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THE JICA PROJECT FOR THE
CONSTRUCTION OF THE
RAILROADS IN THE

**THE SOCIALIST REPUBLIC OF VIET NAM
MINISTRY OF AGRICULTURE AND RURAL
DEVELOPMENT (MARD)**

**JAPAN INTERNATIONAL
COOPERATION AGENCY (JICA)**

**THE STUDY
ON
MODEL RURAL DEVELOPMENT
IN
NAM DAN DISTRICT, NGHE AN PROVINCE**

**FINAL REPORT
MAIN REPORT**

FEBRUARY, 1998

**PACIFIC CONSULTANTS INTERNATIONAL
PASCO INTERNATIONAL INC.**



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Exchange Rate
(As of July 1997)

US\$ 1.00 = VND 11,700

VND 1.00 = US\$ 8.547

US\$ 1.00 = Yen 120

VND : Viet Nam Dong

PREFACE

In response to a request from the Government of the Socialist Republic of Viet Nam, the Government of Japan decided to conduct a development study on Model Rural Development in Nam Dan District, Nghe An Province and entrusted the study to Japan International Cooperation Agency (JICA).

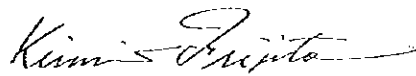
JICA sent to Viet Nam a study team headed by Mr. Masahito Yamanaka, Pacific Consultants International, Japan, two times between October 1996 and September 1997.

The team held discussions with the officials concerned of the Government of Viet Nam, and conducted field surveys at the study area. After the study team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Viet Nam for their close cooperation extended to the study team.

February 1998



Kimio FUJITA

President,

Japan International Cooperation Agency

Mr. Kimio Fujita
President
Japan International Cooperation Agency

Dear Sir,

Letter of Transmittal

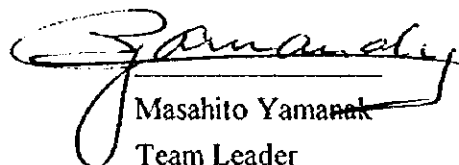
We are pleased to submit the final report entitled "THE STUDY ON MODEL RURAL DEVELOPMENT IN NAM DAN DISTRICT, NGHE AN PROVINCE". The report contains the formulation of the Model Rural Development in Nam Dan District as well as the advice and suggestions of the authorities concerned of the Government of Japan and your Agency. The comments made by the officials concerned of the Government of Viet Nam during discussions on the draft final report are also included in this report.

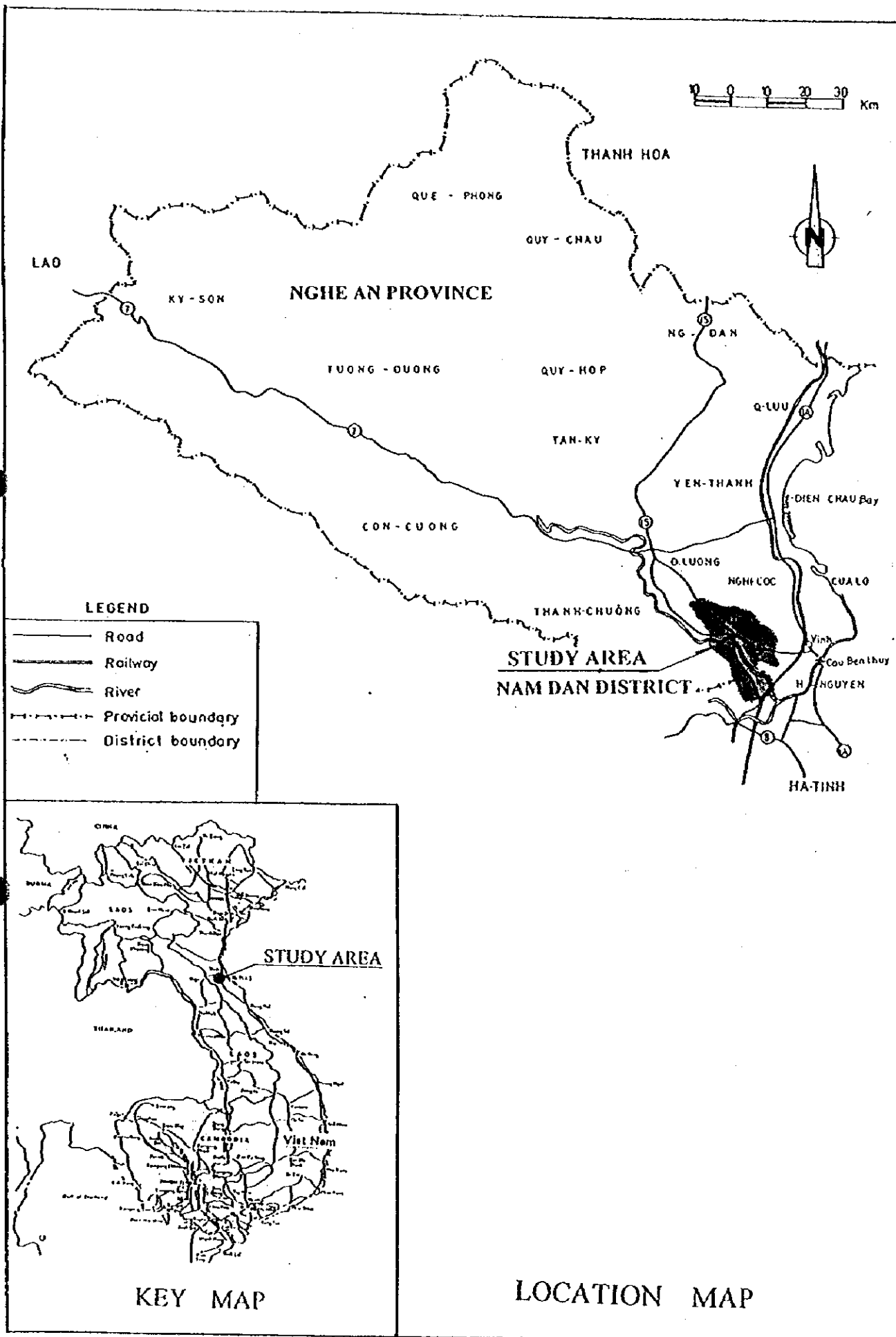
This Model Rural Development presents the direction of an integrated agricultural and rural development in the rural areas focusing on Nam Dan District as a model area of Viet Nam with due consideration of obtaining the maximum synergistic effects from the related projects in deferent sectors. The methodology of formulation and prioritization of projects are suggested in this report. We recommend that the projects concerned to the integrated agricultural and rural development will be implemented based on the methodology suggested in the report.

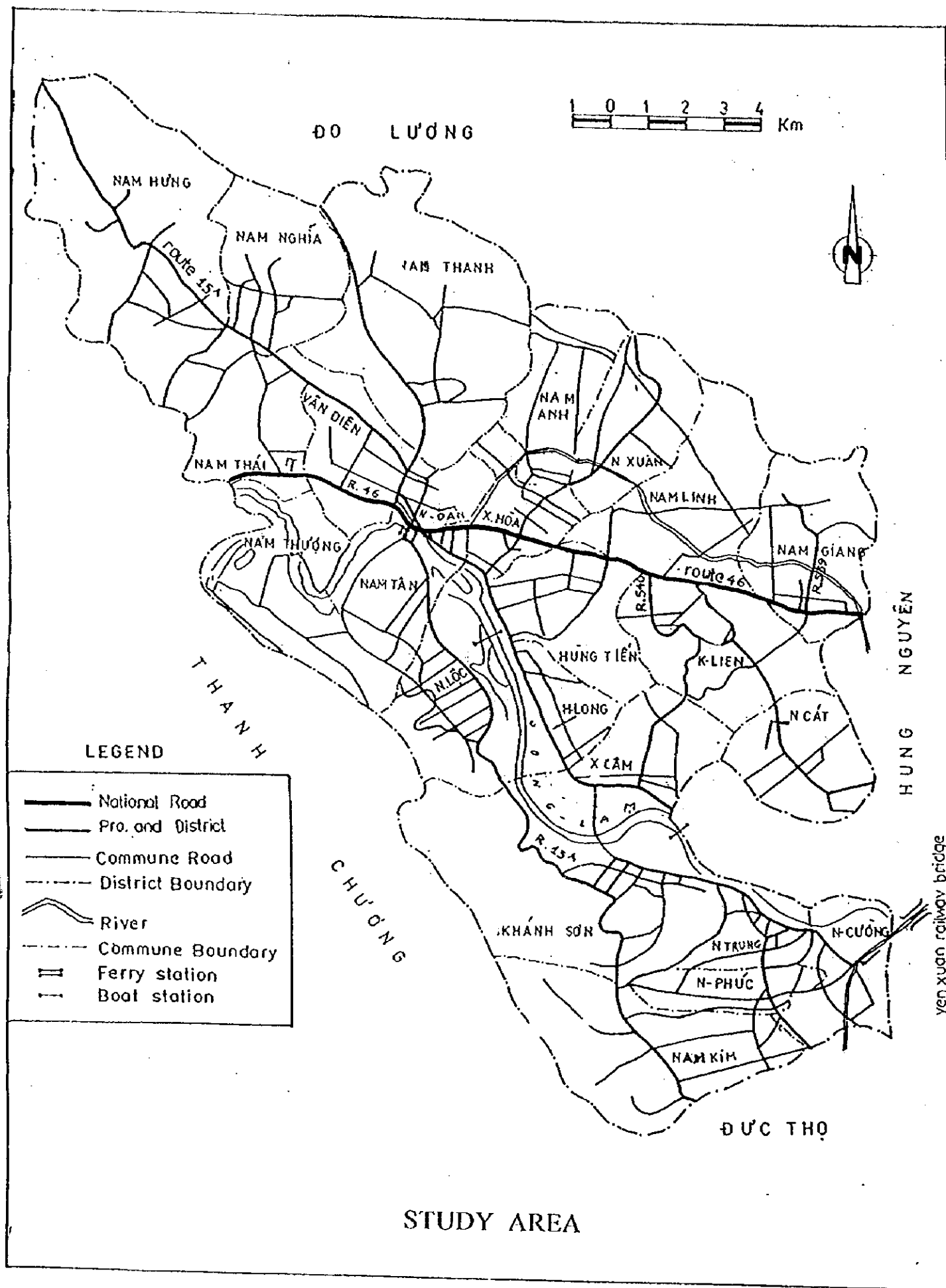
We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs, the Ministry of Agriculture, Forestry and Fisheries and Embassy of Japan in Viet Nam. We also wish to express our deep gratitude to the officials concerned of the Government of Viet Nam for their close cooperation and assistance extended to us during our field survey.

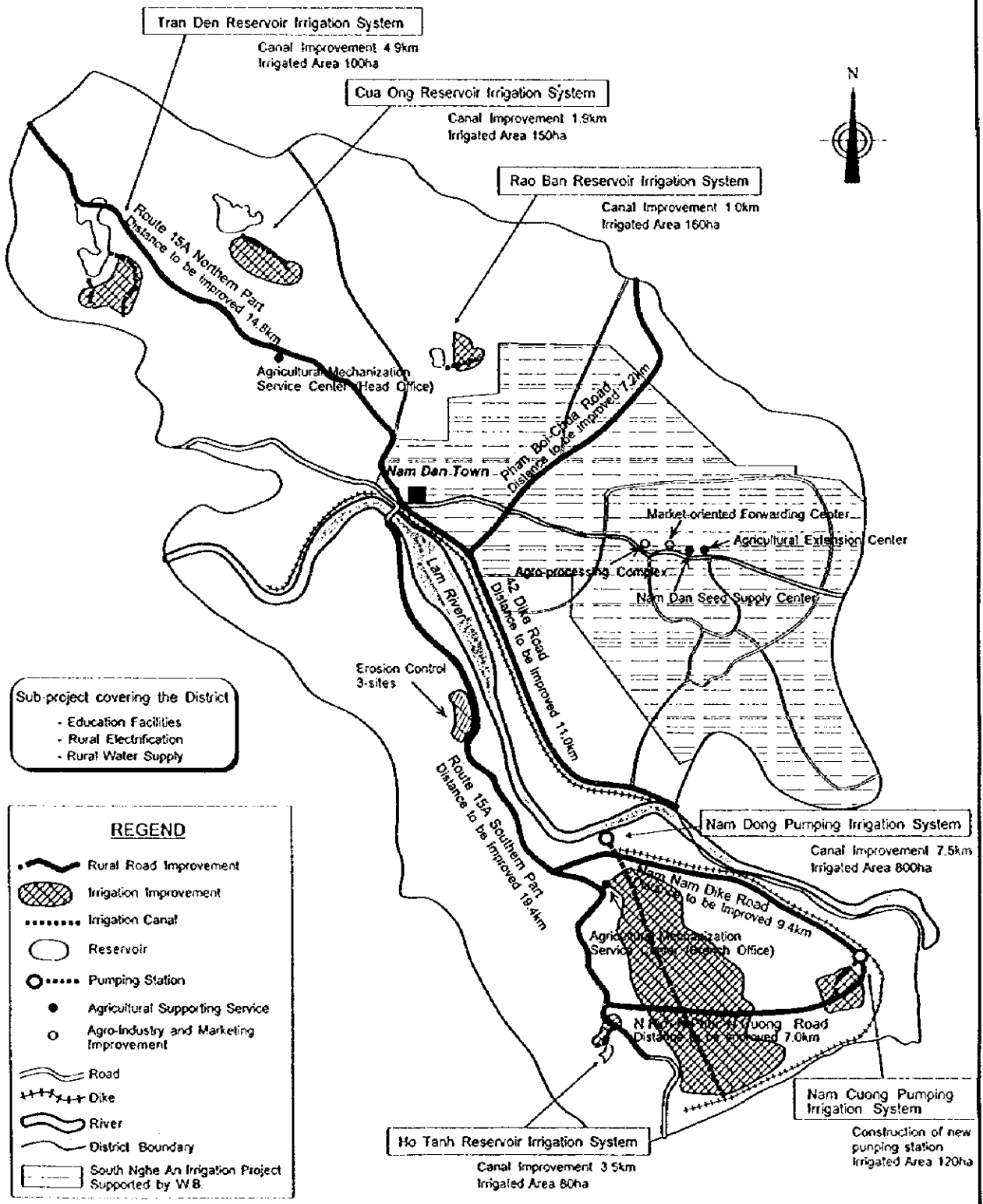
Very truly yours,

February, 1998


Masahito Yamanaka
Team Leader







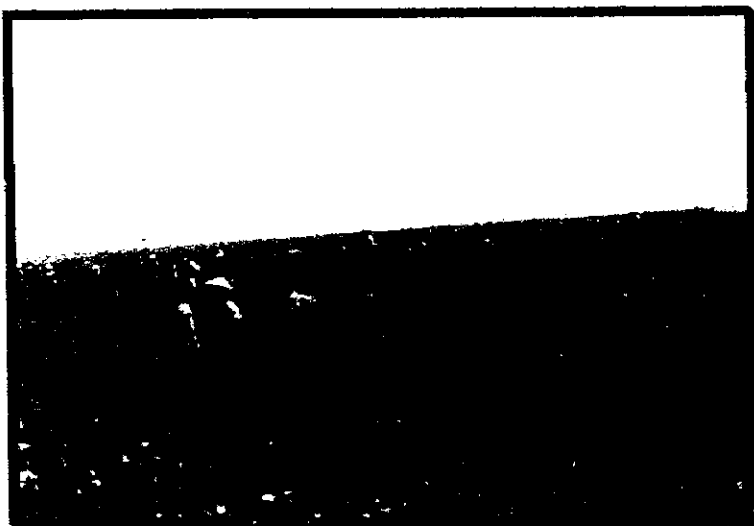
GENERAL PLAN OF MODEL RURAL DEVELOPMENT PROJCT



