Assigned by Ministry of Agriculture, Forestry and Fisheries

Report on the Basic Survey on Agricultural and Rural Development by Progress Stage in Asian Countries

—LAO PEOPLE'S DEMOCRATIC REPUBLIC—

Focus on

Savannakhet and Champasak

MARCH 1998

The Asian Population and Development Association

The Middle in the front

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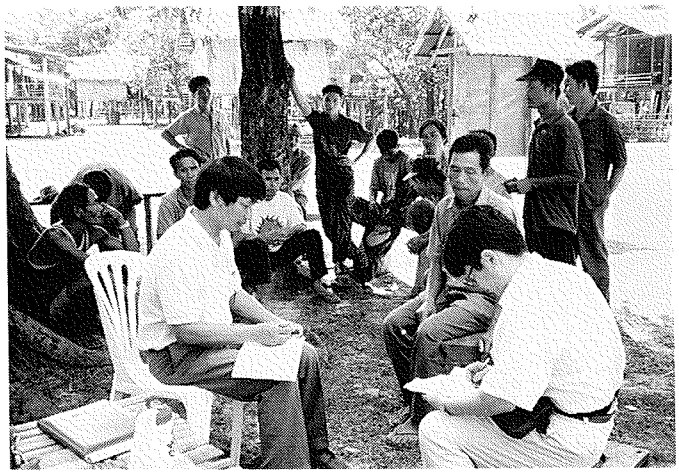
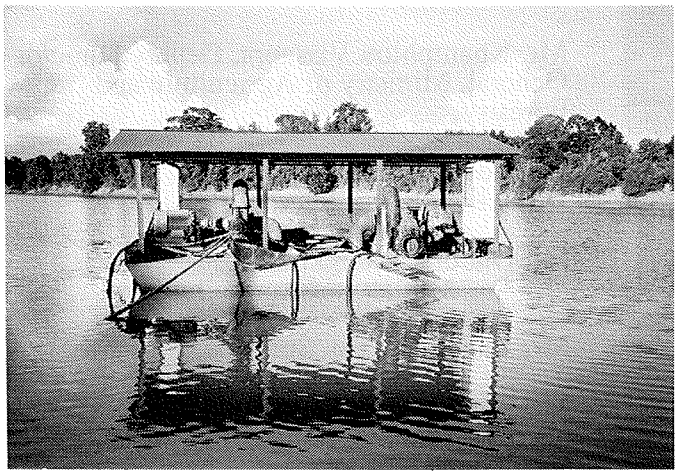
Mr. Akira Hashimoto, JICA Expert
Mr. Tanousay Ounthouang, Deputy Director General, Department of Irrigation, Ministry of Agriculture and Forestry

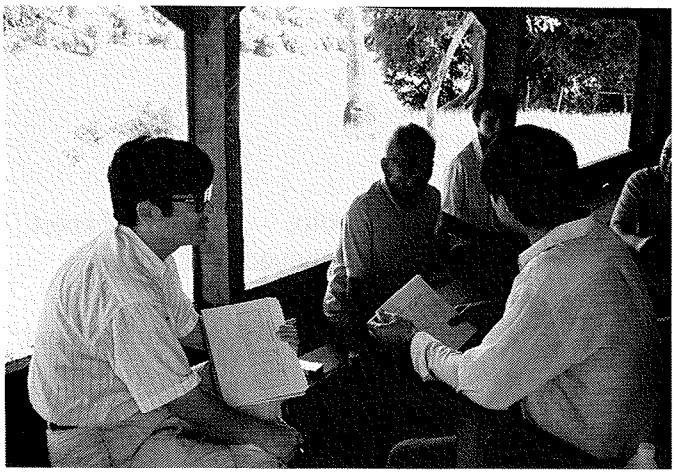
Water Reservoir KM35 (Savannakhet)



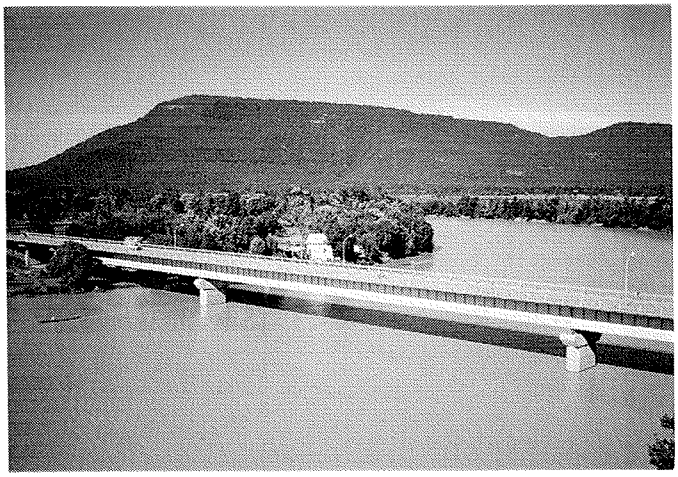
Field Survey at DKK Village (Savannakhet)



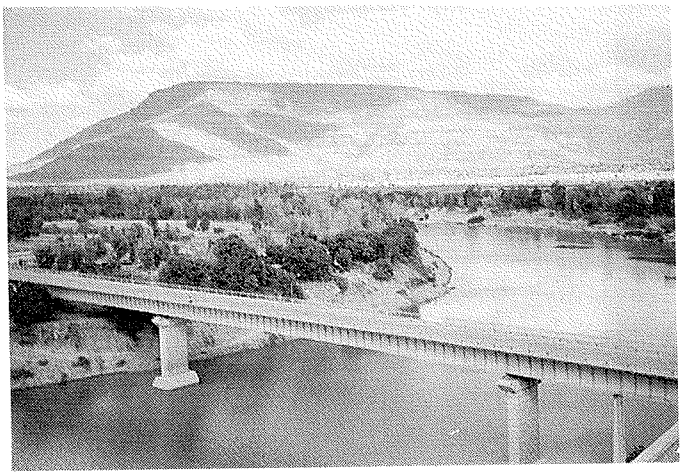
Pumping Facility at ND village
(Champasak)



Field Survey at ND Village



Se Don River in Rainy Season



Se Don River in Dry Season

MAP of LAO P.D.R.

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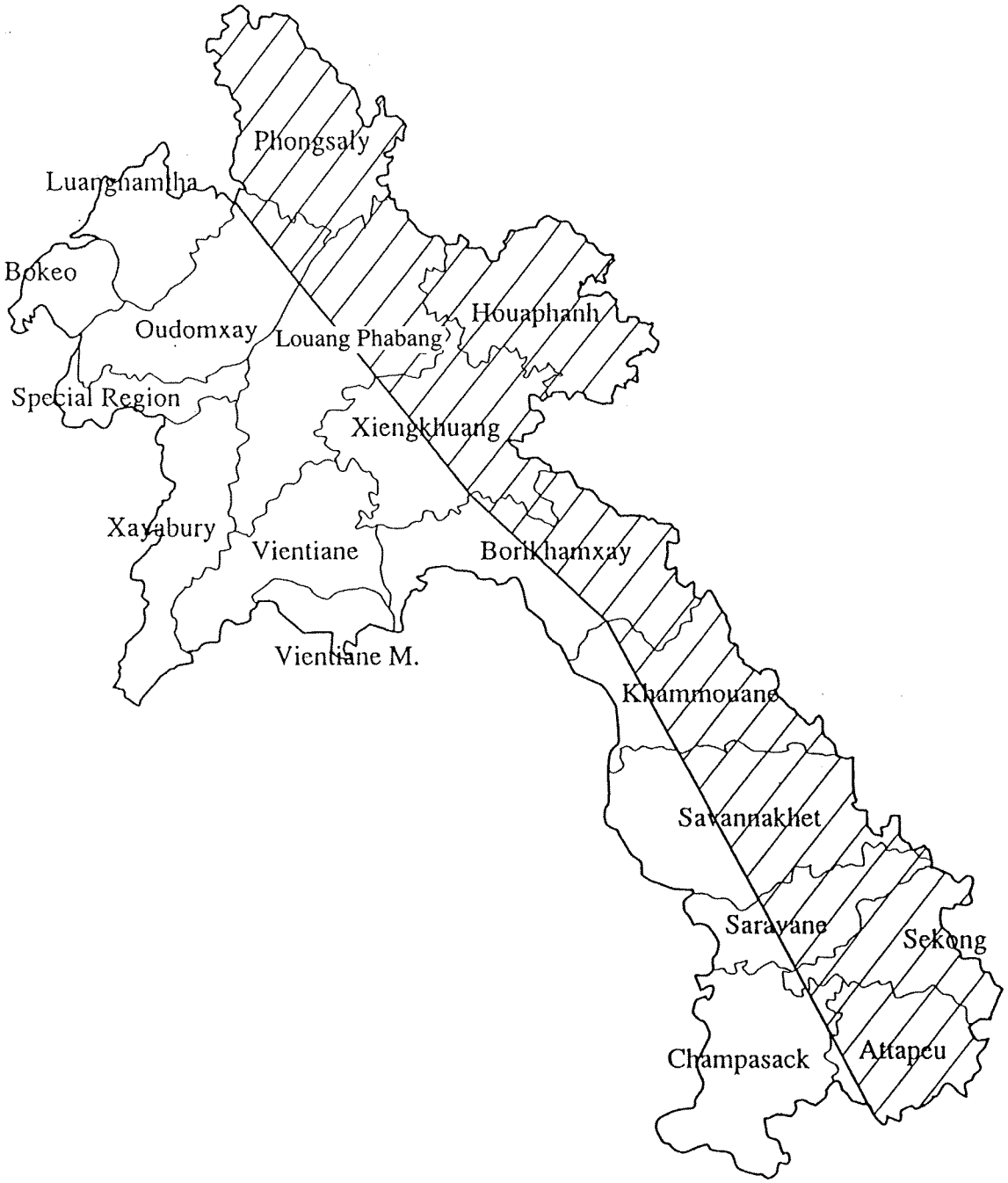
Areas Most Affected by UXO



Foreword

This report presents the results of the "Basic Survey on Agricultural and Rural Development by Progress Stage in Asian Countries," a project implemented in Lao PDR by the Asian Population and Development Association under the consignment from the Ministry of Agriculture, Forestry and Fisheries in 1997. The survey and compilation of the results were mainly carried out by the members of survey committee of APDA (Chairperson: Dr. Shigeto Kawano, Professor Emeritus, the University of Tokyo).

The objective of this survey was as follows: "In extending assistance for agricultural and rural development to Asian countries, it is necessary to identify the areas in which agricultural and rural development assistance is to be offered, the form in which it is offered and the regions to which it is offered in accordance with stages of development in keeping with the country's policy issues for overall promotion and improvement of rural areas while taking structural changes in population and employment into consideration, in an effort to form the foundation for offering effective and efficient assistance.

For this purpose, surveys will be conducted by selecting model regions from Asian countries to study the forms of agricultural and rural development according to structural changes in population and employment, thereby contributing to policy dialogue regarding agricultural and rural development. "The field survey in Laos PDR was conducted with the guidance and cooperation of: Mr. Khampiou Vissapra, Deputy Director General of the Ministerial Cabinet; Mr. Khampheuane Kingsada, Director General of Department of Forestry, Ministry of Agriculture and Forestry; and Mr. Akira Hashimoto, Japan International Cooperation Agency (JICA) expert. In Japan, guidance regarding the content of the survey and assistance in arrangement of field survey were offered by the International Cooperation Planning Division, Economic Affairs Bureau, the Ministry of Agriculture, Forestry and Fisheries. I would like to take this opportunity to extend my deepest gratitude for their support.

I sincerely hope that this report will contribute to the advancement of the rural community and agricultural development programs in Lao PDR and support effective assistance by the Japanese Government in the country.

Lastly, I would like to note that his report has been compiled under the sole responsibility of APDA and does not necessarily reflect the views or polices of the Ministry of Agriculture, Forestry and Fisheries or the Japanese Government.

March, 1998

Fukusaburo Maeda
Chairman
The Asian Population and Development Association

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Chapter One

The Outline of Lao PDR

1. Ecological Environment

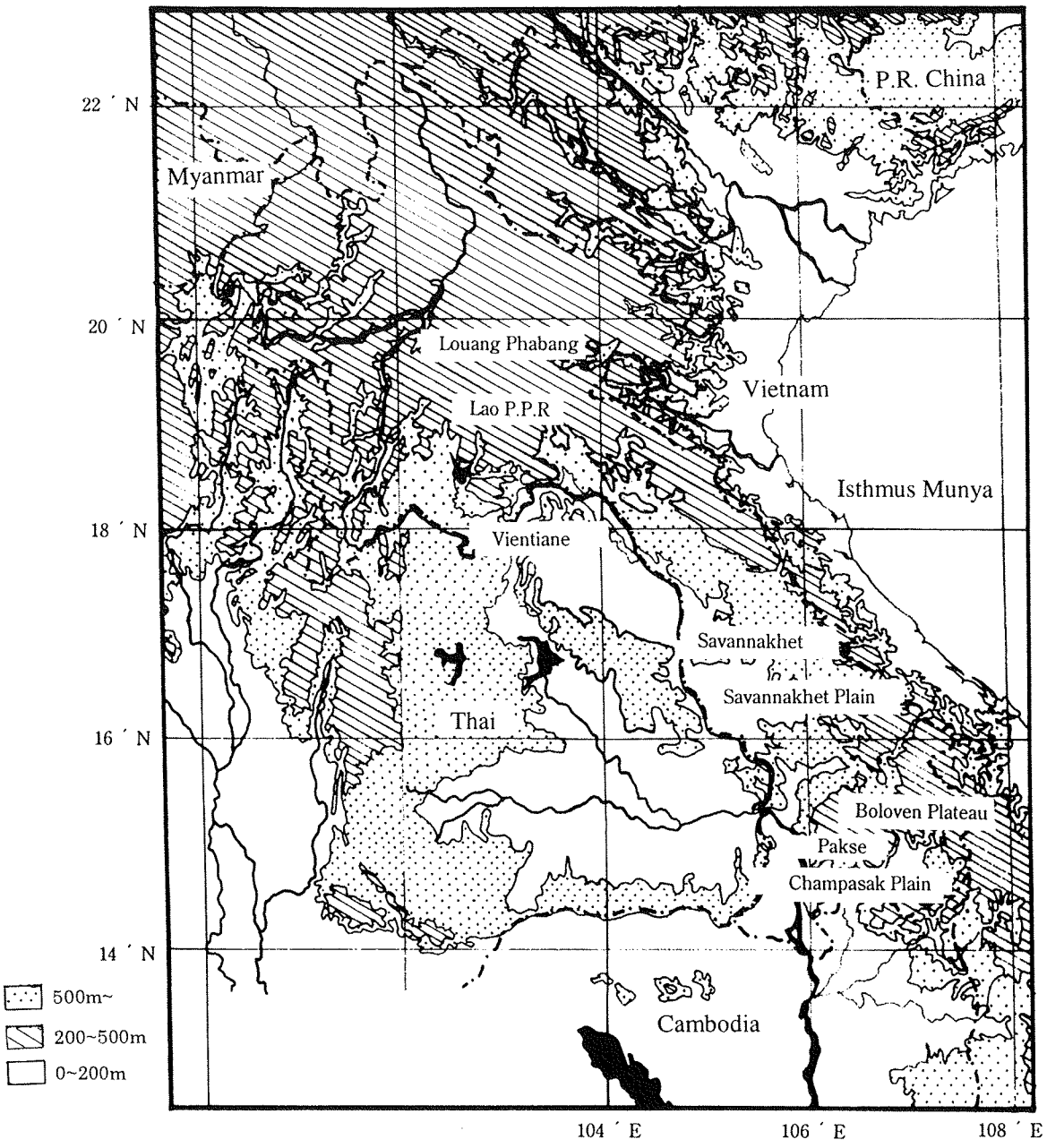
1.1 Geographic Condition

The Lao People's Democratic Republic (hereinafter "Lao PDR") is the only landlocked country in Southeast Asia having an elongated appearance that has the Mekong River in the north and stretches in the north-south direction along a mountain range in the central Indochina Peninsula. The national boundary line that surrounds her land area of 236,800km^2 extends for 5,080km and borders with 5 countries including China, Myanmar, Cambodia, Vietnam and Thailand.

As for natural features, mountains and highlands, namely the northern mountain massif and the Louang mountains which is the backbone, are dominant and account for 75% of the land. Plains stretch out along the Mekong River in the provinces of Vientiane, Savannakhet and Champasak, comprising the breadbasket of Lao PDR.

In terms of general regional division, the land can be divided into northern, central and southern regions. From the viewpoint of topography and geology, the country can be divided by 18 degrees north latitude, which stretches from the Vientiane Plains located on Korat Plateau extending from the northeastern Thailand to the Isthmus of Munya (the Isthmus of Kabao), into northern and southern regions (Figure 1).

Figure 1 Topography of LAO P.D.R.



The northern region is geologically quite complex, mountains are generally dominant and the mountain ranges are comprised of limestone and crystalline rocks. Meanwhile, the southern region can be divided into 3 regions according to its topography: the montane area comprised of the western slope of the Louang mountains; the plains of sandstone substrata originating from the Mekong River alluvium; and the Bolaven Plateau which is a basalt tableland.

Most of Mekong River tributaries run from northeast to southwest, turning into the basic water system of Lao PDR and forming a riverbed plain. The rivers flowing into the Gulf of Tonkin via Vietnam also play important roles including transportation.

1.2 Climate

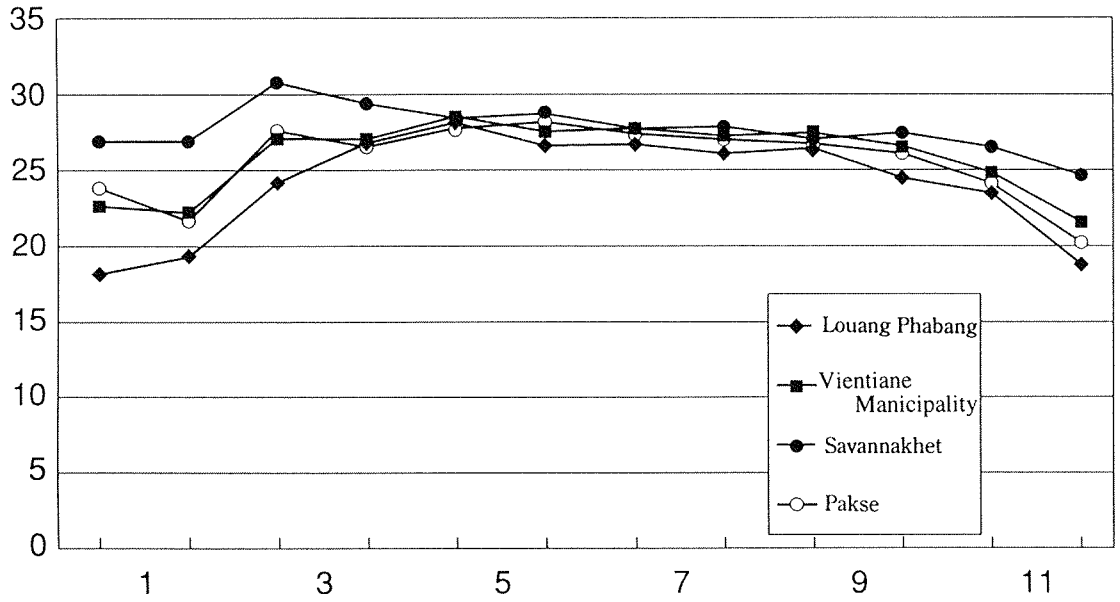
Lao PDR belongs to the tropical monsoon zone and the seasons can be roughly divided into dry season, which extends from November to April, and rainy season, which extends from May to October. Dry season can further be divided into cold season, continuing from November to February, and hot season continuing until the beginning of rainy season.

During the dry season, monsoon from the northeastern direction is dominant due to continental high pressure. The climate is generally dry and cool, although the wind coming over the sea gives rise to fog particularly in the northern region. However, wind direction becomes irregular towards the end of the dry season as southwestern monsoon gradually increases its strength and collides with northeastern monsoon. The season is hot and dry due to the influence of air that has been heated over the continent where there is no rainfall.

Meanwhile, the monsoon in rainy season blows from the southwestern direction and oceanic high pressure that develops over the Indian Ocean results in heavy rainfall. However, regional difference is large—average annual rainfall was about 1,600mm for the country as a whole but was as low as 1,300mm in the north, as high as 2,000mm in the south and reaches 3,500mm in Pakson District of Champasak Province where Bolaven Plateau blocks the monsoon from the sea.

Having mountains and highlands in addition to being a landlocked country, daily temperature fluctuation as well as influence due to difference in altitude is generally large in Lao PDR. Temperatures are relatively high at valley floors and flood plains. If regional differences are ignored, annual average temperature is about 26°C and exceeds 35°C in the hottest month of April. Temperature in regions north of Vientiane sometimes falls below 10°C during cold months of December and January (Figure 2).

Figure 2 Monthly Average Temperature of Respective Cities



1.3 Natural Resources

While variety of arguments exist on the issue of development, Lao PDR still has abundant forest resources compared to other continental Southeast Asian countries and has made timber export in the form of lumber and plywood a major source of earning foreign currency. Main utility varieties include Pinus *Merkusii, Dipterocarpus* sp., *Pterocarpus macrocarpus*, Indian oak and *Podocarpus imbricatus*.

As for non-wood forest resources, stick lac, benzoin and incense trees such as sandalwood and eaglewood have traditionally been well known. Although cultivation of benzoin and cardamom have started in some areas, their quantity remains small.

As can be inferred from the national policy of being "the Battery of Southeast Asia," hydroelectric power generation using dams holds an important position in energy resource development and is contributing to earning foreign currency.

Other sources of energy include coal deposit mainly consisting of fair quality bituminous coal,. Other mineral resources include metal minerals such as gold, iron ore, tin and lead, as well as non-metal minerals such as limestone, rock salt, sulfur ore, potassium ore, sapphire and zircon, although large area remains unexplored and little progress has been made in actual digging.

2. Social and Cultural Environment

2.1 Administrative Unit

The existing administrative system divides the country into Vientiane Municipality, 16 provinces and a special district. There are 11,770 villages belonging to 138 districts[1] in the country. However, districts existed between districts and villages until 1991 when the constitution was enacted, and are still used in local region for the sake of convenience in areas such as medical administration.

One governor and 2 vice-governors are dispatched by the Prime Minister's Office to provinces, municipality and special district. In districts, a district chief and 1 or 2 assistant district chiefs are appointed while villages are controlled by a village chief and 2 assistant village chiefs.

2.2 Education

Institutions of higher education and vocational training in Lao PDR were unified as system under the supervision of Ministry of Education with the establishment of National University in fiscal 1997/98. General education consists of 5 years of primary school and 3 years each of lower and upper secondary schools. Meanwhile, institutions of higher education include 4 year university (6 years for medical school) having 8 departments and 2 year college as a result of integration.

According to1996 statistics[2], there are 762,500 students enrolled in primary school, 123,900 students in lower secondary school and 44,300 students in upper secondary school. In reality, however, it is difficult to generalize owing to disparity that exists between urban and rural areas and among ethic groups, with disparity between gender in rural areas being particularly conspicuous.

While no tuition is required at public educational institutions, chronic shortage of teachers and teaching materials exist. Until the recompilation and publishing of primary and lower secondary school textbooks were started in 1994, it was even difficult to secure the textbooks used by teachers with the exception of primary school national language class. Although some progress was made by the new edition of textbook and teachers' handbook that have been in distribution since fiscal 1996/97, their availability is far from sufficient.

In rural areas, allocation of 5 year primary schools is not sufficient. The fact that students attending primary schools with only 2 or 3 grades will have to commute long distance after moving up to senior class has become one of the reasons for decline in attendance during busy farming season in particular.

Buddhist temples are also functioning as traditional educational institution taught by novice (semi-renunciates under age 20) that covers the curriculum up to lower secondary school level although they are outside the jurisdiction of Ministry of Education. The system is referred to as *buwat hien* (renunciate learning) and has been playing an important role since before the establishment of modern schools and of offering educational opportunities to urban poor and in rural areas after the diffusion of modern education. Moreover, Buddhist temples offer various learning opportunities to lay people.

2.3 Ethnic Groups and Languages

While no reliable data exists with regard to distribution of ethnic groups in Lao PDR, they can be classified from a linguistic viewpoint into four groups; namely Tai, Mon-Khmer, Miao-Yao and Tibeto-Burman. There are also Chinese and Vietnamese living mainly in urban areas.

The number of ethnic groups range from 50 to 100 depending on data. The Lao Government currently classifies these ethnic groups living in the country into 198 appellations and 47 groups from a statistical viewpoint[3] (see "Population of Lao PDR" in the following section).

In addition, classification has been made from a relatively early point in time according to altitude inhabited by respective ethnic groups: the Tai people living in the lowlands near the water and engage mainly in paddy cultivation of glutinous rice are called Lowland Lao (*Lao Lum)*; the Mon-Khmer people living in the hills and engage in cultivation of glutinous upland rice are called Hillside Lao (*Lao Thung*); the Miao-Yao and Tibeto-Burman people moving from small settlement to another in the mountains and engage in shifting cultivation of non-glutinous upland rice, vegetables and opium are called Highland Lao (*Lao Sung*). However, these classifications are nothing more than categories for the sake of convenience. This can also be interpreted in the context of all of these ethnic groups belonging to the Lao tribe in the sense that they are living in Lao PDR. In reality, there is a category called "other Lao tribes"[4] in addition to lowland Lao, hillside Lao and highland Lao, indicating traces of search for identity in a multi-racial country.

National language is Lao which is one of Tai languages, even though Thai, including the majority Lao, accounts for only a little more than 60% of total population. Lao is not spoken in regions having poor access and communication in addition to low level of school education. In particular, there are cases where Chinese and Vietnamese are playing bigger role than Lao as lingua franca in ethnically diverse regions bordering China and Vietnam.

2.4 Religion

Before the Lao People's Democratic Republic was founded in 1975, Buddhism had been established as the national region by the constitution with the king being the "Supreme Protector." Buddhism in this country refers to Theravada Buddhism and the history of Buddhism in Lao PDR is said to have started when King Fangum, the first king of the Lang Xang Kingdom, invited monks from Khmer Empire in 1358.

Today, Buddhist sects (sangha organization) has been reorganized into an organization called the Lao Buddhist Organization and placed under the jurisdiction of the National Construction Front (Neo Lao Sang Xat). However, 60 to 70% of Lao people are Buddhists and the religious fever is becoming stronger with the policy relaxation and advent of middle class in the recent years.

Tai people in particular have believed in Buddhism since the old days, although ancient worship of the spirit called by the name *Phii* lies at its base and manifested in the form of annual functions.

Many other ethnic groups are following spirit worship. However, there is enough difference between the spirit worship of Hmong (Miao-Yao) and that of Mon-Khmer that makes it difficult to put both under the category of "animism."

There are also a very limited number of Christians among Hmong as well as followers of Bahai Faith which originated in Iran.

3. Population of Lao PDR

Nineteen ninety-seven marked a year in which official compilation of the population census was made and the demographically significant study results were publicized for the first time in Lao PDR. This population census was implemented under the initiative of National Statistics Center, Lao State Planning Committee with full support from the Swedish International Development Agency (SIDA) in areas such as required funds, survey techniques and statistical processing. This report will present an overview of population in Lao PDR based on this officially publicized data and analyze the surveyed villages based on the survey slips collected by the survey group.

3.1 Total Population of Lao PDR

According to the results of the 1995 census, Lao PDR currently has a total population of 4,574,846. Average annual growth rate from 1985 to 1995 is 2.5%. The population as of 1997 will amount to 4,806,448 if this increase rate is simply applied to the 1995 figure (Table 1).

Compared to the results of the previous census conducted in1985, male and female population have increased by 504,000 and 486,000, respectively to represent a combined increase of 991,000 or 28% in the country's population. If the present increase rate were to continue, the population of Lao PDR will double in about 28 years. While different opinions exist as to the appropriate scale of population for Lao PDR, abrupt population increase will trigger rapid increase in young dependent population (Figure 3). From the viewpoint of long-term development of the country in the future, an increase in young dependent population will inevitably result in increased educational expenditure for the government.

