovens	854	43	221	295	295
3) Project to Promote Manufacture of Handicrafts	695	35	180	240	240
Total Direct Project Costs	53,782	3,383	13,868	18,418	18,213
Office Expenses	5,378	328	1,387	1,842	1,821
Engineering Service Cost	9,412	575	2,427	3,223	3,187
Material Reserve Fund	5,378	328	1,387	1,842	1,821
Sub-total	73,950	4,514	19,069	25,325	25,042
Price Reserve Fund	5,366	328	1,383	1,838	1,817
Total	79,316	4,842	20,452	27,163	26,859
Foreign Currency Equivalent	(\$ 131million)	(EU 121 million)			

6.2 Implementation Period for Project and Program Schedule

6.2.1 Implementation of Project Package

The projects proposed in the Master Plan will be packaged into one and the project package will be implemented in each village for about 5 years. The initial 2 years of the project period of 22 years will focus on setting up a project office and training extension workers. In the project package, the highest priority will be given to the programs related to the organization of villagers. Other programs will be implemented over the short, medium or long term, depending on the conditions in each village. The details are shown in Figure 6.2.1.

Figure 6.2.1 Priorities in Project Package

Program	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year	6 th Year	7 th Year
Development and establishment of promotional tools for Terroir management	■						
Promotion of Terroir management		■					
Construction of support facilities for extension workers' and Commune staffs' activities		■	■	■	■	■	■
Training of extension workers (PRA, bookkeeping)		■					
PRA survey			■				
Establishment of Terroir management committees			■				
Organizational reinforcement of Terroir management committees			■	■	■	■	■
Formulation of Terroir management programs			■				
Implementation of Terroir management programs				■	■	■	■
Support for establishment of small-scale finance system				■	■	■	■

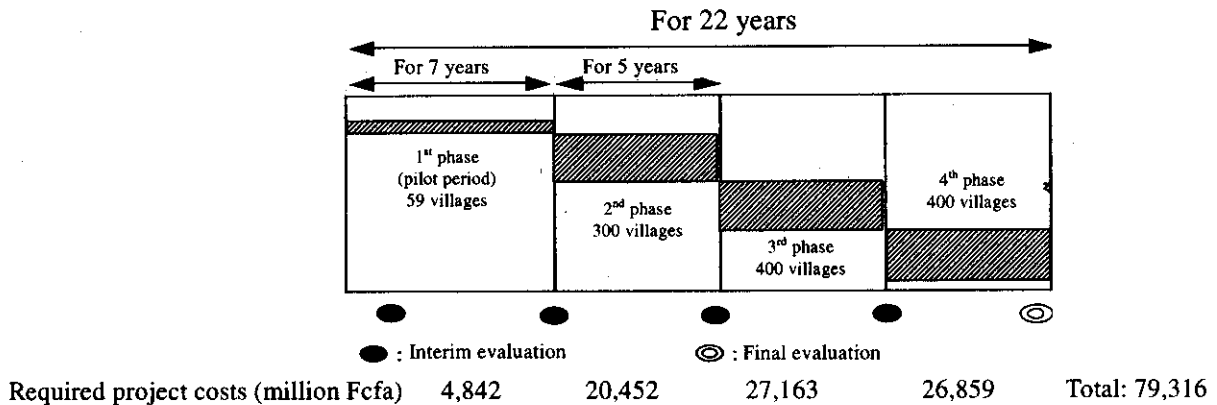
Note 1: The Terroir management programs include programs for the extension of technologies to improve agriculture, stock raising, forestry and livelihood, and programs for the improvement of agriculture, stock raising and forestry.

Note 2: First two years are used for establishment of systems.

6.2.2 Program Schedule

The project period is divided into 4 phases. In 1st phase, a pilot project will be implemented in 59 villages out of the total of 1,159 villages covered by the project. The first evaluation of the system of implementation will be conducted in the second year after the start of the project. An interim evaluation of 1st phase of Terroir Management will be conducted in the seventh year, and where necessary modifications will be made to the method of implementation and content of the Project from 2nd phase onwards. From the second phase to the fourth phase, programs will be implemented in 300, 400 and 400 villages respectively, to spread the costs. From the second phase to the fourth phase priority will be given to villages whose Communes are eager for the programs to be implemented. Figure 6.2.2 shows the schedule for implementation of the project and the work allocation.

Figure 6.2.2 Schedule for Project Implementation and Work Allocation



6.2.3 How to Select Villages

In implementing the Project on the above-mentioned schedule, the criteria for selecting the villages are as follows:

- ① A priority is given to the “Cercles” where the extension workers have been dispatched and the capacity building has been completed.
- ② A priority is given to the “Communes” that have a high maturity in formulation of the Commune development program.
- ③ A priority is given to those districts that represent the planned area and are expected to have the effect of exhibition.
- ④ A priority is given to villages that have a high grade of primary education.
- ⑤ A priority is given to villages where their leaders are firmly motivated with the Project.

The system and procedure of selecting villages are described in Section 7.1 “Project Implementing System” in Chapter 7.

6.3 Evaluation of Project

6.3.1 Economic and Financial Evaluation

(1) Significance of economic evaluation

The agricultural development program is an investment for the sake of development. Therefore, the revenue obtained from the investment should be at the very least exceed the amount invested. Furthermore, the ratio of revenue to cost should be higher than for other conceivable investment programs with the same purpose.