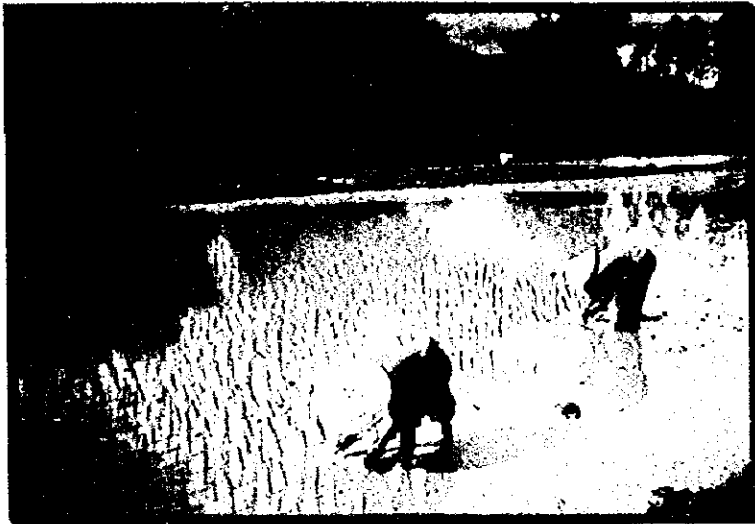
*Present bicycle
Transportation of
agricultural products*



*Periodical village
market*



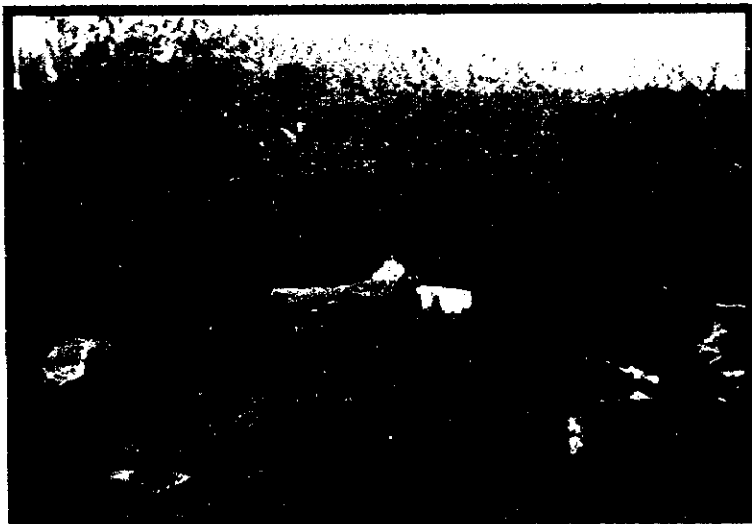
*Plow up (Generally
done using man hana
or cattle. Tractor is
used in few case)*



Transplanting



*Irrigation by
portable pump*



*Garden land on
slope area*



Typical pumping station



*Nam Dan ferry port for
crossing the Lam River*



*Road repair works
by inhabitants*



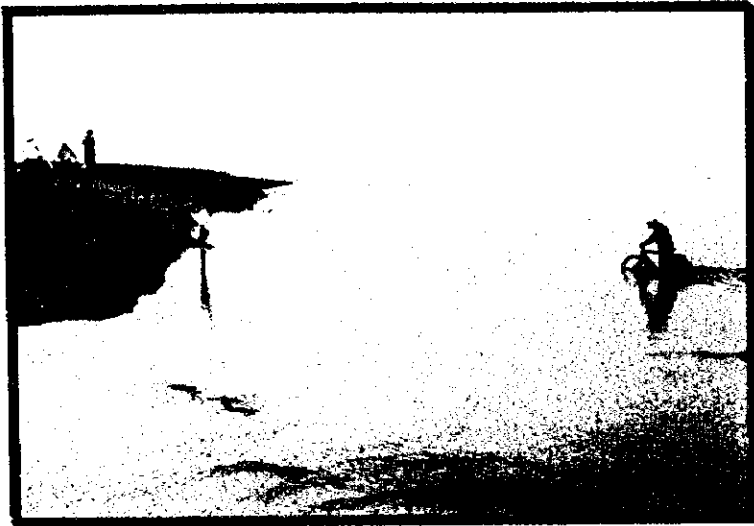
*Shallow well at
farm household*



*Typical commune
health center (CHC)*



Sickroom in CHC



Flood in October, 1996



*Workshop in Vinh city
May 29, 1997*



*Representatives of
farmers and peoples
committee of Nam Dan
District attending the
Workshop*

SUMMARY

SUMMARY

1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The northern-central coastal area, where Nghe An Province is located, is recognized as the most poverty stricken area, where approximately 20% of total national population are living under poverty conditions. Nam Dan District is one of the most seriously affected areas due to disadvantageous natural conditions such as low-fertile soil, suffering from monsoon, typhoon and flood, besides insufficient and superannuated agricultural infrastructures such as old and damaged irrigation facilities. Thus, the low living conditions of the area have necessarily to be improved as soon as possible.

In consideration of the above situation, the Government of Viet Nam (hereinafter referred to as GOV) requested the technical cooperation for the Study on Model Rural Development in Nam Dan District, Nghe An Province to the Government of Japan (hereafter referred to as GOJ) in April 1995. In response to the request of GOV, GOJ dispatched a Preparatory Study Team to Viet Nam in April 1996, and the Scope of Work (hereafter referred to as S/W) for the Study was signed on April 18, 1996.

1.2 OBJECTIVES OF THE STUDY

The objectives of the Study are;

- To prepare a Master Plan of the Study Area and Feasibility Study for priority project(s) in order to improve living conditions of the inhabitants in the Study Area. The Study mainly focuses on agricultural development and rural social development, which will be the basis for a model/pilot development plan for other rural areas suffering from lack of infrastructures in Nghe An Province and also other Provinces in Viet Nam.
- To transfer technology, which is required for conducting the Study, to the counterpart personnel of GOV through on-the-job training in the course of the Study.

1.3 STUDY AREA

The Study Area covers the Nam Dan District in Nghe An Province, which is located 300 km south of Hanoi, the capital city of Viet Nam. Nam Dan District has approximately an area of 30,000 ha and a population of 160,000. In addition to the Study Area, the Study also covers certain areas outside Nam Dan District including Vinh city for the agro-industry and marketing studies.

2. BACKGROUND

2.1 AGRICULTURAL DEVELOPMENT POLICY IN VIET NAM

The guideline for the development of Viet Nam's agriculture is set "to build up Viet Nam's agriculture to be increasingly developed and sustainable through: 1) diversification of products in conjunction with agro-forest and processing industry, 2) step-by-step modernization and industrialization, 3) meeting increasing domestic consumption demand and effective exports, etc, 4) rapidly enhancing living conditions and building up a new rural society", etc.

To achieve the above targets, the rural and agricultural economy is structured based on 1) proper exploitation of natural resources, 2) promotion of comparative advantages of ecological zones, applying appropriate advanced techniques and efficient use of information on potential markets, and 3) enhancing productivity, quality and efficiency of the agricultural sector under a market-based economy.

It is expected that food production will be increased 1.0 to 1.5 million tons every year, from 26 million tons at present to 30 to 32 million ton by the year 2000. To implement the development policy mentioned above during 5 years between 1996-2000, the following activities have to be carried out in depth: investment in irrigation activities and infrastructure, intensive cultivation practices, exploitation of barren lands, promotion of agro-industry, promotion and creation of more jobs in rural areas, especially food processing industry, creation of more rural employment by developing a diversified agriculture.

2.2 BRIEF DESCRIPTION OF NGHE AN PROVINCE

(1) General

Nghe An Province is located at the center of the Northern Region and within the North-South socio-economic circuit in Viet Nam. Total area is 16,370 km² and the population in 1995 was 2,792,000 persons. Nghe An Province is the third largest and most populated province in the country. This province can be divided into 3 zones: 1) coastal area, 2) flat area and 3) midland and mountainous area. It can be said that there is a high potential for integrated agricultural development in this province.

Agricultural sector occupies half of the total Province's regional GDP. However, looking at the GDP growth trend for the recent 5 years, the portion of GDP structure has been changing. The regional GDP portion of agricultural sector has decreased from 62 % in 1990 to 54% in 1995, while the service sector has increased from 24% in 1990 to 34 % in 1995. The growth rate of the total regional GDP for 1991 to 1995 is 8.9% and the regional GDP/capital ratio converted to US\$, increased from UD\$ 148 in 1990 to US\$ 207 in 1995.

(2) Summary of "Master Plan for Socio-economic Development of Nghe An Province"

The objectives and strategies of the Master Plan for Socio-economic Development of Nghe An Province (1996-2010) prepared by the People's Committee of the Province are as follows:

Objectives	Strategy
Achieving an integrated agricultural development (agriculture, forestry, aquaculture, agro-industry) based on a free-market economy.	To optimally and rationally use the available natural and human resources through an adequate technology. To put emphasis on the development of the main industrial and services sectors (agricultural and forestry industry, aquaculture, construction materials, mining, energy, and information systems). To achieve the above-mentioned objectives, it is necessary to attract investments from inside and outside of province and use them efficiently.
Formulate a reformed strong market economy under the guidance of the state	To promote self-reliance at household and institutional levels for the achievement of economic growth.
Aiming to create a link between the economic and social developments	Create the opportunities for improvement and efficient utilization of human resources..

Concerning economic growth rates and sector structure, the Master Plan contemplates two possible scenarios, i.e., Scenario 1 and Scenario 2, and the lower one (Scenario 2) contemplates a growth rate of 12.0% for the period 1996-2001 and 11.41% for 2001-2010. Those growth rates represent a level of regional GDP at 1989 prices, VND1,120 billion in 1995 and VND5,714 billion for 2010. It estimates a sector structure of the regional GDP for the year 2010 as follows: agriculture and aquaculture: 22%, industry and construction: 31% and services: 47%.

3. STUDY AREA

3.1 GENERAL FEATURES

(1) Health and Sanitation

Organization of the public health system in Viet Nam is a four-tier system, i.e., Ministry of Health (national level), Department of Public Health in Nghe An Province (province level), District Health Center (DHC) and Commune Health Center (CHC). DHC, Inter-commune Polyclinic (ICP) and CHC are the facilities by which inhabitants have services for health care directly. In Nam Dan District, there are 1 DHC, 3 ICPs and 24 CHCs. DHC is the center of health and sanitation activities in the District, which has three major functions 1) supervision and management of programs, 2) services of vertical preventive disease control programs such as EIP and IDD and 3) supporting commune health centers (CHC) to deliver the health and sanitation programs. ICP and CHC are service delivery units of health and sanitation activities at commune levels. The main function of the CHC is related to preventive care and support infant delivery services rather than the curative care. In CHC, a midwife has one on the most important role.

The current issues of health/sanitation and medical system in DHC level are 1) deteriorated patient examination room, 2) lack of emergency department, 3) lack of equipment for surgery, and 4) lack of post graduate retraining for doctors. In CHC level, the current issues are 1) lack of education on health and sanitation for people,

mainly for farmers, 2) lack of sanitary facilities (well, latrine and bathroom) at household, 3) lack of retraining for secondary and elementary midwives and 4) unsanitary situation of delivery room.

On the other hand, the issues in the rural health and sanitation to be improved immediately are 1) poor health conditions of women and children, 2) lack of sanitary facilities, knowledge and practice, 3) lack of access to safe water and shortage of water and 4) poor health and sanitation conditions due to poor economic conditions and heavy agricultural workload.

(2) Education

The Bureau of Education and Training of Nam Dan District which is responsible for the education and training in the District covers general education, i.e., primary, lower secondary education and universalization and illiteracy, pre-school education, i.e., crèche and kindergarten, and administration, i.e., accountant, cashier and school facilities, library and teaching equipment. The upper secondary education is administrated by the Department of Education and Training of Nghe An Province.

There are 31 pre schools covering crèche and kindergarten, 32 primary schools, 18 lower secondary schools and 2 upper secondary school, 1 combined lower and upper secondary school, 1 regular educational center for continuing education, and 1 vocational center in the District. The net enrollment ratio in primary and lower secondary schools in the District is 99% and 75% respectively in the school year 1995-96.

To cope with the Provincial Master Plan of Education, the District has a concrete target up to 2000 which are to universalize the primary education by 100% for the children of 6 to 14 years old, to universalize the lower secondary education by 100% for the children of 14 to 17 years old and popularize the upper secondary school by 50% for the school aged youth.

(3) Road Network

In Nam Dan District, the national road Route and the provincial road Route 15A become the basic road network. The district road network links each commune center to the basic road network. The commune road network aims to link village areas and fields.

The total length of roads in the Study Area is 403 km and the road density is 1.37 km/km². The road network in the Study Area is considered as well developed in the Province from the aspect of road density. However, most of the roads are not paved and they have poor traffic conditions especially in the rainy season so that 43% of the roads are inadequate for transit of vehicles during that season. Furthermore, 54 km of total length suffers from traffic interruption by flooding or inundation after heavy rain over 15 days a year, and 25 km suffers over 30 days. The road network in the Study Area is considered as not suitable to cope with the traffic amount in the rainy season.

The Study Area is divided into 2 regions, i.e., the left bank region and the right bank region divided determined by the Lam River. The left bank region includes the

center of the District and is connected to the center of the Province by the National Road Route 46. On the other hand, the right bank region, which consists of 8 communes, is isolated and land transportation for this region to the main region is not set up. In the Study Area, there are 1 ferry service and 5 small boat services which provide service to cross the Lam River. The ferry port is located nearby Nam Dan Town and the Provincial Road Route 15 can provide continuous traffic function by this ferry system. This route is recognized as the back bone for the economic activities in the right bank region. However, this access is interrupted one and half months a year due to flooding of the Lam River and submerged bridges on the Route 15A. It creates transportation problems for the right bank region.

(4) Electricity Supply

According to data of 1996, there are 32,907 households in the District of which 31,532 (95.8 % of the total population) receive electricity services. Electricity consumption in the District during 1996 was 10.2 GWh.

Many substations of the distribution transformer are not located in the center of the distribution line, which make the distance of the low-voltage networks too long. Furthermore, the capacity of these low-voltage feeders is small so that the network has an overloaded conditions. On the other hand, because the branch lines in the rural area has been set up by the farmers themselves, there is lack of uniformity of equipment and it causes electricity losses and troubles.

Total power consumption is measured by meters located at the distribution transformer sites. Electricity charges are allocated to each consumer based on the consumption measured by the individual meter including distribution energy loss. Thus, actual tariff for each commune including power losses is rather high, which creates significant tariff differences among regions. The tariff ranges are two to three times that of the national standard unit rate.

(5) Rural Water Supply

Most of the households have shallow wells near their houses and they rely their domestic water on these wells. However, water levels of these wells fall-down and the water color changes to murky in the dry season. In the semi-mountainous area and the left side area of the Lam river, many shallow wells are dried up in that season. In the area along the Lam river, the water from dugwells become unsuitable for domestic use due to the pollution by flood and heavy inundation during the flooding season.