Should the government fail to take sufficient measures, it would signify an increase in poorly educated population that does not have much to offer in the field of modern industry that would form a source of trouble in the development of the country's future. In addition, food demand will increase with the growing population and expand the imbalance in food trade which is already in deficit, requiring enormous investment in the agricultural sector to remedy the situation. While it is not possible to predict the extent of increase in expenditure to which the economic growth in Lao PDR can accommodate, rapid increase in young population will make fiscal distribution difficult and put enormous pressure on the financial situation of the Lao Government.

Assuming that certain level of population is needed for the economic development of Lao PDR, taking no population control measures until the population reaches that level would result in increase of population largely exceeding the forecasted level as it is not possible to suddenly stop the momentum of increase when population is increasing so rapidly as it is observed today.

The mainstream population policy that has won the consensus in today's world does not seek to check the increase of population alone--it strengthens the rights of women to make decisions by making means of production available to them through empowerment. Moreover, it creates an environment in which mothers who give birth to children and raise them can determine the number of children they would bear through improvement of reproductive health and other measures. It also takes a comprehensive approach of checking population growth by giving women the option of using proper family planning methods.

Therefore, the approach towards solution of the population problem is almost identical to the improvement of living environment in rural areas with emphasis on women as it is not possible to check population increase without improving the living environment in rural areas.

A decreasing trend is observed in the present population increase rate of Lao PDR (Figure 4). However, increase rate remains high in rural areas where people live in difficult environment that keeps them from gaining full access to medical care and education, the requirements without which population problems cannot be solved. For this reason, it is

essential to organically incorporate the population issues in the process of realizing sustainable development in Lao PDR with emphasis on agricultural and rural development.

3.2 Population Increase Rate, Gross Birth Rate, Gross Mortality Rate and Average Life Expectancy

Gross birth rate and gross mortality rate in Lao PDR is 41.3‰ and 15.1‰, respectively. The population increase rate, which is the difference between the two, amounts to 26.2‰ (2.62%). As the birth rate and mortality rate are both high, average life expectancy remains as low as 50 years for men and 52 years for women (Table 3).

3.3 Infant Mortality Rate

Infant mortality rate is an important index in discussing the issue of population increase. In developing countries, high mortality rate signifies large number of deaths among infants than among the elderly. In many cases, the population problem of rapidly increasing population occurs in poor countries. If a country is poor, has shortage of food supply and has high mortality rate, one would expect that population would be controlled by these factors. However, that is not the case and the paradox of population increase remaining at high level despite high infant mortality rate occurs.

Among many reasons existing behind such phenomena, having children has an important meaning in terms of security in one's old age in the developing countries where social security system has not been fully established. For this reason, people give more births to counteract the high infant mortality rate, a practice that leads to increase in malnourished children. Furthermore, people will continue to give birth to children according to their traditional practices unless there is change in awareness of mothers and people around them.

On the other hand, decrease in infant mortality rate signifies certain improvement in the reproductive health environment including primary health care. In addition, a considerable inverse correlation exists between infant mortality rate and literacy rate of mothers. In other words, literacy rate of women aged between 15 and 35 who are mothers in their reproductive age and infant mortality rate show a correlation of –0.90 or more to indicate that literacy rate of mothers play an important role in lowering infant mortality rate.

Lowering infant mortality rate will give reassurance to mothers that they will not lose their children. It is believed that population growth rate will drop to near-replacement level (about 2.1 children per couple) once mothers are able to decide the number of children they will give birth to by being educated about proper family planning instead of continuing to bear children according to traditional practices. It will therefore be important to create an

environment for lowering infant mortality rate by looking at it as one of the indices in restraining rapid population increase.

Infant mortality rate in Lao PDR was 104 per 1,000 births. It was highest at 138 in Xaysomboon Special Region and lowest at 72 in Vientiane Municipality (Table 3).

3.4 Population Structure

Lao PDR currently has a typical pyramid-shaped population structure of having very large young population (Table 1, Figure 3). Fifty-five percent of the population in Lao PDR are aged 19 years and below while those aged 65 years and above accounts for only 4% of the entire population. In addition, a study of population ratio by gender reveals an interesting fact. A table of the number of men for every 100 women (Table 1, Figure 5) shows that there are only 83.4 men for every 100 women in the age group between ages 50 and 54. The age group with second smallest ratio of men is that between ages 20 and 25. The cause of smaller male population in these age groups may be attributable to the civil war that took place in this country.

To look at this matter from the viewpoint of history, the Laos Peace Treaty was signed between Pathet Lao and the monarchy in 1973. A total of 2,092,900 tons of bombs were dropped from 1965 until bombing by the American Forces was discontinued in 1973. The problem of blind shells still poses an enormous obstacle to agricultural development in Lao PDR.

When this occurred 24 to 32 years ago, the people who are currently between ages 50 and 54 were between ages 17 and 29 and played an active role in the war. Indeed, the civil war is casting its shadow on the population of this country.

The drop in the number of people between ages 20 and 25 may indicate the high mortality rate among male infants due to severe poverty that struck the country after the civil war. Generally speaking, infant mortality rate is higher for males than for females provided that other conditions are equal and they grow up in a difficult environment. The history of hardships experienced by Lao PDR is reflected in its history.

3.5 Population by Ethnic Group

The Lao Government categorizes the country's ethnic groups according to their settlement into *Lao Sung* (Highland Lao), *Lao Thung* (Hillside Lao) and *Lao Lum* (Lowland Lao). Lao Lum, the ethnic group settled in the lowlands and engaged in paddy cultivation, is said to be the majority ethnic group in Lao PDR. However, this classification is to a large extent a political concept that was created to emphasize the sense of unity among the people of Lao PDR. The *Lao Sung*, in particular, is divided into a large number of smaller ethnic groups

each having extremely diverse cultural background. However, this classification by the Lao Government is not necessarily invalid.

For instance, the controversial slash-and-burn farming is not used in the paddy farming practiced by the *Lao Lum* in lowlands. The slash-and-burn farming of the *Lao Sung* in the highlands is said to have low impact on the environment and cause very limited soil erosion. The most problematic slash-and-burn farming is that practiced by *Lao Thung* whose traditional skills are limited and are compelled by necessity of their present life to rely on this method. When slash-and-burn is performed in the hillside region, it results in deterioration of the environment by depleting the nutrients in the soil and causing soil erosion.

While the ethnic names of *Lao Sung* (Highland Lao), *Lao Thung* (Hillside Lao) and *Lao Lum* (Lowland Lao) are not indicated in the results of this census survey, the population was divided into 48 ethnic categories in the census statistics (Table 4). The largest population of foreign nationality living in Lao PDR is Vietnamese and comprises 0.3% of the total population, followed by those from People's Republic of China.

Lao PDR is thus comprised of diverse ethnic groups having various patterns of inheritance. For instance, the Lao Lum, which is the majority group in the country accounting for 52.5% of the population, has the tradition of parents living with the youngest daughter and the daughter's spouse inheriting the property. In the case of *Lao Sung* and *Lao Thung*, the eldest son normally inherits the property (refer to Table 8 of Chapter 3). According to the survey results of the surveyed villages, however, there are many exceptions as people do not seem to adhere strictly to these rules. Therefore, the obvious preference for boys prevalent in Japan, China and Korea is not seen in this country. This is quite an important point when attempting to control and stabilize population growth, as it signifies that there is little social pressure on the part of women to keep giving birth until she has a baby boy.

Moreover, the religious situation in Lao PDR will be of little hindrance to solving the population problem. Buddhists and spirit worshippers who worship a spirit named "*Phii*" account for the majority of the population at 65.4% and 33.1%, respectively (Table 5).

3.6 Percentage of Urban and Rural Population

The national average for urban population ratio (urban population/total population) is 17.1%. This urban population ratio differs considerably from one administrative district to another, ranging from the highest ratio of 63.1% in Vientiane Municipality and the lowest ratio of 5.2% in Attapeu Province. A clear contrast exists between the population of different provinces, as the population of paddy farming areas located along the Mekong River basin such as Savannakhet Province, Vientiane Municipality and Champasak Province is large, while that of the montane areas such as Attapeu Province is small. This shows the fact that carrying

capacity of each province has a strong influence on the scale of population. The population and urban population ratio of each province are shown on Table 6 and Figure 6.

3.7 Literacy Rate and School Attendance Rate

In this census, literacy rate was studied by age and by province in addition to gender. In Lao PDR, however, there are many remote areas separated by mountains where children receive only first and second grade education in primary school. For this reason, the census does not show whether the ability to read and write among children in these areas is equal to a practical literacy rate in reality. The functional literacy rate, which is used in the recent years for analyzing literacy rate, is not known. The literacy rate of Lao PDR is low compared to ASEAN countries (Table 7) with considerably disparity existing among the regions of the country (Table 8).

Overall literacy rate in Lao PDR for population of ages 15 and above is 60%. In contrast to the male literacy rate of 74%, female literacy rate is quite low at 48%. By province, literacy rate is highest in Vientiane Municipality at 85% and lowest in Luang Namtha Province at 33% and in Phongsali Province at 35%. Both of these provinces are located in the northern montane area bordering China and Myanmar.

Conspicuous difference also exists between urban and rural literacy rates. Urban literacy rate is 85.2% as opposed to 54.5% literacy rate in rural areas (Table 8, Figure 7, and Figure 8).

3.8 Labor Population

The change that has taken place in the labor population of Lao PDR is an important subject when discussing the economic development in this country. An increase in young population leads to increase in labor population after about 20 years. However, the point that must be noted here is the fact that having a large labor population under the present economic environment will not necessarily bring about economic development. In addition, the present young dependent population will become the matrix for reproduction of population after 20 years. As population will be reproduced at a certain rate against this expanded population, large population would lead to considerable increase in reproductive population. Increase in young population will thus reproduce young reproductive population in an accelerated manner.

In view of the present economy, whether labor population can contribute properly to industrial development would depend on the quality of human resources. When adequate measures are not taken against population increase, there are cases where the increasing population merely increases food demand and unemployment. In other words, people will have to share the ever-diminishing financial resources on a per capita basis in areas such as medical care, education and rural/agricultural development. This would also generally increase

the likelihood of lowering the overall quality of life and intensifying distress in the lives of the people. It is true that many developing countries have developed their countries by using this distress to put the principle of competition to work and offering cheap labor. However, the fact that this process compels the people to go through a period of decline in their standard of living and that going through such process does not guarantee success is forgotten.

At any rate, labor population will continue to increase in the future. Proper social development that would enable this labor population to contribute to the development of Lao PDR therefore becomes very important (Table 9).

3.9 Estimation of Future Population

Estimation of future population based on this census is available. Two alternative estimates have been made corresponding to the difference in the lowering of fertility rate. According to these estimates, the population of Lao PDR will reach the scale of 7.7 million to 8.7 million by the year 2020 (Table 10, Figure 9).

4. Economy of Lao PDR

4.1 Outline of the Economy

After making the shift from planned economy to market economy in 1986, Lao PDR accepted structural adjustment loans from the World Bank and IMF in 1989 in return for implementation of structural adjustment policies and the country's economy has been showing steady growth ever since. The economy boomed in the first half of 1990s, demonstrating an average annual economic growth rate of 6.4% between 1991 and 1996 while maintaining stable levels of inflation and currency exchange (Table 11).

However, the trade balance turned negative after entering 1996 with the expansion of monetary aggregate, line of credit and trade, causing macroeconomic instability.

The deficit in national finance became a serious problem that accounted for 10% of GNP during the 1990-94 period. Foreign aid held a large percentage in national finance and the country is dependent on nearly half of its national budget on aid from overseas.

The background for stable economic trend in the past 10 years include favorable performance of agricultural sector which accounts for about 60% of GDP despite the damages incurred from drought and flood, activation of manufacturing sector including the garment industry since 1988, expansion of the construction sector and growth of the service sector including hotels and restaurants. Expansion of these production sectors has occurred concurrently with the increase in foreign investment. Some 5.9 billion dollars in foreign

investment has been approved as of December 1997. The main investing countries include Thailand (47%), the U.S. (26.6%), Korea (5.7%), Australia (5.1%) and Malaysia (4.9%).

Trade also continued to expand amidst the flow of economic liberalization. Main export items included lumber and electric power, which had been traditionally important sources of obtaining foreign currency, as well as motorcycles mainly for Vietnam and garments for France and the U.S. Thailand alone accounted for 45% of the goods imported to the country, followed by Japan (7.6%), Vietnam (3.7%) and Singapore (2.5%). Towns are flooded with Thai products all the way down to sundries.

Lao PDR has not achieved food self-sufficiency and has been in the state of constant unfavorable balance of trade.

It announced "The Social Development Plan for 1996-2000 (hereinafter "the Plan")" at the Third Session of Ninth National Assembly in October 1996 under which the country's socioeconomic development is being carried out. According The Plan seeks to achieve 8 to 8.5% in average annual economic growth rate during this period while increasing gross domestic product from US$350 in 1995 to US$500 by the year 2000.

However, the Lao economy is starting to feel the effect of the currency crisis that started in Thailand. The exchange rate of Lao kip against the dollar dropped more than 80% from the level in August 1997. In addition, foreign reserve has not been announced since September 1997 to indicate the seriousness of the impact.

As can be inferred from the fact that the target of shifting the Lao economy from semi-natural economy to market economy has been included in the Plan, a large portion of the Lao economy has yet to be incorporated into the market economy and monetary economy, making it difficult to grasp the reality of the economy in the true sense of the term. The greatest challenge from now on would be how to go about effectively linking these potential resources with foreign investment and domestic savings with market economy.

4.2 Emphasis of Development

As mentioned earlier, the industrialization strategy of "expansion of labor-intensive industrial product export through active introduction of foreign private investment" that has been adopted by Southeast Asia and produced certain results in raising the standard of income and absorbing employment was not adequate as demonstrated in the analysis of the population of Lao PDR in the previous section. As the agricultural sector is also lagging behind considerably in terms of productivity and international competitiveness when compared to other ASEAN nations that are on the path to full-fledged industrialization, it is unlikely for the agricultural sector of Lao PDR as a whole would be able to make import substitutes or export on an immediate basis.

Geographically speaking, Lao PDR and all of her neighboring countries are seeking a greater market and more efficient infrastructure service, and the economic assistance from donor countries (agencies) is basically offered in that context. Development in both agricultural and manufacturing sectors is expected to require considerable amount of economic cost and time. Taking these two points into consideration, a more reasonable approach would be, firstly, to seek earning of foreign currency, absorption of employment and improvement of income level by fully equipping herself with, and demonstrating, the function as a land bridge in the flow of free trade. And as Lao PDR develops the country as land bridge, socioeconomic friction is expected to occur within the country in the process of addressing the changes in the environment. Therefore, it will be important to maintain the soundness of rural communities by engaging in agricultural and forestry development as well as rural industry development in an effort to prepare for such change.

Table 1 Population, Distribution by Sex and Age Group

Lao Census 1995

Age	Male	Female	Population	Percent(%)			Sex Ratio
				Male	Female	Total	
00-04	363,223	356,955	720,178	16.1	15.4	15.7	101.8
05-09	355,119	342,134	697,253	15.7	14.8	15.2	103.8
10-14	311,086	294,827	605,913	13.8	12.7	13.2	105.5
15-19	223,222	231,718	454,940	9.9	10.0	9.9	96.3
20-24	169,953	194,940	364,893	7.5	8.4	8.0	87.2
25-29	161,255	179,870	341,125	7.1	7.8	7.5	89.7
30-34	137,349	144,248	281,597	6.1	6.2	6.2	95.2
35-39	133,900	132,146	266,046	5.9	5.7	5.8	101.3
40-44	90,730	91,193	181,923	4.0	3.9	4.0	99.5
45-49	76,417	80,473	156,890	3.4	3.5	3.4	95.0
50-54	60,530	72,613	133,143	2.7	3.1	2.9	83.4
55-59	53,069	56,572	109,641	2.3	2.4	2.4	93.8
60-64	43,216	46,765	89,981	1.9	2.0	2.0	92.4
65-69	34,129	33,877	68,006	1.5	1.5	1.5	100.7
70-74	21,862	24,180	46,042	1.0	1.0	1.0	90.4
75+	25,793	31,175	56,968	1.1	1.3	1.2	82.7
NS	133	176	309	0.0	0.0	0.0	75.6
Total	**2,260,986**	**2,313,862**	**4,574,848**	**100**	**100**	**100**	**97.7**
00-14	1,029,428	993,916	2,023,344	45.5	43.0	44.2	
15-64	1,149,684	1,230,538	2,380,222	50.8	53.1	52.0	
65+	81,874	89,408	171,282	3.6	3.9	3.7	

Figure 3 Population Pyramid

Lao Census 1995

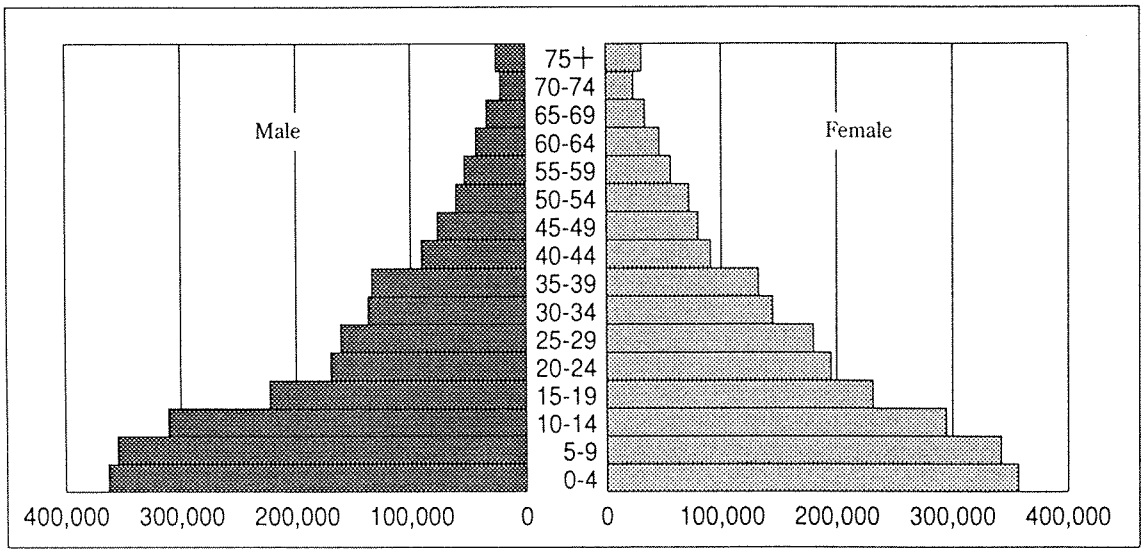


Figure 4 Changes of Ratio of Population by Age Group

(Population Ratio by 5-Year Age Group)

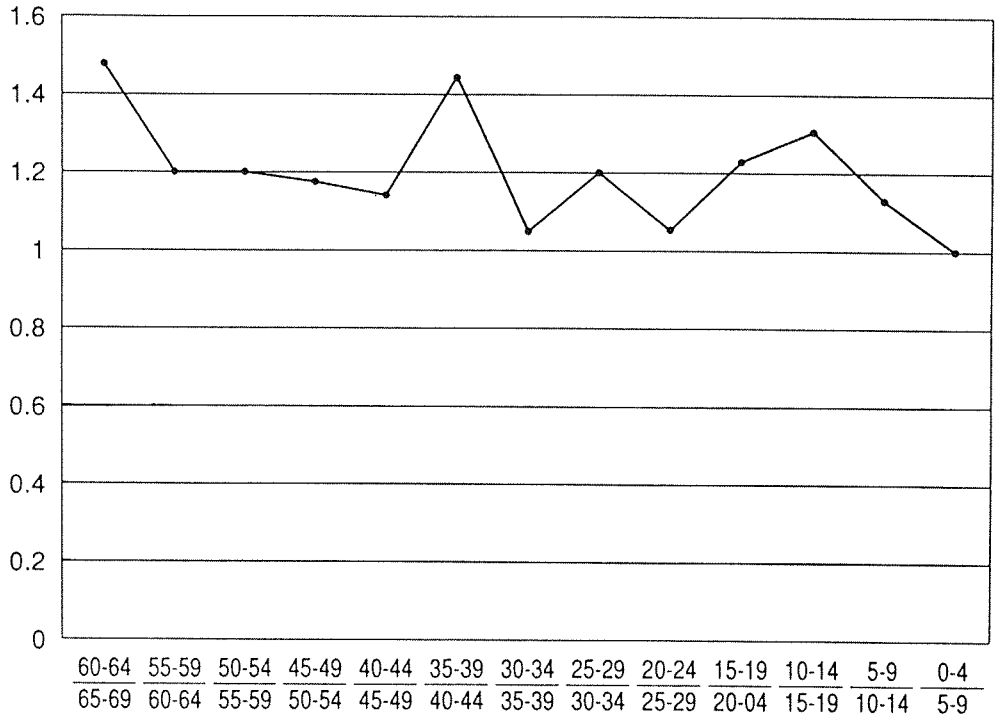


Table 2 Birth Rate/Death Rate by Province

Province	Crude Birth Rate	Crude Death Rate	Population Increase Rate
Vientiane Mun.	44.1	10.9	3.3
Phongsaly	35.1	11.7	2.3
Luangnamtha	35.6	12.9	2.3
Oudomxay	38.2	11.1	2.7
Bokeo	33.6	13.5	2.0
Louang Phabang	39.7	15.2	2.5
Huaphanh	39.6	15.1	2.4
Xayaboury (1)	42.2	16.8	2.5
Xiengkhuang	41.9	15.0	2.7
Vientiane Prov.	36.3	13.9	2.2
Borikhamxay	39.6	16.5	2.3
Khammuane	39.6	12.3	2.7
Savannakhet	42.1	12.1	3.0
Saravan	40.4	12.6	2.8
Se Kong	34.5	12.9	2.2
Champasak	43.9	14.0	3.0
Attapeu	38.8	16.6	2.5
Xayaboury (2)	37.8	15.5	2.2
Xaysomboon SR	40.4	16.9	2.3
Lao PDR	41.3	15.1	2.6

Table 3 Infant Mortality Rate(IMR) /Average Life Expectancies by Province

Province	IMR	Average Life Expectancies	
		Female	Male
Vientiane Mun.	72	59	57
Phongsaly	94	58	55
Luangnamtha	119	55	52
Oudomxay	88	58	55
Bokeo	82	54	51
Louang Phabang	132	53	50
Huaphanh	125	53	51
Xayaboury (1)	134	51	49
Xiengkhuang	121	54	52
Vientiane Prov.	102	54	52
Borikhamxay	136	50	48
Khammuane	83	57	54
Savannakhet	80	58	55
Saravan	86	57	54
Se Kong	96	56	53
Champasak	91	55	53
Attapeu	93	55	52
Xayaboury (2)	126	51	48
Xaysomboon SR	138	50	47
Lao PDR	104	52	50

Figure 5 Sex Ratio (Male per 100 Females) by Age Group

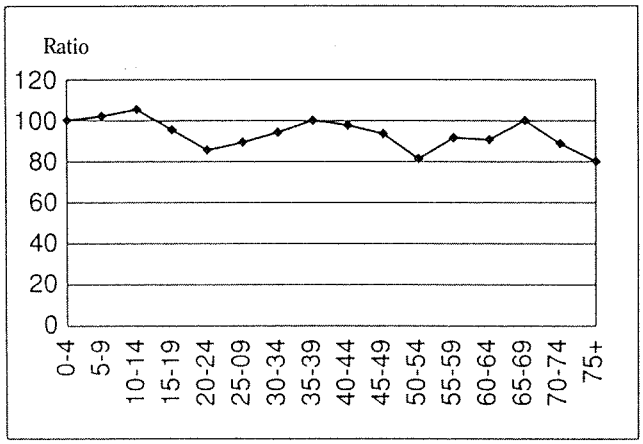


Table 4 Population, Distribution by Sex and Ethnic Group

Lao Census 1995

Ethnic Group	Male	Female	Total	Percent(%)
Lao	1,188,143	1,215,748	2,403,891	52.5
Phutai	232,456	240,002	472,458	10.3
Khmu	247,440	253,517	500,957	11.0
Hmong	158,055	157,410	315,465	6.9
Leu	58,716	60,475	119,191	2.6
Katang	46,865	48,575	95,440	2.1
Makong	45,102	47,219	92,321	2.0
Kor	33,108	33,000	66,108	1.4
Xuay	22,213	23,285	45,498	1.0
Nhuan	12,927	13,312	26,239	0.6
Lawen	20,122	20,497	40,519	0.9
Taoey	15,518	15,358	30,876	0.7
Talieng	11,291	11,800	23,091	0.5
Phounoy	17,647	17,988	35,635	0.8
Tri	10,270	10,636	20,906	0.5
Phong	10,554	10,841	21,395	0.5
Yao	11,291	11,374	22,665	0.5
Lawae	8,702	8,842	17,544	0.4
Katu	8.371	8,653	17,024	0.4
Lamed	7,868	8,872	16,740	0.4
Thin	11,268	11,925	23,193	0.5
Alak	8,052	8,542	16,594	0.4
Pako	6,531	6,693	13,224	0.3
Oey	7,265	7,682	14,947	0.3
Ngae	6,014	6,175	12,189	0.3
Musir	4,342	4,360	8,702	0.2
Kui	3,072	3,196	6,268	0.1
Hor	4,425	4,475	8,905	0.2
Jeng	3,169	3,342	6,511	0.1
Nhahem	2,545	2,607	5,152	0.1
Yang	2,346	2,284	4,630	0.1
Yae	3,904	4,109	8,013	0.2
Xaek	1,329	1,416	2,745	0.1
Samtao	1,060	1,153	2,213	0.0
Sida	890	882	1,772	0.0
Xingmoon	2,934	2,900	5,834	0.1
Toum	1,260	1,250	2,510	0.1
Mone	104	113	217	0.0
Bid	762	747	1,509	0.0
Nguan	657	687	1,344	0.0
Lolo	696	711	1,407	0.0
Hani	594	528	1,122	0.0
Sadang	393	393	786	0.0
Lawy	286	252	538	0.0
Kmer	1,851	2,051	3,902	0.1
Khir	792	847	1,639	0.0
Kree	371	368	739	0.0
Others	5,008	5,193	10,201	0.2
N.S.	12,507	11,577	24,084	0.5
Total	2,260,986	2,313,862	4,574,848	100

Table 5 Population Distribution by Sex and Religion

Lao Census 1995

Religion	Male	Female	Total	Percent(%)
Buddhist	1,480,070	1,513,445	2,993,515	65.4
Animist	748,517	766,688	1,515,205	33.1
Christian	29,317	30,740	60,057	1.3
Muslim	578	555	1,133	0.0
Others	2,362	2,293	4,655	0.1
Not Stated	142	141	283	0.0
Total	2,260,986	2,313,862	4,574,848	100.0

Table 6 Population in Private Households, Number of Households, Average Household Size, Distribution by Urban/Rural Areas and Province

Lao Census 1995

Province	Household	Total Average Size	Population	Number	Urban Average Size	Population	Number	Rural Average Size	Population
Vientiane Mun.	89,413	5.7	508,884	55,984	5.7	319,136	33,429	5.7	189,748
Phongsaly	25,005	6.0	150,791	1,521	5.4	8,154	23,484	6.1	142,637
Luangnamtha	20,390	5.5	112,478	3,113	6.1	18,883	17,277	5.4	93,595
Oudomxay	33,090	6.3	207,483	5,057	6.0	30,420	28,033	6.3	177,063
Bokeo	19,550	5.7	11,689	976	5.7	5,574	18,574	5.7	106,115
Louang Phabang	59,220	6.1	360,640	6,345	6.0	37,970	52,875	6.1	322,670
Huaphanh	35,913	6.8	243,092	2,168	6.4	13,934	33,745	6.8	229,158
Xayaboury	49,038	5.9	287,459	3,693	5.6	20,812	45,345	5.9	266,647
Xiengkhuang	29,298	6.8	198,433	2,208	6.2	13,712	27,090	6.8	184,721
Vientiane Prov.	47,053	6.0	280,965	8,252	5.7	47,394	38,801	6.0	233,571
Borikhamxay	26,434	6.1	160,631	1,602	6.1	9,751	24,832	6.1	150,880
Khammuane	49,126	5.5	269,191	6,194	5.8	35,661	42,932	5.4	233,530
Savannakhet	106,095	6.3	665,133	15,687	6.2	97,593	90,408	6.3	567,540
Saravan	42,057	6.0	253,727	2,610	5.8	15,265	39,447	6.0	238,462
Se Kong	9,487	6.7	63,106	1,599	6.0	9,547	7,888	6.8	53,559
Champasak	84,047	5.9	493,445	10,096	6.1	61,313	73,951	5.8	432,132
Attapeu	15,049	5.7	85,794	737	5.9	4,316	14,312	5.7	81,472
Xaysomboon S.R.	8,264	6.4	53,264	677	6.6	4,436	7,587	6.4	48,828
Total	**748,529**	**6.0**	**4,506,205**	**128,519**	**5.9**	**753,871**	**620,010**	**6.1**	**3,752,334**

Table 7 Major Social Development Index in ASEAN Countries

Country	Average Life Expectancies (Age) 1994	Adult Literacy Rate (%) 1994	Per Capita GNP (US$:1994)	Infant Mortality Rate At1000Birth
Singapore	77.1	91.0	22,500	5
Brunei	74.9	87.9	14,240	NA
Thailand	69.5	93.5	2,410	30
Malaysia	71.2	83.0	3,480	11
Philippines	67.0	94.4	950	35
Indonesia	63.5	83.2	880	48
Vietnam	66.0	93.0	200	37
Myanmer	58.4	82.7	NA	78
Lao P.D.R.	51.7	55.8	320	86
(Cambodia)	52.4	35.0	NA	102
Japan	79.8	99.0	34,630	4

December 1997, Kingdom of Cambodia is not a member of ASEAN

Source) United Nations Development Programme, Human Development Report 1997, United Nations Fund for Population (UNFPA) State of World Population 1997.