Typical “investment standard” indices for evaluating the economic effects of a project are the “net present value” (NPV), “benefit cost ratio” (B/C) and “internal rate of return” (IRR). In this project, the IRR, which is most widely used in international organizations, is used.

The “internal rate of return” means the rate of depreciation at which the current values of benefit and cost are equal: in other words, the earning rate that shows a break-even point.

The “internal rate of return” is the rate of depreciation (i) that satisfies the following formula:

$$\sum_{t=1}^{t=n} \frac{(Bt-Ct)}{(1+i)^t} = 0$$

If the estimated value of the IRR is greater than the given rate of depreciation, the investment can be justified; and if the estimated value is smaller than the rate of depreciation, the investment cannot be justified.

The IRR is used as the “financial internal rate of return (FIRR)” for financial evaluation to determine the appropriateness of investment in a project as a private enterprise, and is used as the “economic internal rate of return (EIRR)” for economic evaluation to determine the appropriateness of investment in a project from the point of view of the state.

(2) Benefit Evaluation

The benefit of a project under project evaluation is expressed as the difference between the implementation of the project (With-project) and non-implementation of the project (Without-project). This rule is common to both financial evaluation and economic evaluation. In economic evaluation, “*benefit* is that which contributes to the increase of national income, and *cost* is everything that reduces the national income”. Benefits in this project can be divided into measurable benefit and benefit that cannot be measured, only described qualitatively.

Measurable benefits include:

- ① Increase of farmers’ incomes through the implementation of measures for agricultural, livestock and forestry production
- ② Added value through the construction of agricultural product processing facilities
- ③ Savings on running costs of vehicles because of improved road conditions

Unmeasurable benefits that can only be described qualitatively include:

- ① Benefits of an improved social infrastructure (wells for drinking water, literacy centers, etc.)
- ② Benefits from ‘soft’ programs

(3) Pre-conditions for project evaluation

There are various methods of project evaluation; financial evaluation to evaluate the suitability for investment by private business, economic evaluation to evaluate the suitability of implementing a project from the point of view of the state, sensitivity analysis undertaking a case study of the prices of goods that have changed more than predicted, and evaluation of other factors, such as the effect on job creation and changes in social conditions.

1) Pre-conditions for financial and economic evaluation

The pre-conditions for financial and economic evaluation are as follows:

(a) Real interest

The price of all goods varies from year to year, and the loan interest of the financial institutions also varies accordingly. In evaluating projects, it is usual to ignore price fluctuations because it is difficult to predict price rises and changes in the loan interest rate during the period from the start to the end of a project. The loan interest rate (nominal interest) of financial institutions is determined after taking

price rises into account. For project evaluation, therefore, it is necessary to use a real interest rate from which the price rise portion has been deducted. The nominal interest rate for the period 1999 to 2002 was 12%, but the annual price rise rate in the same period was 2.5%. Thus, the real interest rate to be used for project evaluation will be 10% in reference to these values. The feasibility of the project will be evaluated based on whether the “financial internal rate of return” exceeds the real long-term interest rate (10%) or not. The short-term fund (agricultural fund) is appropriated yearly as the cost of farming operation.

(b) Interest on loan from international financial institution

The interest rate on a loan from an international financial institution will be 9%, which is the standard rate applied to loans from the World Bank for agricultural projects.

(c) Prices of agricultural and livestock products

Except for cotton, the prices of agricultural and livestock products in this project are determined based on consumption levels within the study area (including Bamako).

(d) Evaluation period

The project evaluation period will be 22 to 30 years.

2) Requisite conditions for economic evaluation

(a) Opportunity cost of capital

The opportunity cost of capital in projects implemented in West Africa by the World Bank is 10% to 12%. In assessing this project, for safety 12% will be adopted.

(b) Tradable goods

There is a difference between national price levels and international price levels due to import tax. In economic evaluation, it is necessary to assess prices based on price levels in the international market. For this purpose, price revision will be made for each commodity, based on the trade statistics in Mali, by obtaining the conversion factor (CF) given by the formula specified below. Of the tradable goods, those that account for a low percentage of the gross project costs will not be subject to price revision by the conversion factor for each commodity, but price revision will be made using the conversion factor (standard conversion factor (SCF)) for the entire trade volume.

$$CF = \frac{M + X}{M(1+tm) + X(1+s+tx)}$$

where M is the gross import amount

X is the gross export amount

tm is the import tariff rate

s is the export subsidy rate, and

tx is the export tariff rate.

Based on the results of calculation using the trade statistics (Annexé M6.3), the following was obtained:

Standard conversion factor (SCF) = 0.935;

Conversion factor for consumer goods (CFC) = 0.909

(c) Non-tradable goods

a) Labor

Labor is divided into family labor and employment labor, and employment labor consists of skilled and unskilled labor.

① Family labor

Family labor is a transfer account item and is excluded from the project costs.

② Skilled labor

There is considerable demand for skilled labor in the survey area and the labor market can be considered to be fully functioning. Therefore, the wages for skilled labor used for assessment are the wages used for the financial analysis multiplied by the conversion factor for consumer goods (CFC) = 0.909.