During these periods in which the water use condition is poor, people in these areas are forced to collect water from other distant areas. The water collection occupies a large part of the workload of the people. Many wells are polluted which animals wastes which create difficulties for the people to keep proper health and sanitation conditions.

People in the Study Area mainly uses water from dugwells provided by themselves and tubewells installed by the Rural Water Supply Program of UNICEF. Some of them take water from the natural streams. In the District, UNICEF has started the Program since 1986 and they have installed 592 shallow tubewells, 1 gravity flow

system and 277 filter tanks from 1986 to 1996. The Program is implemented by the Department of Agriculture and Rural Development of Nghe An Province.

(6) Communications

The total number of households having telephones is around 400, which is equivalent to 1.2 telephones per 100 households and 0.25 telephones per 100 persons. The density of telephone in the Study Area is much lower than the provincial average of 1 telephone per 100 persons, and average of Vinh City of 8 telephones per 100 persons. In the Study Area, 10 communes and 1 town are connected to the telecommunication network as of December 1996, and 1 commune was planned to be connected in the beginning of 1997. The remaining do not have a chance to be linked to the network at present.

The local broadcasting service in the Study Area dividend into 2 levels, i.e., district level and commune level. Both broadcasting levels are operated by the district and each commune authorities, it broadcasts information concerning to the region. The local broadcasting service consists of the District TV and Radio Broadcasting, the District Remote Speaker System and the Local Public Speaker System. They provide the local information such as administrative announcement, market information, agricultural practice information, disaster information and so on.

3.2 NATURAL FEATURES

(1) Topography

There are several mountains and hills with an altitude ranging from 100m to 500m.a.s.l at the northern and western boundary of the Study Area. Most of the slopes of these hills are moderate at the mountainous foot. Around 20,000 ha of plain areas can be found at altitude 4 to 6 m.a.s.l. in the Study Area. The Study Area is divided into two zones; northeastern and southwestern parts by the Lam river.

(2) Meteorology and Hydrology

The annual average rainfall at the Vinh city is 2,133 mm, where more than 85% of annual rainfall appear in the period from June to November. The annual mean, average maximum and average minimum temperatures are 24°C, 33°C, and 17°C, respectively. The sunshine and evaporation are 4.7 hours/day and 940 mm/year, respectively. The average discharge of the Lam river which is the major water course in the Study Area is around 500 m³/s, where the discharge starts to increase in July and the peak discharge appears in October. The low flow season starts in January and lasts until May. Discharge during March and April is considered to be the lowest.

(3) Hydrogeology

Two types of aquifers are distinguished in the Study Area based on geological formations, namely aquifer in clastic sediments of Quaternary period, and aquifer in bedrocks of Triassic period. Groundwater is mainly used for domestic water supply. Most of the abstraction is from the aquifer in clastic sediment of Quaternary period by shallow wells. Water from the aquifer in bedrocks has not been utilized. The groundwater investigation was conducted in some parts of the Study Area in 1983 by Geological Survey of Vietnam.

(4) Land Classification

Land classification is carried out applying the Guideline for Land Classification of FAO-UNESCO. The area of each utilization type and suitability class is summarized as follows:

Land Type and Suitability

Utilization Types	Area of each suitability class (ha)				
	S1	S2	S3	N	Total
Land for Rice	867.2	2,399.6	256.3		3,523.1
Land for Rice and Upland Crops		2,257.8	311.3		2,569.1
Land for Upland Crops	659.8	960.6	1,901.8	5,275.6	8,797.8
Total of Agricultural Land	1,527.0	5,618.0	2,469.4	5,275.6	14,890.0
Habitation and Special Land				3,071.0	3,071.0
Rivers, Streams, Ponds, Lakes				1,095.0	1,095.0
Grand Total	1,527.0	5,618.0	2,469.4	9,441.6	19,056.0

S1: Highly suitable, S2: Moderately suitable, S3: Marginally suitable, N: Non suitable.

3.3 AGRICULTURE

(1) Land Use

The present land use condition of Nam Dan District in 1995 is shown below:

Actual Land Use in Nam Dan District (1995)

Category	Area (ha)
Residential	2,300
of which : Garden land	1,450
Agricultural land	11,530
a. Annual crop	11,510
- Single rice crop	2,200
- Double rice crop	4,000
- Double rice crop + single upland crop	1,600
- Single rice crop + single upland crop	660
- Double upland crop + single rice crop	1,050
- Upland crop	2,000
b. Perennial crop	20
Forest land	4,400
Water surface for Aquaculture	200
Special using land	3,000
Non-use land	8,000
Total	29,430

(Source) Calculated from the Land Use Map (1995)

(2) Agricultural Production

Rice is the most important crop and occupies more than 60% of the total crop planted area. Production of paddy amounts to 50,520 tons, that is equivalent to 320 kg per capita. Peanuts, maize and sweet potatoes are planted in more than 2,000 ha each. Vegetables such as water spinach, field radish, lettuce, chili and onion are planted in 1,100 ha. The products are sold at the markets in communes, in Nam Dan town and even in Vinh city. In addition, mainly in a small area of less than 200 ha, sugarcane, mulberry at riverside are planted, cassava is planted mainly at midlands and soybean or green bean at rice fields as the secondary crop of rice.

(3) Livestock and Aquaculture

Buffalo is the major draft animal found in the area and serves for land preparation in both paddy and upland fields. Although some of the cattle are also used as draft animals (mainly used in upland field), many of them are raised for meat. The average number of cattle, pig and poultry per farm household is 0.7, 1.4 and 3.4 heads, respectively.

It is reported that there are about 200 ha of water surface for aquaculture in Nam Dan district. However, actually much more than this area may be used as fish ponds. In addition, there are about 500 ha of Lam river and about 100 ha of reservoirs.

(4) Farming Practice

The typical rotation model in the Study Area is shown below:

Mark	Category	Rotation Model
CP1	Single rice crop	Winter-Spring Rice [W-Sp] or Summer Rice [Su]
CP2	Double rice crop	W-Sp Rice + Summer-Autumn Rice [Su-Au] or W-Sp Rice + Su Rice
CP3	Double rice crop + Single upland crop	W-Sp Rice + Su-Au Rice + Winter Upland Crop (Maize, Sweet Potato or Vegetable) [W U.C]
CP4	Single rice crop + Single upland crop	Su Rice + Spring U.C (Maize or Sweet potato) [Sp U.C] Su Rice + Winter-Spring U.C (Maize or Sweet potato) [W-Sp U.C]
CP5	Double upland crop + single rice crop	W-Sp U.C (Maize, Sweet potato or Peanut) + Su-Au Rice + W U.C (Maize, Sweet Potato or Vegetable), W-Sp U.C + Su Rice + W U.C
CP6	Upland crop (Single, Double, Triple)	Spring U.C (Maize, Sweet potato or Peanut) [Sp U.C] + W U.C (Maize, Sweet Potato or Vegetable), Sp U.C + Summer U.C (Soybean or Green Bean) [Su U.C] + W U.C

There are three seasons of rice cropping; winter-spring rice cropping (W-Sp), summer-autumn rice cropping (Su-Au) and summer rice cropping (Su). Paddy yield of W-Sp cropping which is sown from December to January and harvested in May is the highest among three croppings, followed by Su-Au cropping which is sown in May and harvested in September and Su cropping which is sown in July and harvested in November is the lowest.

Usually after W-Sp cropping, Su-Au cropping is done. Sometimes Su cropping has to be carried out because of lacking water in the field. If water is available in June,

the farmers choose Su-Au cropping. Su cropping may suffer from flooding from middle of the September to the first half of November. Main upland crops, maize, sweet potato, green bean, etc., are grown in rice field with intensive cultivation such as double cropping and triple cropping with rice.

(5) Land Tenure

According to the Constitution of Viet Nam, land ownership is in the hand of the State. However, a new Land Law enacted in 1993 states that land ownership still belongs to the State but land use rights are given to the farmers on a stable and long term basis. In this new Land Law, the land use rights are extended to five rights: right to exchange, transfer, rent, inherit and mortgage. The right to use land allocated by the State is also given to the farmers. Nevertheless, the District People's Committee has the power to rule on those activities.

(6) Marketing System

Due to the introduction of a free market mechanism in the Country, price controls in all the stages of trading agricultural commodities are eliminated with the exception for a few products. The marketing channels of agricultural products produced in Nam Dan District include representative markets in the District and Vinh City.

The present marketing system is still passing through a transitional period from a former central controlled mechanism to a free market mechanism, and the farmers seem to be intended to start producing more profitable crops departing from the farming practice based on self-sufficiency. In this reflection, there are many different channels used by traders who are mainly small-scale middlemen such as women of farm households using bicycles as their main means of transport. Small-scale middlemen as a majority can cover a very limited area for their trading due to their limited mobility by bicycles and they do not change destination markets to seek more profitable ones according to market information.

Since the introduction of a free market mechanism, market opportunities for the farmers to be involved in commercial farming have increased. However, there are many crucial constraints remained in the current marketing system in the area as follows:

- It is difficult for small-scale companies or traders to have an opportunity to have a resource for expanding their marketing scale due to lack of accessibility to credit.
- As the farmers are mainly relying on traders for market information, they do not have enough bargaining power to set appropriate prices for their products due to lack of institutional market information system and reliable market information.
- Product supply in the District does not satisfy the market demand except for some products such as rice and meat.
- The conditions of roads connecting communes are inadequate especially in the rainy season, and impede trading activities as well as access to information.

(7) Agro-industry

The present conditions and constraints are summarized below:

- Almost all the factories use antiquated and/or simple machinery and equipment and their function is incomplete due to difficulty of procurement of spare parts, etc. The capacity of them is insufficient and they are mostly used for the side job of the farmers.
- All the state-owned enterprises do not implement enough sales or marketing promotions for their products. On the other hand, the private ones are doing marketing activities aggressively, even though the marketing information is limited and the market to be covered is limited to the near-by areas.
- Even though enterprises have an intention to expand their scale, it is difficult to access credit necessary for that.
- There are no public services of support, marketing activities, acquisition of machinery and worker's training which are indispensable for the development of agro-industry in the area.
- Small enterprises in District have limited access to capital, technology, marketing information and technical assistance. Additionally, they are dispersed and hampered by inadequate transportation network. Thus, they are suffering from disadvantages in terms of gaining access to official assistance and obtaining and sharing with information compared to other enterprises of similar activities.

(8) Agricultural Supporting System

The Nam Dan Agricultural Extension Station has started giving services since 1996. The Station is under the guidance and supervision of the Provincial Agricultural Extension Center. The main purposes of the extension services are related to the introduction of new agricultural technologies, new crop and animal breed varieties, and the establishment of "Extension Model Plots" where new agricultural technologies are taught to the farmers. In this service, the "Training and Visiting System" (T&V) is applied.

At present, there are only 4 persons are working at the Station. This number is evidently insufficient to cover 31,800 households in the District. In addition, it is very difficult to visit the farms during the rainy season when most of the rural roads become muddy. At present, the following problems can be detected in connection with the extension services.

- The budget is too few to operate an efficient extension services.
- The number of extension workers is not enough for the effective transfer to the farmers of know how to improve productivity, farming management, new technology, etc. The training of the communes' extension workers is also not enough.
- Transportation means are not enough to carry out the extension activities.
- Number of training facilities and materials for both extension workers and farmers is not enough.
- Model Extension Plots show only respective farming technology. The establishment of a comprehensive model farm with model management directly connected with the increase of farmers' income is required.

For the public organization related to the rural credit, there are Viet Nam Bank for Agriculture (VBA), Viet Nam Bank for the Poor (VBP) and Credit Cooperatives which are part of SBV system at the provincial level. The problems of the rural credit are :

- Nam Dan District branch of VBA is unable to cover all the credit demand due to lack of adequate funds and leaves unattended a big sector which represents 75% of the total credit demand. In other words, most of the farmers must seek for loans from informal financial with a correspondingly heavier financial burden in the case of sources other than relatives who usually do not charge interest or a very low one.
- Most of the loans provided by the formal financial sources, i.e., VBA is for short-term loans (with a maximum of 6 months). Long-term loans are not available at present.
- The loan officers of VBA are not enough in number; creating bottleneck against the expansion of loan.
- The interest rate is set by SBV and it does not necessarily reflect the demand and supply conditions for capital in the districts.
- As most of the farmers cannot mortgage this lands due to lack of land rights certificates, they cannot put them up as collateral; failing to have access to credit.

(9) Organizations related with Agriculture

Originally, Viet Nam had two types of farmer's organizations. "Cooperative" was engaged directly in agricultural production, while "Union" or "Association" was the organization to represent the interest of particular group of people such as farmers, youth and women. Major organizations existing in the country which are closely related with agriculture and farmers include 1) Agricultural Cooperative, 2) Farmers' Union, 3) Women's Union and 4) Unions of Vietnamese Gardeners. These farmers' organizations operate with effective development of activities under the national trait of mutual aid and support-needed people. However, from farmers' point of views, it is observed that some of their activities are overlapped among several organizations. On the other hand, reforms under the Doi Moi policy to transfer agricultural production units from cooperatives to farm households have proved to be effective in increasing agricultural production. However, functions that were previously assigned to agricultural cooperatives such as irrigation land improvement, and collective disease and pest control are being lost.

(10) Irrigation and Drainage Facilities

Until now 33 pumping stations have been built in the Study Area excluding those of the South Nghe An Irrigation Project with a total installed capacity of 66,820 m³/hr and 21 reservoirs and ponds have been constructed. The whole designed command area of these structures is about 7,300 ha. Actual irrigated area is 3,300 ha and accounts for 90 % of rice growing area and 54.6 % of cultivated area. Due to topographical characteristics, the gravity drainage of both sides of the Lam river is easy excluding some far and low lying areas. With this reason, the drainage system so far has not been reasonably considered. On-farm drainage system mainly consists of natural streams and rivers.

(11) Rural Society and Farm Household Economy

Average number of family members is 5.3 persons and the ratio of male and female for the family members is approximately 50:50. An average of 1.9 persons in a farm household are working full time in agriculture. The average of electrification is 95%. However, usage of electricity at each household is limited with poor conditions of distribution system. The water source for daily life is mainly wells for 87% of families in the District. Most of the families in the area consider that the water they use is of good quality. However, 45% of the families living in the Plain Area consider the water quality is insufficient. 62% of families live in semi-permanent type houses and the families in the area typically use wood/charcoal for cooking.

Among the family goods, 'bicycle' is the item which has the highest percentage of possession (86%) which characterize the living condition in the area. Approximately 50% of the family possess television sets and/or radio as means of information source. The condition of food sufficiency is specially poor in the area located in the right side of the Lam river and approximately 30% of the people in the area sometimes face shortage of rice for their consumption. The proportion of women for head of household or holding land use right is 27% and the proportion for experience in credit system is 17%. Decision making regarding agricultural production is mainly done by men. However, women make decision regarding animal husbandry in many cases. There is no gender difference in opportunities of education and medical treatment. On the other hand, the time spent for household work in a day is extremely long for women compared with men.