Table 8 Literacy Rate by Province, Sex and Urban-Rural

Lao Census 1995

Province	Male(15 Over)			Female(15Over)			Total(15Over)		
	Literate	Population	Rate	Literate	Population	Rate	Literate	Population	Rate
Vientiane Mun.	149,386	161,966	92.2	129,869	164,536	78.9	279,255	326,502	85.5
Phongsaly	18,473	41,192	44.8	10,925	43,657	25.0	29,398	84,849	34.6
Luangnamtha	14,790	31,754	46.6	6,801	34,718	19.6	21,591	66,472	32.5
Oudomxay	33,313	55,751	59.8	14,219	58,495	24.3	47,532	114,246	41.6
Bokeo	17,889	31,479	56.8	9,114	33,438	27.3	27,003	64,917	41.6
Louang Phabang	63,255	92,550	68.3	38,284	99,492	38.5	101,539	192,012	52.9
Huaphanh	44,380	62,528	71.0	26,972	66,089	40.8	71,352	128,617	55.5
Xayaboury	59,961	79,689	75.2	45,101	82,238	54.8	105.062	161,927	64.9
Xiengkhuang	35,101	47,598	73.7	23,811	50,510	47.1	58,912	98,108	60.0
Vientiane Prov.	68,058	81,369	83.6	48,692	80,258	60.7	116,750	161,627	72.2
Borikhamxay	33,861	43,612	77.6	23,651	44,986	52.6	57,512	88,598	64.9
Khammuane	50,609	71,604	70.7	34,888	81,039	43.1	85,497	152,643	56.0
Savannakhet	124,936	177,966	70.2	85,885	196,931	43.6	210,821	374,897	56.2
Saravan	42,330	64,409	65.7	26,132	74,289	35.2	68,462	138,698	49.4
Se Kong	9,750	17,434	55.9	4,479	18,640	24.0	14,229	36,074	39.4
Champasak	113,400	133,958	84.7	89,319	150,463	59.4	202,719	284,421	71.3
Attapeu	15,951	23,043	69.2	9,757	26,262	37.2	25,708	49,305	52.1
Xaysomboon S.R.	9,485	13,656	69.5	4,302	13,935	30.9	13,787	27,591	50.0
Total	**904,928**	**1,231,558**	**73.5**	**632,201**	**1,319,946**	**47.9**	**1,537,129**	**2,551,504**	**60.2**
Urban	217,303	235,141	92.4	187,216	239,709	78.1	404,519	474,850	85.2
Rural	687,625	996,417	69.0	444,985	1,080,237	41.2	1,132,610	2,076,654	54.5

Table 9 Population, Economic Active Population and Unemployment Rate

Lao Census 1995

Province	Popula-tion	Population 10 years Over	Economic Active Population	Activity Rate	Number of Un-employment	Un-employment Rate
Vientiane Municipality.	524107	393,977	234,696	59.6	16,801	7.2
Phongsaly	152848	104,657	79,380	75.8	832	1.0
Luangnamtha	114741	80,408	61,426	76.4	447	0.7
Oudomxay	210207	140,722	108,191	76.9	2,266	2.1
Bokeo	113612	79,031	60,861	77.0	884	1.5
Louang Phabang	364840	242,194	168,463	69.6	2,905	1.7
Huaphanh	244651	161,327	116,675	72.3	1,669	1.4
Xayaboury	291764	200,643	136,770	68.2	1,928	1.4
Xiengkhuang	200619	126,638	83,484	65.9	1,609	1.9
Vientiane Province	286564	202,669	126,079	62.2	4,390	3.5
Borikhamxay	163589	110,876	77,092	69.5	2,086	2.7
Khammuane	272463	188,274	141,427	75.1	3,083	2.2
Savannakhet	671758	464,334	341,958	73.6	6,658	1.9
Saravan	256231	171,397	136,056	79.4	866	0.6
Se Kong	64170	44,086	36,196	82.1	324	0.9
Champasak	501387	35,196	243,459	69.3	6,372	2.6
Attapeu	87229	60,349	43,653	72.3	840	1.9
Xaysomboon Special Reg.	54068	34,633	24,681	71.3	395	1.6
Total	**4,574,848**	**3,157,417**	**2,220,547**	**70.3**	**54,355**	**2.4**

Figure 7 Literacy Rate by Age and Sex

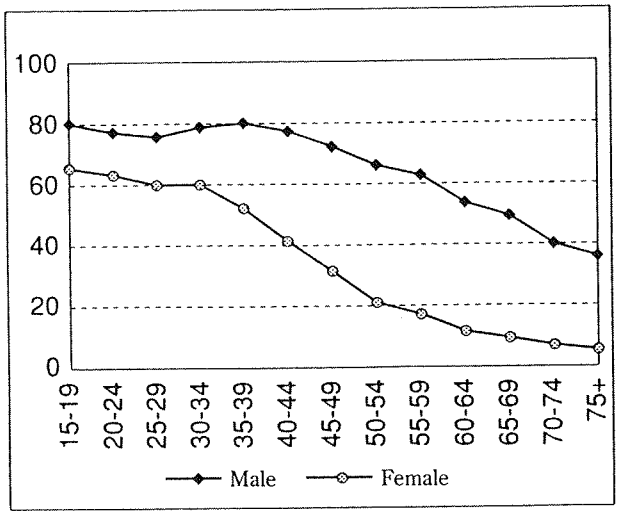


Figure 8 Population Never Been to School by Age Group and Sex

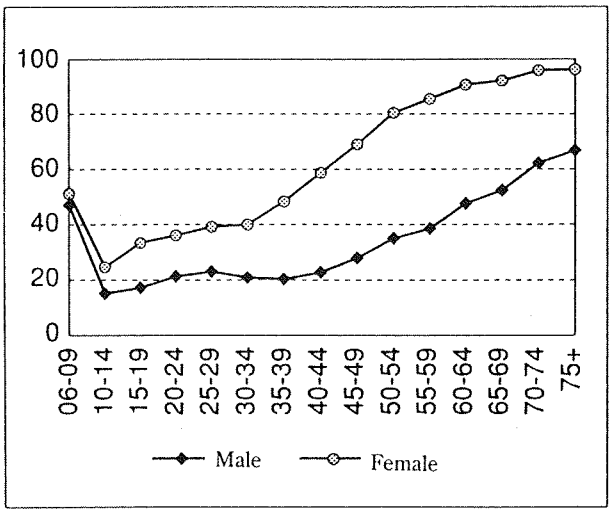
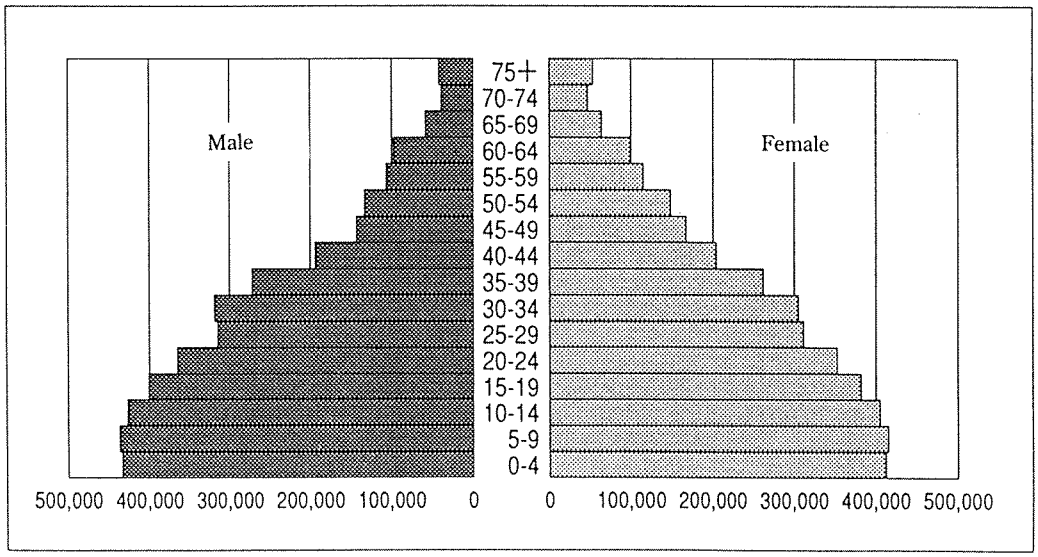


Table 10 Population Projection(1995-2020)

Year	Lao Census 1995 Alternative One	Lao Census 1995 Alternative Two	1995 Census
1995	4,600,000	4,600,000	4,800,000
2000	5,200,000	5,100,000	5,500,000
2005	5,900,000	5,800,000	〃
2010	6,800,000	6,400,000	〃
2015	7,700,000	7,100,000	〃
2020	8,700,000	7,700,000	〃

Figure 9 Population Pyramid 2020
(Population Projection Alternative Two)



[1] Raw data from the second census conducted on March 1, 1995.
[2] State Planning Committee, National Statistical Center. 1997. *Basic Statistics about The Socio-Economic Development in The Lao P. D. R.*. Vientiane: National Statistical Center.
[3] Khanasinam Kaan-samlwat Phonlamuang tua Patheat, Sun Sathiti heang Saat. 1994. *Kaansamlwat Phonlamuang tua Patheat 1995, Khu Muu Nakdeun Samlwat* [Researcher's handbook for 1995 census]. Vientiane: Sun Sathiti heang Saat.
[4] e.g. SOMSANIT, Pwankham *et al.*, ed.. 1994. *Beabhien Phumisaat San Matthnyom 3* [Text of Geography Secondary 3rd Grade] Vientiane: Kaswang Suksaa-thilcaan. However, it is not described in the new version text printed in 1997.

Table 11 Major Macro Economic Indicator

	1989	1990	1991	1992	1993	1994	1995	1996	1997
1. Real GDP Growth Rate (%) 1990	14.3	6.7	4	7	5.9	8.1	7	6.8	7.5
2. Inflation Rate of Consumer Price (%)	59.6	35.7	13.4	9.9	6.3	6.8	25.7	7.3	8
3. Finance (in percentage of GDP)									
Government Revenue (excluding foregin aids)	8.3	9.9	10.3	10.4	11.8	12.3	12.2	13	13
Government Expenditure	24.9	23.4	20.9	21.3	17.9	23.8	21.9	22.1	20.7
Overall Balance (without grants)	-16.6	-13.5	-10.6	-10.9	-6.1	-11.5	-9.7	-9.1	-7.7
Overall Balance (with grants)	-12.6	-10.7	-6.8	-6.7	-4.4	-5.2	-4.2	-5.6	-4.2
4. Balance of Payments									
Export (in million dollars)	63	79	97	133	241	300	313	323	341
Import (in million dollars)	211	202	228	266	432	564	589	690	719
Export-Import (%)	30	39	42.4	49.9	55.8	53.2	53.1	46.8	47.4
Current Account (%) excluding official transfers	-18.5	-11.7	-11.3	-8.8	-10.9	-14.4	-13	-16.5	-15.4
Current Account (%) including official transfers	-15.7	-9	-4.6	-3.5	-3.1	-6.3	-6.9	-12.1	-11.3
Debt Redemption Ratio (in percentage of GDP)	15.9	10.3	11.2	6.5	4	3.3	5.7	5.8	8.4
Gross International Reserves (in million US dallor)	59.7	64.8	57.2	85.5	150.9	158.2	191.1	285	349
5. Exchange Rate for Kip/Dollars	714	696	712	717	717	719	925	954	1021
6. External Debt (in million dollars)	238	309	338	414	492	579	675	803	960

Note) Data in this section was made available by Dr. Kenji Domoto of Shiga University.

Chapter Two

Agricultural & Rural Development Strategy of the Lao PDR in ASEAN

1. Economic System and Socioeconomic Development
2. Lao PDR in ASEAN
3. Need for a new approach for moving from subsistence to commercial agriculture
4. Rural development in Lao PDR

Chapter Two

Agricultural & Rural Development Strategy of the Lao PDR in ASEAN

1. Economic System and Socioeconomic Development

The Lao PDR's economic structure consists of many sectors under different forms of ownership and economic organizational systems. These different economic sectors, which are all equal before law, will coexist for a long time. They operate under the control of the state based on the market economic mechanism, which require the sectors to cooperate and compete with one another. They also have the common obligation to country's socioeconomic development. Since 1986, the Lao PDR has been engaged in a comprehensive programme of economic reforms referred to as "New Economic Mechanism --NEM)". the main objective of this reform is the transform the centrally planned economy into a market-unabated economy and also to convert the natural and semi-natural economy into a goods production economy along the line of market mechanism aimed at gradually improving the standard of living of the people. The policy of economic development of the Lao PDR up to the year 2000 is to build the base for sustainable economic growth and promote human resource development based on the multi-sectoral economy and the participation of the people from all walks in of life the society. In order to implement successfully the aforesaid policy, the government of Lao PDR has laid down the following objectives:

- To enhance the unity of and cohesion in the entire people;

- To mobilize people of all state to participate actively in the implementation of the two strategic tasks of defending and building the nation.
- To strive for progress and prosperity through self-reliance;
- To increase productive forces through research and development and the utilization of the new achievement in the fields of science and technology to boost the growth and build the foundation of the national economy so as to enter into the 21st century with readiness;
- To pay great attention to cultural and social development;
- To gradually increase people's material and moral standard of living, especially those who live in the remote, rural and hilly areas; and
- To broaden the relations of co-operation with foreign countries in order to contribute to the cause of peace, friendship and co-operation in Southeast Asia and in the world.

In its socioeconomic development plan up to the year 2000, the government set the following targets:

- Growth of the GDP at the rate of 8-8.5% per annum;
- The average rate of inflation must be kept under 10% per annum;
- The share of public investment in the Socioeconomic development should be 25-30% of the GDP;
- The mobilization of the revenue receipt of the budget should be 16-16.5% of the GDP;
- It is estimated that in the year 2000, the population will increase to 5.2 million and the average of per capita GDP will be about $ 500;
- Primary school shall become compulsory;
- Life expectancy of 56 years for male and 58 years for female in the year 2000.

To achieve the above-cited objectives, the government has given emphasis on eight priority development programs.

1. Food production;
2. Abolishment of forest degradation and stabilization of the shifting cultivation;
3. Commercial production;
4. Development of socioeconomic and technical infrastructure;
5. Integrated rural development;
6. Human resource development;
7. Broadening of international relations and co-operation with foreign countries; and
8. Development of services sector.

On the basis of the policies and the overall economic stand, the following tasks have to be implemented for each sector:

Rural Development: Rural development has a strategic importance in terms of policies, economy and society. The focus for this is on the creation of farmers' household economy, expansion of the number of model families and set up economic-cultural groups. At the same time, the government encourages and promotes the participation of various economic sectors.

Agriculture and Forestry: These are fundamental sectors in national economy. This area must be actively developed, holding as prime task to closely link the upgrading of productivity with the preservation, rehabilitation and enrichment of the soil, the forest and water sources. The production of sufficient rice for consumption and reserve constitution is sought.

Communication: Telecommunication and construction: Attention is to be paid to upgrading the quality and construction of additional number of national roads network and highway systems stretching North-South and East-West so as to hook up with those of the neighboring countries. This is needed for the national development and enhances the country's geographical potential.

Industry and Handicraft: Based on the country's potentials, the development of electric energy and mining industries will play important role in the national development. Simultaneously, the development of light industry, small-scale industry and handicraft needs to be encouraged and promoted. Tourism: It is an important part of the open- up policy with foreign countries. It is necessary to accelerate, to open up natural and cultural tourist destinations, as this sector is a new potential of the country's national income.

Finance: The objective for the years to come is to gradually stabilize the national finance on the basis of increasing domestic income, reducing reliance on external income, balancing income and expenses in the national budget. In addition, the increase of the management of macro finance by state, the improvement of the financial control organs and the conducting of strict control on this matter are essential.

Banking: The currency policy is an important state instrument in the management of market economy. In the coming years, it is necessary to strive to maintain the currency's stability, control the price index and the inflation rate to avoid serious upsurge. The role of the Bank of Laos in the management of currency activity throughout the country and the activity of the state

and private business banks, including joint venture banks and branches of foreign banks must be increased in a flexible and strict manner.

External Economic Relations and Promotion of Foreign Investment: Increase in the co-operation with neighboring countries and other countries in South- East Asia is one of the main tasks in the opening up of the country to the outside world. Actually, it is compulsory for all sectors to prepare all conditions for membership of ASEAN's Free Trade Area (AFTA), and the World Trade Organization (WTO), and enhance the sense of responsibility and initiative in external economic relations, giving the foreign investors confidence and satisfaction concerning their investment in Lao PDR.

2. Lao PDR in ASEAN:

2.1 Rationale:

The end of the cold war presented both opportunities and challenges for Southeast Asia. Regional State present the opportunities for moving Away from Away of life dominated by conflict and tension for investing greater resources in the task of economic and social development for extending the scope and the variety of collaboration with friends and neighbors, and for enhancing regional co-operation in pursuit of lasting peace and shared property. In the last few years, the region as A whole has taken up some of the opportunities offered by changed global and regional environments. Most of the region's economies remain on the fast forward track, enhancing Southeast Asia's position as one of the most dynamic epicenters of economic activities and growth in the world. Regional co-operation has been widened and deepened. On the basis of our open-door policy, the Lao Government is strongly committed to pursue its policy of economic reform pursuant to the market oriented mechanism and intensify its external relations and co-operation with all countries, primarily with neighboring countries. The Lao PDR considers its membership in ASEAN to be one of the most important objectives in its foreign policy of expanding external relations. With the objective, goals, principles and aspirations of the ASEAN for building a peaceful and prosperous Southeast Asian community, and to global contemporary trends, it means greater opportunities to further contribute to the cause for common On the basis of our open-door policy, the Lao PDR's government is strongly committed to pursue its policy of economic reform pursuant to the market- oriented mechanism and benefits of the region and the world; on 23rd of July 1997 Lao PDR and the Union of Myanmar were admitted as regular member of ASEAN, This historic event demonstrates the righteous policy of the Lao PDR government

aimed at expanding co-operative relationship with all states in the region and in the world and of great significance for enhancement of the fruitful co-operative relationships between the Lao PDR and ASEAN member states. This has also made the vision of the ASEAN founders for the Association to comprise the 10 Southeast Asian countries close to reality.

2.2 The Lao PDR's Duties as a New Member of ASEAN

Being a member of ASEAN, one of the most important areas is to active participation in ASEAN Free Trade Area (AFTA). Its ultimate objective is to increase ASEAN's competitive edge as a production base geared for the world market. A critical step in this direction is the liberalization of trade in the region through the elimination of intra-regional tariffs and the elimination of non-tariff barriers. This will have the effect of making ASEAN's manufacturing sectors more efficient and competitive in the global market. At the same time, consumers will source goods from more efficient producers in ASEAN, thus creating intra-ASEAN trade. In addition, the cost competitiveness of manufacturing industries in ASEAN is enhanced and with the larger size of the market investors can enjoy economies of scale in production. In this manner, ASEAN hopes to attract more foreign direct investments into the region. This will in turn stimulate the growth of supporting industries in the region for many direct foreign investments.

The Common Effective Preferential Tariff (CEPT) is the main instrument for making ASEAN a free trade area. This means that ASEAN Member States shall have common effective tariffs among themselves in AFTA, but the level of tariff with non-ASEAN countries shall continue to be determined individually. Due to such ultimate objective of ASEAN and its main instruments, in a short term, after being a member of ASEAN, Lao PDR will face some problems and difficulties because of the low levels of social, economic, human resources and infra-structural development together with a number of institutional and legal constraints. These severely limit both the capacities to reduce poverty and to achieve higher rates of sustainable economic growth with equity. From a long-term viewpoint, however, this process could contribute to and benefit from the achievement of sustainable rapid growth while reducing poverty and maintaining social equity.

In addition, being a member of ASEAN, Lao PDR has to further open up her economic co-operation and development. It means that there will be more and more external businessmen and investors from both member countries and other countries coming to invest in Lao PDR. This will create competition strongly between local and external investors and it might have some negative impact to the local investors due to most local investors lack of experiences, technologies and capital to run their business to complete with one another. Therefore, local ineffective investors will be then collapsed due to their products are unacceptable in term of

both quality and quantity to the market. The government cannot protect all national products except the strategic products which are the most basis for the livelihood of the people.

Nevertheless, Lao PDR see the future well-being and that of ASEAN as complementary. It expects its membership in ASEAN to bring more opportunities for co-operation, thus contributing not only to its economic development but also to regional advancement and resilience. Lao PDR also see the Association as having created, and continuing to create, the conditions for peace and stability in the region which Lao PDR acknowledges as important prerequisites for economic development. Lao PDR also expects ASEAN to play an active role in helping it to overcome its economic backwardness.

As member of ASEAN, Lao PDR envisions that it will be able to actively participate in various co-operative endeavors of ASEAN, as well as in the extensive international linkages that ASEAN has fostered through the years so that Lao PDR can overcome its economic backwardness. As countries which are lagging behind in almost every sector of life compared to its neighbors in ASEAN, Lao PDR hopes that ASEAN will accord it special consideration to ease and facilitate its integration into the regional process. In particular, Lao PDR hopes that ASEAN will recognize that Lao PDR urgently need assistance to overcome a number of specific technical problems.

Membership in ASEAN offers the hope of overcoming problems due to its land-locked position. There are considerable communication and transportation difficulties not only between Lao PDR and the outside world but also within the country itself. Its geography also seemed to foreclose the possibility of the country receiving benefits from future development of maritime resources in the South China Sea. Moreover, ASEAN membership also presents an opportunity to reinvigorate ways of thinking and doing things.

Lao PDR now hopes to turn its geographical handicap into a strategic advantage by becoming the "land bridge" between Southeast Asia and China, by transforming itself into a communicational and economic link between two of the fastest growing areas in the world, and thereby accelerating the processes of its own economic and social development. Recognizing weaknesses and urgent need for assistance, Lao PDR has emphasized that it will not, and do not want to, be a burden to ASEAN. Lao PDR fully and firmly expect to contribute to the future growth of ASEAN as much as it will benefit from membership in ASEAN.

2.3 Overview on Agriculture and Forestry Situation in the Lao PDR.

2.3.1 Policy for Agriculture Forestry Sector

Taking cognizance of the challenges posed and opportunities offered in regards to national socio-economic development, the Government adopts the economy policy which is based primarily on the enhancement of agricultural and forestry resource base as the foundation for the development of processing industries and to be linked to service sector from the outset.

Agriculture sector's primary task is to produce enough food for the country especially in achieving self-sufficiency in rice by the year 2000, while slash-and-burn cultivation in upland areas is to be steadily and effectively stabilized through the creation of more productive and permanent farming systems, the promotion of off(-farm economic alternatives, wherever necessary such as in critical watersheds, resettlement of shifting cultivators will be the unavoidable solution. Crops Livestock and Fisheries sub-sectors are to be boosted in a much more commercialized scales in view of moving Away from nature dependent subsistence farming towards commodity production thus promoting agribusiness and agro-industry development. Forestry sub-sector is primarily mandated to protect existing forest further degradation, regenerate all unproductive and degraded forest land areas. The economic, ecological, socio-cultural, educative and aesthetic functions of the forest are to be perpetually enhanced to the fullest extent possible. The general government policy guideline in managing these natural resources emphasizes on the maintenance of the balance between the economic development and the protection of environment, to ensure reasonable economic growth while enhancing healthy natural environment.

2.3.2 Actual Performances on Agricultural and Forestry Production

Agricultural and forestry production for the last 15 years or so is illustrated in the figures below:

a.) Agricultural Production- Harvested Area, S= ha; Production, P= Tons

Year	1980		1985		1990		1995		1996	
	S	P	S	P	S	P	S	P	S	P
Rice	732,000	1,053,1	663,487	1,395,177	650,300	1,991,495	559,889	1,411,829	553,741	1,413,500
Subsidiary Crops	769,490	108,741	700,650	118,721	714,849	284,826	603,046	149,502	605,711	170,594
Vegetables	5,230	42,500	5,941	39,351	7,168	53,512	9,482	61,727	14,615	88,853
Industrial crops	36,931	63,216	36,315	106,969	54,786	178,857	122,690	57,960	146,230	

Subsidiary Crops include maize and tubers. Industrial Crops are mungbean, soybean, groundnuts, tobacco, sugar cane, cotton, coffee and tea.

b) Livestock Production (Heads)

Year	1980	1985	1990	1995	1996
Cattle	446,940	626,510	841,900	1,145,870	1,186,000
Buffaloes	853,290	939,390	1,071,750	1,191,416	1,211,700
Swine	1,111,090	1,189,760	1,371,530	1,723,590	1,772,000
Goat/sheep	48,600	81,540	139,410	152,930	159,000
Poultry	4,620,600	6,470,800	7,884,500	1,338,350	11,656,000
Fisheries (tons)				36,000*	38,000*

c) Forestry Plantation Development. -Accumulated area: (ha).

Year	1985	1990	1995	1996
State	2,425	4,416	21,512	33,411

d) Irrigation Development: - Irrigated Area, ha)

Year	1993/94	1994/95	1995/96	1996/97
Area	11,000	13,500	17,720	26,380

Note: in 1996: irrigated area during rainy season 144,530 ha, irrigated area during dry season 26,380 ha

2.3.3 Major Constraints Confronting Agricultural Development Effort

The endeavor put on promoting increased food availability and developing agricultural sector in the Lao PDR has been obstructed by many constraints of which the main ones are:

- Low level of education and inefficient agricultural services pose a constraint to the transfer of new and improved technology and information. While the low input, low risk and low output farm technology is appropriate for subsistence production, but it places a tight limit on increase of productivity. Moreover, labor constraints appear to substantially limit expansion into new land areas under such production techniques. The scope to increase agricultural productivity and hence returns from farming through improved technology is large, both for crop and for livestock production;
- The limited extent of farmers' market integration and the consequent concern with food self-sufficiency, results in very limited crop diversification. Rice is produced in almost 97 percent of all villages. Stronger consideration for comparative advantages in production is conditioned by access to efficient input and output markets and infrastructure; Declining

soil fertility occurs in the uplands where slash and burn culture is practiced. Population pressure, particularly in the northern region has resulted in a shortage of land in the more accessible areas. This in turn has shortened the fallow period causing economic consequences: a decline in soil fertility and an increase in the number of weeding which again have led to the clearance of more forests for crop cultivation, adding to environmental degradation.