③ Unskilled labor

In the survey area, a single crop is grown per year and there is no notable industry except agriculture, so unemployment occurs particularly in the dry season. Some residents go to cities or neighboring countries to work, but all the surplus labor cannot be absorbed. Therefore, workers' wages used in financial analysis are multiplied by the employment rate and conversion factor for consumer goods (CFC) = 0.909 and used for assessment. The unemployment rate (1 – employment rate) will be 20%.

3) Financial evaluation

(a) The results of calculating the assessable projects are shown in Table 6.3.1.1. Grazing prevails in the study area. Plants with green leaves are limited in the dry season. Irrigated vegetables and young trees that have been planted and are not protected by fences against intrusion by livestock may be eaten by the grazing livestock. The financial internal rate of return (FIRR) of small-scale irrigation projects is so low that it is difficult to implement loan-based projects. The small-scale irrigation project and afforestation project are difficult to implement by loans because the financial internal rate of return (FIRR) is substantially lower than the real interest rate of 10%. However, these projects have a high social significance from the viewpoint of combating desertification. Other projects are feasible by loans. The foreseeable investment effects and the present situation are as follows:

① Small-scale irrigation

This is a popular program among residents, but the irrigated fields in grazing districts require the construction of fences against intrusion by livestock as well as construction of irrigation wells. The cost of building fences to keep out livestock is so high that the investment effect is low.

② Vaccination facilities

It is expected that the mortality of livestock due to disease can be improved 8% by vaccination, demonstrating the effectiveness of vaccinations. The number of livestock owned by farmers is clarified by conducting vaccinations and the livestock tax (250 FCFA per head) can be collected from the farmers. The demand for this project is high because the farmers recognize that the effectiveness of the vaccinations is greater than the amount of tax payment.

③ Afforestation

Without fences to keep the livestock out, all the saplings that have been planted will be eaten by livestock in the dry season. The growth rate of saplings is about two-thirds and

supplementary plantation is essential. In the study area, natural forests are cut down for sale and consumption, and the economic value of mature trees is low. However, the financial internal rate of return (FIRR) indicated above will be obtained if the wood is processed into charcoal and sold with added value.

④ Road construction

In the verification survey, the traffic volume transferred from bypasses increased substantially owing to rehabilitation of existing roads (it almost amounted to construction of new roads). The traffic volume increased 1.9 times for carts, 6 times for motorcycles and 2.7 times for bicycles. These figures were used to calculate the effect.

⑤ Mill construction

The working hours spent by farmers milling and polishing cereals can be curtailed by about 3 hours per day. If the working hours spent milling and polishing are converted into labor costs, the costs are 28% higher than the charges that the farmers pay to use the mill.

Table 6.3.1.1 Results of Calculation of Financial Internal Rate of Return (FIRR)

	Project	FIRR
(1)	Small-scale irrigation	0.87%
(2)	Vaccination facilities	20.97%
(3)	Afforestation project	0.90%
(4)	Road construction project	11.08%
(5)	Mill construction project	11.27%

4) Economic evaluation

The calculation results are shown in Table 6.3.1.2. If the economic internal rate of return (EIRR) exceeds 12%, regarded as the appropriate level of investment, the projects for construction of vaccination facilities, roads and mills are significant from a national point of view. However, the small-scale irrigation and afforestation projects are less appropriate in an economy based on the market prices of products.

Table 6.3.1.2 Results of Calculation of Economic Internal Rate of Return (EIRR)

	Project	EIRR	Remarks
(1)	Small-scale irrigation	9.57%	
(2)	Vaccination facilities	24.32%	
(3)	Afforestation project	2.48%	
(4)	Road construction project	11.17%	
(5)	Mill construction project	17.73%	

6.3.2 Project Evaluation from Social Viewpoint

(1) Consistency with higher-ranking plans

The objectives of agricultural development are indicated in the following plans:

- 1) "National Environmental Action Plan and National Action Plans for the Implementation of the United Nations Convention to Combat Desertification"

Important items related to agriculture

- ① Quantitative and qualitative acquisition of food and other products through sustainable

management of natural resources

- ② Joint activities with residents for improvement of living conditions and prevention of environmental pollution and hazards
- ③ Promotion of cooperative activities at regional level and international level in the environmental conservation field.

2) "Directive Scheme for Rural Development Sector (Schéma directeur du secteur développement rural)

Important items related to agriculture

- ① Food security by increased production of food, diversification of production and increased production in agriculture, stock raising and sylviculture
- ② Environmental conservation for sustainable development and conservation and acquisition of natural resources

The development plan (M/P) complies with the basic programs of the above higher-rank plans. Increased production of cereals by the introduction of seeds and rationalization of fertilization practices will secure greater self-sufficiency and sustainability (national utility), and the small-scale irrigation program will contribute to improving eating habits, promoting higher incomes and relieving poverty. The implementation of literacy education will contribute to cultivating basic abilities for various activities, and sapling production and afforestation will directly contribute to the prevention of desertification.

(2) Qualitative evaluation

In addition to the quantitative economic evaluation, a qualitative evaluation of each project was made from the viewpoint of the local community based on 9 indicators as indicated in Table 6.3.2.1. Of these indicators, the assessment of "project difficulty" used the results (score in project evaluation) of the verification project. The indicators for evaluation are ① contribution to combating desertification; ② meeting the needs of rural society; ③ contribution to reduction of poverty; ④ compatibility with the technical level of the administration; ⑤ compatibility with the technical level of residents; ⑥ compatibility with the funding scale; ⑦ difficulty of implementation; ⑧ consideration for gender and ⑨ urgency of the project.