The average area of paddy field is $2,511\text{m}^2$ and the figure for each area varies from $1,559\text{m}^2$ (Nam Dan) to $3,509\text{m}^2$ (Plain). The average number of plots is 6.7. Orchard and/or other perennial crop fields are found mainly in the Northwest Area ($2,258\text{m}^2$) and Mountain Area ($2,285\text{m}^2$). Concerning agricultural facilities, an average of 82% of the farmers have a shed for livestock. Facilities are mainly used to shelter 'Egg-laying chicken' (69%), 'Cattle' (54%) and 'Goat, Sheep' (46%). The use of waged labor for agricultural production is rare in the area. Purposes of using such labor are mainly 'Tilling', 'Weeding' and 'Transporting'. In the area, 57% of farmers own cattle and 26% own buffaloes. And approximately 90% of these animals are used for agricultural work.

The average of cash income per farm household is VND7.5 million. As a typical model of rural household management, each household consumes their own production as self-consumption. Including this portion of value income as converted to cash value, the average of total annual income per farm household is VND12.2 million and the portion of value income is 39% as an average. The proportion of agricultural cash income to the total annual income is 33%. The average income can be divided by the average number of family members (5.3 persons) to obtain an average of annual income per person of VND2.3 million. Compared with the poverty line of VND1.1 million which was set in the World Bank Study in 1995, the average income is more than double of the poverty level. However, the income level of each family differs greatly and the proportion of the families whose income levels are under the poverty level is calculated as 21%.

4. MASTER PLAN

4.1 BASIC DEVELOPMENT CONCEPTS

(1) Potential and Constraints on Rural Development

The common potential and constraints on rural development among related sectors are described below:

- Economic conditions of Nam Dan District are evolving from a self-sufficiency economy at farmer's level towards a free-market economy. The differences in degree of the development presently achieved for each sector are becoming apparent.
- The official stance towards development is increasingly oriented towards a policy of farmers' self-reliance, and farmers now are free to seek economic activities based on their own profit-seeking motives.
- At present, farmers can make actions to achieve self-reliance. However, the supporting systems for this farmers' action such as guidance of new farming technology, marketing information, farmers credit is not sufficiently provided yet.
- Now, even though a number of agricultural and social infrastructures exist, deterioration of those facilities is evident. This deterioration is one of the major constraints on rural development in Nam Dan District.
- It has become obvious that there are many problems that can not be solved by implementing countermeasures only inside Nam Dan District and that it is largely influenced by the trend of external factors such as improvements of road and marketing system in Nghe An Province.
- It is necessary to consider such external factors in addition to development potentials and constraints in each sector. The external factors are more important factors for some sectors.

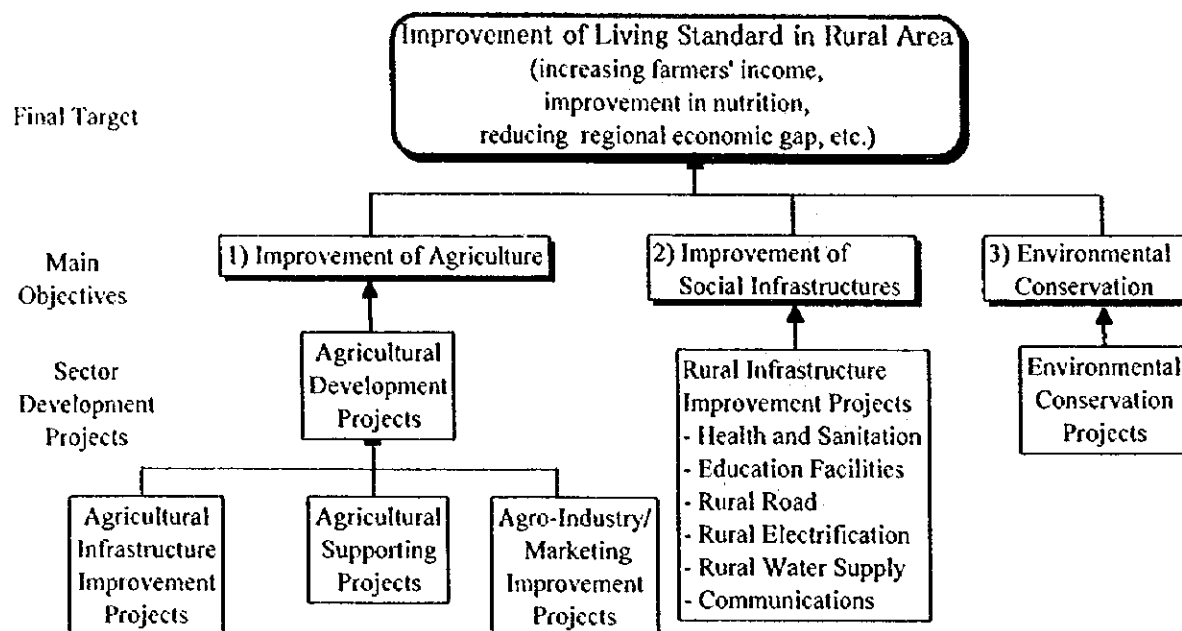
(2) Target Year and Required External Conditions

Based on the discussions between the Vietnamese side and the Study Team, the target year of 2010, which is the same as the target year of the Master Plan of Socio-economic Development of Nghe An Province, has been set as the target year for the objective Master Plan of the Model Rural Development in Nam Dan District.

For the required external conditions, the predictions provided in the Master Plan of Socio-economic Development of Nghe An Province are also considered in this study of the Model Rural Development.

(3) Basic Concepts for Model Rural Development

The final target of the Model Rural Development is set to improve the living standards in the rural areas comprehensive raise of farmers' income, improvement in nutrition, reduction of regional economic gap, etc. For the attainment of this final target, three main objectives of: 1) Improvement of agriculture, 2) Improvement of social infrastructures and 3) Environmental conservation are proposed. The projects in the respective sectors are formulated in accordance with these main objectives as shown in the following figure:



4.2 STUDY ON SECTOR PROJECTS

The proposed projects for each sector have been prioritized based on the comparison of degree of the following factors which are required to achieve the economic, living and environmental circumstance by 2010. At the prioritization, it is considered that respective sector project should be coordinated with the master plan of the Province and the District.

Factor	Basic consideration on prioritization
1. Urgency	Projects expected to be the countermeasures against the present problems that should be solved urgently
2. Realization	Projects expected to be implemented by a proposed executing agency or organization without any difficulty
3. Adaptability	Projects expected not to have any kind of contradiction with the plans at higher-level such as the National Development Plan for other sectors
4. Inhabitant needs	Projects expected to meet the most urgent needs of the inhabitants in the Study Area
5. Sustainability	Projects expected to have sustainable development potential and not to have a huge negative environmental impact
6. Impact	Projects expected to have a high socio-economical impact
7. Model	Projects expected to be used as model projects for other areas
8. Economy	Projects expected to provide the farmers with high profits
9. Synergistic effect	Projects expected to have a high synergistic effect through the combination of those projects with others of the same or different sector

The ranking for the proposed projects in each sector has been carried out based on the following criteria.

Rank	Conditions
A	Early implementation of the project is strongly recommended.
B	Early implementation of the project is recommended.
C	Implementation of the project is recommended.
D	Recommendation of the project shall be canceled.

The proposed sector projects and the results of prioritization are summarized below:

Results of Prioritization of Projects in Master Plan

	Projects	Compleh. Assess.	Remarks		Projects	Compleh. Assess.	Remarks
Irrigation/Drainage				Education Facilities			
	Reservoir Irrigation System		Area		School Electrification	A	
R02	Ho Thanh Reservoir System	A	80 ha		Rehabilitation of School Facilities	A	
R06	Trang den Reservoir System	A	100 ha		Establishment of Technical Middle School	B	
R09	Cua Ong Reservoir System	A	150 ha		Providing Teaching Aids for School	B	
R11	Rao Bang Reservoir System	A	160 ha		Expansion of Regular Educational Center	C	
R01	Vung Huyen Reservoir System	B	20 ha		Expansion of Vocational Center	C	
R04	Vuc Mau Reservoir System	B	50 ha	Rural Road			
R05	Hao Hao Reservoir System	B	20 ha	1	Route 15A (North)	A	15 km
R17	Khe Dinh Reservoir System	B	60 ha	2	Route 15A (South)	A	19 km
R19	Khe Bo Reservoir System	B	35 ha	3	42 Dike Road	A	11 km
R10	Thanh Thuy Reservoir System	C	100 ha	4	Phan Boi-Chua Road	A	7 km
RN2	Da Han Reservoir System	C	250 ha	5	Hung Tien-Nam Linh Road	A	9 km
	Pumping Irrigation System			6	42 Dike-Kim Lien Road	A	4 km
P16	Nam Dong Pumping System	A	800 ha	7	Kim Lien-Nam Cat Road	A	8 km
PN1	Nam Cuong 2 Pumping System	A	120 ha	8	Nam Tan-Nam Loc Road	A	9 km
P07	Nam Cuong 1 Pumping System	B	140 ha	13	Nam Nam Dike Road	A	9 km
P10	Du DU Pumping System	B	80 ha	14	Nam Kim-Nam Phuc-Nam Cuong Road	A	7 km
P19	Nam Tan Pumping System	B	200 ha	9	Cau-Sao Market Road	B	4 km
P20	Dai Dong 1 Pumping System	B	90 ha	10	Nam Thanh-Nghi Loc Road	B	7 km
P23	Ru Dun Pumping System	B	200 ha	11	Nam Thai Road	B	5 km
P28	Ghenh station Pumping System	B	320 ha	12	Northern Ring Road	B	15 km
P31	Xuan Lam Pumping System	B	330 ha	15	Nam Phuc-Nam Trung Road	B	4 km
P09	Nam Trung Pumping System	C	500 ha	Rural Electrification			
P21	Dai Dong 2 Pumping System	C	60 ha		Complete Electrification	A	
P27	Sen doi Pumping System	C	80 ha		Rehabilitation of Distribution Network	A	
P29	Hong Long 1 Pumping System	C	135 ha		Up-grading of Distribution Network	B	
P30	Hong Long 2 Pumping System	C	200 ha	Rural Water Supply			
P33	Ru Doi Pumping System	C	50 ha		Public Water Supply System (Dried-up Area)	A	
	Inundation Mitigation, Drainage Improvement		Area				

	Projects	Compleh. Assess.	Remarks		Projects	Compleh. Assess.	Remarks
F1	Nam Nam Di ke	A	1920 ha		Public Water Supply System (Inundation Area)	A	
D1	Nam Nam Drainage Improvement	C	1400 ha		Material Supply of Filter Tank	A	
	Agricultural Supporting Services		Area		Public Water Supply System (Plane Area)	B	
	Agr. Extension Center	A	11502 ha		Improvement of Existing Gravity Flow System	B	
	Seed Supply Center	A	8450 ha		House Connection System (Nam Dan Town)	C	
	Agr. Mechanization S.C.	A	1410 ha		Environmental Conservation		
	Nursery Center	B			Erosion Control	A	
	Agro-industry and Marketing						
	Agro-processing Complex	A					
	Market-oriented Forwarding Center	A					
	Improvement of Confectionery Factory	B					
	Group Communal Facility for Silk Yarn	B					
	Group Communal Facility for Soy-sauce Production	B					
	Pine Tree Gum Processing Facility	B					
	Health and Sanitation						
	Rural Health and Sanitation Improvement	A					

(1) Agriculture

- Farming Plan

The farming plan is established based on the following basic consideration:

1. Establishment of diversified farm management systems
2. Balanced development of agriculture, forestry and fishery
3. Improvement of Cropping Pattern
4. Effective Water Use
5. Introduction of crop varieties adaptable for environmental condition, development of farming technology and their extension
6. Promotion of agricultural Mechanization
7. Promotion of production increase of livestock, fruits and fishes
8. Promotion of afforestation
9. Establishment and reinforcement of agricultural supporting systems for agricultural development
10. Promotion of group farm management

- Proposed Production Plan

Based on the basic considerations mentioned above, the increase of crop yield and the conversion of crop varieties from Summer rice with low yield to Summer-Autumn rice of crop varieties with higher yield as possible as admitted by water supply shall be promoted. The proposed cropping area and production plan of the major crops are as follows:

Proposed Cropping Area										(ha)
W.-Sp.		Su.-Au.		Summer		Winter		Year Total		
Roce	U.C.	Roce	U.C.	Roce	U.C.	Roce	U.C.	Roce	U.C.	Total
6,844	4,658	6,771	1,202	614	0	0	3,161	14,229	9,021	23,250
W.-Sp. : Winter-Spring				Su.-Au. : Summer-Autumn				U.C. : Upland Crop		

W.-Sp. : Winter-Spring

Su.-Au. : Summer-Autumn

U.C. : Upland Crop

Proposed Production Plan of Major Crops											(ton)
Rice (Irrigated)	Rice (Rainfed)	Subtotal	Maize	Sweet Potato	Ground Nuts	Green Bean	Sesame	Vegetable	Chili	Sugarcane	Mulberry
55,840	8,329	64,169	4,780	11,864	3,417	500	35	8,732	74	12,180	1,300

- Irrigation and Drainage Improvement Plan

Actual irrigation area in the Stud Area is less than 50 % of the designed irrigation area due to low water use efficiency caused by old irrigation facilities and lack of water sources. Therefore, it is important to increase actual irrigation area for improvement and stabilization of agricultural productivity in the area, and the actualization of effective water use by improvement of irrigation facilities (renovation/new construction of facilities and development of new water sources) is the basic countermeasures. For the drainage improvement, the damage mitigation plan without producing bad influence on the area outside the Stud Area is the basic countermeasures.

- Agricultural Supporting Service

In consideration of lack of farming land to be developed, the concept of the agricultural supporting service is defined to increase yield through introduction of new technology and input of effective materials and to rise cropping rate through intensive cropping in order to increase agricultural production in the District.

- Agro-industry and Marketing Improvement

Under the process that Viet Nam is promoting a free market economy, the farmers in the Nam Dan District have started converting the production system from self-sufficiency type production to market-correspondence type one. In this circumstances, it is proposed to have a development plan with a policy induction model having the following objectives to support the process:

- To change a way of thinking of the farmers to the new and advanced one adaptable to the free market economy.
- To prepare the situation in which farmers can advance their activities into the field of agro-processing and trade as a down-stream field of agricultural production.
- To create new group activities of farmers along with the above objectives.
- To displace these activities as the model of an advanced farmers' activities and to induce other areas to introduce them.

- Rural Credit

It is clear to see the inevitability of an improvement of the rural financial system as an important step towards achieving an efficient agricultural system. However, this problem including the improvement of related laws should be solved at national

level, and the review of rural financial system for whole country is recommended.

Item	Basic Ideas on Rural Credit
Beneficiaries	Credit should be granted on a priority basis to the projects related to agricultural production, even though credit for consumption purposes should is not neglected.
Flexibility	In order to achieve production diversification, improvement in aquaculture, agro-industry, marketing, etc., it is necessary that the loan terms (amount, period, interest, etc.) must be enough flexible to meet the requirements of each sector.
Relaxation of Financial Regulations	Make each financial institution of work under free competitive conditions in order to promote the diversification and improvement of the services to the farmers.

(2) Health and Sanitation

- Improvement of Rural Health and Medical System

The private health care practice is not common in Nam Dan District and the majority of people rely on CHCs as the first-contact health care facility. Facilities and equipment of CHCs have been deteriorating or lacking due to lack of budget and the level of technique and knowledge has been also declining due to lack of retraining of staff. The improvement of CHCs is expected the big impact on improving people's health conditions in rural area at commune level.