- Speed up urbanization may result in turning high potential agricultural land Away from agricultural production thus decreasing crop land availability;
- Unexploded ordinance restricts the use of cultivable land area, particularly in certain in the north and along the eastern border where large tracts of land can only be farmed at great risk. Each year exploding ordnance causes gear human suffering. Well over two million tons of ordnance-primarily anti(personnel cluster bombs) was dropped over Lao PDR and extensive ground battles left an additional staggering amount of unexploded ordnance such as mortar shells, munitions, land mines and other contraptions. Twelve out of 18 provinces and more than 50 percent of Lao territory still continue to be affected by unexploded ordnance.
- In Lao PDR have occurred severe floods and droughts annually for the last thirty years, many of which have caused extensive damages to crops and animals and substantial loss to agricultural production such as those during the years of 1996. 1971, 1977, 1983, 1988, 1993, 1994, 1995 and 1996, which are usually followed by pest and epidemics outbreaks affecting seriously the agricultural production thus the livelihood of the people. As the consequence the Lao PDR has to import rice to make up for the shortages of rice almost every year as can be seen in the table below.

Recorded Floods and Droughts, and Rice Shortage 1966-1995.

Year	Natural Disaster	Estimated costs (US$)	Region(s) affected	Rice import
1966	Large flood	13,800,000	Central	
1967	Drought	5,120,000	Central/Southern	
1968	Flood	2,830,000	Southern	
1969	Flood	1,020,000	Central	
1970	Flood	30,000	Central	
1971	Large flood	3,573,000	Central	
1972	Flood	40,000	N/A	
1973	Flood	3,700,000	Central	
1974	Flood	180,000	Southern	
1975	Drought	N/A	N/A	
1976	Flash flood	9,000,000	Southern	
1977	Severe drought	15,000,000	Central/Southern	
1978	Large flood	5,700,000	N/A	
1979	Drought and flood	3,600,000	N/A	
1980	Flood	3,000,000	Central	
1981	Flood	682,000	Central	
1982	Drought	N/A	N/A	
1983	Drought	N/A	N/A	
1984	Flood	3,430,000	N/A	
1985	Flash flood	1,000,000	Oudomxay	7,000
1986	Drought and flood	2,000,000	N/A	
1987	Drought	5,000,000	Central/Northern	
1988	Drought	40,000,000	Central	
1989	Drought	20,000,000	Southern	
1990	Flood	100,000	Central	20,000
1991	Drought and flood	3,650,000	Central	26,100
1992	Drought and flood	N/A	Central	7,014
1993	Drought and flood	21,000,000	Central/Southern	5,713
1994	Drought and flood	21,150,000	Central/Southern	16,541
1995	Large flood	62,838	Central/Southern	15,938
1996	Large flood and drought	65,937	Central/Southern	26,737

* Number of hectares affected by natural calamities

Source: Government of the Laos 1996. Preparation of Flood Loss Prevention and Management Plan

Notes: All data compiled by Department of Meteorology and Hydrology; N/A: not available

2.3.4 Development Programs of Agriculture and Forestry Sector.

In the effort to translate the Government's socioeconomic development policy into effective activities on the ground, taking into consideration intrinsic constraints and opportunities and actual economic and social conditional, the Ministry of Agriculture and Forestry has started implementing its six development programs at the outset of the fourth national five-year plan 1996-2000, and which can be briefly outlined as follows:

Food Production Program

The government considers achieving food self-sufficiency to be an important prerequisite for improving the living standards of the people. Food self -sufficiency will improve both the quantity and quality of food consumption and reduce the instability of availability. The target is to produce 2 million tons of paddy, 25,000 tons of maize, 175,000 tons of roots and tubers, 24 kilograms of meat per capita per year and 35 kilograms of fish per capita per year by the year 2000.

Self-sufficiency is to be achieved through intensification in the six major plains; expansion of cultivated area for paddy in montane basins where adequate water is available is also promoted. Agricultural intensification depends on the timely supply of inputs such as improved seeds, fertilizers, insecticides, pesticides, and agricultural tools at prices affordable by farmers. Introduction of integrated pest management systems is also encouraged. Post harvest handling is to be improved. Efficient input and output markets must be developed, access to credit must be improved, and the establishment of an effective extension service capable of transferring the new technology to the farmers is essential for the successful implementation of this program.

To encourage the production of marketable surpluses the state plans to introduce a guaranteed minimum price for paddy. Hence the state will buy and sell paddy in the market to regulate the market price and hold a buffer stock for times of emergency. Intensification in the livestock sector will focus on a combination of improved feeding practices and improved veterinary services.

Commodity Production Support Program

The purpose of these program is to develop the agro-processing sector to provide income opportunities at the local level and increase the value (added manufacturing of export commodities. The commercial crops to be included are: rice, maize soybean, mungbean, ground nut, vegetables, sugar cane, tobacco, cotton, coffee, fruits and meal-livestock and fish).

Stabilization of Slash-and-Burn Shifting Cultivation

One of the main priorities of the government is to stabilize slash and burn cultivation because of the serious negative environmental effects of this farming system. The target is to stabilize 50,000 out of 150.000 present slash-and-burn families by the year 2000. These farmers will be encouraged to take up alternative economic activities such as planting trees, animal husbandry, food and/or cash crop production in the mountain plains, wage labor in processing factories, or trading apart from developing improved more productive and permanent farming systems in upland areas. Land and forest allocation scheme to secure land tenure and appropriate land use also plays an important role in this end.. To facilitate the resettlement the government must guarantee farmers access to the necessary financial and technical support in areas such as land clearing and construction of irrigation schemes.

Irrigation Development Scheme

The objectives of this program are: to increase rural incomes and stabilize rice availability by expanding irrigated area in both the wet and the dry season; and to improve the operation and maintenance of existing. The target for the year 2000 is to irrigate 50 percent of total cultivated agricultural land area. irrigation schemes

Construction of small-scale community based irrigation schemes and boreholes or water wells for households will be emphasized. These can limit the effect of droughts, can be used for domestic consumption and horticulture production, and solve the problem of seedbed preparation. Efforts will also be made to mobilize loans and grants to invest in medium and large-scale irrigation schemes in high potential areas. Reaching the targets is thus a joint effort between the state and the communities. However for immediate solution the installation of water pumps proves to be the appropriate measure since it does not entails time consuming sophisticated planning and preparatory process.

Agriculture and Forestry Research Program

The objectives of this program are: to conduct surveys of agriculture and forest land and of water resources in order to prepare master plans for land use and agricultural development, especially in the northern provinces; to rehabilitate existing research stations and centers and expand research activities to new areas; and to cooperate with research institutes abroad especially in the field of improved seed varieties and their multiplication and in meteorology and hydrology.

Human Resources Development Program

The objective of this program is to upgrade the technical and managerial skills of the staff in the Ministry of Agriculture and Forestry. The development of an effective extension service at the district and provincial level is particularly important. Extension staff should be trained in a technical field and be able to transfer information and technology to farmers. Lack of sufficient skilled staff is an important constraint in all sectors of the Lao economy development.

3. Need for a New Approach for Moving from Subsistence to Commercial Agriculture:

The implementation of the New Economic Mechanism, in moving from a centrally planned economy to a market economy necessitates profound changes to transform the age old subsistence economy- based entirely on rice as a barter element until recently), into a cash economy-based on production of agriculture products for market). These transformations require a deep change, not only in the mentality/traditional way of life of people in rural areas, but also in the production system which, now should be market oriented. Lao farmers usually donut want to take risk; therefore, to enable Lao farmers to produce cash crops they should be assured of a secured market and a remunerative price for their products. At present, emphasis is rather place on production, than on marketing by taking for granted that production will necessarily lead to marketing. In fact the major constraints in implementing NEM by Government institutions, farmers and investors alike are marketing and remunerative return, rather than production. Often, projects in agriculture sector promote the development of a number of crops, based on agro-ecological potentials, which to the detriments of farmers do not find a sustainable market. Thus farmers discontinue the growing of such crops.

Therefore, not adequate attention has been given, so far, on what should be done for transforming the rice based subsistence economy into a market economy at the levels of :-a) institutions,-b) farmers,-c) donors,-d) investors. In future, while planning and promoting diversification of crops and animal production and in finding alternatives production systems for shifting cultivation, attention should be paid first and foremost to marketing and pricing policy as well as to the economics of production rather than to production alone. This has a number of implications for Government institutions, farmers, donors, and investors.

Government institutions, in particular the Ministry of Agriculture and Forestry need to identify and develop feasibility studies for major crops and livestock to be produced, for which there is a demand within the country and a sustainable market abroad for export. It would be

advisable that such crops are not in competition with similar commodities produced at competitive quality and price by neighboring countries such as Thailand, China and Vietnam. If the above is taken into consideration only few commodities, at present, could be advantageously developed for internal market and/or export, provided necessary investments are made, for their processing, and to improve the quality of the final product: the commodities could be for example:

(a) Crops: Groundnuts, Soybeans, Maize, Mungbeans, Sesame, Chili, Garlic, Vegetables and in particular vegetable seeds;
(b) Horticulture: Pineapples, Tamarind, Cashew nuts, Bananas to only mention few.
(c) Trees: Mulberry Trees-for production of silk cocoons for export), Styrax and Eagle Wood-for production of expensive gums for export). Kapok Tree, Bamboo and Rattan.
(d) Livestock: Comparative advantage for Lao PDR vis a vis of neighboring countries is the existence of local breeds in unlimited quantity which can be further improved for meat production. The local breeds of chicken, ducks, swine, goats and cattle are in big demand in the neighboring countries and in the internal market.

Rice would continue to be the major rain-fed crop to meet the internal requirement. However, rice being not a remunerative crop for the farmers, its cost of production should be kept as low as possible so that the farmers can get the a maximum revenue. This could be possible, by fully exporting local varieties of which Lao PDR is endowed in plenty and which are resistant to pests and less demanding in fertilizers and water. The yield of these local varieties, which are reasonable, could be further increased through selection and genetic improvement.

The other key factors essential for marketing are:
- Roads, in particular feeder roads
- Transport facilities
- Agro-processing
- Credit facilities
- Availability of inputs through retailers at Districts and village levels
- Collection of harvest at farm gate at a remunerative price to the farmers

The private sector investing in agriculture could be greatly benefited in concerning on commodities for which Lao PDR has a comparative advantage over other countries to meet the need of its local market as well as the need of the international markets without entering into

competition with products produced in the neighboring countries. At present, the problem is a total lack of information and data on market intelligence of agriculture commodities within the country to guide and assist the private sector in the identification of marketable products and for the preparation of feasibility studies.

However, the private sector could use to their advantage national institutions when and where capacities exist within the country for reinvestment studies, technology development, training, application of adaptive research and/or proven technology existing within the country; such approach could also enable the national institutions to further strengthen their capability and expand their activities. Thus, both the private sector and Government institutions could be benefited by such cooperation and move faster in transforming the age old subsistence agriculture into a production oriented agriculture. Also, it would be of mutual interest to the farmers and the private sector to have an assured quantity of commodities for marketing to be agreed mutually through contractual arrangements.

Therefore, from the above it becomes evident that Government institutions, in particular the Ministry of Agriculture and Forestry in cooperation of the Ministry of Commerce need to take initiative and the lead to get organized to:

(a) advise the Government on policy matters in relation to import and export of crops based on internal and external market intelligence of major commodities on crops, horticulture products, wood products and livestock;
(b) make better known to the private sector the institutional capabilities existing in the country for the preparation of investment studies and technology development at farmers' level;
(c) assist farmers in production of marketable products by facilitating availability of farm inputs including quality seeds at district and village levels and taxation policy for marketable products favorable to farmers.

4. Rural development in Lao PDR:

4.1 General:

Based on the characteristics of the country, the Party and Government of the Lao PDR considers rural development a strategic matter of critical national significance. In the past, rural development was aimed primarily at ensuring national rice self-sufficiency and restricting shifting cultivation. To date, important sectoral and area development initiatives has been implemented bringing about material improvements in several aspects such as in road construction and maintenance, construction of schools, small reservoirs, maintenance and development of small scale irrigation schemes among others.

4.2 Rural Conditions in Lao PDR:

The rural economy, which is dominated by agriculture, contributed more than 50 percent of the Gross Domestic Product and almost half of official export earnings in 1993 and employed about 80 percent of the labor force.

Paddy production is the basis of economic activity of most farmers in Lao PDR. Production and consumption of crops other than rice are still very limited. Most farmer households, typically cultivating between one to two hectares, are only just moving Away from pure subsistence. Lowland rain fed paddy cultivation accounts for 70 percent of total rice production, upland paddy cultivation 25 percent, and dry-season irrigated paddy cultivation less than 4 percent. Almost all upland paddy is produced under slash and burn/ swidden cultivation which is becoming increasingly unsustainable both as a livelihood system and environmentally.

The rural people in Lao PDR live in villages in which traditional social structures continue to play an important role in such matters as the allocation and use of common property resources. There are also membership and mass organizations which operate extensively in the rural areas, such as the women's union, and to a lesser extent farmer, health and other groups promoted by various development initiatives.

In 1990, the net availability of rice, which provides about 75 percent of average energy requirement, was approximately 180kg. Per person per year which is adequate. However, between 1991 and 1994, the net availability has ranged between 139 and 173kg per person per year, suggesting a worsening food security situation. The disparity in geographical distribution of rice production and transport difficulties makes the situation worse in the north. Even in the south, the majority of households are food insecure due to disparity in income distribution.

The 1994 Lao Nutritional Assessment Survey (LNAS) showed a significant problem of malnutrition. Among Children under five years, 48 percent are affected by chronic malnutrition (stunting), while 10 percent are affected by acute malnutrition-wasting). Acute malnutrition is more prevalent in the southern region of the country (16 percent of children). Malnutrition of children is more frequent amongst socio-economically disadvantaged households in rural areas.

Infant mortality rates range from an estimated 117 to 147 per 1,000 live births, depending on the region. Half of the children under five years are affected by malnutrition and most of the population lack access to basic health and sanitation, birth spacing and nutritional services. The national maternal mortality rate is estimated at 653 per 100,000 live births. The rate in the mountainous north-eastern part of the country is more than twice the national rate and one of the highest in the world. Modern medical facilities are used by only 10 percent of those in the rural areas compared to 23 percent in urban areas.

Adult literacy is estimated at 50 percent for adults, 65 percent for men and 35 percent for women. Net primary school enrollment is about 55 percent in rural areas (58 percent of all boys, 52 percent of all girls) compared to 79 percent in urban areas. The mean years of schooling average 2.9 overall, 3.6 for males and 2.1 for females. Less than 1 percent of the population have been educated at the tertiary level. Performance varies dramatically by region, ethnic group, and rural and urban areas.

The national completion rate for primary school is about one-third of primary school entrants. Primary schools do not exist in some mountainous areas. The *Lao Lum* comprise about 55 percent of the population but 73 percent of primary school enrollment. In some rural areas, it is estimated that only 25 percent enroll in primary school.

While women make up 51 percent of the total work force, they are under represented in education. Girls comprise 44 percent of school children, women are 40 percent of teachers, 38 percent of students studying to be teachers, 28 percent of students of higher education, and 15 percent of polytechnic students.

To date, the rural population has yet to receive adequate social services, whether in communication and transport, education, public health or others. The majority of the rural population follow livelihood systems based on the rhythm of nature, live in unhygienic conditions are illiterate and have low cultural awareness, particularly in the case of minority ethnic women. They carry out largely subsistence production using traditional tools and techniques. Rural people lack knowledge on how to use their potential, and lack an appreciation of the value in preserving existing natural resources. The environment and natural resources are destroyed by slash and burn cultivation and undifferentiated tree filling which are the cause of dwelling forests and water sources necessary for the rural population's living conditions. A survey conducted by the World Bank in certain provinces indicated that the Lao PDR has presently a population living in poverty, that is with an income of less than $100 per year per person, of approximately 46 percent and 53 percent of the total and rural population respectively.

By contrast, urban areas are developing as social services, communication and transportation are improved. The economy is growing along with employment and higher income. However, the gap between urban and rural areas is increasing and putting pressure on migration towards the towns, particularly among the youth seeking higher income and opportunities for self-development. The majority of students from the countryside in urban areas do not want to return to develop their rural homes on completion of their studies. This situation is generating economic and social problems in both the urban and rural areas. The government of Lao PDR considers therefore rural development as an important element among the eight national socio-economic development.

4.3 Rural Development Policies:

In March 1994 the People's Revolutionary Party, Lao PDR, adopted a resolution on rural development. This resolution highlighted the strategic importance of rural development for Lao PDR, emphasized the need to establish focal zones, and called for the establishment of a steering Committee to implement the proposed guidelines.

Guidelines for future activities outlined in the resolution included the promotion of agricultural commodity production, introduction and transfer of advanced and more effective methods of production; provision of technical advice to farmers and to involve them in practical work such as intensive agriculture, animal raising, planting industrial and other cash crops.

The resolution further called for localities to be identified and established into focal areas, such as focal area for development of rice and food consumption; focal area for livestock development; focal area for commercial crops and industrial trees; focal sites for resettlement and farming stabilization, and focal areas along the border in accordance with the particularities of each locality.

The resolution of the Sixth Congress of the Lao People's Revolutionary Party again stressed the strategic importance of rural development.

4.4 Directives and Measures for Implementing Rural Development:

November 1994, Decree 40 was issues by the Party, which formally established a Leading Committee for Rural Development and outlined its roles and responsibilities. This decree also called for Provincial Rural Development Committees to be set up with the Vice-Governor as chair. The mandate and authority of the rural development committees was restricted to area-specific focal sites, within which the Provincial Rural Development Committees could co-ordinate the work of line ministries. Planning and co-ordination outside the focal sites continues to come under the purview of Provincial Socio-economic Plan, coordinated by the State Planning Committee.

The Central and Provincial Rural Development Committees are assisted in their work by a rural development office at the center and in each province. In August 1996 Decree No. 131 was issued by the Prime Minister re-establishing the central level Rural development Committee as part of the Prime Ministers Office.

4.5 Measures:

Grassroots activities shall focus on the education and mobilization of the population to be aware of and implement their civil obligations, revolutionary duties, change their traditional

production methods for new and more efficient ones, to transcend from backwardness, to generate wealth for their families and contribute to the national construction and development. Public servants will be trained for the grassroots, and leading and active staffs will be selected and trained to lead villagers in the implementation of the activities.

Provincial rural development committees shall co-ordinate the activities of provincial services at the grassroots, while encouraging and monitoring the activities of districts at the grassroots and shall report on a permanent-quarterly, annual basis to the central rural development committee.

The provincial rural development committees shall study and formulate plans and projects specifically for their respective focal development areas with the assistance of technicians from sectors belonging to the vertical organizational line in their provinces. Any province not possessing sufficient technicians may request technical assistance from the relevant line ministries. National rural development planning must start from the grassroots and ensure that such plans are appropriate with the actual conditions of the socio-economic development, financial capacities and the national requirements.

The central rural development committee shall study and compile plans, projects and rural development situations, lead, monitor and promote the implementation of the central level resolutions. In co-ordination with the State Planning Committee and the concerned sectors, it will establish global strategic rural development plans as guidelines for the localities to identify detailed plans and projects specifically for their localities.

The central rural development committee shall summarize, analyze the plans and projects presented by the provinces which will be submitted to the State Planning Committee for inclusion into the national -economic development plans and approval by the National Assembly.

As the plans and projects are approved, the central rural development committee shall hand over such plans and projects, together with their budget, to the provincial rural development committees which will efficiently direct the implementation of the plans and co-ordinate with the concerned sectors of the provinces and districts for the assignment of staffs to the projects. At the same time, the central rural development committee, in co-ordination with the district committee and the project management, may bring modifications to the projects if deemed necessary.

Chapter Three

Field Study Report

1. Outline of the Surveyed Regions

2. Analysis of Field Study

3. Agriculture and Rural Development is Bolaven Plateau

Chapter Three

Field Study Report

1. Outline of the Surveyed Regions

1.1 Outline of Central and Southern Laos

1) Characteristics of agriculture in Southern Laos

Northern and southern regions of Lao PDR have contrasting physiographic environment with the south exceeding the north considerably in productive capacity. A survey was conducted in the northern province of Louang Phabang last year, conducting a similar survey of the present situation of the south is indispensable in examining food production and rural development for the entire country.

Generally speaking, rice farming is an extremely important subject in examining agricultural production of Lao PDR where harvested area of rice accounts for as high as 73% of total arable area, and annual polished rice consumption per capita is among the highest in the world at 200kg[1].

In the north, paddy rice and upland rice are grown in similar proportions. Paddy farming in this region is performed in small scale at montane basins and riverbed plains, thus forming an ecological environment not adaptable to large-scale cash crop production nor infrastructure improvement including irrigation and drainage projects. Furthermore, limitations in

transportation and logistics resulting from topographic conditions are considered to be an inhibiting factor of rural development.

Meanwhile, flood plain based on psammite stretch out across Savannakhet Province and Champasak Province, forming the breadbasket for Lao PDR in the south. Double cropping is practiced through irrigation in this region (Table 1). In addition, the Bolaven Plateau of fertile basalt origin has taken advantage of its abundant rainfall to become the production center for cash crop such as coffee as well as vegetables and fruits. Please refer to the cross section of the surveyed area (Figures 1 and 2).

To compare the region from the viewpoint of scale of settlement, average size of settlements[2] is 312 persons/52 households in the north and 376 persons/66 households in the south. Number of members per household is 6.0 in the north and 5.7 in the south, suggesting that settlements are slightly larger and households are slightly smaller in the south than in the north. Significant difference in population density is observed as that of the north is 14.7 persons/km^2 as opposed to 27 persons/km^2 in the south.

For the reasons stated above, comparison of the survey in the southern region with the survey conducted last year in the northern region is expected to provide a more explicit picture of agriculture and rural life in Lao PDR.

2) Savannakhet

Savannakhet is a province located almost at the center of Lao PDR, a country stretched out in the north-south direction. It has an urban area on the bank of Mekong River that serves as the center of the province (Khantabuli, commonly known as Savannakhet) as well as Savannakhet Plains which extends over an area of 6,000km^2 and is the largest plain in Lao PDR.

The province has an area of 21,774km^2, a population of 694,200 and population density of 32 persons/km^2. It has the largest population in the country and, along with Champasak Province, is way ahead of other provinces in population density with the exception of Vientiane Municipality[3]

Savannakhet Plains is an old flood plain on sandstone substrata. It is surrounded by Mekong River, Bangfai River (Isthmus of Munya) and Se Banghieng River (Isthmus of Khemarat), and is located at an altitude of about 150m. It is hardly affected by river flooding and is the largest breadbasket in Lao PDR where irrigated paddies are more prevalent than any other part of the country with the exception of Vientiane Municipality.

The province has an annual rainfall of 1,445.8mm[4] which is a marginal amount for maintaining rain-fed paddies. There were 3 years between 1976 and 1996 when rainfall fell short of 1,200mm, which means that drought will inevitably occur once every 7 years if the

paddies depended solely on rainfall. Meanwhile, rainfall exceeded 1,600mm in 6 years during the same period, giving rise to surplus which was used to compensate for bad crop or shipped outside the province.

3) Champasak

Pakse, the provincial capital of Champasak Province, is located at the junction of Se Don River, which originates from Se Kong Province and flows through northern Bolaven Plateau, and Mekong River. The city, which was originally built during the French colonial age, has now developed to become the second largest city in Lao PDR. In addition to Pakse, the province has an old city of Champasak. Champasak Province has an area of 15,415km^2, a population of 518,000 and the second highest population density after Vientiane Municipality of 34 persons/km^2.

Champasak Plains is a region containing an area of 4,000km^2 in flood plains and stretches for 150km along Mekong River. It has the lowest altitude in the country of 100m. It touches Bolaven Plateau in the east and Danglek Mountains that rose from Korat Plateau in the west. The flow of Mekong River is narrowed as it skiffs between the rocks from the south of Isthmus of Khemarat onward. Then it is finally released near Mt. Kangheuang, about 20km north of Pakse, and flows into the plains. Its northeastern end spreads to the north of Bolaven Plateau along Se Don River and connects to the Saravan Plains.

Like Savannakhet Plains, its substrata are predominantly psammite. While soil is fertile in the south as a result of alluvia development, its degree of utilization is low because the area is sparsely populated.

Annual rainfall is relatively abundant at 2,055.5mm[5], even though average yield[6] is 2.47t/ha for the entire rice crop and 2.5t/ha for rainy season rain-fed paddy, both lower than national average.

Coffee is an important farm product. Pakson District, which borders Bolaven Plateau, is one of the largest coffee production centers in Lao PDR, the details of which will be described later in the report.

Sericulture once flourished in Champasak Province and ikat weaving from Saphai Village of Champasak District and Pathumphon District is still well-known today. Today, weaving is not directly linked with agriculture as Lao PDR imports almost all of her raw materials from Thailand and China. Therefore, domestic production of raw materials is desired from the viewpoint of promoting rural industry.

4) Bolaven Plateau

Bolaven Plateau is a tableland with an area of about 10,000km^2 that spreads out from Pakson District of Champasak Province to other provinces including Salavan, Se Kong and Attapeu. Its upper area has an altitude around 1,200m. It is a dead volcano having Mt. Thevada which has an altitude of 1,426m and is located 4km east of Pakson (altitude 1,260m), as its crater. The entire plateau is covered with soil from basaltic substrate.

Se Don River flows on the north side and Se Kong River flows on the south side. The western foothills extend to Champasak Plains while the eastern and southern edge are surrounded by Salavan Plain and Attapeu Plain, respectively.

Pakson has annual rainfall exceeding 3,000mm. Combined with fertile soil, coffee and tea have been planted extensively in Bolaven Plateau since the French colonial age. Pakson is the only domestic production center for tea in the country. As for Lao coffee, *robusta* was the main variety in the old days, although planting of *arabica* has been increasing recently to meet the export demand.

Three provinces–Champasak, Saravan and Se Kong–account for more than 95% of coffee production in Lao PDR. Laongam District in Saravan Province is also a famous coffee production center. A common sight at Bolaven Plateau during the dry season is picked cherry beans being dried in the sun for adjustment of dryness. They are small farms in general, however, and the quality of their product is often lowered during adjustment, storage and transport.

At the same time, cultivation of various temperate zone crops is actively pursued in Bolaven Plateau by taking advantage of the cool climate, meeting a good portion of domestic demand for starchy roots and cabbage. The point that must not be overlooked when reviewing the production statistic of starchy roots is the fact that, although the starchy roots production in Champasak and Saravan Provinces consists almost entirely of white potato, considerable amount of cassava is included in domestic production as A whole.

Other cash crops grown in this region include soybeans, groundnuts and cardamom. Cardamom, which is planted after upland rice in slash-and-burn, requires hardly any work between seeding/planting and harvest.

1.2 Agricultural Development in the Rice Farming Villages of Central and Southern Laos

1) Agriculture in Savannakhet Province and Champasak Province

Savannakhet Province is located in the central region of Lao PDR with flood plains of Mekong River and its tributaries accounting for a large portion of its area. Rice is grown in more than 90% of all arable land. It is said that there are 159,000 hectares of arable land suited

for rice crop in rainy season, although only about 55% of this land is currently cultivated. By planted area, rainy season paddy accounts for 91% of total area planted. Dry season rice only accounts for 3% of total area planted with rice crop to indicate an extremely low rate of irrigation. Production of crop other than rice is limited and is not so significant. A characteristic of this province aside from rice crop is the large number of livestock with the number of buffaloes and cattle in particular being the highest in the country.

Champasak Province is located in the southernmost part of Lao PDR and is comprised of flood plains and Bolaven Plateau divided by Mekong River. Rice is also an important crop here and takes up nearly 80% of planted area. Rainy season paddy in the lowlands accounts for 94% of this rice production. The percentage of irrigated area is less than 1%. Coffee production in the highlands is the second most important crop after lowland rainy season paddy. A large number of buffaloes and cattle are also raised here, making the region the second largest producer in the country after Savannakhet Province (see Table 2).

Thus agriculture in the surveyed regions is characterized by the very important position held by lowland paddy rice cropping and by buffaloes and cattle.