The economic evaluation of the sapling production, afforestation and small-scale irrigation projects is low because of small benefits and high project costs, but these projects are urgently required for the success of issues such as combating desertification and reducing poverty.

Table 6.3.2.1 Qualitative Evaluation of Projects

Evaluation Indices	Evaluated Projects									
	① Contribution to combating desertification	② Meeting the needs of rural society	③ Contribution to reduction of poverty	④ Compatibility with technical level of administration	⑤ Compatibility with technical level of residents	⑥ Compatibility with funding scale	⑦ Difficulty of implementation	⑧ Consideration for gender	⑨ Urgency of project	Total
1. Program to improve ability of residents to run projects										
1) Project to establish Terroir Management support system	These are essential projects (requisite elements) for implementing the following projects and securing their sustainability, so are not evaluated.									
2) Project to support organizing of residents										
3) Literacy rate improvement project										
4) Project to improve residents' ability to implement projects										
5) Project to support establishment of micro credit system	3	5	5	3	3	4	4	4	5	36
2. BHN fulfillment program										
1) Modern well construction project	4	5	3	5	3	3	4	4	4	35
2) Road construction project	2	5	4	5	4	3	4	3	4	34
3. Farmers' income stabilization program										
1) Project to supply improved seeds for rain-fed produce and fertilizer	3	4	5	4	3	4	4	3	3	33
2) Small-scale vegetable cultivation project	4	5	5	4	3	3	4	4	3	35
3) Cereal bank construction project	3	5	5	3	3	3	4	3	4	33
4) Vaccination facilities construction project	3	4	4	4	3	3	3	3	3	30
5) Livestock production enhancement project	2	3	5	4	4	5	4	4	3	34
6) Improved poultry house construction project	2	3	5	4	3	4	3	3	3	30
7) Improved fodder plants introduction project	5	3	3	3	3	3	3	3	4	30
4. Natural resources conservation and management project										
1) Mini-nursery construction project	5	4	3	4	2	3	3	3	5	32
2) Afforestation promotion project	5	5	3	4	3	4	3	3	5	35
3) Land use rules establishment project	5	4	2	2	3	4	3	3	5	31
4) Soil conservation project	5	3	3	4	3	4	3	3	5	33
5. Project to alleviate burden on women										
1) Mill construction project	3	3	4	4	3	3	3	5	3	31
2) Project to promote manufacture of improved ovens	4	4	4	4	4	4	4	5	4	37
3) Project to promote manufacture of handicrafts	3	3	5	3	4	4	4	5	3	34

Note: The qualitative evaluation shows the average score in 5-rank assessment by the Study Team members,
 • Compatibility with funding scale: Considers the government's fund-raising capacity and the farmers' ability to contribute.
 • Difficulty of implementation: Means the general difficulty in implementing the project.

(3) Positioning and evaluation of projects from social viewpoint

The qualitative evaluation made in (2) above can be deemed to be an accurate assessment of the entire project by adding a comprehensive social evaluation based on consideration of the points described below.

1) Character of projects that make up the Master Plan

The projects composing the Master Plan are positioned as “element projects”. The element projects have different functional and operational characters and are categorized as follows:

(a) Functional category

- ① A project that has a positive or negative impact on other element projects (including those that have a mutual impact) or an independent project that has no impact on other element projects
- ② A project that is a precondition or external condition for system operation (requisite element)
- ③ A project that has long or short continuity of effect

(b) Operational category

- ① A project that is of direct benefit to residents and society
- ② A project whose benefit is only apparent after going through a certain separate process (roundabout materialization of target effect)

2) Master Plan as system to combat desertification

- ① The Master Plan can be deemed to be an integrated system intended to combat desertification in combination with the above element projects.
- ② The M/P has a hierarchical structure consisting of subsystems that function by village unit or jointly by several villages, and at the base of which are the residents and rural communities.
- ③ The village subsystem consists of element projects needed by residents or the community. However, the types and combinations of projects depend upon the village community structure (tribes, educational level, flexibility to change, etc.), development stage (income level, BHN fulfillment level, etc.), and external environmental conditions. Each village consists of qualitatively different forms (subsystems).

3) Concept of total utility from social viewpoint

- ① From the above viewpoints, it is desirable to grasp the social utility of the element projects as components of the M/P based not only on effectiveness from one aspect of the project, but also on the time factor (continuity of effect, time required to demonstrate an effect, etc.) and the effect on the surrounding area, and if possible to grasp the overall utility of the project package.
- ② For instance, if a project with a one-year period to demonstrate the effectiveness of one input is compared with another project with a 5-year period, the total utility is the same even though the latter's one-year utility is one-fifth (1/5) that of the former. Or if a project provides the opportunity to introduce another project, some of the effects can be allocated to the project that provided the opportunity.
- ③ The concept of total utility based on such views is shown in Figure 6.3.2.2.