- Improvement of Environmental Sanitation

The sanitation facilities such as well, latrine and bathroom are severely deteriorating or lacking not only at each household but also at schools. So, most of these facilities should be rehabilitated or constructed. At the same time, spread of information, education and communication (IEC) activities about health and sanitation in order to improve people's sanitary practice continuously is critically important.

- Home Living Improvement

For establishing healthy society in rural areas, introducing sanitary living practice in each family is the basic necessity. And it is indispensable for achieving sanitary living environment and good healthy conditions to implement health and sanitary activities at family level. At the same time with the extension service for agricultural production, an implementing new integrated activities is necessary in the view of improving living conditions at family level. For these activities, farmers' participation especially positive participation of women who hold an important role in rural family will be a precondition.

Presently, Nam Dan District is included within the project areas of the JICA's technical cooperation, "Reproductive Health (RH) Project", which was started in June 1997. The activities of RH Project do not cover all the activities of the proposed project. However, the Project covers all the activities which are considered to be implemented urgently in the proposed project. Under these circumstances, it is concluded that the activities of the proposed project in this Master Plan are expected to be covered by the "RH Project".

(3) Education Facilities

Under the direction of Nghe An Province, the education sector in Nam Dan District is aiming to achieve 100% lower secondary education covering child's age between 6 and 14, and 50% upper secondary education covering appropriate age group. To support above effort, improvement of the following school facilities is proposed:

- Providing school facilities and educational materials/equipment

Improvement of general education facilities by providing electricity to the schools in which electricity is not provided, rehabilitating poor school facilities, procuring deficient education equipment in laboratory is proposed.

- Establishment of technical middle school

It is necessary for extending technical and vocational education in the future to build new schools or increase number of classrooms. Technical middle school should be established. Subjects to be taught in the technical middle school should be selected in consideration of regional characteristics, and industries and inhabitants' needs which exist in the area, in order to have two main functions of education and training.

- Expansion of general education center

Class rooms, educational materials and equipment which are insufficient in the general education center for training of teachers shall be expanded. At the same time, poor facilities at the center shall be improved.

- Expansion of vocational center

Subjects to train shall be expanded from students in lower secondary school to the general. The coverage of training which is presently limited within the near-by areas shall be expanded by introducing vehicles. Also, number of classrooms and laboratories shall be increased and equipment shall be additionally provided. Subjects to train shall be planned in consideration of needs in the area.

(4) Rural Road Improvement

The road network improvement project is formulated based on the basic concept of developing a road network adequate to accommodate future transportation system and enhancement of road management systems. Road improvement and rehabilitation of basic, major and inter-commune road networks should focus on achieving all-weathered road for vehicle traffic by pavement.

The routes to be improved are selected based on the aspects of development of an adequate road network, improvement of inhabitants' access to the social and economic key facilities and their farm and inhabitants' needs.

For the bridge of Route 15A crossing the Lam River, the route is justified as a basic road in the Study Area and also essential especially for the right bank region. Even though the route has a high priority in the area, the construction of a bridge crossing the Lam River is considered to be infeasible for the improvement of the rural road network in this area which has a small population and a few economic activity compared with the scale of big investment.

However, this route has an important role for economic development of the inland area of the Province that is not developed well from the point of view of provincial economic activity. To cope with the province-wide basic road network development, the route shall be improved as one complete route including the distance to the north up to Route 7 and the distance in Ha Tinh Province up to Route 8. In order to improve the southern section, a bridge crossing the La river, one of the main tributaries of the Lam river, is also to be constructed.

Because of the circumstances mentioned above, it is recommended that the bridge crossing the Lam River should be developed in the province-wide or larger scale development plan, and it is concluded that this bridge is excluded from the Master Plan.

(5) Rural Electrification

The present electrification rate in Nam Dan District is high, 95.8%. However, the power supply is in extremely poor condition due to deterioration of the distribution facilities. This has caused low quality of electricity supplied, frequent power outage and high percentage of power losses. Furthermore, the large amount of power losses has triggered higher power tariffs; it is two to three times higher than those in other districts at present. In addition, it is necessary for inhabitant at non-power supplied areas to be electrified in order to solve and improve their living standards disparity from other districts.

- Extension of Electrification

Low voltage distribution lines are to be extended and substations and distribution lines are to be newly constructed in order to electrify non-power supplied areas, equivalent to approximately 5 % of total households.

- Rehabilitation of Distribution Networks

The power supply to each commune in Nam Dan District is made through the distribution lines from Nam Dan Central Transformer Station in Nam Dan Town. However, the following problems are occurring as a result of over load at distribution lines due to small capacity of the lines in each commune. In order to improve those situation, it is of primal need to reduce the power losses in the distribution network. It contributes to even out the disparity in power tariffs and to supply adequate electrical power services. For this reason, distribution lines are to be rehabilitated and distributing substations extended.

- Up-grading of Distribution Network

It is necessary to increase power supply in order to meet the future increased power demand with the improvement of the living standards in the District, while the power supply is sufficient for the present power demand. Therefore, the existing central substation is to be rehabilitated and the distribution lines and medium voltage lines newly constructed.

(6) Communications

Communication and information systems perform a very important role not only in economic development but also to close the regional economic gap, social and

everyday activities in the rural areas. To achieve both economic development and regional equality, the development of a communication and information systems is indispensable. The improvement of this sector is proposed in other related sectors.

(7) Rural Water Supply

The proposed rural water supply plan aims to achieve a stable, reliable and year round continuous water supply. The highest priority in the plan is given to improvement of areas where many people are suffering from contaminated water and shortage of safe water of wells.

In the plan, it is targeted to provide safe domestic water for the inundated area along Lam River, in which shallow wells are infiltrated with flood water during the rainy season, and for the dried-up areas located at relatively high elevation, in which shallow wells are dried up during the dry season. To achieve this target, introduction of deep groundwater development by providing deep wells which are expected to provide safe, stable and reliable water source is to be applied.

(8) Environmental Conservation

At present, forest lands in the District are managed based on 3 classification, i.e., special use forest, protection forest and production forest. Felling of trees in protection forest areas is controlled completely; land use in special use forest area and production forest area is also regulated to prevent them from unplanned development. These regulations have recently shown their effects in Nghe An Province and Nam Dan District. Also, the "Barren Lands Regreening Program" (hereinafter referred to as the Decree 327 program), the national program for forest regeneration, has been carried out by GOV since 1993. The afforestation in the District also has been conducted by afforestation yard. In the District, barren land which can be planted is planned to be afforested by the year 2000 depend on the Program.

However, afforestation in barren lands for forest generation requires a long term until its values are expected. Therefore, the aims of the proposed environmental conservation are to reduce direct damages of fortune and farm land by erosion with short period's countermeasures in addition to the assistance to afforestation plan throughout the prevention of run-off of surface soil in barren lands and lands immediately after afforestation.

4.3 STUDY ON MASTER PLAN

4.3.1 Selection of Priority Projects

In consideration of the relation and balance among the priority projects selected from respective sectors under an all-encompassing viewpoint of the objective of the Master Plan, the prioritization of the projects has been re-evaluated and the priority projects are selected.

List of Priority Projects (Priority A)

Project	Cost (million VND)	Remarks	Project	Cost (million VND)	Remarks
Irrigation and Drainage			Education Facilities		
Reservoir Irrigation Project		Irrigated area (ha)	School Electrification	1,364	
Ho Thanh	7,542	80	Rehabilitation of School Facility	22,264	
Trang den	12,032	100	Rural Road		Distance (km)
Cua Ong	10,252	150	Route 15A (North)	17,554	14.8
Rao Bang	8,408	160	Route 15A (South)	41,433	19.4
Pumping Irrigation Project			42 Dike Road	14,790	11.0
Nam Dong	22,661	800	Phan Boi-Chua Road	16,083	7.2
Nam Cuong 2	9,966	120	Hung Tien-Nam Linh Road	13,416	8.8
Inundation Mitigation Project, Drainage Improvement Project		Covering area (ha)	42 Dike-Kim Lien Road	8,761	4.2
Nam Nam Dike	3,952	1,920	Kim Lien-Nam Cat Road	13,046	7.6
Agr. Supporting Services			Nam Tan-Nam Loc Road	16,620	8.7
Agriculture Extension Center	2,085		Nam Nam Dike Road	16,120	9.4
Seed Supply Center	21,719		Kim-N. Phuc-N.Cuong Road	20,468	7.0
Agricultural Mechanization Service Center	41,804		Rural Electrification		
Agro-industry and Marketing			Electricity Supply	37,625	
Agro-processing Complex	16,234		Rehabilitation of Distribution Network	75,965	
Market-oriented Forwarding Center	4,027		Rural Water Supply		
Health and Sanitation			Public Water Taps System for Semi-mountainous	53,617	
Rural Health and Sanitation Improvement	0		Public Water Taps System for Right Side of Ram	16,052	
			Installation of Filter Tanks to All of Existing Wells	5,808	
			Environmental Conservation		
			Erosion Control	2,074	

Note : - Administration fee, engineering service fee, physical contingency are included in Project cost.
Price escalation is excluded.

- The project cost of "Rural Health and Sanitation Improvement" is not considered in this Master Plan, since the activities in this project are expected to be covered by the on-going "Reproductive Health Project" supported by JICA's technical cooperation.

4.3.2 Implementation and Operation/Maintenance Plan

(1) Implementation System

The projects can be classified into two groups by their different focuses. One is the group of projects focusing on infrastructures and the other is the group of projects focusing on the support to farmers activities. The projects can also be classified into three groups by their necessity of technical and financial assistance from international organizations, their necessity of implementation at national or provincial level, and their possibility of implementation by the inhabitants

themselves.

(2) Implementation Plan

The implementation plan of the projects proposed in each sector is studied based on the prioritization discussed in the previous section. In this process, implementation at each stage is considered in order to realize effects of each project efficiently by focusing on the relationship among projects and synergetic effects of the projects.

(3) Project Cost

The cost of the projects proposed in this Master Plan excluding price escalation is 553,744 million VND for the priority "A" projects, 341,958 million VND for the priority "B" projects, 127,747 million VND for the priority "C" projects and 1,023,449 million VND as the total for the whole projects.

Summary of Project Cost

Sector	Project Cost(million VND)			Total
	Priority "A"	Priority "B"	Priority "C"	
Agriculture				
Irrigation and Drainage	74,815	54,084	94,706	223,605
Supporting Service	65,608	5,085	-	70,693
Agro-industry/Marketing	20,261	10,643	-	30,904
Health/Sanitation	0	-	-	0
Education Facilities	23,628	52,991	26,439	103,057
Rural Road	178,291	66,286	-	244,577
Rural Electrification	113,590	142,720	-	256,310
Rural Water Supply	75,477	10,150	6,602	92,229
Environmental Conservation	2,074	-	-	2,074
Total	553,744	341,958	127,747	1,023,449

- *: Project cost includes administration cost A consultant fee and physical contingency, and excludes price escalation
- *: The project cost of "Rural Health and Sanitation Improvement" is not considered in this Master Plan, since the activities in this project are expected to be covered by "Reproductive Health Project" supported by JICA's technical cooperation.

(4) Operation Plan

Operation/maintenance has been practiced in Viet Nam for irrigation and road facilities with farmers' participation. And, management system of farmers' organization centered by the people's committee in the district or commune has been relatively well established. Since organizations in this area have been relatively well functioned as viewed in the example, the existing organizations are principally employed in the operation/maintenance system for the proposed projects. However, increasing number of staff, enhancing training and local management and allocating finances are necessary in the case that staff and ability of existing organization are insufficient.

(5) Farmers' Participation

This Project shall be implemented and managed in consideration of farmers' participation in order to reflect farmers' intention at each stage of its implementation. At the planning stage of the Project, farmers are to provide necessary information for planning and the implementing agency is to reflect farmers' intention to the planning. Also, farmers are directly involved in construction for some projects. At the operation stage, farmers are involved in the project as beneficiaries. On the other hand, guidance by the governmental organization for the farmers to positively participate in the operation of the project should be considered even at the stage of operation by the governmental organization in the case of the projects being expected to be managed by the farmers themselves.

4.4 INITIAL ENVIRONMENTAL EXAMINATION

(1) Law on Environmental Protection and Related Organization

Law on environmental protection was issued on January 10, 1994 in which there are very clear articles to prevent environmental pollution in general; there are also articles concerning the exploitation of agricultural land and water sources. For the guideline of EIA, the Government Decree (No.175 / CP) providing a guidance for implementation of the Law on Environmental Protection was distributed in October 1994. The organization responsible for environmental management in the central government is the Ministry of Science, Technology and Environment (MOSTE). Much of the implementation responsibility rest on the provincial, and district governments.

(2) Initial Environmental Examination (IEE)

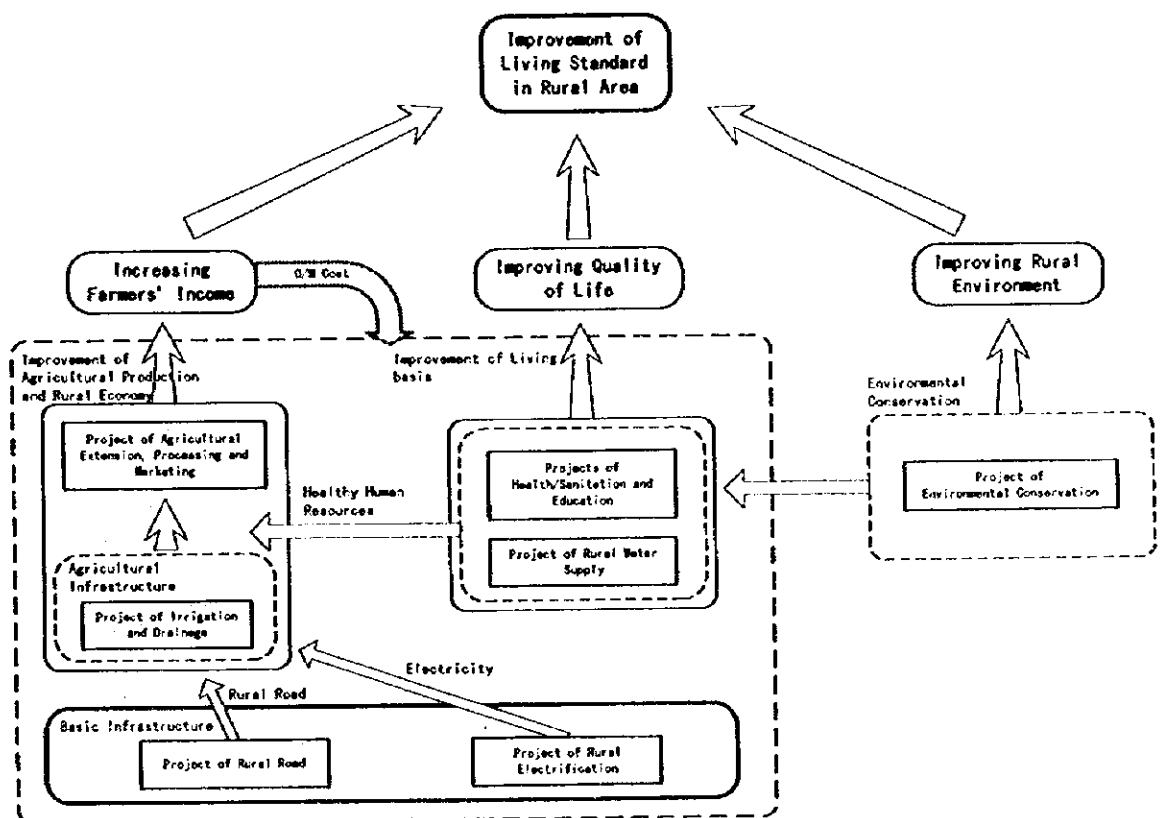
As a result of IEE, it is concluded with following considerations that the environment will not be seriously affected by the implementation of the proposed projects. As a consequence, EIA is not necessary during further stages of the study.