As can be inferred from the above base data, typical agriculture in the surveyed region is "*Thammasat* (natural) agriculture," which organically combines lowland rice crop relying on rainfall with stock farming and forestry, and is sound in the sense that it does not go against the dispensation of nature. Farm households utilize straws, which is a byproduct of paddy, weed growing at paddy boundaries and forest undergrowth as feed for water buffaloes and cattle that are used for farming work while applying cow dung and straws to their paddies as manure. Livestock are basically put out to grazing and are raised in a very extensive manner. In addition, large livestock such as water buffaloes and cattle also play an important role as security asset to avoid the risks of rice production, which is unstable because of the reliance on rainfall. Particular attention must be given to this aspect of natural farming, as will be discussed again later in this paper.

The characteristics of lowland rice cropping in the surveyed regions are examined in detail in Table 3. As mentioned earlier, the percentage of irrigated area is low in both provinces. For this reason, although the percentage of farmers using at least some improved varieties is quite high at 55.8% in Savannakhet and 35.7% in Champasak, the percentage of farmers using only improved varieties is low to indicate that many farmers still use local varieties that have high resistance to drought and flood. The percentage is only 2% in Champasak. Moreover, the use of chemical fertilizers is closely related to diffusion of improved varieties and therefore results in relatively high percentage of use. Meanwhile, the percentage of farm households using agri-chemicals is low in both provinces. This is presumed to be the result of pest damage being not so serious, which is a rule that applies generally to Lao

PDR. Thus modern input factors are being introduced to some extent but their effect is extremely limited due to delay in equipment of irrigation facilities, resulting in low yield level of less than 2 tons per hectare in both provinces.

Many development projects have been implemented for to improve productivity in lowland rice cropping of the surveyed regions. In Savannakhet, many irrigation projects, including the Lahanam District Irrigation Project (phase 1 construction completed in 1996) and the KM35 Irrigation Project (realized by grant from Japan; construction of dam, weir, main canal completed and handed over to Lao PDR in 1996), have either been planned or implemented. As for projects aiming to improve rice farming techniques, a project on supply of improved seeds is being planned at Thanosa Seed Production Farm by IRRI and the Lao Government. In Champasak, various pump irrigation projects are being planned and implemented through financial assistance from the central government. In addition, rice crop technical improvement project is already being implemented by IRRI at Fonngam Rice Crop Experiment Station.

1.3 Outline of the Surveyed Villages

Last year's survey was conducted on slash-and-burn with focus on population carrying capacity and environmental degradation. This year, the emphasis of the survey was placed on rice farming in the lowlands of the Mekong River basin which accounts for a large portion of rice production in Lao PDR.

1) Selection of surveyed villages

In this year's survey, the surveyed villages were selected for the purpose of centering the survey on rice farming in the lowlands of the Mekong River basin. As far as rice farming is concerned, Savannakhet Province is the largest producer in Lao PDR, followed by Champasak Province. Therefore, it will be necessary to study the situation in these two provinces when examining the situation of rice farming in Lao PDR. Fluctuations in somewhat self-sufficient mode of life in rural Lao PDR are largely affected by the availability of irrigated water which has become the bottleneck in paddy farming. The effect of irrigation goes beyond production and extends to selection of variety, input of agrichemicals and chemical fertilizers, actual farm work including farm rituals, as well as social organization and industrial structure of the farming village that lie behind such factors. In addition, it has become necessary to select "villages to which irrigation has been introduced" and "villages to which irrigation has not been introduced" in areas that have similar natural conditions to measure the effect of introducing irrigation. For this reason, a village utilizing irrigation and a village dependent on rainfall for rice farming were selected in Savannakhet Province for comparison.

Another purpose of the survey was to grasp the overall condition of Bolaven Plateau, which holds a very important position in commercial farm production of Lao PDR, and study the present situation of rural weaving industry which is considered to have the potential for marketability. Therefore, "formation of market economy" in rural areas and changes that have occurred in rural life during the process of formation were observed by taking a general view of hand weaving industry following last year's survey in Louang Phabang Province.

The surveyed areas in this study were selected from the viewpoint of meeting these requirements and conducting effective survey in a limited survey period. In particular, hearing survey using questionnaire was conducted at 3 villages in Savannakhet Province and Champasak Province. The general condition of these 3 villages will be outlined in the following.

2) Outline of surveyed villages

In this survey, hearing survey using questionnaire was conducted at 2 villages in Savannakhet Province and 1 village in Champasak Province. The 2 villages selected in Savannakhet Province consisted of "a village to which irrigation has already been introduced" and "a village to which irrigation has not been introduced" in a region where irrigation has been introduced to compare the effect of introducing irrigation. The surveyed area corresponds to KM35 Irrigation Project Area which is being carried out under the assistance from Japan. Two members of Japan Overseas Cooperation Volunteers, one specializing in agricultural economy and the other in crop cultivation, are permanently stationed in this region.

While we intended on picking a typical village on the flood plain for our study in Champasak Province, a village on the Se Don River basin on the outskirts of Pakse, the provincial capital of Champasak Province, was ultimately selected as we sought a supplementary effect by combining it with a study on rural industries.

3) Overall condition of surveyed villages

a. Surveyed region in Savannakhet Province

As mentioned earlier, the surveyed region in Savannakhet Province is located in side the KM35 Project Area. This project is a rural development project centered around irrigation facilities that has been put forward using free financial aid from the Japanese Government. Starting with the preliminary study in August 1990, E/N was signed in December 1993 and the construction started in 1994. In February 1996, the results of this 2.325 billion yen project were handed over to Lao PDR. The main contents of the project included construction of agricultural irrigation dams, agricultural irrigation weirs, canals and farmer support centers as well as improvement of related rural roads and installation of rural service water (wells).

Irrigated area amounted to 1,350ha, benefiting 2,496 households in 23 villages. The main objectives of the project included stabilization and increased production of rice through irrigation, creation of major production centers for cash crops such as groundnuts and maize and diffusion of cultivation. The region can be divided into Houei Bak District, which is the subject area for dam irrigation, and Houei Xay District, which is the subject area for weir irrigation.

The villages included in this survey were Village Dong Khan Khou (DKK) and Village Allan Vatthana (AV) in Houei Bak District. While irrigated water has started coming into Village DKK since last year, irrigation has not yet been introduced to Village AV. The details of respective survey results have been analyzed separately. In addition, the result of interviews with village chiefs about the general information of their village has been attached (Table 4).

Village DKK has an area of 378ha and population of 1,041 while Village AV has an area of 217ha and population of 857. Arable land is 277.91ha in Village DKK and 211.55ha in Village AV, indicating that almost all village land except for residential area is used for cultivation,

One common characteristic of both villages is that they are *Lao Lum* (Lowland Lao) villages located in *Lao Thung* (Hillside Lao) region. Although several *Lao Thung* families live in these villages as a result of marriage, they can be considered as *Lao Lum* villages as a rule.

b. Surveyed region in Champasak Province

Village Ngua Deang (ND), the village selected in Champasak Province, is a village located in the Se Don River basin, 5 to 6 kilometers northeast of Pakse, the provincial capital of Champasak Province. The village has an area of 1,750ha spread out on both banks of the Se Don River, 339.44ha of paddy area and a population of 1,180. It is a village devoted to education and the home of present governor of Champasak Province. The village is a typical *Lao Lum* village and has a history that goes back by some 800 years. In contrast to the villages of the Hillside Lao and Highland Lao ethnic groups we studied last year that were almost all new because of their slash-and-burn practice, this village is a typical permanent settlement. Therefore, the temple in the village was a magnificent permanent structure.

c. Comparison of surveyed areas

While the detailed analysis will follow, the greatest difference between Village DKK/AV in Savannakhet Province and Village ND in Champasak Province seems to lie in the existence of hinterland in the village premises. In Lao PDR, hinterland with no specific purpose has great significance for agriculture and livelihood. Among the words that were frequently heard during the survey was *Thammasat*. The word intrinsically means "in accordance with Dharma"

but is generally used in the sense of "not doing anything in particular" or "letting nature take its course."

Not doing anything in particular in the area of population and public health is referred to as "*Thammasat*. Most mountain villages in last year's survey did not have toilets. An extremely natural process in which people went into forest to empty their vowels and followed by swine that clean up after them exists. This method is indeed *Thammasat* provided that there is no infectious disease and plenty of hinterland (land that can actually be used such as forest, even if it is not owned by the village) is available. However, this method will not be reasonable if there is no sufficient hinterland. Moreover, the people of Lao PDR are not accustomed to systems other than *Thammasat* and cannot maintain the style of life they have lead so far without this hinterland.

Hinterland was very limited in the two villages of Savannakhet Province and the villagers were unable to increase their large livestock owing to shortage of grass. If there is plenty of hinterland, people can simply graze their animals there and not worry about their feed. However, the people of Village AV in particular were not able to increase the number of buffaloes for cultivation despite their wish due to shortage of grass. As a result, they were compelled to introduce tractors which do not eat grass but require cash spending.

This suggests that there is a serious problem about looking at low population density from the viewpoint of agriculture in developed countries. In other words, the fact that agriculture in Lao PDR depends considerably on the abundance of hinterland which is currently not included as expenditure must be taken into consideration.

As for the 2 villages in Savannakhet Province, dry season crop has become possible, and a situation in which considerable portion of dry season harvest can be used to earn cash has been created in Village DKK, while people are compelled to go work Away from home during the dry season to make up for shortage of food.

The difference is significant and the people in Village AV are anxious for introduction of irrigation at their village. However, the policy of theKM35 Project is to build only the main canal and leave the construction of terminal canals to the self-help effort of the farmers. As a result, secondary and tertiary canals are not fully functioning in reality and whether the main canal can be maintained properly to demonstrate its full effect depends considerably on how the irrigation facilities will be managed.

d. Irrigation in surveyed villages

i) Village DKK

Although Village DKK is irrigated, there is a delay in construction of terminal canals and much of water is provided by flowing through other paddies, as described in detail in the

following chapter "Field Survey Report II –Irrigation and Rural Community." The situation is attributable to the fact that irrigation facility has just been built and gives rise to the importance of future terminal canal construction. The effect of irrigation therefore has not necessarily manifested in full.

ii) Village ND

Since irrigation is performed by pumping water from Se Don River which flows through the center of the village, main canal will not be built and the pump is connected directly to terminal canals. This will solve the maintenance issue of the main canal and, unlike in the case of the KM35 Project, will clarify the responsibilities of beneficiaries to enable management of irrigation facilities by small-scale water users' associations. It is verily the pump irrigation seen in this village that the Lao Government is trying to place at the axis of irrigation facility construction. According to the results of field study, however, this village had very low yield this year after being hit with both flood and drought. Moreover, there were many cases where the seeds that were sown did not lead to harvest because the period of sowing was not well understood. Therefore, sufficient guidance on dry season crop must be offered for this irrigation to fully demonstrate its effect.

The comparison of these 2 villages has made it clear that the availability of irrigation has led the people of respective villages to take different measures in terms of non-agricultural employment and measures against drought and flood. This is a very helpful fact in moving the irrigation policy forward.

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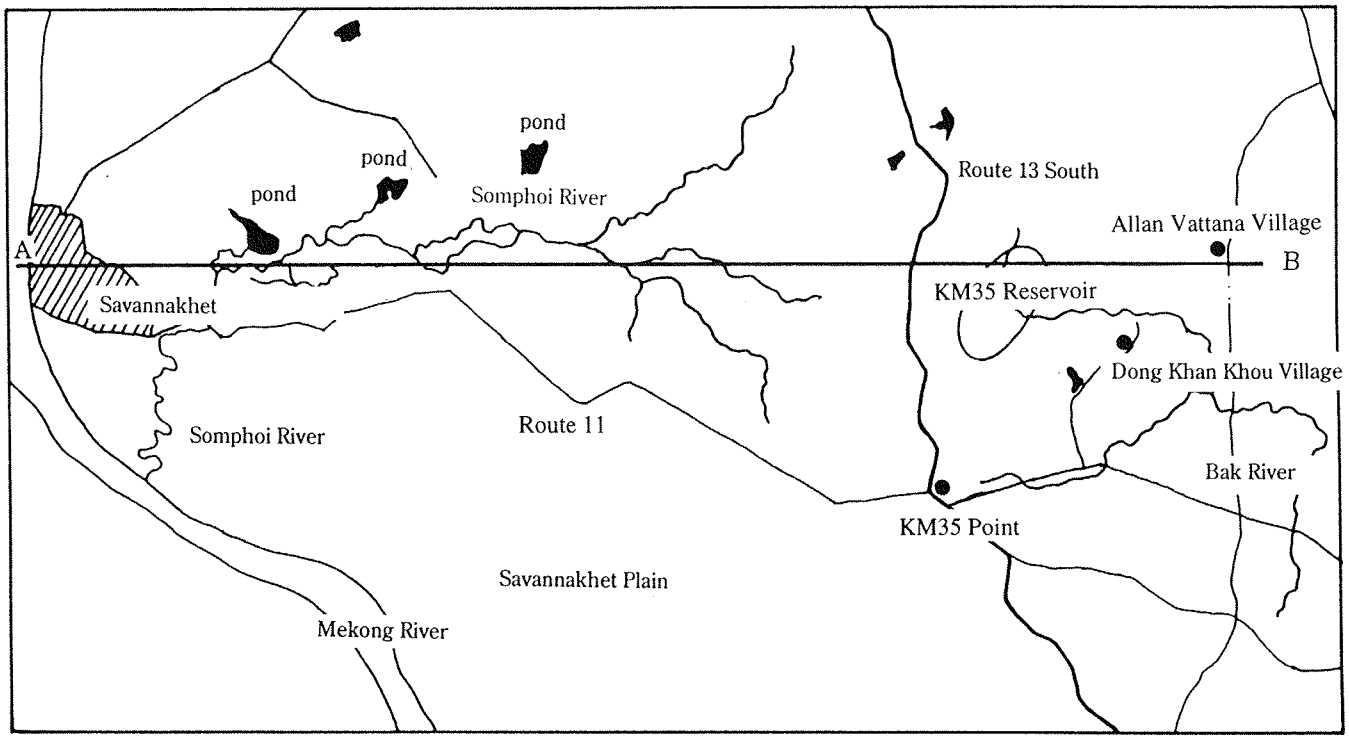
[1] YAMAGUCHI, Junichi. 1997. Inasaku [Rice Cultivation] TANAKA, A. *et al. Nettai-nogyo Gairon* [Introduction of Tropical Agriculture]. Tokyo: Tsukiji Shokan. According to raw data of FAO.
[2] Estimated by author, according to the 2nd census conducted on March 1, 1995
[3] State Planning Committee, NSC, *op. cit.*
[4] Estimated by author, according to *op. cit.*
[5] Estimated by author, according to *op. cit.*
[6] *op. cit.*

Fig. 1 Cross-Section of Mekong River-Savannakhet-KM35 Project Site



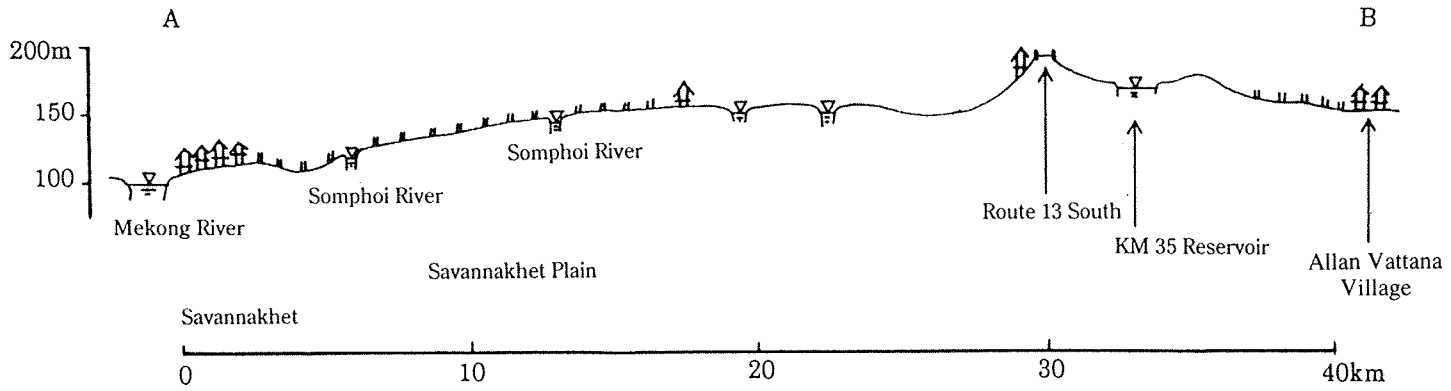


Fig. 2 Cross-Section of Mekong River-Bolaven Platean-Sekong River

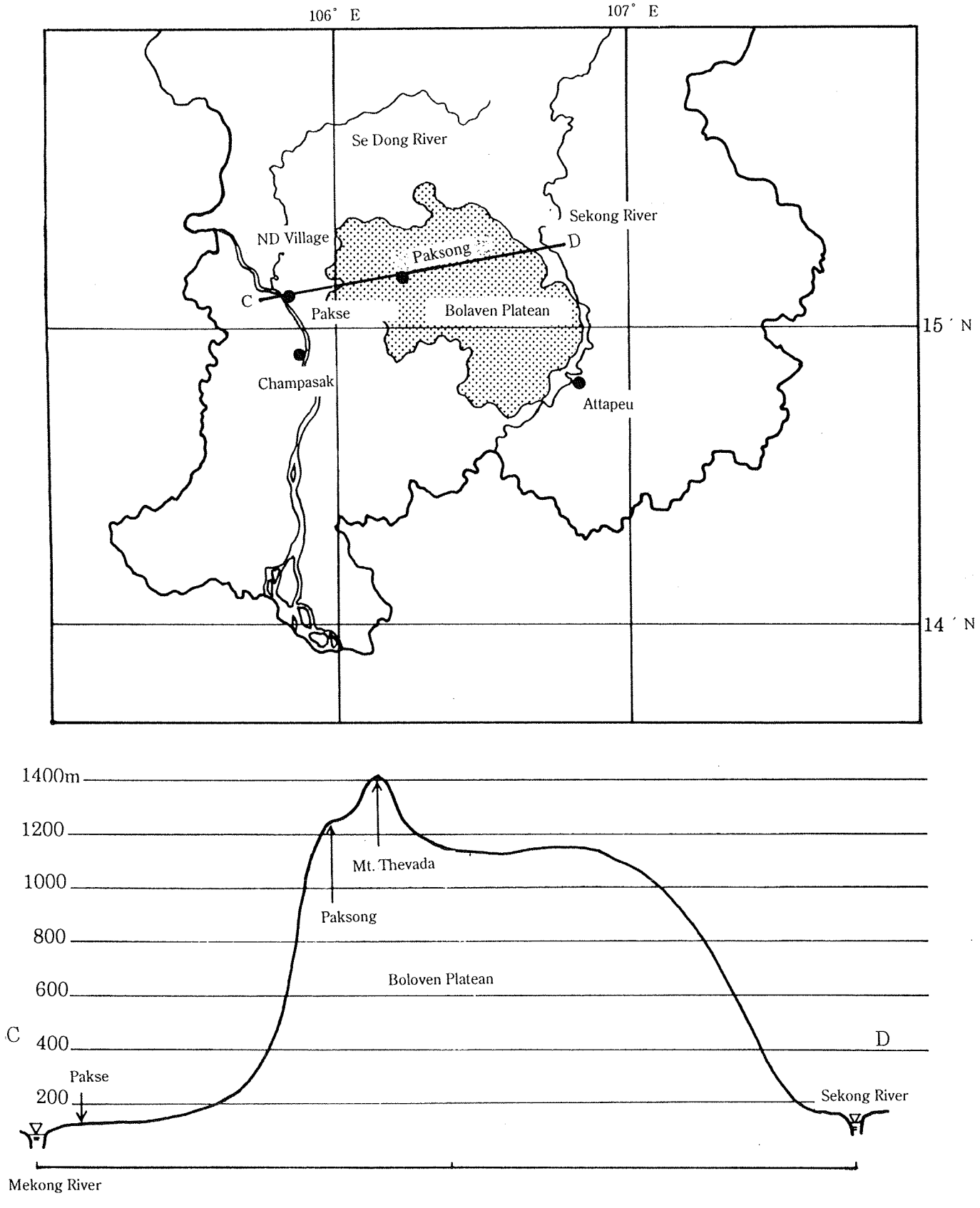


Table1: Situation of Farm Products (1996)

	Whole Country		Savannakhet		Champasak		Saravan	
	Harvested Area (ha)	Production	Harvested Area (ha)	Production	Harvested Area (ha)	Production	Harvested Area (ha)	Production
Total Rice	553,741	1,413,500	73,654	214,048	63,040	155,696	42,092	113,285
Paddy (Rainy Season)	363,133	1,076,000	65,802	197,406	59,836	149,676	34,186	100,165
Irrigated Paddy	17,962	71,500	2,460	8,800	560	2,090	290	935
Upland Rice	172,646	266,000	5,393	7,842	2,644	3,930	7,616	12,185
Maize	37,380	76,584	1,730	2,078	1,320	1,216	810	1,600
Starchy Roots	14,590	92,499	710	4,621	120	1,000	1,320	10,560
Vegetables	14,615	88,853	1,890	14,087	350	2,200	2,540	16,500
Mung Beans	1,680	1,680	30	17	360	360	--	--
Soy Beans	3,575	3,245	40	22	460	432	365	365
Groundnuts	9,405	11,875	530	426	650	650	2,300	3,360
Tobacco	7,220	7,220	540	1,894	680	2,100	510	2,290
Cotton	9,145	6,760	690	415	70	39	720	449
Sugar Cane	3,395	87,058	20	600	130	1,700	80	1,710
Coffee	23,145	10,020	--	--	14,150	7,075	7,400	2,240
Tea	395	101	--	--	360	94	--	--

Source : prepared from State Planning Committee 1997 Data.

Table 2 Production of Main Agricultural Products in the Surveyed Area (1996)

Region	Savannakhet Province		Champasak Province	
	Harvested area (,000ha)	Production volume (,000tons)	Harvested area (,000ha)	Production volume (,000tons)
Rice (hulled)	73,654	214,048	63,040	155,696
Rainy season paddy	65,802	197,406	59,836	149,676
Dry season paddy	2,460	8,800	560	2,090
Upland rice	5,392	7,842	2,644	3,930
Maize	1,730	2,078	1,320	1,216
Root crops	710	4,621	120	1,000
Mungbeans	30	17	360	143
Soybeans	40	22	460	432
Groundnuts	530	426	650	423
Tobacco	540	1,894	680	2,100
Cotton	690	415	70	39
Sugar cane	20	600	130	1,700
Coffee	-	-	14,150	7,075
Tea	-	-	360	94
Vegetables	1,890	14,087	350	2,200
Number of animals raised (,000)				
Buffaloes	24,050		14,050	
Cattle	30,460		15,000	
Swine	15,850		13,100	
Goats and sheep	2,100		120	
Poultry	82,400		210,000	

Source: Ministry of Agriculture and Forestry, Agricultural Statistics of Lao PDR 1996, Cabinet Office of MAF, Vientiane, June 1997

Table 3 Current Situation of Lowland Rice Farming in the Surveyed Area (1995)

	Savannakhet	Champasak
Number of lowland rice farmers (,000)	69.5	47.4
Planted area (,000ha)	92.0	84.2
Yield (t/ha)	1.64	1.84
Percentage of farmers using improved seeds (%)	55.8	35.7
Percentage of farmers using only improved seeds (%)	27.1	2.0
Seeding rate (kg/ha)	49	52
Percentage of farm households using pesticides (%)	6.8	3.6
Percentage of farm households using chemical fertilizers (%)		
Volume used (kg/ha)	54.9	33.7
	87.7	54.3

Source: FAO, Rice Crop Survey 1995 Analysis of Results, Ministry of Agriculture and Forestry, Cabinet Office, Division of Statistics, Planning and Finance, Vientiane, 1996

Table 4 The Result of Hearing Survey from Village Chiefs (1997 Survey)

1. Status of Land Use

	Dong Khan Khou Village (Savannakhet)	Allan Vatthana Village (Savannakhet)	Ngua Deang Village (Champasak)
Village area (ha)	378ha	217ha	1750ha
Village population	1041	857	1180
Arable land area	277.91ha	211.55ha	NA
Cultivated area (paddy)	277.91ha	211.55ha	329.44ha (rainy season) 200.00ha (dry season)
Forest land	100.09ha (including residential area)	NA	1338.54ha (including rivers and ponds) 7.98ha (planted teak) 29.97ha (banana and other fruit trees, vegetables, maize)
Fish farm		6ha (15 locations)	
Protection forest	0ha	NA	25.0ha 2.0ha (sacred land)
Slash-and-burn area	6ha	0ha	NA
Residential area and other areas	Included in forest area	5.45ha (including roads)	9.58ha 5.0ha (cemetery) 0.75ha (temple) 1.49ha (village property)
Remarks	There is a rock salt layer not too far from the ground surface that may give rise to salinization in the event irrigation is introduced.	Wants to increase the number of buffaloes for cultivation but cannot because there is not enough grass for feed. Wants to introduce tractors instead.	Pump irrigation was introduced this year. Pumps are made in India. Yield from dry season crop was low as the seeds were planted at the wrong time.

Table 4 The Result of Hearing Survey from Village Chiefs (1997 Survey)

2. Ownership of Livestock and Poultry

As of March 1997	Dong Khan Khou Village (Savannakhet)	Allan Vatthana Village (Savannakhet)	Ngua Deang Village (Champasak)
Livestock			
Buffalo	175	104	230
Cattle	419	156	176
Swine	173	96	49
Poultry	4927	250 (poultry total)	3450 (poultry total)
Ducks, Moscovy duck	665		
Rice yield			
Rainy season crop	2.5t/ha	2.5t/ha	2.5t/ha
Dry season crop	2.5t/ha	Nil	4.0-4.5t/ha

Table 4 The Result of Hearing Survey from Village Chiefs (1997 Survey)

3. Others

	Dong Khan Khou Village (Savannakhet)	Allan Vatthana Village (Savannakhet)	Ngua Deang Village (Champasak)
Drinking water	Well water (hand-push well). Drunk as it is.	Rain water during the rainy season. Brought from a spring 2km Away during the dry season. There is also a well in the village but is not used for drinking because it is tasteless.	Rainy season: well water (hand-push well), well water for irrigation Dry season: [Se Kong?] River, well water for irrigation
Whether water is boiled before drinking	Not boiled as a rule.	Not boiled as a rule. Boiled only at the beginning of rainy season before drinking.	Not boiled as a rule.
Rice bank	Existed in the past but died out due to poor repayment rate.	In existence.	Was started this year.
Existence of toilet	No	No	About 70 from Lao Red Cross project.
Non-agricultural income	Villagers were going to Savannakhet to work before irrigation was introduced. At present, they only go to help the next village during harvest for a wage of 1500kip/day..	Go to Vientiane to work during the dry season from December to May. Other destinations include Savannakhet and Thailand.	Villagers go help the next village during harvest. Farmers who do not own their rice paddy (25 households) stay overnight to work. Their normal work is to help farm work in the village.
Remarks			The goal has been set to graduate from upper secondary school because it has become a requirement for career in military or police.

2. Analysis of Field Study

2.1 Population of the Surveyed Villages

1) Outline of population in the surveyed villages

Surveys on the population of surveyed villages, educational standard, family planning and hygienic condition based on the surveys were conducted in 1996 and 1997. The results of this survey are attached to this report. The surveyed villages are located in the slash-and-burn farming area in the montane area of Louang Phabang Province (Village PT and Village LL) and in the basins of the Mekong River where paddy farming is the dominant form of agriculture. In particular, the two villages in Savannakhet Province, a province in central Laos, are located more than 35km from Savannakhet City, making them remote villages located in the plain and hill area. A new irrigation system has been introduced to one of the two villages (Village DKK) while irrigation system has not been introduced to the other village (Village AV) even though it has a similar natural environment. Meanwhile, Village ND is a traditional paddy farm village in Champasak Province located in southern Laos. These five villages have quite different characteristics considering the situation of agriculture and rural areas in Lao PDR. Although the number of samples is limited, the selection of these villages is considered effective in determining the overall condition of Lao PDR.