Figure 6.3.2.1 Master Plan as Anti-desertification System

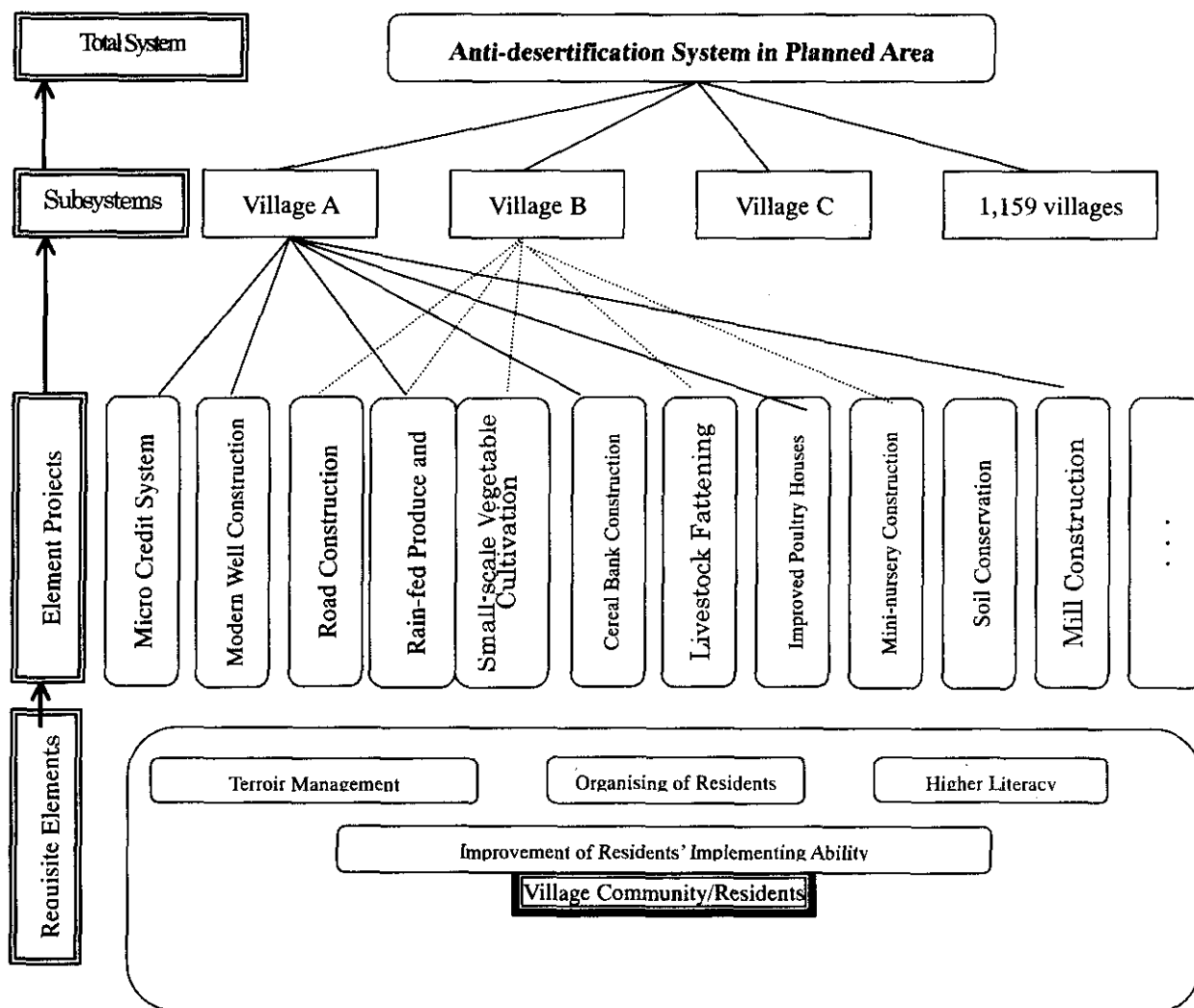
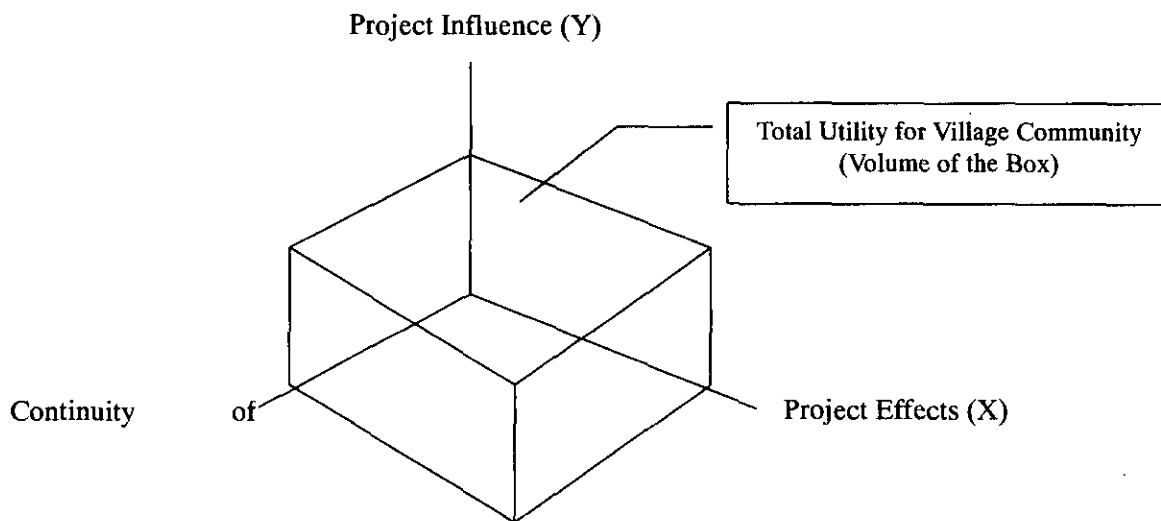