- Most of the Study Area consists of cultivated land and artificial forests. Thus, the implementation of the development does not directly affect the natural environment, especially concerning valuable species and protected areas.
- In the agricultural development plan is mostly rehabilitation or renovation of the existing facilities (especially irrigation facilities) is proposed. Thus, the implementation of the development does not seriously affect the environment.
- Main economic activity in the District is agriculture. Agricultural population represents 94% of the total population of the District. Thus, this rural development benefits almost all the inhabitants and the implementation of the development does not seriously affect the social environment.
- There is a possibility that some of people may be obliged to move out of their houses due to the expansion of the road width. However, they are directly benefited by the expansion of the road width; this problem can be solved with a proper land guarantee for those who are affected. Also, the resettlements of 8 residential houses are planned due to the establishment of a new pumping station. However this problem also can be solved with an enough resettlement guarantee and assistance for their living.

4.5 SUGGESTION FOR THE IMPLEMENTATION OF MASTER PLAN

The concept of the expected effects by implementing this project is illustrated below. Accordingly, living standards in rural area are improved with the increase of income and improvement of living conditions by improving basis for living and improving agricultural production and rural economy. At the same time, it is indispensable for a stable development of rural area to improve rural environment. Also, appropriate maintenance and management will become possible with economic increase of farmers and rural area. And these conditions also make the re-investment to building infrastructure possible. This cycle of resources is essential for the sustainable rural development. By implementing this Master Plan, a future model of rural society will be realized with the harmonic balance of farm households, rural economy, rural living conditions and rural environment.

However in order to implement the projects in the Master Plan on schedule, the project budget of VND 1,023,449 million is necessary. So, an early complete implementation of the M/P may be difficult in consideration of present annual budget of Nam Dan District. The step by step implementation of the projects which have higher priority in consideration of the balanced development as a rural development would be one of the choices even though resulting positive effects are delayed. Because the expected effects would come out acceleratedly not with straight line.



5. PRIORITY PROJECTS

5.1 AGRICULTURE

5.1.1 Irrigation and Drainage Improvement

(1) Facility Plan

Ho Thanh Reservoir System (R2)

The water loss will be saved by renovating canal system (main canal: 3.5km) and it is expected that irrigated area will be increased from present 45 ha to 80 ha.

Trang Den Reservoir System (R6)

It is expected that the irrigated area will be increased from present 45 ha to 100 ha with the renovation of canal systems (main canals: 4.9km in total), spillway and 2 intakes.

Cua Ong Reservoir System (R9)

Small water leakage is observed and the amount of leakage water become quite high when water level is close to the top of the dike. Thus, it is proposed to enlarge the capacity of existing two spillways for keeping safe water level in the rainy season. It is expected that the irrigated area will be increased from present 100 ha to 150 ha with the renovation of canal system (main canal: 1.9km).

Rao Bang Reservoir System (R11)

It is expected that the irrigated area will be increased from present 100 ha to 160 ha with the renovation of canal system (main canal: 1.0km).

Nam Dong Pumping System (P16)

The total capacity of present pumps is more than 1.6 m³/s and it is sufficient to irrigate 800 ha. However, the flowing capacity at main canal is not enough and only 253 ha of paddy field is irrigated at present. It is proposed to enlarge flowing capacity with the renovation of canal system including related structures (main canal: 7.5km) in order to irrigate 800 ha.

Nam Cuong Pumping System (PN1)

Nam Cuong pumping system has been planned since 1995 by Nam Dan District. It is expected to irrigate newly 120 ha of farm land with installation of a new pumping station and construction of a new canal system (main canal: 1.7km).

Drainage System of Nam Nam Dike

Inundation for two or three weeks caused by back water from the La river occurs mostly every year. Even upper part of the inside of dike is influenced by the back water and inundation. Because the main drainage canal connected to the La river belongs to Ha Tinh Province, it is impossible to formulate drastic mitigation plan without improvement of the drainage canal located in Ha Tinh Province. In consideration the above, it is proposed to shorten the inundation period by enlarging the capacity of drainage gate and to secure the safety of the dike structure by installation of two spillways. It is expected that inundation period will be reduced to more or less one week.

(2) Implementation Plan

Implementation stage of renovation/construction of irrigation and drainage facilities is divided into two stages, preparation stage (detailed design, tendering) and construction stage. Considering effective construction, it is better to set one year for preparation stage and to carry out the construction in the dry season of next year.

(3) Operation and Maintenance Plan

Operation and maintenance work for irrigation system is consist of water management (decision of water distribution, irrigation water supply, watching), facility maintenance (inspection, repair) and administration (collection of water fee). Agricultural cooperatives, which are management agencies, manage the irrigation systems under the supervision of commune peoples' committee. Some part of water management work (irrigation water supply, watching) and facility maintenance are carried out by private company with a contract base. For the drainage facilities, peoples' committee of 5 communes which are management agencies carry out the O/M works under the supervision of the District Peoples' Committee, and small-scale maintenance shall be carried out with the inhabitant participation.

5.1.2 Agricultural Supporting Services

(1) Agricultural Extension Center

Establishment of Agricultural Extension Center aims to contribute to the increase of agricultural production and to the increase of farmer's income by activation through expansion of extension organization and enrichment of facilities and equipment. In addition, exhibition of model farming practice which is expected to provide a high profit to the farmers should be initiated. The following are included in the activities of the Center :

- Arrangement of the agricultural extension workers at least one person for each commune in order to enhance T & V (Training and Visiting) system,
- Enrichment of equipment and materials for extension services,
- Exhibition of technical model plot: technologies such as new varieties of crops, new feeding method of poultry, and
- Exhibition of the model farming practice: 5-6 farmers' group farming; instruction and exhibition of farming technologies including farm mechanization and farm management technology etc.

(2) Seed Supply Center

The Nam Dan Seed Supply Center is proposed to be established by expanding the existing Nghe An Provincial Crop Seed Company as to increase rice production without increasing present cropping area by supplying high quality seeds to whole rice cropping fields. The Center carries out undermentioned works making full use of present seed supply system of the existing Nghe An Provincial Crop Seed Company.

- To produce high quality seeds on the contract basis under the supervision of the Nghe An Provincial Government and with assistance of the Nghe An Provincial

Crop Seed Company. Quantity of produced seed will cover cropping areas of 6,844 ha, 6,771 ha and 614 ha for winter-spring cropping, summer-autumn cropping and summer cropping, respectively. Contracted farmers are selected by the cooperatives. Distribution of original seed and collection of produced seed are also made with the cooperation of the cooperatives.

- To preserve the produced seed while maintaining a high quality.
- To distribute timely high quality seed to the farmers.

Item	Cropping Season		
	W. - Sp	Su. - Au	Summer
Necessary quantity of seed	273.8 ton	270.8 ton	24.6 ton
Necessary field for seed production	98 ha	108 ha	10 ha

(3) Agricultural Mechanization Service Center

The Agricultural Mechanization Service Center is proposed to be established with a complete set of farm machinery and to carry out timely rent of machine or contracted farming service. The Center aims to exhibit that agricultural mechanization will contribute to increase agricultural production and to increase farmer's income and to keep farmer's health through mitigation of farmer's heavy labor, production increase by timely farming, increase of income sources by farm labor saving. The area covered by the irrigation and drainage improvement subproject of 1,400 ha is selected to be a service area of the Center. The activities proposed to the Center are :

- Training of operation technique of farming machine for the farmers and issue of license to the mastered farmers
- Lending of farming machine to licensed farmers
- Implementation of contracted farming
- Maintenance and repair of machinery
- Advice and guidance on farm mechanization
- Guidance on farm mechanization for the Farming Model Plots assisting the Agricultural Extension Center

(4) Implementation Plan

- Agricultural Extension Center :

The Agriculture and Rural Development Department of the Nam Dan District which becomes the core for the implementation of the Project executes the Project in close connection with the Agricultural Extension Station of the District under the support and supervision of the Nghe An Provincial Agricultural Extension Center.

- Seed Supply Center :

The Agriculture and Rural Development Department of Nam Dan District which becomes the core for the implementation of the Project executes the Project in close connection with the Nghe An Provincial Crop Seed Company under the support and supervision of the Nghe An Provincial Agriculture and Rural Development Department.

- Agricultural Mechanization Service Center :

The Agriculture and Rural Development Department of Nam Dan District which

becomes the core for the implementation of the Project executes the Project in close connection with the Agricultural Extension Station of the District under the support and supervision of the Nghe An Provincial Agriculture and Rural Development Department.

(5) Operation Plan

- Agricultural Extension Center

The Center increases extension workers in charge of communes and arranges skilled laborers who assist the technical officers in charge of technology exhibition. Appointment of extension workers are made to participate in the training courses concerning method of extension activity, new technologies of farming practice, animal feeding, etc. provided by the Nghe An Provincial Agricultural Extension Center. In addition, some extension workers are also made to participate in the short term training courses provided by the Nghe An Provincial Agricultural Extension Center for their technical level brush up every year.

- Seed Supply Center

The Center consist of 3 sections such as seed production on contract basis, seed processing and preservation of seed and seed distribution. Necessary staffs in each section are to be appointed.

- Agricultural Mechanization Service Center

The Center consist of 4 sections such as administration, training and guidance, operation and workshop. Necessary staffs in each section are to be appointed.

5.1.3 Agro-industry and Marketing Improvement

(1) Activities

1) Agro-processing Complex

a. Rice mill

- To process paddy as much as possible produced in the project area.
- To carry out waged processing for the part of paddy for farmers' self-consumption with the same rate as that of existing millers in the area.
- To buy the part of paddy for farmer's selling at the market price rate.
- To give back the qualitative and quantitative merits by technology improvement to the consignment farmers.
- To make effort to sell it with the higher price by quality improvement and to expand profits by selling at proper place on suitable time.

b. Ground nuts oil mill

- To process ground nuts as much as possible produced in the project area.
- To pursue profits qualitatively and quantitatively by technology improvement.
- To acquire the confidence in the market and expand the regular customers by selling the good products with stable quality.

c. Feed mill

- To produce and sell the combination feed that is mainly for pig raising in order to promote an animal breeding industry in the area.
- To produce feed with mainly rice bran and oil cake generated from the two mills

above and other materials procured.

d. Grain dryer and ground nuts sheller

- To make the farmers use the dryer and the shelling machine freely for the purpose of advancing the procurement of ground nuts that is the material for the oil mill and giving the merit of reduction of loss occurred by insufficient drying to the farmers.
- To use the waste such as husk and ground nuts shell generated from this facility as fuel of the dryer, and reduce the operation cost.

e. Miscellaneous

In the future, it is expected that the farmers' groups engaging the activities above will develop and create the following new individual business lines:

- Wholesaling of rice
- General edible oil production sales business including the rice bran oil and salad oil
- Overall combination and concentrated feed production sales business
- Intensive raising and sales business of pig, chicken, beef cattle, etc., not as the side job of the farmers.

2) Market-oriented Forwarding Center

a. Accumulation of market information

- To collect and accumulate market information widely and daily including information that is offered by the People's Committee.

b. Processing and analyzing of accumulated information

- To grasp trading trend and needs in markets by processing and analyzing accumulated information.

c. Market-oriented farming

- To plan the kind of crops, harvest time, sales time, destination place, sales unit, etc. in order to get high profits on the basis of the analysis of information.
- To promote group farming as much as possible, not individual farming by each farmer, in accordance with the plan above.
- To promote group procurement of agricultural inputs which provides financial benefits to the farmers.

d. Group collection and forwarding

- To adjust harvest schedule in advance among the farmers and carry out joint collection using a truck.
- To carry out group work by the farmers themselves such as sorting by destination places and binding, packing and grading in case of market requirement, and forwarding by a truck.
- To store the products such as beans that can be stored in a warehouse at first and ship it in good time of market condition.
- To transport the products to the markets in the neighboring area by a truck and to the markets even out of the province when the increase of a profit is expected within a possible area.

(2) Implementing Organization

As Agro-processing Complex and Market-oriented Forwarding Center projects are to be carried out by the farmers' group, the grouping of farmers is indispensable. The implementing agency of the projects will be the cooperative where the facilities of the projects are installed. The facilities are managed by the farmers' group of proper-scale farmers directly that are selected by a village unit out of all the member farmers in the cooperative.

(3) Implementation Plan

As implementation of the projects in this sector should be carried out after achievement of improvement of agricultural productivity and increasing the treatment amount for rural market, the implementation of projects in irrigation and agricultural supporting sectors is one of the preconditions for the implementation of these projects. On the other hand, it is necessary to consider the coordination with the projects in rural road and electrification sectors for effective generation of project benefit. Therefore, the implementation of those sectors' projects should precede this sector's projects; they should be implemented after the improvement of those other sectors' conditions. Furthermore, it is recommended to establish new organizations are established in Nam Dan District; that is, "a New Agricultural Management Promoting Committee" which is in charge of coordination for overall activities and "a New Agricultural Management Promoting Division" which executes the projects in keeping the relation with the operating cooperatives.

(4) Operation and Maintenance Plan

The management agencies are sub-organizations belonging to the cooperatives, and the activities are carried out under instruction and supervision of "a New Agricultural Management Promoting Division. Temporary employees are to be hired for seasonal simple work.

5.2 EDUCATION FACILITIES

(1) Outline of Projects

- Material Supply Program for Electricity Supply to Schools
Wiring to schools (53 schools in total), set up of electric covering at schools (53 schools) and supplying lighting equipment as 2 lights per classroom.
- Material Supply Program for Rehabilitation of School Facilities
Reconstruction of 56 classrooms, heavy repair of 181 classrooms and repair of 113 classrooms.

(2) Implementation and O/M Plan

Education and Training Division of the District requests the Communes to design and submit rehabilitation plan, inspects these plans and supplies the materials required in consideration of total balance of overall plans in the District. The responsibilities of rehabilitation works using these materials belongs to the Communes. Each Commune implements the program including after care with the inhabitants' participation. Technical guidance by the technician of the District is essential for the implementation of construction works. Especially for the electricity works, as there are big problems such as accidents during installation works and

power loss caused by poor technique of inhabitant who has no sufficient knowledge for electricity, the works should be done by the technicians dispatched by the District.

5.3 RURAL ROAD IMPROVEMENT

(1) Facility Plan

The typical road structure is decided based on the Vietnamese Standard for Motorway and the Grade IV of the Standard is applied due to the expected traffic condition and characteristics of the routes.