2) Characteristics of the surveyed villages

To look at the characteristics of the surveyed villages, Village PT and Village LL in the slash-and-burn farming region have higher percentage of people in age groups that are forming new households (between ages 30 through 49) and lower percentage of people between ages 20 through 29 compared to other villages in the survey. This is because they are settlements formed in accordance with the policy of the Lao Government (Table 5).

Villages DKK, AV and ND where no migration has taken place have high percentage of population between ages 0 through 9, signifying that population is increasing at high rate in these villages.

No significant difference exists with regard to number of births, survivals and deaths. Therefore, the increase of population in the slash-and-burn region indicates the reality in which the people are forced to move to other areas (mainly cities) because of the limited population carrying capacity of the region that they are living in. In other words, the same problem could arise in Villages DKK, AV and ND of the lowlands in the future. Needless to say, the unique circumstances of Villages PT and LL being settlement villages must be taken into consideration. For instance, their living environment is more difficult compared to other

villages in many ways. As for the surveyed villages, the advantage of having good access to information because of their proximity to trunk roads is not necessarily enjoyed by all villages in the northern region. However, it suggests the possibility of population migrating from rural areas to cities in the event the carrying capacity of villages in the lowlands along the Mekong River basin reaches its limit and making a transition from being a food producing population to food consuming population.

3) Family planning and ideal number of children

The ideal number of children obtained from this survey was 4.2, a value twice as high as the replacement level. However, average number of births exceeded the ideal number of children at 6.9 (Table 4-5). Therefore, it would be possible to restrain births to the level of ideal number of children once a proper means of family planning is provided. With regard to the diffusion of family planning, guidance is being offered in Louang Phabang Province by the Lao Women's Union (LWU) in conjunction with the provincial and district hospitals. The main methods used in this context include pills distributed through LWU, injections offered by provincial and district hospitals and basal body temperature.

However, diffusion of these methods is not necessarily sufficient. These two villages are settlements inhabited by people that have migrated here from the mountains according to the policy of the government and form a mixture of various ethnic groups. Among them, the *Lao Sung* of the highlands has been isolated from the modern social system of Lao PDR to the extent that some of them did not even know the existence of elementary schools. Although information about family planning has not been properly conveyed to these people, there is possibility of future diffusion as no apparent obstacle exists among them in accepting family planning.

In Villages DKK, AV and ND of the lowlands, the *Thammasat* method, which is synonymous to not taking any measures, was most popular. This method has not been recognized as one of the family planning methods. Other popular methods included pills and injections, although the majority of the pills were of the type made in China and not certified in Lao PDR. One tablet of this pill is said to be sufficient to remain effective for a month and an injection will allegedly maintain its effectiveness for about three months. However, there were many cases where the injection was discontinued at district hospitals due to side effects. Although it is not clear whether the problem is attributable to the side effect of the drug or to some kind of infection, it is important to equip the district hospitals with autoclave.

In Villages DKK, AV and ND of the lowlands, some people responded to the questionnaire by saying that they could not understand the explanation they were given at district hospitals and provincial health departments.

4) Hygiene, water and toilet

A question about the existence of toilet revealed that it is not customary in the rural areas of Lao PDR to build toilets. In this survey, houses equipped with toilets were rare and the only exceptions were the toilets that were being built at Village ND through assistance from the Lao Red Cross. Most people go to forest to relieve themselves, followed by swine that clean up after them. This is indeed a method compatible with nature (*Thammasat*) that incorporates people into the food chain, provided that there is no infectious disease and plenty of hinterland is available for natural purification. However, hygienic problems occur when population density increases along with the amount of excretion.

As for drinking water, river water, water from wells and rainfall is drunk as it is except in the northern region where it is boiled in for water quality reasons and at the beginning of the rainy season (Table 15). Considering the manner in which excreta is treated, these customs may expand the damage in the event an infectious disease breaks out and raise the infant mortality rate. The method of obtaining drinking water that did not cause any problems under low population density will suddenly trigger hygienic problems once the amount of excretion exceeds the natural treatment capacity.

A serious problem also exists with regard to installation of toilets in Village ND (Table 14). These toilets employ the ground permeation method and night soil is basically not collected. The response to one of the questions in the survey about the measures taken when the toilet becomes full was that toilets are shut down and abandoned when they become full after two to three years of use. These toilets are installed in various parts of the village and many of them are located not too far from the wells that are used for drinking water. Moreover, the entire village is frequently submerged during the rainy season which means that there is a good possibility of night soil flowing out of the toilets. Village ND has a population of 1,180 and the population density in the residential area of the village is as high as 1,242 persons per square kilometer. Hygiene-related environment may deteriorate with the future population increase and require rapid increase in public investment for improving the infrastructure of this village.

Table 5 Population Structure of Surveyed Households

Name of Village	PT '96	LL '96	DKK '97	AV '97	ND '97	Total
Village Population	350	244	1041	857	1180	
Surveyed Households	18	15	12	17	11	73
Age						
0-9	32	39	40	36	29	176
10-19	26	37	22	32	24	141
20-29	6	3	16	14	24	63
30-39	12	15	13	13	10	63
40-49	13	11	9	9	6	48
50-59	9	3	5	6	5	28
60 over	2	0	0	1	3	6
No. of Lineage	100	108	105	111	101	525
No. of Co-habitants	112	113	115	121	85	546
Average size of Household	6.2	7.5	9.3	7.1	7.7	7.5

Note: Total population by age includes the head of household, his wife, their children and grand children, and their parents. Therefore the number of total population by age is not equal to total number of co-habitants as total number of co-habitants includes not only family lineage but also co-habitants. Figures of PT Village and LL Village are results of our survey in 1996 in Louang Phabang Province; of DKK Village and AV Village in 1997 in Savannakhet Province; and of ND Village in 1997 in Champasak province. The numbers of samples are different from other tables stated below, because the above table contains the results of questionnaires on farm household survey.

Table 6 Rate of Population by Age(%)

Village	PT	LL	Sub-Total	DKK	AV	ND	Sub-Total	LAO PDR
Age								
0-9	32.0	36.1	34.1	38.1	32.4	28.7	33.1	30.9
10-19	26.0	34.3	30.3	21.0	28.8	23.7	24.6	23.1
20-29	6.0	2.8	4.3	15.2	12.6	23.7	17.0	15.5
30-39	12.0	13.8	13.0	12.3	11.7	9.9	11.4	12.0
40-49	13.0	10.1	11.5	8.6	8.1	5.9	7.6	7.4
50-59	9.0	2.8	5.8	4.8	5.4	5.0	5.0	5.3
60 over	2.0	0	1.0	0	0.9	3.0	1.3	5.7

Table 7 No. of Households by Ethnic Group

Village	PT 96	LL 96	DKK 97	AV 97	ND 97
No. Households	18	15	7	8	8
Lao-Sung	6	2	0	0	0
Lao-Thung	6	13	0	0	0
Lao-Lum	6	0	7	8	0
Total	18	15	7	8	8

Table 8 Inheritor of Property in Household

Village		PT'96	LL'96	DKK'97	AV'97	ND'97
First Son		2	7	0	0	1
First Daughter		1	1	0	0	0
Last Son		2	4	0	2	1
Last Daughter		1	1	0	2	3
Equal	Both	5	0	3	1	1
	By Male	1	0	0	0	1
	By Female	2	0	0	0	0
	Total	8	0	0	1	2
Other		2	2	1	1	0
No Idea		2	0	3	2	1
Total No. of Household		18	15	7	8	8

Note1: PT and LL

Population of Village PT consists almost equal to that of ethnic in proportion, and as a result, Village PT has a heterogeneous character. On the other hand, people of Village LL were moved from old Village LL and have a homogeneous character. A few families of the Village still belong to *Lao Sung* and the rest to *Lao Thung*; and these two villages were established 15 years ago.

Village DKK, AV and ND

Village DKK and AV are located in Km 35 Project Area. Village DKK is located in the living area of *Lao Thung*, although the people are mostly *Lao Lum*. Village ND people are *Lao Lum*.

Table 9 Average No. of Ideal Children

Village	PT'96		LL'96		DKK'97		AV'97		ND'97	
By Sex	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl
Average No. of Ideal Children	1.9	1.9	2.6	2.3	2.3	1.8	2.4	2.0	2.0	2.0

Table 10 Average No. of Children (No. of Births, Survivors, and Deaths) by Household

Village	PT'96	LL'96	DKK'97	AV'97	ND'97
No. of births	6.1	7.5	6.4	7.5	6.9
No. of survivors	4.7	5.7	5.3	5.5	5.5
No. of deaths	1.4	1.7	1.1	2	1.4

Table 11 Attitude of Family Planning

Village	PT'96	LL'96	DKK'97	AV'97	ND'97
No. of Answers (b)	13	12	7	7	8
Practicing (a)	4	7	3	2	2
Not practicing	10	5	4	5	6
But has intention for practicing	5	0	2	3	2
Practicing Rate	30.7%	58.3%	42.8%	28.5%	25.0%

Note: This table does not include answer from old people because they were too old to practice family planning

Practicing rate is calculated by (a)／(b)x100

Table 12 Methods of Family Planning

Village	PT'96	LL'96	DKK'97	AV'97	ND'97
Modern Method	8	7	5	5	2
Pill	7	5(1)	1(1)	1(1)	1(1)
Injection	0	1	4	3	1
Rhythm	1	1	0	1	0
Traditional Method	1	0	0	1	1
No Idea	0	0	0	2	1

Note: Figures in parentheses refer to cases using Chinese pill.

Table 13 Average Duration of Breastfeeding

Village	PT'96	LL'96	DKK'97	AV'97	ND'97
Month	15.3	15.3	16.5	22.3	24.0

Table 14 Sanitation

Village	PT'96	LL'96	DKK'97	AV'97	ND'97
Furnished	2	0	0	0	6
Not Furnished	16	15	7	8	2
No. of household	18	15	7	8	8

Note: Lao Red Cross has introduced toilet construction project to Village ND.

Table 15 Source of Drinking Water

Village	PT'96	LL'96	DKK'97	AV'97	ND'97
River	18	15	0	0	6
Well	0	0	7	1	3
Rain Water	0	0	0	5	3
Others	0	0	0	1	0

Note: Since some people use river and rain water seasonally, total number is bigger than that of surveyed households.

2.2 Agriculture and Rural Economy in Lowland Paddy Villages of Savannakhet Province and Champasak Province

1) Summary of farm economy in surveyed farm households (Table 16)

Village DKK is included in the KM35 Project Area where the construction of secondary and canals is incomplete. However, some farm households have been using the irrigation facility since fiscal 1996 by drawing water directly from primary canal into their field. Village AV is also included in the KM35 Project Area but is unable to build any irrigation facilities. Village ND is scheduled to have access to irrigation facilities (pumps) starting this fiscal year

through a project implemented by Champasak Province and only a limited number of farm households are engaged in dry season crop on a trial basis.

The scale of farmland ownership is about 2ha in all three villages. Paddy crops and other crops are planted only in small quantities mostly for home use. The area of dry season crop is about half of rainy season crop in Village DKK, zero in Village AV and about 10% of rainy season crop in Village ND. Rice yield in Village DKK is higher than the provincial average by reflecting the high percentage of irrigated are a while that of Village AV is equal to the provincial average and that of Village ND is extremely low due to crop failure (Table 16). The amount of agricultural asset ownership excluding farmland is highest in Village ND.

The level of farm income in Village DKK is more than twice as high compared to that in Village AV by reflecting the existence of irrigation. In Village ND, average income was higher than Village AV because non-agricultural income was higher and some villagers sold their livestock in response to crop failure.

Rice production per farm household is sufficient for home consumption in both Village DKK and Village AV. In Village AV, however, there were households that could not grow enough rice for themselves due to crop failure. On the other hand, an average farm household in Village ND should have been able to meet its own demand on a year of normal harvest.

2) Land holding, labor utilization and livestock breeding

Land tenancy is still uncommon in all three villages. This fact suggests that the rural structure is characteristic of owner farmer (Table 17). As for the occupations of farm household members, the number of those mainly engaged in farming is overwhelmingly high. Important occupational categories aside from farming include public servants (such as teachers and provincial government workers) and cottage industry (bamboo basket making in Village DKK and Village AV, weaving in Village ND). Other occupations that exist in very limited numbers include mechanics, drivers, daily wage laborers, small shop owners (in the village), store clerks and office workers (Table 18).

Large number of livestock, especially buffaloes and yellow cows, are raised in three villages. In Village DKK, yellow cows, white buffaloes in Village ND. Relatively small number of cows and buffaloes in Village AV is attributable to limited availability of grassland. This fact has also had an effect on the rice farming and irrigation investment (Table 19).

3) Prices of agricultural products and inputs

Table 20 shows the farm gate prices of the main products (rice and livestock). Wages, land rent, agricultural machinery, rent for draft animals and prices of chemical fertilizers and agricultural chemicals are as shown in Table 21.

4) Rice farming

Given the price systems mentioned above, rice farming in the study villages are practices as follows..

a. Farm work

Rice nursery: In the case of rain-fed paddies, rice nurseries are built in a section of the field with the arrival of rainfall. Plowing is performed by buffalo, and scarifier is used for harrow and level after molding. The work is mainly performed by the owner of the paddy and is completed in half day to a day. Seeding is done by broadcasting on the same day or next day.

Primary transplantation is performed from dry nursery to wet nursery in the north such as Louang Phabang but is not seen in the south. In northern Laos, there is a verb "*sam*" meaning "to perform primary transplantation." The fact that this verb is not understood in southern Laos is an indication that transplantation has traditionally been performed only once from wet nursery to the main paddy.

Seeding: Seeding is performed from the end of May to beginning of June in the main planting season, i.e. rainy season crop. Seeding schedule is determined by rainfall because plow cannot be used until the field's soil becomes soft by absorbing moisture from the rain when using buffalo plow on rain-fed paddy. For this reason, it is not possible to prepare the rice nursery and sow the seeds when the arrival of rainy season is delayed. Seed rice is soaked in water for 2 days and then left for 2 nights to hasten germination.

While the growing period of local breeds is secured regardless of when the rainy season starts through the use of planter dry nursery in the north, such technique is not seen in the south. Seeding in wet nursery is limited to broadcasting.

Tilling of the main paddy and transplantation: Once the seeding on the nursery is completed, the main paddy is tilled. Buffalo plow is mainly used as in nursery, although 2 persons use plow to till the soil followed by a person scarifying the soil. When tilling of the entire main paddy is completed after about 15 days, transplantation is performed along with harrow and leveling.

In Louang Phabang Province, the work including harrowing, leveling, and transplantation is performed intensively through work-sharing among neighbors. In the surveyed areas, however, the work was performed over a long period (30 days) using only family labor. For this reason, seedlings are transplanted after 15 days instead of 45 days to 60 in the north.

Fertilization: Organic fertilizers such as manure are hardly used in rainy season crop, not to mention chemical fertilizers. On the other hand, about 400kg/ha of chemical fertilizers are mixed in at the same time as tilling of the main paddy because improved varieties having high

resistance to fertilizers are planted. Purchase of fertilizers is depended on loans from the Agriculture Promotion Bank in many cases.

Agrichemicals used in addition to chemical fertilizers include insecticides, the purchase of which is also made through loans even though they are not as prevalent as fertilizers. Application of herbicides is extremely rare as weeds are picked out by hand after the transplantation to the main paddy is completed in many cases. Weeding is performed only once.

Harvesting: Rice is harvested by using sickle to cut the plant at its stubble. The work is performed only by family labor for rainy season crop over a period of 30 days.

The rice harvested in the morning is dried until midday of the following day, then bundled and piled up to the height of one's thighs. After a certain area is harvested, a plastic cover is spread out on a section of the field after it is leveled to build a threshing ground. Traditionally, threshing was performed after applying buffalo dung and waiting for it to become hard and dry.

Threshing is performed by twining the rice bundle between 2 sticks that are tied by rope and hitting it against the ground or a stand made of *Pterocarpus macrocarpus* or other hardwood material. Threshed rice is carried to the storehouse in the premises and stored there.

The work is supplemented by hired labor for dry season crop when family labor is not sufficient as delay in harvesting and storage may result in the harvest being exposed to rain. However, it is rarely done in the north.

Field crop: Before dry season became possible through irrigation, some fields were used to plant field crops and as salt farm during the dry season. The crops were used for home consumption and also served as an important source of cash income. Once dry season rice crop spread through irrigation, it has replaced these crops and a tendency to plant paddy rice consecutively has become conspicuous.

After crop from paddy is decreasing as people in areas that do not grow rice during the dry season find temporary employment in cities during the slack season, and the vegetables for home consumption are grown at paddy borders and on stream banks in small scale.

b. Variety

In Village DKK, the majority of farm households had been using local varieties until fiscal 1995. In fiscal 1996, the number of households using local varieties was reduced by about half, and local varieties were mainly used for rainy season crop. Improved varieties such as *Ta Dok Kham* and Ubon 505 were used for dry season crop, and 2 or more varieties with different growing season were mixed to avoid risk in rainy season. Since 1997 crop year, the

use of *Ta Dok Kham* and Ubon 505 was started almost exclusively for both dry and rainy seasons.

In the case of Village AV, the use of varieties was almost the same as that in Village DKK for fiscal 1995 and 1996. However, it used more RD variety as improved varieties than Village DKK. In 1997 crop year, 10 out of 13 households switched entirely to improved varieties.

In Village ND, introduction of improved varieties started slightly earlier than Villages DKK and AV. The considerable number of households already have introduced improved varieties prior to 1995. The situation in fiscal 1996 was about the same as that in Villages A and B. Improved varieties used here include RD variety, *Ta Dok Kham* and Ubon 505. In fiscal 1997, half of the farm households used local varieties by mixing with improved varieties.

c. Mechanization

Some farm households have started to use cultivators at the same time as the introduction of dry season rice in 1996 crop year. Farm households that are only engaged in rainy season rice crop often rely on buffaloes. Threshing machines (using the cultivator motor) are used by half of the households.

In contrast, few farm households are using cultivators in Village AV. Threshing is done by hand.

Cultivators are not used in Village ND and buffaloes are used instead. Manual threshers brought in from Japan before the revolution, are used by half of the households.

d. Input of seeds, fertilizers and agri-chemicals (Table 22)

The amount of seed application in Village DKK is about same as the provincial average in rainy season and is higher than average in dry season. It is less than the provincial average in Village AV and same as the provincial average in Village ND (refer to Table 3).

As for input of fertilizers, all farm households in Village DKK are using chemical fertilizers in quantities exceeding the provincial average. This trend is particularly strong in dry season. All farm households in Village AV also use chemical fertilizers. The amount of fertilizer application is about the same as the provincial average and is less than that in Village DKK. Half of the households are using barnyard manure. Some households purchase their barnyard manure. In Village ND, nearly half of the farm households do not use any chemical fertilizers and apply only compost and manure or no fertilizer at all. The amount of fertilizer application is below provincial average. Sixty percent of farm households in Village DKK use agri-chemicals. On the other hand, no chemicals are used in Village AV and hardly any is used in Village ND.

e. Profitability of rice crop (Table 23)

The case of Village ND is not comparable with the others because of poor crop due to bad weather. To compare Village DKK and Village AV, gross revenue per unit are a was about 60% higher for Village DKK while operating cost was about 12% higher for Village AV owing to increase in the cost of chemical fertilizers, agri-chemicals and hired labor that were incurred as a result of introduction of dry season crop. Net profit, which is obtained by subtracting operating cost from gross income, was almost 90% higher for Village DKK. One of the reasons for operating cost not increasing as high as gross revenue, as can be inferred from the fact that fixed asset expenses in Village DKK was lower than that in Village AV, lies in the success in reducing the competition over fixed asset use accompanying dry season crop through mechanization. Moreover, a comparison in terms of profit obtained by subtracting production cost, which adds imputed values of family labor and owned land to the operating cost, from gross profit shows that the figure for Village DKK exceeds that of Village AV by more than 150,000 kip per hectare despite higher input of family labor in Village DKK compared to Village AV. This fact shows that the increase in family labor input through introduction of dry season crop is fully compensated by the increase in gross revenue and by the savings in fixed asset expenses through mechanization. Village ND would have had a much higher profitability than Village AV had its yield been at the level of average year (1.5t/ha for local varieties and 2.5t/ha for improved varieties).

As can be inferred from the comparison between Village DKK and Village AV, introduction of improved varieties of rice in dry season has contributed to high productivity and profitability of rice. If we compare the productivity in dry season and rainy season, this point can be shown clearly. Even though the amount of modern input application is higher for dry season crop as shown in Table 22, production cost is low because the yield is high enough to compensate for the large amount of input (Table 24). This indicates that introduction of dry season crop is the main cause of the higher profitability in Village DKK. In addition, if we compare the profitability of local varieties with that of improved varieties for all villages, it can be seen that improved varieties had higher profitability in Village DKK with irrigation but was lower in other less irrigated villages.

f. Surplus labor and labor-intensive rice farming (Table 26)

The imputed family labor income by subtracting production cost per unit weight (not including imputed family labor wages) from the price of rice in Village DKK is about the same level as daily labor wages while that of other villages is considerably lower than daily labor wages. This fact implies that the problem of surplus labor has been solved in Village DKK though introduction of dry season crop and that surplus labor still exists at least in Village AV.

This point is also consistent with the observation of extremely limited employment opportunities (Table 18).

Rice farming in the surveyed regions is labor intensive by utilizing such surplus labor, where planting, harvesting and threshing are often performed through traditional methods. This point is also clear from the fact that labor input per land area is 2 to 3 times higher compared to Northeast Thailand where agriculture is conducted under similar conditions (Table 27). The higher labor intensive technology in Village DKK can be explained by the delay of technological progress for labor saving efforts despite increase in labor demand during planting and harvesting process as well as the increase of marginal productivity in dry season crop.

5) Income of farm households

Table 28 shows the income of farm households and its details in the villages surveyed. According to this table, Village DKK and Village AV have very high dependence on rice farming (nearly 80% in Village DKK). Village ND is also estimated to have the ratio of dependence on rice farming exceeding 50% in an average harvest. As this supports the fact that earning opportunities other than rice farming are extremely limited in the surveyed villages, increased income from rice farming is expected to have considerable multiplier effect.

Moreover, introduction of dry season crop has the possibility of diminishing the importance of animal raising due to the high dependence on rice farming and the high family labor income from rice in Village DKK. In contrast, livestock still plays an important role in Village B and Village ND where it accounts for 30% of income and compensates for instability of income from rice.

The foregoing observation clearly indicates that, once dry season rice becomes possible through irrigation development, it will dramatically increase the rice production volume and achieve improved and stable farm income. However, irrigation system is not easily constructed. In lowland rice cultivation agricultural development, the questions that need to be answered include: whether the introduction of irrigation facility will pay economically; how to achieve the development of paddy farming in areas where introduction of irrigation facilities is not possible; how to implement construction, maintenance and management of public goods such as irrigation facilities, assuming that benefits exceeding cost can be expected from irrigation development; and how to diffuse the new technology accompanying the introduction of dry season crop in the case that irrigation facilities will be available.

These points will be examined in the next section.

2.3 Problems in Development of Lowland Agriculture Depending on Paddy Farming

1) Tasks of irrigation development will be omitted here as it is detailed in the next chapter.
2) Problems related to farming technology
   a) A strategy of improving productivity through introduction of improved varieties can be considered for regions where introduction of irrigation facilities is not possible. However, improved varieties in general have the advantage of having short maturing period and requiring small amount of water as well as the disadvantage of being able to absorb only small amount of nutrients in the soil because of their short maturing period and being susceptible to pests and drought. As is clear from the facts observed in Section e), introduction of improved varieties under unstable climatic conditions may cause more harm than good under the present technical standard.

   While introduction of highly profitable cash crop instead of traditional rainy season paddy may be pursued in such cases, no promising crop has been identified so far, as cash crops suited for lowlands are poor in quality and have little market.

   New exploitation of agricultural land for paddy farming has the problem of possibly leading to exhaustion of grass field for buffaloes and cattle in dry season. Unexploited arable land is mostly forest with vines and undergrowth providing precious feed for buffaloes and cattle. Rain-fed lowland agriculture in Laos has a rational system that incorporates livestock and forest into paddy farming. As is clear from the example in Village AV, profitability of paddy rice farming will not improve and become unstable if they deplete grass feed resources and destroy the organic system of forest, livestock and rice by increasing modern input while leaving irrigation underdeveloped.

   b) Promoting animal raising in lowlands is accompanied by the aforementioned problem of procuring grass feed resources for cows and buffaloes. Meanwhile, raising pigs and poultry also has tasks such as how to procure feed for increased number of livestock, whether it would pay off to raise native breeds with low breeding and fattening efficiency by depending on purchased feed and how to supply piglets and chickens and diffuse breeding technique to small farm households when introducing improved breeds.

   c) The challenges that are anticipated to arise in terms of improvement and diffusion of farming techniques when irrigation facilities become available and introduction of dry season crop become possible are summarized below based on the hearing survey conducted in the KM35 Project Area.

Yield drops after 2 to 3 years when farm households repeatedly use their own seed. Therefore, it is necessary to procure seeds from outside of their farm in one way or another.

While Savannakhet Province allegedly has a plan to supply seed rice at Thanosa Seed Production Farm and KM35 Project Center to support provision of improved seeds for farm households, the plan is yet to be implemented.

As for pest control, farmers do not sterilize seeds or take other pest control measures because the damage in Lao PDR is not serious enough for applying chemicals to pay off economically. However, damage from rice blast and Bakanae disease is often reported. Although weeding the paddy field thoroughly to give nutrients to rice is more effective in preventing these diseases than spraying chemicals, farmers have not been able to implement this.

With regard to mechanization of agriculture, use of cultivators and threshing machines are fully effective in the sense that they make it possible to get the work done at proper time and save on the expenditures for fixed capital. However, this is only true in the cases where they are rented and owning them will result in over-investment. For instance, the price of a cultivator made in Thailand is equal to the price of 6 to 7 buffaloes. However, agricultural machinery rental market is still undeveloped.

There is absolute shortage in the number of provincial extension officers that are assigned to introduction of new technology mentioned above. In the case of KM35 Project Area, 2 persons including a member of JOCV have been posted to transfer new technologies, even though it is said that 20 staff for extension services are needed.

Lastly, there exists a more fundamental problem of farmers not following the instructions that are given to them because they can enjoy certain harvest even through their traditional farming method.

3. Agriculture and Rural Development is Bolaven Plateau[1]

3.1 Agriculture in Bolaven Plateau

Bolaven Plateau is the name for a highland region covering 5 districts in 3 provinces of Champasak, Salavan and Se Kong, and has a total population of 140,000, and has 26,434 households, 94% of which are farm households (all figures from 1994).

The areas included in this survey were Paksong District and Bachiang District in Champasak Province. They are rainy areas with annual precipitation of 3,374mm, with 90% of this precipitation concentrated in the rainy season from May to September. Altitude reaches 1,200mm at the top of the highlands. Highest temperature is about 24°C which is 8°C lower compared to the lowlands. The temperature remains more or less constant throughout the year,

although lowest temperature drops to about 11°C from December to February in the dry season. Frost has also been recorded several years ago.

Bolaven Plateau is covered with well-structured and developed clay soil that provides high potential for agricultural development in this region.

Under these conditions, upland rice, paddy, cardamom, vegetables and tea are grown in addition to the main crop of coffee in the surveyed areas. In addition, areas other than farmland are pasture for livestock breeding and forests which cover more than 80% of the land (refer to Table 29).

Upland rice is grown on slash-and-burn fields and is often cultivated together with or in rotation with groundnuts, soybeans and cardamom. Paddy is a rainy season crop dependent on rainfall. The majority is grown without fertilizers and even manure is not applied in some cases. Average yield is 2.6t/ha.

More than 90% of coffee grown in this region is *robusta* although conversion to *arabica* is currently taking place. It is normally grown without any fertilizer or agri-chemical and pruning is performed improperly. It is sometimes grown together with field crops. The quality is poor because of poor post-harvest treatment which results in high water content, mixture of mungbeans, fermentation due to improper drying, and poor threshing and selection. For this reason, it is categorized as poor quality item in the European market and is traded at prices that are 10 to 20% lower than the international trading prices.