Figure 6.3.2.2 Concept of Total Social Utility



6.3.3 Grade of Contribution to Combat against Desertification

The grade of contribution (expectation) through the implementation of the M/P to combat the desertification as described up to the preceding chapter can be summarized as below. Four contribution indices were used for the combat against desertification: ① Land productivity; ② Area of forest; ③ Natural vegetation including pastures; and ④ Farmers' livelihoods. If the M/P is not implemented, the decrease of incomes and unstable livelihoods of the farmers that will be playing a main role in future combat against desertification will continue similarly to the past trend under the background conditions such as decline of land productivity, decrease in area of forests, decrease in vegetation as well as population increase. However, by implementing the M/P, the aggravation of resources can be suppressed and the quality and quantity of some resources can be improved, so that the livelihoods of farmers will be stabilized and improved.

(1) Improvement of land productivity

The land productivity in decline in recent years will be improved 50%. Without the Project, the cereal supply rate in the planned area will decrease from 262% at present down to 162%, resulting in a substantial reduction of the capacity of supplying surplus cereals to other areas outside of the planned area. With this Project, the land productivity will be substantially improved and the capacity of supplying surplus cereals to other areas will be maintained at the present time.

(2) Increase of area of forests

The area of forests that decreased in recent years will increase 10%. Without this Project, the forest resources will be exhausted by 2016. With this Project, the forest reproductivity will increase 10% and the area of forests will increase approximately 40,000 ha within the planned area.

(3) Prevention of aggravation of the natural vegetation

The aggravation of the natural vegetation (including pastures) that made progress in recent years will be prevented. In addition, the reproduction of vegetation in the land use regulated area and in the improved fodder plant introduced area.

(4) Stabilization of farmers' livelihood

Without this Project, the incomes of the farmers that will be playing a main role for future combat against desertification will decrease nearly 40% in inverse proportion to the population increase, resulting in their unstable livelihoods. With this Project, the decrease of incomes will be suppressed at least and the means of earning incomes will be diversified and stabilized, resulting in stabilized rural livelihoods. Further, if the present trend of population movement continues and a part of the population increased in the planned area flows out to city areas (this probability is really high), the farmers' incomes will increase 15%, making their livelihoods more stable.

CHAPTER 7 PROJECT IMPLEMENTATION METHOD

7.1 Project Implementation System

(1) Implementation System

The core of this Project is "Terroir Management support". In other words, the Project will analyze the present state of the village Terroir (social, economic, and natural resources), draw up plans and implement the various projects on the basis of residents' participation. The plans drawn up at the village level will be reflected in development plans at the level of the Commune and the Cercle, and eventually at the level of the Région. An Operation Committee for implementing the Master Plan will be set up composed of representatives of the Ségou branch offices of technical agencies including Ségou Region DRAMR and DRAER of the Ministry of Rural Development, the Regional Directorate of Water Resources of the Ministry of Mines, Energy and Water, the Regional Directorate for Nature Protection of the Ministry of Facilities, National Land Development, Environment and Cities, and the Regional Directorate of Elementary Education of the Ministry of Education. The committee will deal with the basic policy and implementation period of each project and ensure compatibility with the policies of the regional governmental offices in the Ségou Region.

A "project office to prevent desertification in the southern Region of Ségou" (hereafter referred to as "the Project Office") will be established in Ségou City as the organization to implement the project. The Project will be implemented with the cooperation with the Ségou branch offices of related Ministries, with the Ségou Region Local Government office as a liaison office.