The facility plan of respective routes to achieve objectives is shown below:

Route	Distance to be improved	Pavement plan	Distance to be widened	Road embankment plan
1. Route 15A (Northern Part)	14.8 km	Asphalt Pavement	-	
2. Route 15A (Southern Part)	19.4 km	Asphalt Pavement	-	Distance around the Mong Bridge L = 3.0 km H = 0 ~ 1.9 m (Average 1.0 m) To cope with the level 3 flood water level of the Lam River (E.L. 7.9 m at Nam Dan).
3. 42 Dike Road	11.0 km	Asphalt Pavement	11.0 km	
4. Phan Boi - Chua Road	7.2 km	Asphalt Pavement	7.2 km	
5. Hung Tien - Nam Linh Road	8.8 km	Asphalt Pavement	8.8 km	
6. 42 Dike - Kim Lien Road	4.2 km	Asphalt Pavement	4.2 km	
7. Kim Lien - Nam Cat Road	7.6 km	Asphalt Pavement	7.6 km	Distance after the Nam Ha Bridge L = 2.8 km H = 0 ~ 1.0 m (Average 0.8 m) To cope with frequently inundation level. (Road Surface E.L. = 3.5 m)
8. Nam Tan - Nam Loc Road	8.7 km	Asphalt Pavement	8.7 km	
9. Nam Nam Dike Road	9.4 km	Asphalt Pavement	1.8 km	Distance in Nam Cuong Commune L = 6.0 km H = 0 ~ 2.2 m (Average 0.9 m) To cope with the level 3 flood water level of the Lam River.
10. Nam Kim - Nam Phuc - Nam Cuong Road	7.0 km	Gravel Surface	7.0 km	Distance in Nam Nam Dike L = 4.8 km H = 0 ~ 1.7 m (Average 1.0 m) To cope with frequently inundation level. (Road Surface E.L. = 4.5 m)

(2) Implementation Plan

The preparation of adequate rural road network is considered as the basic condition for the overall rural development plan. Thus, the implementation of the rural road

improvement should be scheduled ahead of that of other sectors so as to realize their effect quickly and efficiently. Especially, Route 15A is required to be improved ahead of other routes due to its function as an important basic road in the area. Considering the present system of the road administration in Viet Nam, it is considered to be better that the road improvement be implemented by the present administration system. Thus, the improvement of Route 15A only is proposed to be implemented by the Nam Dan Transportation Office, Nghe An Province, and other roads to be implemented by the District.

(3) Road Management Plan

Road management organization for the rural road improvement project is proposed to be two types due to the present administrative organizations for road management. Route 15A which is a provincial road should be managed by the Nam Dan Transportation Office of Nghe An Province. Other priority routes are classified as district roads and they should be managed by the District. In order to cope with the increase of upgraded roads to be maintained and to enhance the management ability for all the district roads, a new project office for road management is proposed to be newly established under the Planning and Investment Division of Nam Dan District which has responsibility for road administration.

5.4 RURAL ELECTRIFICATION

(1) Facility Plan

- Extension of Electrification

The required works comprise of construction of new overhead distribution lines and substations which can supply electric power to the non-power supplied areas.

Region	Number of Substations	Capacity of Transformer (kVA)	Length of Line (km)	Number of New Poles	Length of Line (km)	Number of New Poles
1	3	300	2.50	6	25.30	42
2	6	600	3.10	7	30.80	46
3	4	400	4.05	10	28.25	44
Total	13	1,300	9.65	23	84.35	132

- Rehabilitation of Distribution Networks

The required works is rehabilitation of overhead distribution lines, which can raise confidence in the distribution network service and supply electric power of good quality.

Region	Length of Line (km)	Number of New Poles	Length of Line (km)	Number of New Poles
1	16.6	14	6.2	59
2	6.3	4	33.6	32
3	12.0	10	38.2	37
Total	34.9	28	133.8	128

(2) Implementation Plan

The proposed project shall be implemented by carrying out the repair and rehabilitation of the distribution networks prior to the expansion of electrification works, due to the following matters.

- The rehabilitation of the existing facility shall precede the new installation works from the viewpoint of the interface of both works.
- The schedule of power supply provided by this Project shall be coordinated with other projects such as the pumping facility included in the irrigation projects

(3) Operation and Maintenance Plan

The operation and maintenance of distribution network and other equipment should be conducted by electrical engineer in the Agriculture and Rural Development Division of the District. In the O/M activity, the prevention of accidents and effective maintenance indicated below are to be focused:

- Deterioration of equipment
- Poor action of guard system (deterioration of guard relays)
- Deterioration of cable insulation
- Accidents due to poor installation
- Decrease of the appearance of salt covering insulators (caused by salt, etc.)
- Degree of sag of overhead wire lines
- Degree of corrosion of wooden poles

5.5 RURAL WATER SUPPLY

(1) Public Water Supply System by Deep Wells

- Outline of Project

Public water supply system by deep wells including water source facility, treatment facility and distribution facility is adopted for the priority project. In this system, the groundwater is pumped up from deep wells by using submersible pumps, and water is then treated and distributed through pipelines to the users via public hydrants. Considering the present water supply problems in the area, the following areas has been selected:

- Inundation area along the Lam river, where shallow wells are infiltrated with flood water during the rainy season. (7 Communes)
- Dried-up area in relatively high elevation area, where shallow wells are dried-up during the dry season. (10 Communes)

- Implementation Plan

The construction works is schedule to be completed in 10 years including one year for preparation period. The implementation of the works in the inundation area should be scheduled to be conducted ahead of the works for dried-up area, because the inundation area is suffering from poorer sanitation conditions than the dried-up area.

- Operation and Maintenance Plan

The proposed water supply system is an independent system to be operated by each service block. A new organization is to be formed and have the responsibility for all the activities including billing and money collection as well as operation and maintenance of the system. It is proposed to establish a Rural Water Management

Office (RWMO) and an Operation and Maintenance Unit (O/M Unit) for each of 19 service blocks. RWMO shall be established under the administration of the Provincial People's Committee and O/M Units shall conduct operation and maintenance works for the systems with the assistance of RWMO. The operation and maintenance cost shall be allocated by the service charge collected from inhabitants.

(2) Material Supply of Filter Tank

- Outline of Project

Groundwater of shallow wells in the Project Area is of low quality for domestic use because most of the shallow wells are polluted by human and animal wastes due to inappropriate location and structure of the wells. Although filter tanks are installed at the shallow wells by the UNICEF's program in the Project Area, there are still 19,470 wells (70% of total existing wells) which do not have filter tanks because of shortage of funds. Among them, the area of 16,170 wells is to be included in the proposed public water supply system. Therefore, it is planned to provide construction materials for the installation of filter tanks on the remaining 3,300 existing wells only. In this project, only materials are supplied and the farmers are to install filter tanks by themselves with the same procedures adopted by UNICEF Program.

- Implementation Plan

Construction materials of filter tank consisting of steel bar, cement, PVC pipe, brick, etc. are to be supplied to the people through the above mentioned Program. Implementation period is planned to be 10 years considering the capacity of present number of the staffs at the Rural Water Supply Office in Nghe An Province.

5.6 Environmental Conservation

(1) Objective of Protection Works against Gully Erosion

Fundamental countermeasures for maintaining living conditions of the inhabitants should be conservation of forest by afforestation. However, it takes a long time to complete the forest conservation by afforestation. Therefore, urgent countermeasures against gully erosion are proposed to keep the safety of residential houses, roads and farm lands until the lands are conserved by trees. These sites are located in dangerous places that cause damages due to the large-scale gully. The proposed works consist of simple weirs using gabions to be established on the existing gullies and are to decrease the stream by smoothing the longitudinal slope of the stream which contributes to the stabilization or decrease of the development of gullies. Also, this works becomes the model for works to be performed at other erosion sites.

(2) Summary of Project

The proposed protection works are selected in consideration of the following:

- Living conditions of the inhabitants are seriously affected by the gully erosion.
- Urgent countermeasures are required
- The required protection works cannot be made by the inhabitants by themselves due to the large scale of gully erosion.

There are 3 sites in Khanh Son commune which require urgent protection works.

Protection works against gully erosion are planned by employing the method of gabion works. Gabion stores soil in the gully by checking the soil run off and stabilizes the development of the gully.

(3) Implementation Schedule

At present, the Department of Forest Protection under the District People's Committee conducts protection works of the forests and these works consist of countermeasures against forest fire, harmful insects and soil erosion. Therefore, the implementation of the project is to be carried out by the Department of Forest Protection. The construction works shall be conducted in the dry season of the next year, considering the preparation period of design and tendering. Furthermore, it is desirable the works are to be conducted after the completion of rural road construction works in view of the transportation of construction materials.

6. MODEL RURAL DEVELOPMENT PROJECT

6.1 Formulation of Model Rural Development Project

In this section, "a Model Rural Development Project", a kind of a package project, which is formulated by combining the priority projects planned in each sector is proposed to be dealt as a model project for developing rural areas in Viet Nam. "The Model Rural Development Project" is a project promoting improvement of agricultural production, living conditions and environmental conditions in the objective rural area integrally. The purpose of the Project is to achieve the improvement of living conditions for local residents integrally and complexly. Also, this project is aimed to indicate a model of agriculture and rural development in Viet Nam. The following ideas are employed in selecting projects in respective sectors in consideration of appropriate investment balance for achieving the final goal of the project efficiently and effectively:

- **Agricultural Production Sector : Irrigation/Drainage, Agricultural Supporting System, Agro-industry/Marketing**

Agricultural production is the most important element of this Project, because it improves farmer's living conditions economically by increasing agricultural income. At the same time, it is also essential as a economic foundation for the qualitative improvement of living conditions. In consideration of production of the economic effects from the Project, all of the priority projects in this Sector are selected in the Model Project.

- **Rural Living Conditions Sector : Educational Facility, Rural Water Supply**
All of the priority projects in this Sector are selected in the Model Project. Because they are indispensable as the basic conditions for achieving healthy living standard in rural area and qualitative improvement of living conditions.

- **Rural Social Infrastructure Sector : Rural Road, Rural Electrification**
The proposed projects in this Sector contribute to the improvement of both agricultural production and living environmental conditions. They are also the basic conditions for producing the project effects in other sectors. However, the projects which are expected to contribute directly to the improvement of agricultural production only are preferentially selected as the sub-projects of the

Model Project in consideration of the balance between economic effects from the Project and social investment. The priority projects in this Sector which are not selected as the sub-projects forming the proposed Model Project should be implemented continuously after the implementation of the Model Project in consideration of the very important role of these projects for the improvement of the rural living environment.

• **Environment Sector : - Environmental Conservation**

All of the priority projects in this Sector are selected in the Model Project. Because they are indispensable for stability over the rural area.

Based upon the above-mentioned points of view, the projects in respective sectors which form the proposed "Model Rural Development Project" are summarized as follows:

Components of Model Rural Development Project

Sector	Project	Sector	Project
Agricultural Production	Irrigation and Drainage	Rural Living Condition	Education
	Reservoir Irrigation Project		School Electrification
	Ho Thanh		Rehabilitation of School Facility
	Trang den		Rural Water Supply
	Cua Ong		Public Water Taps System for Semi-mountainous
	Rao Bang		Installation of Filter Tanks to all of existing wells
	Pumping Irrigation Project	Rural Social Infrastructure	Rural Road
	Nam Dong		Route 15A (Northern Part)
	Nam Cuong 2		Route 15A (Southern Part)
	Inundation Mitigation Project, Drainage Improvement Project		42 Dike Road
	Nam Nam Dike		Phan Boi - Chua Road
	Supporting Services		Nam Nam Dike Road
	Agriculture Extension Center		Nam Kim - Nam Phuc - Nam Cuong Road
	Seed Supply Center		Rural Electrification
	Agricultural Mechanization Service Center		Rehabilitation of Distribution Network
	Agro-industry and Marketing Improvement	Environment	Environmental Conservation
	Agro-processing Complex		Erosion Control
	Market-oriented Forwarding Center		

6.2 IMPLEMENTATION AND O/M PLAN

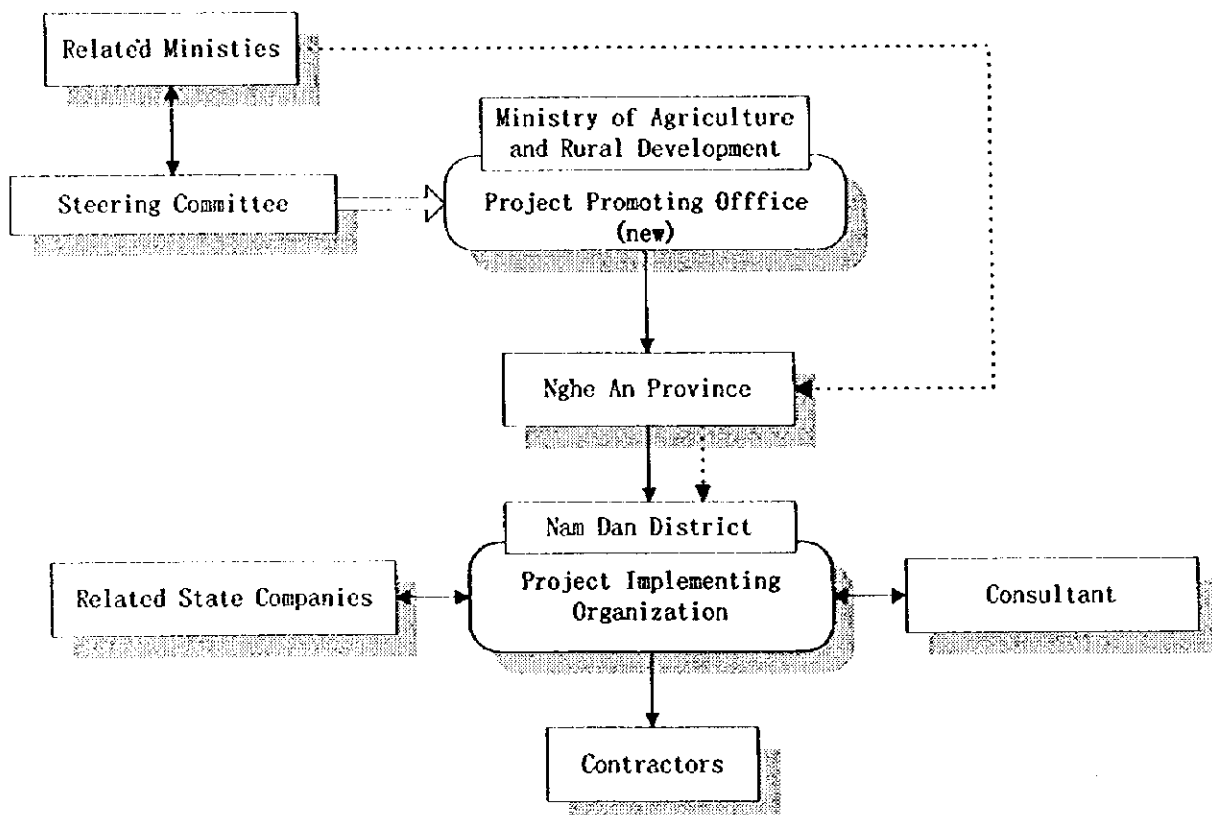
6.2.1 Implementation Procedure

(1) Method of Project Implementation

In the implementation of the projects in each sector, the implementing organizations formed by related department or section in Nam Dan District execute the tasks.

(2) Recommendation for Implementation

Regarding the organization necessary for realizing the integrated Model Rural Development, there is no organization in the Ministry of Agriculture and Rural Development which can efficiently manage such integrated development projects as a central government. The local implementing and managing organization for this Model Project is Nam Dan District. However, in order to coordinate with other agricultural development projects and to study extension of this Model Project at the national level, it is recommended that "a Project Promoting Office" for the Project should be newly established in the Ministry of Agriculture and Rural Development. It is, also, recommended that the Steering Committee should be continuously established for coordinating related sectors. The committee consists of members from related ministries and is headed by the Ministry of Agriculture and Rural Development that has direct responsibility for the major agricultural projects in this Project.