Vegetables such as cabbage, Chinese cabbage, white potato and ginger are grown in dry season as cash crop. Seeds are imported and crops are grown using chemical fertilizers and agri-chemicals. Small pumps or watering cans are used for irrigation. These vegetables are shipped not only to local markets but also to Vientiane and Thailand. Ginger is preserved in salt and exported to Japan as materials for pickles. Tea is grown only in regions along the national road that runs through Pakson District. It is grown organically without any chemical fertilizer input.

Agricultural irrigation and drainage facilities are underdeveloped as only 640 hectares are irrigated in the Bolaven Plateau belonging to Champasak Province.

As for roads that are important for expanding the sales of farm products and daily economic activities, only the coffee road and parts of national road are paved. Village roads connecting respective villages with the main road are mostly dirt roads with no drainage facilities such as gutters. Passenger cars can only use these roads in dry season and only large trucks can pass through these roads in rainy season.

Although agriculture in Bolaven Plateau is still undeveloped despite its enormous potential as explained above, the following development projects are implemented.

a) LUADP (Lao Upland Agricultural Development Project)
Research and extension project for coffee and field crops. Loan from the World Bank (construction of coffee road) and technical assistance from France and Australia.

b) SIDA
Project for measures against slash-and-burn.

c) Project for paving National Road 23 through financing from ADB.

d) Houay Ho Hydroelectric Power Station Project (BOT).

e) Various research and extension projects at fruit tree, livestock and field crop experimental stations.

f) Permission of private land use (e.g. reforestation, livestock farming, fruit tree farming by private companies and individuals,).

g) Small and medium scale irrigation projects for paddy farming by Champasak Province and SIDA

3.2 Bolaven Plateau Integrated Rural Development Project[2]

An outline of integrated rural development project in Bolaven Plateau planned by the Lao Government and JICA is as follows.

1) Target

The target shall be to increase the production of coffee, tea, vegetables (cabbage, Chinese cabbage, white potatoes), upland crops (groundnuts, soybeans, and maize), livestock and paddy, to increase the income of farmers and to contribute to increased food production and reduction of slash-and-burn.

The target of production for main farm products is as follows:

Table Production Indices of Main Farm Crops

	Yield before the project	Yield after the project
Paddy	2.6t/ha	3-4t/ha
Coffee	0.3	1.5
Tea	0.26	1.0
Groundnuts	1.5	2.0
Cabbage	8	20
White potato	10	20

2) Methods

- Improvement of rural infrastructure such as road and electricity
- Construction of irrigation facility (weirs, reservoirs, main canals, secondary canals)
- Farmers will implement construction of tertiary and fourth canals through the organization of water users' associations. At that time, on the basis of "beneficiary pays

principle," related provincial agencies will implement various projects to encourage the beneficiary farmers to construct irrigation system by offering subsidies to the farmers for purchase of agricultural materials and preferential APB loans.

- Strengthening of research and extension service.
- Various support projects for livelihood enhancement.
- Market development through equipment of wholesale market.

3.3 Challenges faced by Bolaven Plateau Comprehensive Project for Agricultural and Rural Development

1) Extension and improvement of agricultural technologies

a) Traditional farming methods with high profitability.

As mentioned in Section 1, agriculture in Bolaven Plateau is practiced by traditional farming methods that do not go against the providence of nature and hardly use any modern input factors with the exception of certain imported vegetables. Furthermore, farmers have little dissatisfaction about the bounty of nature that they receive from their fertile and vast land. For instance, in case of a farm household interviewed in Bachiang District had mix cropping of durian trees, upland rice and vegetables in the same field in addition to coffee. This farm household, which was assumed to be an average durian grower, earns 1.35 million kip a year from the 27 adult trees they currently own without applying any agri-chemicals or fertilizers except for the manure they use when the trees are seedlings. They said that they were fully satisfied with their present situation.

b) The better skills of veteran farmers superior to that of experiment stations

While not all farm households possess high skills, there are those that have achieved high productivity and profitability without using any modern input factors such as chemical fertilizers and agri-chemicals.

The tea growing farm household that we interviewed had said that they were able to harvest 2.25t/ha without applying any chemicals or fertilizers. This is higher level of yield than the target of the Comprehensive Project for Agricultural and Rural Development which is 1.5t/ha.

Coffee farms have also achieved an yield of 1.7t/ha on their first year of harvest for *arabica* species, which is considerably higher than the cultivation experiment results for *arabica* at the Upland Crop Research Station of 0.8t/ha (2.4t/ha in the second year and 1.8t/ha in the third year). Furthermore, these results were obtained when the former produced organic coffee using only coffee pericarp for fertilizer while the latter required chemical fertilizers consisting of nitrogen (250kg/ha), potassium (100kg/ha) and dolomite (130kg/ha). Considering the fact that yield will increase in second and third years and that the results of

experiment at the experiment station is about the same as the goal set in the Integrated Rural Development Project, this farm household is expected to achieve yields largely exceeding the target.

Groundnuts growing farms that are growing local varieties without using any agri-chemicals or chemical fertilizer have yield exceeding 2t/ha which is the same level as the target for the Integrated Rural Development Project. According to the provincial officer from Palay Irrigation Research Center who accompanied the survey, farmers do not follow the instructions that are given to them about manure application and use of improved varieties.

Thus, the farmers are satisfied with their traditional cultivation techniques and are reluctant about introducing new techniques. Techniques based on traditional farming methods employed by innovative farmers have achieved higher productivity than modern technology. Therefore, improved veteran farmers' technologies that can be easily accepted by farmers should be sought (by analyzing the advantages and disadvantages of traditional techniques and improving them) instead of compelling farmers to use the modern technology.

2) Potential for irrigation development

Irrigation development is the crux of the Integrated Rural Development Project. In this case, as in the case of lowland rice farming, there are issues such as whether sufficient funds can be supplied to farmers and whether water users' association can be operated efficiently. In view of the experience in other Asian countries, it is not possible to conclude that no doubt exists in terms of viability. The discussion of this point will be omitted as it has been examined in detail in the previous section.

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[1] Ministry of Agriculture, Lao PDR People's Democratic Republic and Japan International Cooperation Agency, "Principal Report on Comprehensive Project for Agricultural and Rural Development in Bolaven Plateau," September 1997.
[2] Ibid.

Table 16 Overview of Farm Economy in the Sample Farm Households

Region	Savannakhet Province (irrigated)	Savannakhet Province (not-irrigated)	Champasak Province (partially irrigated)
Village	DKK	AV	ND
Number of sample households	11	13	11
Number of family members living together (persons/household)	9.6	6.2	7.9
Number of family labor (persons/household)	4.3	2.8	3.0
Area of owned farmland (ha/household)	2.3	2.2	2.5
Area of rice field	2.2	2.1	1.9
Others	0.1	0.1	0.6
Area used for rainy season paddy (ha/household)[1]	2.0	2.0	2.1
Area used for dry season paddy (ha/household)[1]	0.9	0	0.2
Farm household income (kip/household)	1,780,067	830,685	1,136,801
Maximum	4,832,300	2,003,500	4,110,000
Minimum	697,500	0	294,000
Fixed agricultural assets (kip/household)	939,200	629,231	1,194,818
Yield of unhulled paddy (t/ha)	2.1	1.4	0.5
Unhulled paddy production per person (kg)	643	457	138
Farm household income per person in unhulled paddy equivalent (kg)[2]	931	667	719

Reference: Minimum requirement of unhulled paddy production per person is 280kg, which is calculated by subtracting 20% loss from the target set by the government of 350kg.

Note 1) Planted area

Note 2) We used 200 kip per 1kg of unhulled rice for conversion rate.

Table 17 Land Holding and Land Tenancy

Village	DKK	AV	ND
Number of samples (household)	9	13	11
Area of owned rice field (ha)	21.2	27.6	27.1
Area of rented paddy field (ha)	1.0	0.7	4.9

Note) Total value of surveyed farm households.

Table 18 Main Occupations of Farm Household Members (persons)

Occupation	Village DKK		Village AV		Village ND		Total
	Male	Female	Male	Female	Male	Female	
Agriculture	18	12	15	18	10	13	86
Public servant	0	2	3	0	5	2	12
Cottage industry	3	0	1	0	0	2	6
Electrical repair	1	0	0	0	1	0	2
Driver	2	0	0	0	0	0	2
Daily wage labor	1	0	0	0	1	0	2
Small shop	0	1	0	0	0	0	1
Shopkeeper	0	1	0	0	0	0	1
Company worker	0	0	0	0	1	0	1
Total	25	16	19	18	18	17	113

Table 19 Number of Livestock Raised (per household), Unit: heads

Type/Village	DKK	AV	ND
Buffaloes (adult)	1.7	2.3	3.5
Cattle (adult)	3.3	0.7	1.7
Swine	0.9	1.2	0.5
Poultry	17.5	13.9	18.5
Ducks	2.9	2.7	5.3

Table 20 Prices of Farm Product

Type/Village	DKK	AV	ND
Unhulled rice (kip/kg)	200-300	200-400	NA
Buffaloes (1000 kip/head)			
Male	200-300	200-260	180-300
Female	200-375	200-300	140-320
Cattle (1000 kip/head)			
Male	45-120	100-200	100-150
Female	120	200-250	150-200
Swine (1000 kip/head)	13-50	20-100	25-300
Poultry (kip/head)	1000-2500	1000-3000	1000-3500
Ducks(including Moscovy ducks) (kip/head)	1500-3000	2000-4000	2500-5000

Table 21 Wages, Rent and Current Input Prices

Village	DKK	AV	ND
Farm wages	1500 kip/day		
Daily wages (skilled)	3000 kip/day		
Daily wages (unskilled)	1500-2000 kip/day		
Public servant salary	40,000-56,000 kip/month		
Land rent (in hulled rice equivalent)	150kg-160kg/ha	430kg/ha	120kg-261kg/ha
Rent for agricultural machinery			
Cultivator	20,000 kip/ha	40,000 kip/ha	-
Powered thresher	5-10% of harvest	-	5-10% of harvest
Rent for buffalo	110,000 kip/year	600kg of unhulled rice/year	300-600kg of unhulled rice/year
Chemical fertilizers (16-20-00)	18,000 kip/50kg		
Market price (1996)	13,500 kip/50kg		
APB price (1996)	1,300 kip/kg		
Agri-chemicals (1996)			

Table 22 Input of Seeds, Chemical Fertilizers and Agri-chemicals

Input	Village DKK		Village AV	Village ND
	Rainy season	Dry season		
Seeds (kg/ha)	48	60	32	53
Chemical fertilizers (kg/ha)	190	245	142	54
Agri-chemicals (kg/ha)	2.4		-	N/A

Note) Average value in farm households that are using each current input.

Table 23 Profitability of Rice Cultivation in Surveyed Farm Households

Village	DKK	AV	ND
Number of samples (households)	9	13	11
Planted area (ha/household)	3.2	2.0	2.3
Gross revenue (kip/ha)	539,151	330,438	122,940
Production cost (kip/ha)	448,264	395,556	352,162
Farm expenditures	92,480	90,275	80,773
(cash and payment in kind)			
Wages for hired labor	16,092	11,279	12,382
Ordinary investment[1]	71,162	49,842	29,370
Fixed assets	20,263	25,858	27,638
Farm rent	667	3,297	11,383
Imputed wage of family labor[2] (kip/ha)	311,401	218,578	204,107
Imputed wage of rent on owned land (kip/ha)[3]			
Net profit (gross revenue minus farm expenditures) (kip/ha)	28,679	86,703	67,272
Profit (gross profit minus production cost) (kip/ha)	446,671	240,163	42,167
	90,887	-65,118	-229,222

Note 1) Self-supplied fertilizers such as manure are not included.

Note 2) Estimated by using daily wage per person of 1500 kip.

Note 3) Estimated by using the effective farm rent in Table 19.

Table 24 Productivity of Rice by Rainy and Dry Seasons in Village DKK

Average yield Rainy season	1.96t/ha
Dry season	3.05t/ha
Production cost per unit weight	
Rainy season	Kip 216,323/t
Dry season	Kip 175,174/t

Table 25 Profitability of Local and Improved Varieties

Village	DKK	AV	ND
	Net profit per unit area (kip/ha)		
Local variety	337,472	272,306.5	56,545
Number of samples	3	4	5
Improved variety	469,459	197,469	28,450
Number of samples	4	7	5

Table 26 Imputed Family Labor Income

Village	Imputed family labor income per person per day (kip/day)
DKK	1417
AV	1090
ND	-280
Daily labor wage (kip/day)	1500

Table 27 Labor Input per Unit Area (man-day/ha)

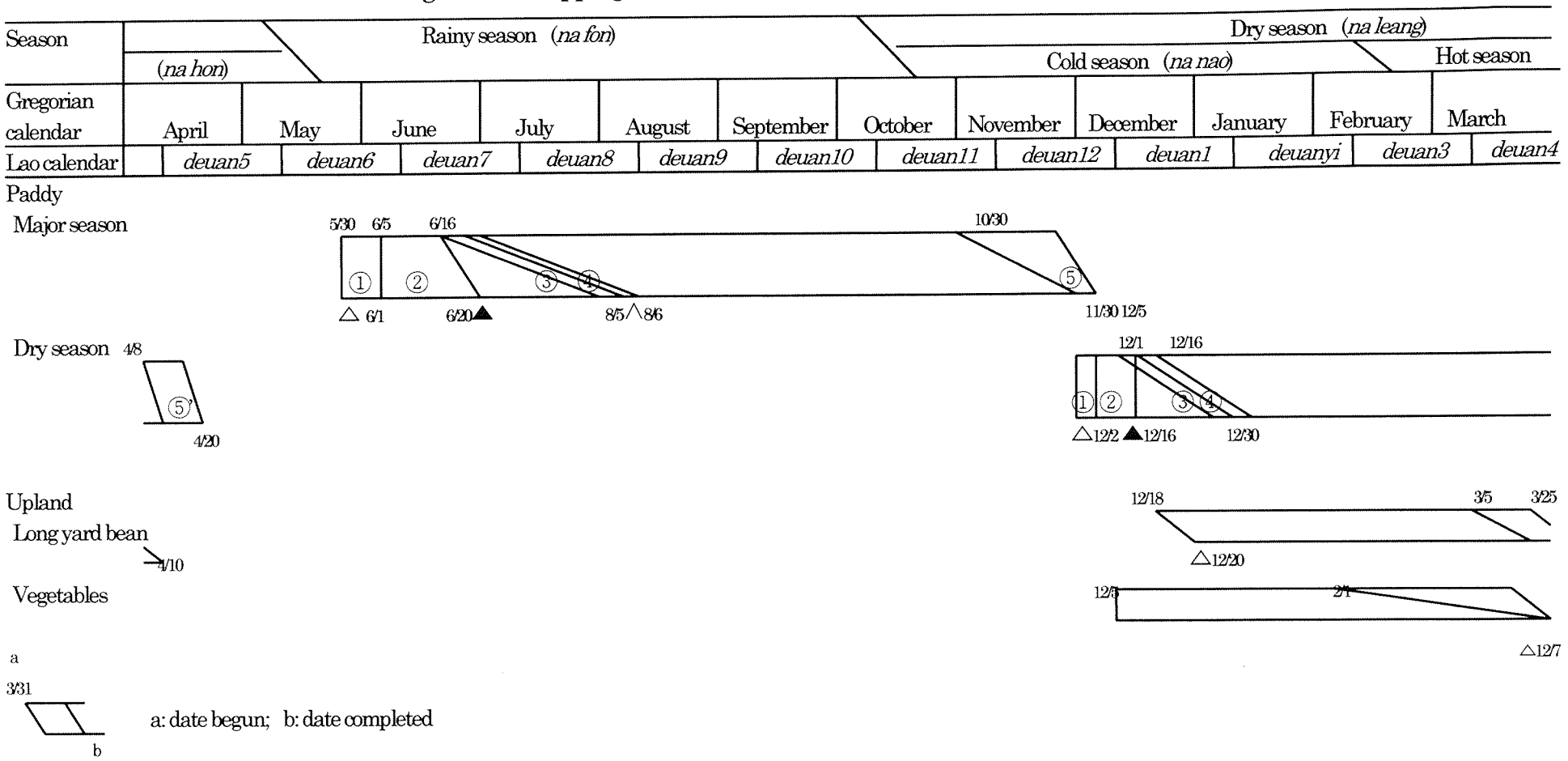
Village DKK	Village AV	Village ND	Northeast Thailand (rain fed)	(rain fed)	Cambodia (irrigation, rainy season)	(irrigation, dry season)
216	153	145	73	167-176	94	123

Source: Village survey data gathered by the authors. Data on Northeast Thailand and Cambodia quoted from IRRI, World Rice Statistics 1993-94, 1995, Manila (Philippine) IRRI

Table 28 Farm Income and Its Details

Village	DKK	AV	ND
Farm income (kip/household)	1,780,067	830,685	1,136,801
Farm income (kip/household)	(100)	(100)	(100)
Of which from rice cultivation	1,495,400	776,608	429,455
Of which from livestock	(84)	(93)	(38)
	1,383,956	493,531	92,319
Non-farm income	(78)	(59)	(8)
(kip/household)	111,444	283,077	337,136
	(6)	(34)	(30)
	284,667	54,077	707,345
	(16)	(7)	(62)

Figure 3 Cropping Calendar in Southern Laos (Savannakhet)



a: date begun; b: date completed

① Land preparation for nursery(Family Labour 1psn.x1day)

② Ploughing by buffalo(Family Labour 3psn.x15days)This period is including nursery culture.

③ Harrowing and leveling by buffalo

④ Picking up seedlings and transplanting(Family Labour 3psn.x30days)

⑤ Harvesting and threshing(⑤Family Labour 3psnx30days,⑤' Family Labour 3psn.+Weged Labour 2psn.: 1000kip/dayx16days)

△ Sowing: broadcasting

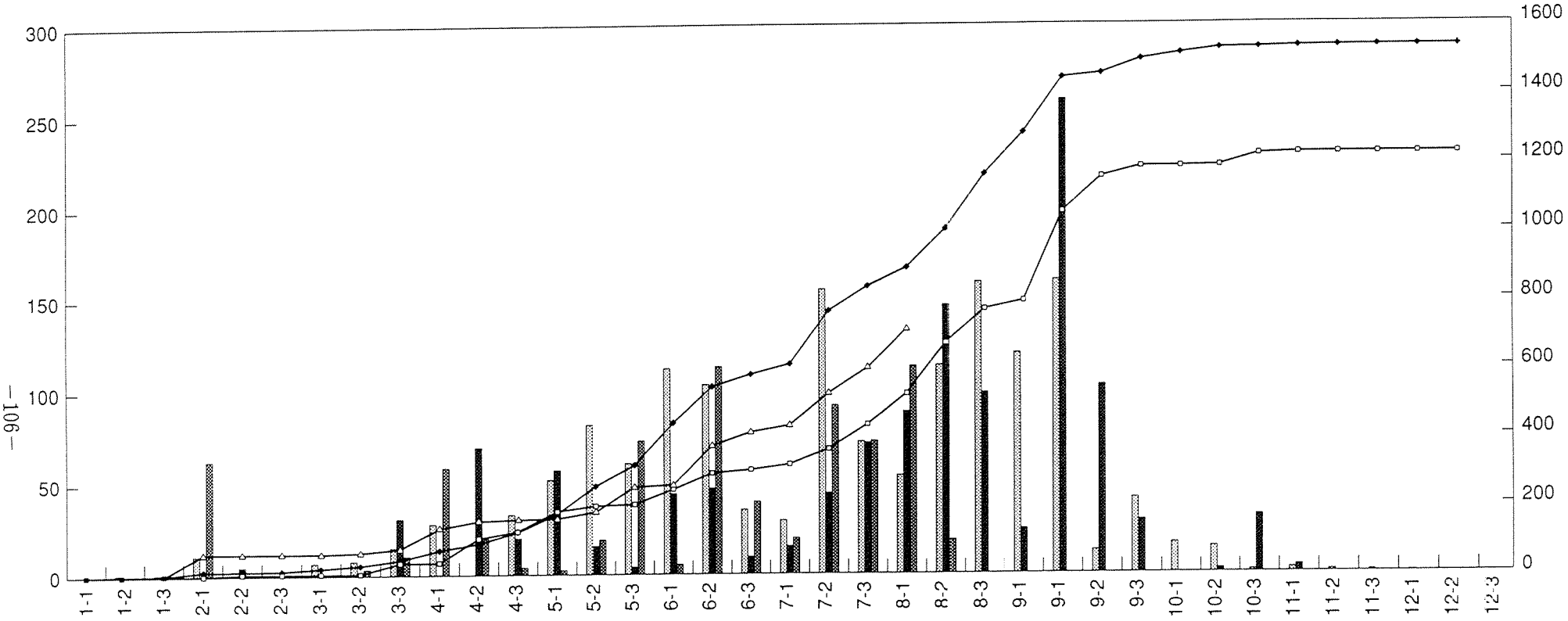
▲ Fertilizer application(as the case may be in major season)

∧ Weeding by hand

Table 29 Land Use in Bolaven Plateau

	Paksong	Bachiang
Farmland	18,590ha	4,010ha
Coffee	16,100	560
Paddy	240	540
Upland rice	710	2,260
Cardamom	760	650
Tea	380	-
Vegetables	400	-
Forest	342,370	52,850
Pasture	29,100	8,370
Others	2,650	700
Total	392,710	64,930
Number of livestock		
Cattle (head)	17,900	5,660
Buffaloes (head)	2,220	2,110

Appendix 1 Annual Rainfall at KM35 Project Area



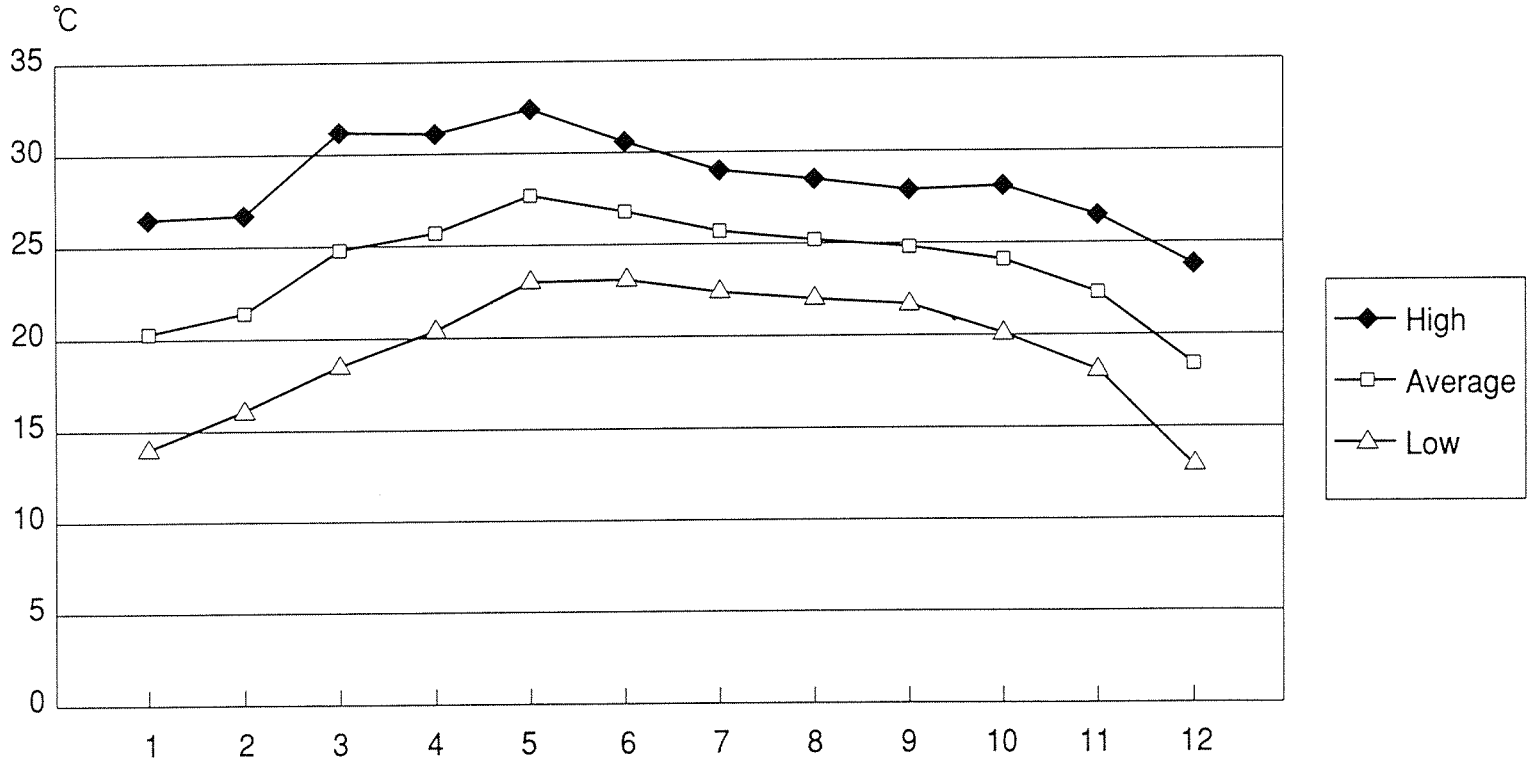
Rain Fall Record 1997

unit: mm

	January			February			March			April			May			June			July			August			September			October			November			December		
	1-1	1-2	1-3	2-1	2-2	2-3	3-1	3-2	3-3	4-1	4-2	4-3	5-1	5-2	5-3	6-1	6-2	6-3	7-1	7-2	7-3	8-1	8-2	8-3	9-1	9-2	9-3	10-1	10-2	10-3	11-1	11-2	11-3	12-1	12-2	12-3
Ordinary	0.2	1.1	1.1	11.0	0.5	1.0	7.0	8.0	15.2	28.0	18.6	33.0	52.0	82.0	60.8	122.1	103.4	35.2	29.2	155.2	72.2	53.7	113.4	159.0	120.0	160.0	12.4	41.0	16.3	14.3	1.3	2.4	1.2	0.8	0.3	0.2
96	0.5	0.0	0.0	0.0	5.0	0.0	0.0	0.0	31.0	0.5	70.0	20.0	57.5	15.5	4.0	44.0	47.0	9.5	15.0	44.0	71.5	88.5	146.5	98.5	24.5	258.5	102.5	29.0	0.0	2.3	31.5	4.0	0.0	0.0	0.0	0.0
97	0.0	0.0	1.0	63.0	0.0	0.0	0.0	3.5	10.5	59.0	20.0	4.0	2.5	19.0	73.0	5.5	113.0	39.5	19.5	92.0	72.5	113.0	184.0													
Accumulation	0.2	1.3	2.4	13.4	13.9	14.9	21.9	29.9	45.1	73.1	91.7	124.7	176.7	258.7	319.5	441.6	545.0	580.2	609.4	764.6	836.8	890.5	1004	1163	1283	1443	1455	1496	1513	1527	1528	1531	1532	1533	1533	1533
-96	0.5	0.5	0.5	0.5	5.5	5.5	5.5	5.5	36.5	37.0	107.0	127.0	184.5	200.0	204.0	248.0	295.0	304.5	319.5	363.5	435.0	523.5	670	769	793	1052	1154	1183	1183	1185	1217	1221	1221	1221	1221	1221
-97	0.0	0.0	1.0	64.0	64.0	64.0	64.0	67.5	78.0	137.0	157.0	161.0	163.5	182.5	255.5	261.0	374.0	413.5	433.0	525.0	597.5	710.5	895													