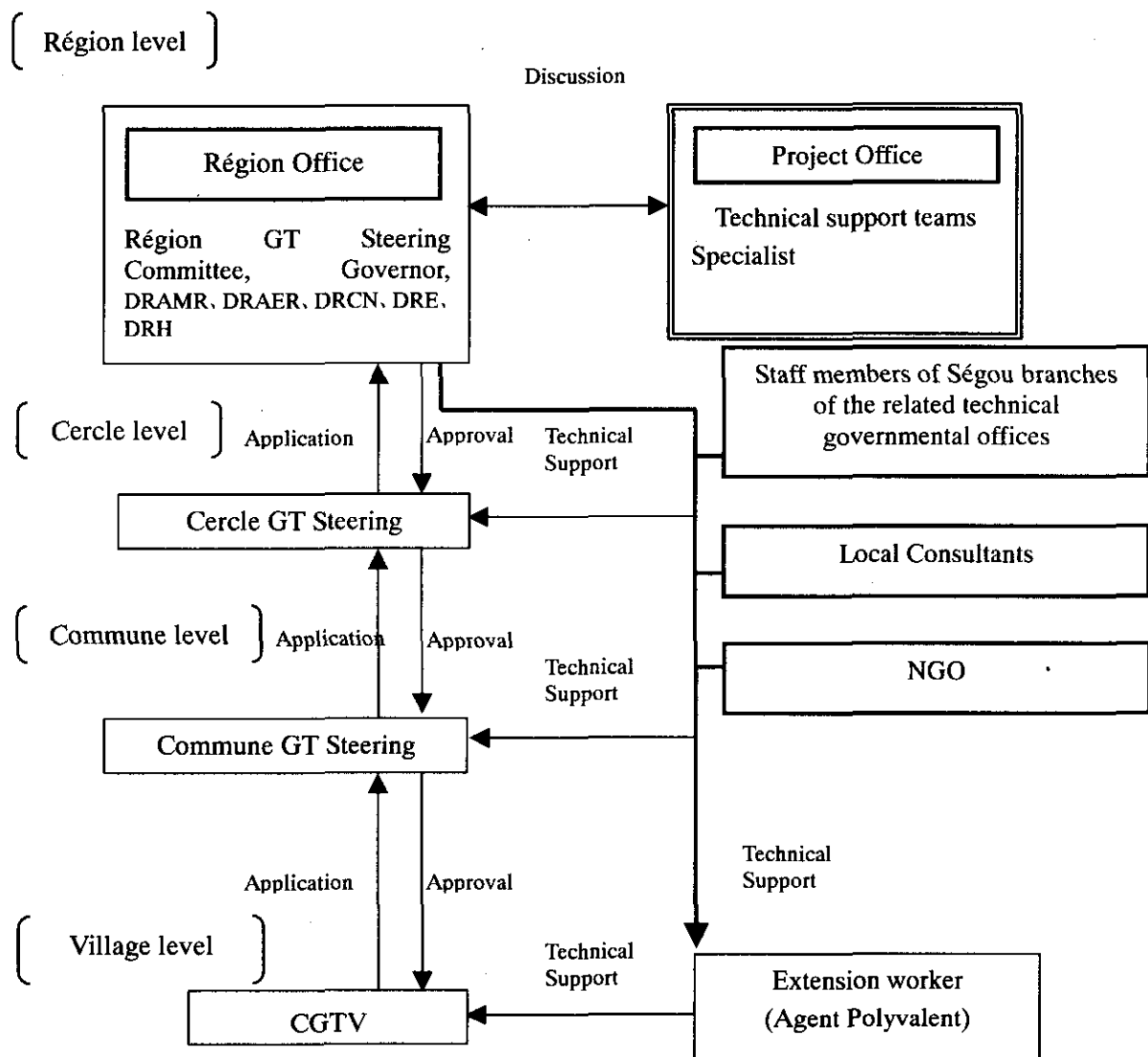
In addition, a Village Terroir Management Committee will be set up in each local governing body (Région, Cercle or Commune) and these will receive, evaluate and process applications for development programs wrapped put together by the local committees under them.

(2) Implementation Process

- ① With the support of the extension workers, the residents of a village will carry out a Participatory Rural Appraisal Survey (PRA) study, analyzing the present natural, social and economic conditions of the village and clarifying the tasks needed for the sustainable development of the village.
- ② With the support of the extension workers, the villagers will set up a village Terroir Management Committee as a villagers' organization to resolve the tasks needed for the sustainable development of the village.
- ③ The village Terroir Management Committee will, with the support of the extension workers, formulate a schedule for implementation of the Terroir management programs for the village, following the priorities of the villagers. This schedule will state clearly the responsibilities and obligations of the villagers.
- ④ The village Terroir Management Committee will submit the schedule for the village Terroir management programs to the Commune Terroir Management Committee and make an application for the programs.
- ⑤ The Commune Terroir Management Committee will make a primary assessment of the application for village Terroir management programs submitted by the village Terroir Management Committee, and submit to the Cercle Terroir Management Committee those applications that are judged to be appropriate.

- ⑥ The Cercle Terroir Management Committee will make a secondary assessment of the application for village Terroir management programs submitted by the Commune Terroir Management Committee, and submit to the Région Terroir Management Committee those applications that are judged to be appropriate.
- ⑦ The Région Terroir Management Committee will, in co-operation with the Project Office, make a final assessment of the content of the application for village Terroir management programs submitted by the Cercle Terroir Management Committee.
- ⑧ With regard to the approval and implementation of the programs, the above procedure will be taken in reverse.