Implementation Organization

6.2.2 Implementation Plan

The project implementation plan is decided based on the consideration that the sub-projects/components having relation with agricultural production sector which contribute to economic effect directly is given priority on implementation, and that the schedule is arranged considering the mutual relation and synergistic effect between respective sub-projects/components so that project effect appears effectively and efficiently.

6.2.3 Project Cost

The project cost consists of construction cost, land compensation cost, material supply and equipment procurement cost, administration cost, engineering cost and price escalation.

(1) Basic Condition of Cost Estimation

- The basic cost such as labor cost, material cost and construction machinery operation cost are based on the "Unit Price of Construction in Nghe An Province, the first half of 1997" and interview with construction companies in the Province.
- The requirements per unit works refer to the Vietnamese Standard issued by Ministry of Construction.
- The price of domestic materials are based on those including transportation of them to the construction sites. On the other hand, the price of imported materials are based on the material CIF price plus domestic transportation cost and tax.
- The construction cost are estimated with local and foreign components. However, the money of the Viet Nam (VND) is used for both components. The unit costs for respective works items consist of direct and indirect costs, and the indirect cost is set as 30% of the direct cost based on the analysis of interview with construction companies.
- The foreign exchange rate used is US\$ 1.00 = VND 11,700 as monthly average of the exchange rate of the Bank for Foreign Trade as of July 1997.
- The physical contingency is set as 10% of the construction cost and other cost.
- As the price escalation of the foreign currency portion, 1.8% is applied based on the annual average rate of the consumer prices index of G-7 during 1994~1996. As that of the local currency portion, 8.0% is applied.

(2) Project Cost

As a result of the disbursement schedule, the project cost excluding price escalation is estimated to be VND 464,275 million, the foreign portion of which represents VND 150,105 million (32%) and the local portion VND 314,170 million (68%). The project cost including price escalation is estimated to be VND 552,436 million, the foreign portion of which represents VND 156,397 million (28%) and the local portion VND 396,039 million (72%).

Total Project Cost Summary

(unit : million VND)

Items	L/C	F/C	Total Amount
1 Construction Cost	224,534	57,727	282,261
2 Land Compensation Cost	4,329	0	0
3 Administration Cost	14,329	0	0
4 Engineering Cost	5,645	22,581	28,226
Sub-total	248,838	80,307	329,146
5 Material Supply and Equipment Procurement Cost	36,771	56,152	92,923
6 Physical Contingency	28,561	13,646	42,207
Sub-total	314,170	150,105	464,275
7 Price Escalation	81,871	6,291	88,162
Total	396,039	156,397	552,436

The investment schedule is determined to be total 6 years including preparation period except for education facilities and rural water supply. The investment schedule of education facilities and rural water supply is determined to be 10 years due to the consideration of the balance of investment and the ability of implementation organizations. The investment schedule is shown below:

Preparation	Construction Period					
n	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year
	1%	38%	18%	20%	8%	6%
						7~10th Year
						4 years total 9%

6.2.4 O/M Plan

Each project in the Project is to be basically operated and maintained by appropriate sector in Nam Dan District as an implementing agency which is as same as the case of implementing the Project. Also, the Steering Committee shall coordinate all the sectors as same as the implementation. Related ministries of respective sectors shall coordinate each other as the organizations in the central government. At the same time, they shall guide and support related sectors in Nam Dan District through Nghe An Province. However, they should lead the District in consideration of farmers' management from the beginning for the projects which are suitable for the farmers to operate and maintain by themselves.

6.3 PROJECT EVALUATION

6.3.1 Basis of Evaluation

The evaluation conditions of the economic and financial evaluations are as follows:

- a. The project life is set as 30 years from the commencement of the Project including detailed design period and construction works period, considering the working life period of the main structures.
- b. The currency used for the estimation is the Dong of Viet Nam (VND).

- c. The foreign exchange rate used is US\$ 1.00 = VND 11,700, which was the average exchange rate of the Bank for Foreign Trade for July 1997.
- d. For the prices of agricultural products, farm-gate prices are used and for the prices of agricultural production input materials and construction materials, delivery prices at the production and construction sites are used.
- e. An economic discount rate of 10% is applied in the economic evaluation. This figure represents the opportunity cost of capital and is used to determine the present value of future flow of costs and benefits of the Project as recommended by World Bank.
- f. A financial discount rate applied in the financial evaluation is the deposit rate of interest on annual basis of the State Bank of Vietnam as of 8.4%.

6.3.2 Benefits of the Project

(1) Agricultural Benefit

1) Irrigation and Drainage Improvement

Benefit from the Irrigation Improvement Sub-project including improvement of reservoirs and pumping stations is considered as an increase of the crop productions mainly caused by increase of yield and efficiency of cropping pattern structures. Total annual net production value of six irrigation systems under with-project conditions is VND 17,077 million, about 3.6 times that of without-project conditions, and the total annual benefit is VND 12,342 million.

Benefit generated by the Inundation Mitigation Sub-project is recognized as an increase of the crop productions caused by avoiding crop damage by inundation, especially on Summer-Autumn and Summer paddies. Additionally, shortening of the inundation period will contribute to a rise of the living conditions of inhabitants (intangible benefit). The annual net value of inundation mitigation in 1,200 ha under with-project conditions is VND 4,033 million, about 1.4 times that of without-project conditions, and the annual benefit is VND 1,170 million.

2) Agricultural Supporting Services

Benefits generated by the Agricultural Supporting Services Sub-project are considered as an increase of the crop productions generated by the introduction of new farming practices with effective use of fertilizers and agro-chemicals, an increase of the crop productions especially for paddy generated by the introduction of high quality seeds and an increase of crop productions especially for paddy generated by the control of cropping periods by avoiding inundation period. The annual net production value out of the Irrigation Improvement Sub-project area under with-project conditions is VND 81,114 million, about 1.5 times that of without-project conditions, and the annual benefit is VND 28,659 million.

3) Agro-industry and Marketing Improvement

Benefit generated from the Agro-processing Complex is the net profit of the difference between expenditure of raw material purchase and income of product selling and service charge of rice mill. The former is estimated at VND 1,361 million and the latter is estimated at VND 1,942 million. The annual net profit is VND 581 million. Benefit generated from the Market-oriented Forwarding Center is the net profit of the difference between expenditure of purchase and income of

selling agricultural products. The former is estimated at VND 675 million and the latter at VND 1,180 million. The annual net profit is VND 504 million. Therefore, total annual benefit from the Agro-industry and Marketing Improvement Sub-projects is VND 1,085 million.

(2) Education Facilities

Benefits generated by the implementation of the Education Facilities Sub-project are considered to be the improvement of educational conditions in classrooms of primary and secondary schools. However, these benefits are taken into account as intangible and they are analyzed in the socio-economic evaluation.

(3) Rural Road Improvement

Tangible benefits generated by the Rural Road Improvement Sub-project are considered to be transportation cost reduction and products quality increment. The total annual benefit is estimated at VND1,506 million.

(4) Rural Electrification

Benefits from the implementation of the Rural Electrification Sub-project are considered as a mitigation of power loss and a rise of the living conditions caused by improvement of voltage drop (intangible benefit). The annual benefit is estimated at VND 2,040 million per year based on the national net electricity rate of VND 500/kWh, corresponding to the 40% of the actual electric supply.

(5) Rural Water Supply

Benefits from the Rural Water Supply Sub-project can be recognized as the decrease of the diseases and the improvement of living standard of inhabitants (intangible benefits). Therefore, it is considered that this Sub-project has the same objectives and activities as those of the health and sanitation sectors and the economic benefits generated by this Sub-project can be considered to be intangible. Benefit from the implementation of this Sub-project is analyzed in the socio-economic evaluation.

(6) Environmental Conservation

Tangible benefits of avoided damage by the erosion control are considered to be benefits for lemon fields, residential houses and soil run-off. The annual benefit is estimated at VND 12.3 million.

6.3.3 Economic Evaluation

(1) EIRR, ENPV and EB/C

EIRR of the Project is 14.5% and ENPV is VND 88,890 million at the economic discount rate of 10% in the prices of July 1997, and EB/C is 1.3 at the same discount rate. The project evaluation has proven that EIRR exceeds the opportunity cost of capital, ENPV is positive and EB/C exceeds 1. Therefore, it is judged that the implementation of the Project is economically feasible.

(2) Sensitivity Analysis

Sensitivity analysis has proven that a change in the construction period has a stronger economic influence on the FIRR and a change in the project benefit has stronger influence on the ENPV and FB/C than a change of other items.

6.3.4 FINANCIAL EVALUATION

(1) FIRR, FNPV and FB/C

FIRR of the Project is 9.2% and at the financial discount rate of 8.4%, FNPV is VND 17,843 million at price of July 1997, FB/C is 1.1 at the same discount rate. Project evaluation has proven that FIRR exceeds the financial discount rate, FNPV is positive and FB/C exceeds 1. It is judged that the implementation of the Project is financially feasible. Sensitivity analysis has proven that a change in the project benefit has a stronger financial influence on the Project than a change in construction period and project cost.

(2) Agro-processing Complex and Market-oriented Forwarding Center

FIRR of the Agro-processing Complex is drastically below the financial discount rate, FNPV is negative and FB/C is under 1. It is judged that the implementation of the Complex is not financially feasible. On the other hand, FIRR of the Market-oriented Forwarding Center exceeds the financial discount rate, FNPV is positive and FB/C exceeds 1. It is judged that the implementation of the Center is financially feasible. The Agro-processing Complex has limited commercial viability, if all the initial capital investment thereof is to be included in the project cash flow. Therefore, the Complex is expected that the government should directly finance some parts of the initial capital investment.

(3) Investment and Repayment

An example of investment and repayment conditions of the foreign loan for the Project indicates that proportion of the foreign loan covers 75% of the total cost with an annual interest rate of 2%, loan maturity of 30 years, grace period of 10 years and equal annual payment of the principal. In the 11th project year, the sum of equal annual reimbursement for principal and interest reaches the maximum of VND 28,600 million. In the 2nd project year, the sum of the reimbursed interest of the foreign loan and the Governmental finance to the Project reaches the maximum of VND 49,200 million. This amount accounts for about 6.8% of the budget plan for expenses of the People's Committee of Nghe An Province in 1997.

(4) Farm Income Analysis

Expected annual agricultural net incomes are increased about 2.6 to 5.6 times in comparison with without-project conditions. Increased value of agricultural net income are from VND 2,600 thousand to VND 4,400 thousand per year for an average farm size in each irrigation system at 1997 prices. Accordingly, even if the Education and Rural Water Supply Sub-projects would apply the same charge or tariff system after the completion of the Project, these increased incomes of the farmers could cover the new costs.

6.3.5 Socio-economic Evaluation

The Project brings about the following secondary or indirect intangible benefits which are important in reviewing the validity of the implementation of the Project as well as the direct or tangible benefits:

- (1) Contribution to the National and Provincial Development Plans
- (2) Stable Supply of Food
- (3) Increase in Employment Opportunity
- (4) Improvement of Living Standard
- (5) Improvement of Rural Water Supply
- (6) Improvement of Education Conditions
- (7) Promotion of Marketing and Agro-processing
- (8) Economic Stimulation

6.3.6 Environmental Evaluation

The Project is essentially a rehabilitation project for agricultural and rural development. Therefore, no significant impacts are anticipated. However, when implementing the Project, the possible impacts on the project site are taken into account, together with the natural conditions surrounding the Project and the socio-economic conditions. When the Project is executed, a more detailed environmental study should be carried out in the project site. It is important to assess the possible effects of the implementation of the Project and to find out possible countermeasures before the commencement of the construction works.

Specially, as the Irrigation and Drainage Sub-project and the Rural Road Improvement Sub-project require a lot of civil engineering works, in the detailed design of the main infrastructures, the construction methods must be considered in such a way as not to affect as much as possible the characteristics and distribution of the soils and not allow the apparition of water and soil contamination, noise and vibrations. Still more, as the new construction of a pump station and rural roads potentially impacts several families, special consideration to the designs is required to minimize the number of affected families. When executing the Project, the works must be managed in an adequate way and it will be necessary to establish a monitoring system for any possible environmental mutation.

6.3.7 Comprehensive Evaluation

Through the implementation of the Project, it is possible to predict that the living standard of local people in and around the Study Area will be greatly improved, which comes from an increase in agricultural production, stable supply of food, increase in employment opportunity, expansion of income, improvement in living conditions, etc. The implementation of the Project is highly expected to stabilize the inhabitants' living and welfare conditions in the Study Area, and to have a deep impact on agricultural activities and to contribute to the national economy.

The implementation of the Project is judged as valid based on the results of economic and financial evaluations as computed from tangible benefits. In addition, socio-economic impacts evaluated from intangible benefits are also judged as big

enough. Any remarkable negative environmental impacts from the implementation the Project are not confirmed by the environmental evaluation and the Project is evaluated as a sustainable agricultural and rural development plan considering the environmental situation. Moreover, the implementation of the Project is justified to be feasible from technical and organizational operational viewpoints. Accordingly, it is recommended that a high priority should be given to the Project for its implementation in an early stage.

6.4 RECOMENDATION

The Project should be implemented as soon as possible due to the following reasons:

- Economic differences between urban area and rural area have widened recently in Viet Nam and this has becomes one of the serious social problems in the country. In this situation, economic development and increase of farmers' living standard are urgent matter to be considered in rural areas.
- The implementation of the Project is economically and socially possible. At the same time, it contributes greatly to increase farmers' living standard and developing rural areas.
- In the rural society changing day by day since the market economy was introduced, the implementation of the Project will present a rural society as what it should be in the future. And it will indicate the direction and the method for realization of such project. The implementation of the Project is extremely valuable as displaying the rural development as a model for extending the development to other areas.

Therefore, even if the implementation of the Project covering the whole area of Nam Dan District is difficult, it is recommended that the immediate implementation of the Project in some parts of the Project area. In this case, it is better to implement it in a limited area by including as many sectors as possible in consideration of the nature of the Project as a model rural development, not focusing on a specified sector.

7. MONITORING OF PROJECT

The human development index (hereinafter referred to as "HDI") is a comprehensive socio-economic index recently adopted by UNDP to display degree of relative development for each country and is considered to replace the traditional GDP index. Some modifications are necessary in order to adopt this methodology for the analysis of present conditions in the specific farming areas. The adoption of this methodology was considered in the Study with the mind of its suitability for the analysis of the present conditions in the Study Area by unifying indices for different dimensions such as life span, knowledge and living standards of the people in the area.

As a result of calculation based on the pre-conditions set in this Study, HDI value calculated for Nam Dan District is 0.558 which is slightly higher than that of the national average 0.540. This is due to the fact that the education indexes of Nam Dan are higher than those of national average by about 10% even though the economic index is lower by about 20%, and calculated HDI value presents well the social and

economic conditions of Nam Dan.

For the formulation and implementation of an integrated rural development plan consisting of many sector projects, one of the very important factors to take into consideration is to continuously monitor the project effects based on the changes of conditions in the project area by adopting the same indexes in the same area. By monitoring the results of the implementation of the Project, it will be possible to have a feedback from the monitoring results to the Project, and it will be useful for other similar projects in other regions. This is one of the objectives of the present Study concerning the formulation of a Model Rural Development Plan. Thus, it is strongly required to execute a continuous monitoring of the rural living conditions applying HDI method.