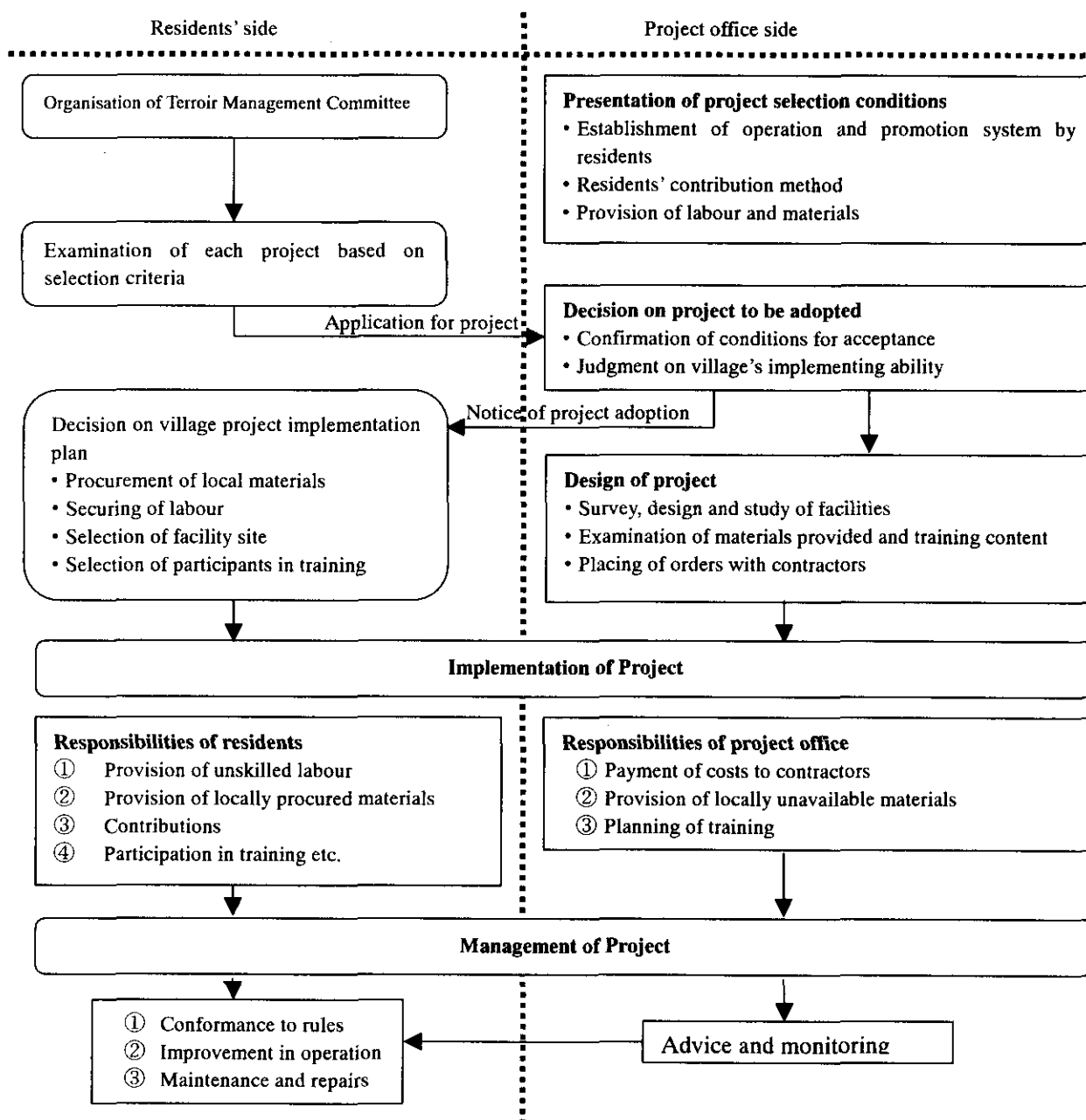
Figure 7.1.1 Project Implementation System (draft)



7.2 Project Operation and Management Methodology

The methodology of project implementation, operation and management is described in the project summary tables in Section 5.3, Chapter 5. As a rule, operation and management of these projects should be performed independently by residents on the initiative of the CGTV. The diagram in Figure 7.2.1 shows the demarcation between the CGTV and the project office in project implementation, operation and management. In implementing each project, the residents will bear part of the necessary funding in order to clarify their awareness of participation in the project (project ownership). The cost contribution is described below, and in addition residents are also required to provide the unskilled labor necessary for implementing the project. Residents' contributions are put into the account of the relevant Terroir Management Committee, providing a micro credit fund to be appropriated to the operation fund for each project (for maintenance and repair of facilities) and to support the farmers' own funds.

Figure 7.2.1 Model Diagram of Project Implementation, Operation and Management



<Principles regarding villagers' share of the financial burden>

- The basic approach towards the sharing of the financial burden is as follows:

Training 0%

Public (joint) activities

- Of those items requiring a high investment and not readily procured within the village:
 - * Items creating a direct profit 30%
 - * Items creating no direct profit 0%
- Items requiring low investment and easily procured within the village 100%
- Items to be implemented under commission to specialists Fixed amount for each facility

Individual programs of participating farmers

- Of expendable farming supplies:
 - * Items for which the technology is established and to which farmers have easy access 80%
 - * Items for which the technology is not fully established and to which farmers do not have easy access 30%
- Durable consumer goods 100%

(Principle of providing simple labor)

The construction period and the amount of simple labor to be provided will be determined through discussions between the Project side and the CGTV. If the CGTV does not provide any labor, it will pay to the Project 1,000 FCFA per person per day. The construction period will be the farmers' off-season of January to April, to accommodate the villagers' farm work.

7.3 Fund Raising Concept

Mali's financial position is such that a revenue deficit of just under 40% accrues every year and foreign debt has increased 3-fold over the past 15 years. In the 2000 budget, investment costs accounted for 217,100 million FCFA (49%) of the annual expenditure of 440,100 million FCFA. This rate is almost the same every year. Most of the investment costs rely on foreign support (loan aid or grant aid), and investment projects implemented with their own funds are limited.

In implementing this plan, the projects should be operated with consideration given to the actual state of the national finances as described above. Although small-scale irrigation is effective in increasing production and reducing poverty and the afforestation project is nationally required to combat desertification, it is economically difficult for farmers to bear all the costs of implementing these projects. Therefore, it is desirable that aid agencies offer grant aid for implementing these projects. As the project costs are so high, the possibility of procuring a considerable portion of the costs from international aid organizations must be studied. Projects that are economically feasible and the cost of which can be borne by the farmers should be given priority.