Source: JCCV data

Appendix 2 Monthly Temperature June 1996 - May 1997 at KM35 Project Area

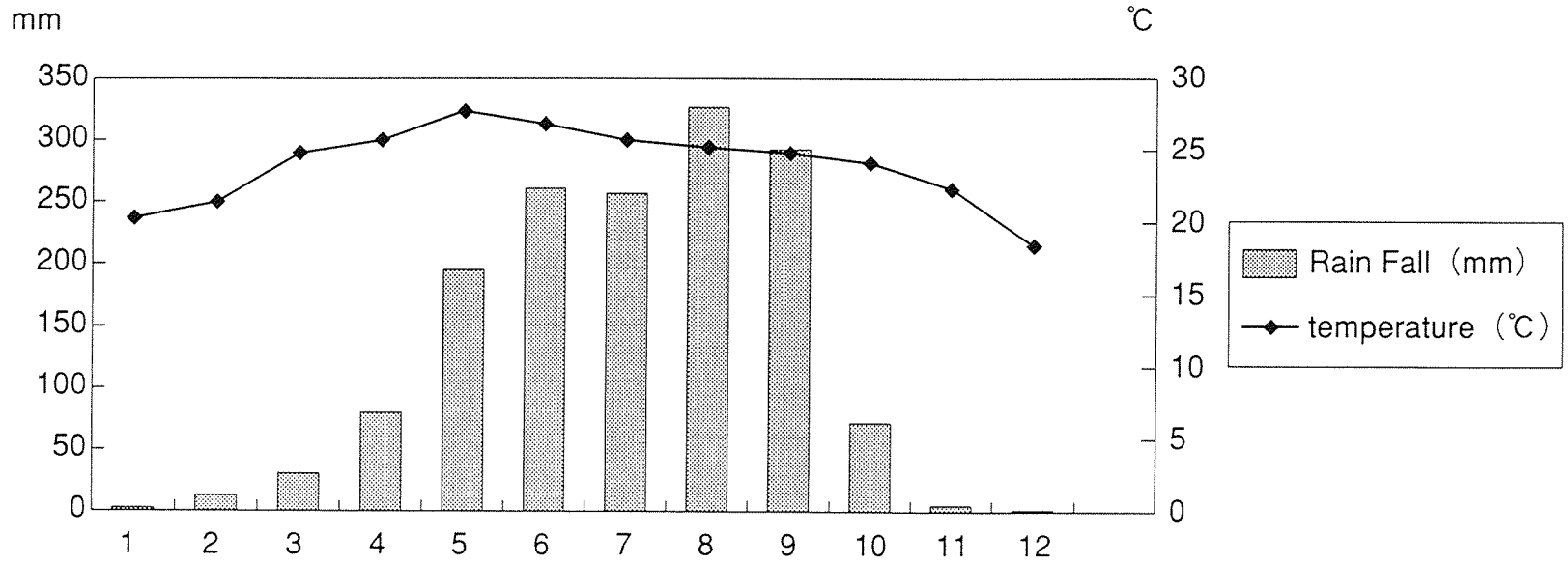


Monthly Temperature Record 6/96 – 5/97

	1	2	3	4	5	6	7	8	9	10	11	12	Average
High	26.5	26.7	31.2	31.1	32.4	30.6	29.0	28.5	27.9	28.1	26.5	23.8	27.8
Average	20.3	21.4	24.8	25.7	27.7	26.8	25.7	25.2	24.8	24.1	22.3	18.4	23.9
Low	14.0	16.1	18.5	20.4	23.0	23.1	22.4	22.0	21.7	20.1	18.1	12.9	20.0

Source: JOCV

Appendix 3 Monthly Temperature and Rainfall at KM35 Project Area



Meteorological data

	1	2	3	4	5	6	7	8	9	10	11	12	total/average
Rail Fall (mm)	2.4	12.5	30.2	79.6	194.8	260.7	256.6	326.1	292.4	71.6	4.9	1.3	1533.1
temperature (°C)	20.3	21.4	24.8	25.7	27.7	26.8	25.7	25.2	24.8	24.1	22.3	18.4	23.9

Source: JOCV

Chapter Four

Field Survey Report II
- Irrigation and Rural Community -

1. Present Situation of Irrigation
2. Irrigation policy and its problems
3. The significance of irrigation: higher production and consumption smoothing
4. Irrigation (the case of Savannakhet Province)
5. Water Users' Association and Its Charter
6. Conclusion

Chapter Four

Field Survey Report II
- Irrigation and Rural Community -

1. Present Situation of Irrigation

Irrigation is hardly utilized in Lao PDR with the area irrigated during the dry season for rice cultivation amounting to only 18,000ha in fiscal 1996. Since it is impossible to grow rice in dry season without irrigation, dry season rice cultivation is practiced in parts of fields where rice is grown during the rainy season. However, only 4.96% of the area cultivated during the rainy season (363,100ha) is irrigated in the dry season, and irrigation is used only for backup purposes in the rainy season. Under these circumstances, more than 50% of the government's fiscal expenditure in the agricultural sector has been spent on construction of irrigation facilities since 1992/93 based on the recognition that irrigation rate must be raised in order to achieve food self-sufficiency (63.8% in fiscal 1994/95). The Ministry of Agriculture and Forestry's Fifth National Conference on Irrigation which was held in July 1997 has set the goal of increasing the irrigated area to 280,000ha and 150,000ha in rainy season and dry season, respectively, by the year 2000.

Investment in irrigation basically aimed to introduce paddy crop in dry season, a period when hardly any paddy crop has been planted due to scarcity of water. However, dry season paddy shows equal, or even superior land productivity to rainy season paddy (Table 1). This mainly because the farmers tend to refrain from using chemical fertilizer, which is prerequisite

for the introduction of improved varieties, in the rainy season for fear that chemical fertilizer is runoff due to high precipitation. Therefore, the introduction of paddy in dry season has the potential for increasing rice production in Lao PDR by leaps and bounds. For this reason, the discussion here will focus on irrigation in dry season.

The methods of irrigation include: 1) small-scale and conventional temporary weirs; 2) pumps; 3) gravity irrigation using permanent facilities (dams and weirs); and 4) reservoirs and ponds. As for area irrigated in dry season, pumps irrigate 44.83% of farmland, followed by 27.99% of gravity irrigation, 14.20% of temporary weirs and 10.15% of reservoirs. Generally speaking, gravity irrigation is superior from the viewpoint of maintenance and durability. However, little effect can be expected from gravity irrigation in dry season if it is used by building small weirs (temporary weirs) on rivers that often dry up during the dry season. This is also obvious from the fact that the ratio of area irrigated by temporary weirs in dry season/rainy season is only 5.30%. The same ratio for large gravity irrigation is also not significant at 21.16%. In contrast, the ratio for pump irrigation is as high as 49.74% (Table 2). Large gap exists among different methods of irrigation in the ratio of area irrigated in dry season and rainy season. Pump irrigation is therefore most superior from the viewpoint of dry season irrigation. From the viewpoint of area irrigated per irrigation facility, pumps irrigate an area of 105.20ha in average as opposed to only 17.83ha of gravity irrigation. These are merely average values and vary widely among different irrigation methods according to their water supply capacity. In the case of pumps, for instance, 7 horsepower pump irrigates 3-4ha, 14 horsepower pump 6-7ha, 100 horsepower pump 100ha and 120 horsepower pump 110ha. Pumps with small horsepower use diesel fuel but those exceeding 100 horsepower require electricity. Although easy comparison should not be made without identifying other conditions, pump irrigation is considered efficient from the viewpoint of its irrigation capacity in dry season. It goes without saying, however, that stable supply of rural electricity and diesel fuel is indispensable for diffusion of pump irrigation. Moreover, consideration must be given to the fact that double cropping cannot be realized through pump irrigation by securing the same cultivated area as the rainy season in the dry season unless irrigated area ratio between dry and rainy seasons reaches 50%.

Regional characteristics can also be observed in irrigation method (Table 3). In the northern region, temporary weirs and gravity irrigation are mainly used and pump irrigation is not practiced. On the other hand, pump irrigation is predominant in the central region and gravity irrigation is prevalent in the southern region. While these regional differences are considered to be mainly attributable to topographic reasons, the fact suggests the importance of selecting suitable location for each irrigation method at the time of introduction.

A point that must be considered with regard to irrigation is the fact that the majority of these facilities have the property of public goods as they supply water to several farm households via irrigation canals. Therefore, unlike the irrigation method using tube well where only the owner of the well benefits, it will be important to operate and manage the irrigation facility as public goods. For this reason, organization of water users' association becomes indispensable for irrigation projects. In other words, irrigation will be deeply involved in rural communities in terms of fund procurement, operation and management of irrigation facility and collection of water use fees. Let us move on to the next topic with these points in mind.

2. Irrigation Policy and Its Problems

The Lao Government is trying to promote pump irrigation, which is a rational choice for increasing dry season planting. However, consideration must be given to the fact that it is a strategy limited to specific regions of diffusing irrigation in the plains, and that it could widen the gap between the plain regions and the montane areas.

The Government has decided to make a fiscal expenditure of 45.627 billion kip for prevention of droughts and floods, and the majority of this resource will be spent on the purchase of pumps (mostly made in India). At present, the first phase installation of1,427 pumps, which cost 6.2 billion kip, is nearly completed and will be irrigating 30,000ha of farmland. One thousand seven hundred eighty two pumps (costing 8.5 billion kip) that were purchased in the second phase are expected to be imported in the near future and will be irrigating 40,000ha of farmland. Each pump will irrigate an area of 21.02ha and 22.45ha in the first phase plan and second phase plan, respectively, indicating that the pumps that are being imported are of medium horsepower. Unit price of pumps is 4,345,000 kip for the first phase and 4,762,000 kip for the second phase. In the final third phase plan, 658 pumps will be purchased at 7.5 billion kip.

Because of the budget shortage, however, the Lao Government is unable to secure sufficient budget for irrigation. For this reason, promotion of irrigation projects based on beneficiary contribution and foreign aid becomes indispensable. Mr. Hirotsugu YONEDA, a former JICA expert who was a member of the Irrigation Bureau of the Ministry of Agriculture and Forestry in Lao PDR, has classified such irrigation development projects into the following 3 categories.

a) Irrigation development through NGO method: NGO offers purchased materials such as reinforcing bar and cement free of charge while farmers offer local materials such as lumber

and building stone as well as construction labor. This NGO method is suited for farmers who do not have the surplus for commercializing their farm products or do not have access to the market. For this reason, it is applied to small-scale irrigation in montane areas.

b) Irrigation development through material procurement from rural financing: A method promoted by IFAD (International Fund for Agricultural Development) in which farmers utilize rural financing to procure the funds to purchase construction materials in addition to the local materials and construction labor they would provide in the NGO method. Since IFAD is intended for poor farmers, availability of the fund will inevitably be limited to small-scale irrigation facilities that can only cover tens of hectares.

c) Irrigation development carried out under government-private complementation: Intended for medium and large-scale irrigation. While large-scale investments such as construction of pumps, weirs and dams, installation of power lines and construction of main canals are carried out as government projects, construction of terminal waterways for drawing water into farmland will be borne by beneficiaries who take out loans from the agricultural promotion bank. However, terminal waterways could be relatively large in scale and may require tightening with heavy machinery. In addition, concrete weirs will have to be built at several locations of the canal. Therefore, the construction has to be carried out by construction companies. Irrigation development of this type is adopted in the plains region of Lao PDR.

The latter two methods are based on the principle of beneficiaries covering the cost by taking out a loan from agricultural promotion bank. Reference shall be made to the background that led to adoption of such methods. Tables 4 and 5 show data related to fiscal budget. Although strict comparison cannot be made because one is based on fiscal year and the other is based on calendar year, the budget for the Ministry of Agriculture and Forestry in fiscal 1994/95 was 5.17 billion kip (Table 4), and the amount obtained by subtracting non-development expenditures from this budget was almost equal to the amount of public investment in 1995 for agriculture and irrigation which was 4.66 billion kip (Table 5). Incidentally, the amount spent for irrigation in fiscal 1994/95 amounted to only 3.3 billion. Therefore, Lao PDR has no choice but to depend on overseas aid for irrigation development budget. For instance, Lao PDR was able to procure at home only 4.839 billion kip (23.47%) out of 20.615 billion kip in her 1996 public investment, and depended on foreign aid for the remainder. Only 31.07% of the total amount invested in agriculture and irrigation was procured domestically. Some of these funds from overseas are spent directly on dam construction represented by the undermentioned KM35 Project while others are allocated through agricultural promotion bank. As so in the case of KM35 Project, farmers bear the cost of terminal waterway construction by utilizing Agricultural Promotion Bank.

The Agriculture Promotion Bank was established in June 1993 as the bank for agricultural financing. The majority of its loans (more than 80% of the total lending according to the hearing survey) are offered to the farmers in the form of group loan by following the system of Gramin Bank in Bangladesh. However, the Agriculture Promotion Bank requires collateral at the time of offering the loan and differentiates itself from other small credit loans in this respect. The Agriculture Promotion Bank relies on the National Bank of Lao PDR and low interest aid money for its capital. Interest rates on loans from the National Bank are 5% for short term, 3% for intermediate term and 2% for long term, which, in turn, are offered by the Agriculture Promotion Bank at interest rates of 10%, for short term, 8% for intermediate term and 7% for long term to the farmers. However, financial constraint in which the real lending interest of the Agriculture Promotion Bank turns negative is occurring when considering the fact that inflation rate in Lao PDR was 9.9% in 1991/92, 6.2% in 1992/93, 8.1% in 1993/94, 19.5% in 1994/95 and 19.5% in 1995/96. As a result, the Agriculture Promotion Bank will lose its economic validity as financial intermediary body without being able to mobilize its deposits. In fact, deposits account for only 4.3% of its liabilities. In addition, occurrence of credit rationing cannot be avoided at such low interest financing, giving rise to issues related to resource allocation. Many of the experiences in the developing countries have taught us that such financial institutions turn into mere resource distribution bodies with faltering fund recovery. The fact that lending interest is lower than deposit interest signifies that the financial market itself will not function, and the Lao Government is aware of the problems that exist under the present situation. When looking at the Agriculture Promotion Bank as a subject of two-step loan, it is necessary to carefully observe how this bank will be incorporated into the development administration in the future.

3. The Significance of Irrigation: Higher Production and Consumption Smoothing

Compared to neighboring countries, Lao PDR is characterized by the availability of remaining land frontier in the country. Map preparation work for selecting land is under way through foreign aid. Extensive land use based on traditional farming method in rainy season exists in Lao PDR as a valid alternative to intensive land use with irrigation. Although data for cost-benefit analysis to determine which method should be given priority is not available, the following points should be kept in mind.

When self-sufficiency of cereal crops is considered from a macroscopic point of view, irrigation, which involves large sum of construction costs as well as issues related to its

operation and management, is not necessarily an economically viable option. This gives rise to the possibility that increasing grain production through reclamation would be more effective. From a microscopic point of view, however, introduction of irrigation is desirable because rainy season cropping relying on rainfall irrigation is prone to fluctuating production owing to delay in arrival of rainy season and occurrence of flood. For instance, out of 367,263ha (363,133ha) of harvested area for rainy season rice in 1995 (1996), 62,838ha (65,937ha), or 14.6% (15.4%) of cultivated land, was damaged by flood (Agricultural Statistics of Lao PDR, 1996). Rainy season rice production in Pakse where this year's survey was conducted has been devastated by deluge. As a measure against such damage, introduction of irrigation will contribute not only to higher productivity but to stabilization of production. The effect of irrigation is not limited to the new introduction of dry season paddy—it extends to enabling farm work at the right timing for rainy season crop by supplying water needed for rice seedling and tilling when arrival of rainy season is delayed. Needless to say, it stabilizes the production of rainy season rice.

When seen in this way, irrigation has the effect of stabilizing the consumption (income) of farm households in addition to the effect of increasing rice production from a macroscopic viewpoint. As mentioned earlier, however, operation and management of irrigation facilities will become an issue in Lao PDR as irrigation is offered through irrigation canals that are shared by several beneficiary farm households. In other words, it is an issue of sustainability that has been indicated often in the recent years. Let us examine this by using the example of Savannakhet Province.

4. Irrigation (the Case of Savannakhet Province)

In Savannakhet Province, an agricultural development project centered around construction of irrigation facilities (commonly known as the KM35 Project) is under way by receiving grant aid from the Japanese Government. The facility has been handed over to Lao PDR in 1996. The Farmer Support Center (where two JOCV members are posted along with Lao PDR staff) was built as a part of the project, and is currently managing the irrigation facility. Irrigation facilities are being built at two districts (Houai Bak District and Houai Xay District) under a total construction budget of 23 billion kip. In Houai Bak District, irrigation using a dam with 16 million tons of impoundment and 21,481m of main and branch canals is expected to irrigate 950ha in rainy and dry seasons (438 beneficiary households). However, dry season rice cultivation will become possible only in 550ha of the irrigated area. In Houai Xay District, weir irrigation and 7,831m canal will be irrigating 410ha in rainy season and

200ha in dry season (256 beneficiary households). Irrigated area in rainy and dry seasons is same in the former and less for dry season in the latter to indicate the fact that weirs (head works) are not sufficient and dams are needed to enable large scale irrigation in dry season. In addition, terminal waterways will have to be built to draw water into the field. Terminal waterways are large-scale canals that require compaction of soil using heavy machinery. Their construction cost is covered by the loans that the member farm households of water users' association took out from the Agriculture Promotion Bank, and construction companies executed the construction. The main canal divides in left and right direction from the dam or weir and runs through relatively high part of the valley above the locations where terminal waterways are built. Water is supplied to each field by using plastic tube to draw water into fields located below water surface through the siphon method.

This project can be categorized as an irrigation development carried out under government-public complementation described above. It is then necessary to determine the level of burden borne by the farmers. The construction cost and the extension of the 13 terminal waterways that qualified for loan in Houai Bak District are shown in Table 6. Total number of beneficiary farm households and irrigated area amounted to 121 households and 306,315ha, respectively. In average, there were 9.3 farm households requiring terminal waterways (24 households maximum and 4 households minimum). Average farm area per household came to 2.53ha (standard deviation=1.62ha) and ranged from a high of 8.83ha to a low of 0.26ha. The amount loaned per hectare was 471,663 kip, and kept below the upper limit of the loan which was 600,000 kip per hectare. Repayment period was 7 years following a 3 year deferment period. Interest rate was 7% although effective interest rate was non-positive after price hike was taken into consideration. Therefore, an average of a little less than 68,000 kip in real terms and 86,200 kip in nominal terms will have to be repaid every year.

Land productivity of irrigated land in dry season is 2.5 tons/ha for local varieties and 3 to 5 tons/ha for improved varieties. In this section, let us analyze the costs and benefits of introducing irrigation by assuming a slightly lower land productivity of 3.0 tons/ha. Since the farm gate price of unhulled paddy is 200 kip/kg, farm households will earn a gross profit of 600,000 kip/ha. As the water use charge for dry season is 18,000 kip/ha (amount scheduled for rainy season is 5,000 kip/ha) and 70,000 kip/ha is required for operating input goods (according to a farm household production cost survey at Village DKK), net profit will amount to more than 500,000 kip/ha (447,000 kip/ha in the survey of Village DKK). Therefore, nominal repayment of 87,000 kip/ha will not impose excessive financial burden on the part of farm households. Rather, one must say that water use charge (used for operation and management of canals) accounting for only 3% of gross profit is extremely low compared to other countries of

the world. In other words, the burden on the part of farmers concerning the construction of irrigation facilities is by no means excessive and may even have room for some increase.

Let us assume that a loan of 250 million kip to buy a 100 horsepower pump for irrigating 100 hectares and the upper limit of loan available per hectare for building terminal waterways for these 100 hectares (600,000 kip X 100 = 60 million kip) was taken out from the Agriculture Promotion Bank. The 7% interest can be ignored, as the effective interest rate will not become a positive figure under the present inflation rate. Assuming a repayment period of 7 years, 121,400 kip will be repaid each year for every hectare. Assuming that gross profit from dry season rice crop is 600,000 kip/ha (land productivity = 3 tons/ha, farm gate price of unhulled rice = 200 kip/kg) and a slightly high operating expenses of purchased materials (such as water use charge and chemical fertilizer) accounting for 30% of gross profit, net profit will amount to 420,000 kip/ha. If this were the case, the amount of repayment will be about 30% of net income even if the farmers paid for the cost of the pump. Thus the profit from dry season rice cultivation alone is sufficient to repay the loan including the cost of pump irrigation. Needless to say, however, this calculation assumes that a stable rice market is in effect.

The problems associated with irrigation projects that were identified in the observation of the KM35 Project were as described below.

At the time of the survey, irrigated area in Houai Bak District in dry season was 104ha, accounting for only 18.9% of 550ha scheduled for irrigation. In Houai Xay District, irrigated area in dry season was limited to 10ha. In Houai Bak District, there were 42 intakes (which means that the same number of terminal waterways will have to be built). However, when farmers organized their own groups and applied for a total amount of 560 million kip in loans to the Agriculture Promotion Bank last year, the Bank approved only 146 million kip for 13 groups. In Houai Xay District where 21 intakes are located, the Bank approved loans in the amount of only 145 million kip for application of 565 million kip. This is because a limit is imposed on the total amount of loans that can be offered by the Agriculture Promotion Bank. Table 8 shows the amount of loan applications for irrigation purposes and the amount that was approved. It reiterates this fact by indicating that the loans offered only account for about 10% of the amount applied for. As a result, end field irrigation in dry season in Houai Bak District is limited to 104ha (82 households) that are irrigated by beneficiary farm households of the 7 canals already in existence and by those who draw water directly from the intake. In this case, irrigation water has to be drawn from a patch to a patch. For this reason, there is a tendency to reject water supply to other fields as farm households try to prevent washout of fertilizers they had applied, thereby limiting the irrigated area. This raises an issue with regard to collection of water use charge. The fact that irrigated area is far less than the area that has been planned for irrigation indicates that operation and management expenses of canals could not be raised. The

difficulty in determining the accurate irrigated area in patch-to-patch irrigation will also pose a problem in the collection of irrigation charges.

Needless to say, irrigation development projects carried out under government-private complementation require budgetary balance. However, the KM35 Project has made it clear that a wide gap exists between the irrigation project investment as part of government budget (used for construction of main canal and installation of pumps) and the cost of building terminal waterways borne by the farmers for drawing water into their farms (i.e. the amount loaned by the Agriculture Promotion Bank). While the former is determined by the government and the latter by the National Bank of Lao PDR, money from foreign aid plays an important role in determining both of these amounts. The government has a tendency to depend on foreign aid for large-scale irrigation projects. Moreover, "government-private complementation irrigation project" in which the farmers pay for the construction of terminal waterways will become popular under the present situation where participation of beneficiaries in the development administration has become somewhat fashionable. Under the present situation, however, there is lack of revenue source for meeting the financial demand related to construction of field canals through loans taken out by farmers because of the bias in fund allocation towards irrigation facilities that are built under the government budget such as main canals and pumps. As a result, there are cases where investments in irrigation have become inefficient owing to shortage of construction capital for terminal waterways. There is a need for an aid that recognizes the existence of complementary nature between these two areas of investment.

Land ownership and its are a will have to be finalized as it serves as the basis for calculating the water use charge. As land record never existed, finalization of the area of land owned by farmers will be indispensable when introducing an irrigation facility. When JOCV members kept the record in the KM35 Project, they were not able to prepare an effective land record for the following reasons:

1) It was difficult to grasp who owned which plot because many farmers had same names as part of their custom to use nicknames, and
2) Names that were registered at the water users' association were a mixture of householders' names and their children's names.

The first dry season rice cultivation was undertaken since the introduction of irrigation this year. As the Farmer Support Center lent out the seed rice for dry season crop, it was possible to grasp the irrigated areas of the farmers. This also made it possible to collect water use charges. It is not possible to identify the irrigated area for rainy season crop as the farmers

prepare their own seed rice and may give rise to problems in collecting water use charges. Full attention must be given to the fact that, without creation of land record and identification of farm households that will benefit from the irrigation canal, difficulties may arise in collecting water use charges, which, in turn, may result in inability to operate and maintain the irrigation facility. Furthermore, creation of land record leads to legal establishment of private ownership. This means that land can be used as collateral which is a requirement for agricultural financing to function properly.

Collection of water use charges were done by the Farmer Support Center this year with JOCV members playing the key role. However, water users' association (intake managers at each water users' association) will have to do this job in the future. JOCV members have expressed their concern about the inability of water users' associations in collecting water use charges after few intake managers have responded to their call for a meeting. As many experiences in the developing countries show that collection of water use charges rarely work perfectly, the course of events in Lao PDR require careful observation.

Only 30% of main canals are lined and there are even curved sections that are not lined. This has resulted in serious problem of damaged canals and is requiring a large amount of operation and management cost, even though lining will not necessarily solve all of the problems. Linings are also damaged and repairing cement sections reveals other problems of difficulty raising the funds to purchase cement and shortage of repair engineers. The fact that mount canals that can be repaired by farmers are easier to maintain must not be overlooked.

Considering the geographical features of Lao PDR, there are some areas that can be irrigated by building dams. Incidentally, the budget for KM35 Project has amounted to approximately 230 billion kip, not including the construction cost of terminal waterway paid for by the farmers. The project, however, only irrigates 700ha for paddy crop in dry season. As mentioned earlier, the government budget for irrigation development in fiscal 1994/95 was only 3.3 billion kip. Under the present circumstances where the government finance is hard-pressed and dramatic increase in irrigation budget cannot be expected, the feasibility of irrigation development implemented in the form of KM35 Project is likely to become extremely low. If that were the case, the existing method in which the government purchases the pump and the farmers cover the cost of building field canal by using agricultural credit would be more realistic.

5. Water Users' Association and Its Charter

Water users' association will have to be organized for operation and management of irrigation facilities because of their public goods nature. The scale of water users' associations in Lao PDR varies widely and hence the number of their beneficiary farm households (members) is also considerably dispersed. A report from the World Bank entitled "Lao PDR: Public Expenditure Survey, 1997" has concluded that: 1) it is impossible for village-level engineering and operation organizations to operate and maintain large-scale irrigation and this has resulted in inefficient management of such irrigation facilities, and therefore 2) investment should be limited to the construction of irrigation facilities with irrigated area of 100ha or less. These points deserve some attention.

While the work for organizing water users' associations to control farm households that benefit from irrigation is under way, little can be said about the problems of water users' associations because of their short history. However, according to many experiences of the developing countries, it is not rare that collection rate of irrigation charge does not reach 50%. As a result, operation and management of irrigation facilities are not performed properly and poor efficiency of irrigation system is manifested. As for KM35 Project, the leader of water users' association has said that "collection rate of irrigation charge is 100% with farmers actively participating in operation and management of the canal (e.g. weeding and simple repair)." This may be partly attributable to the fact that this is the first year irrigation is carried out. In the case of KM35 Project, beneficiary farmers of terminal waterways form a lower branch of water users' association at each intake in addition to water users' association exercising overall control. Since the average number of farm households at end field is only 9.3, they are believed to comprise peer groups that realize relatively easy organizational management as water users' association units.

However, the evaluation of water users' associations in Lao PDR has not been fixed and opposite evaluations do exist. NGOs and the Lao government are recommending community-managed irrigation (hereafter "CMI") and urging the Department of Irrigation to give investment priority to CMI. For this reason, the government has given legal entity to water users' associations (Implementing Guidelines for the Ministerial Decree on Water Users Associations, 1997). In addition, District Agricultural Forestry Service Office (DAFSO) under the Irrigation Bureau is engaged in organizing water users' associations.

DAFSO identifies regions where CMI projects are feasible and explains the project to local farmers to obtain their consent to participation in the project. Then it supervises the design and construction of irrigation facilities and goes so far as to monitor the water users' association. If that were the case, whether DAFSO has the personnel to perform such work will

be the key to the future irrigation development projects. Meanwhile, many problems have been pointed out with regard to operation and management of irrigation system in developing countries. Water users' associations, in particular, have the tendency of not functioning effectively when they cover more than one village. This means that water users' associations function better in village-level pump irrigation schemes than in large-scale irrigation projects as represented by KM35. Diffusion of pump irrigation would be appropriate from this viewpoint as well.

6. Conclusion of This Chapter

Achievement of self-sufficiency in rice is a prerequisite for the economic development of Lao PDR. Increase in rice production will become possible in Lao PDR through reclamation of the still remaining land frontier and diffusion of dry season rice cultivation with the help of irrigation. In this survey, a strategy was examined for the latter approach. Irrigation will have profound effect in the sense that it will enable rice cultivation in dry season when land productivity becomes higher than in rainy season. The points that need to be considered in connection to this are: 1) the tight financial condition of the government and 2) operation and management of water use facilities.

With regard to the former, construction of irrigation facilities paid for by the farmers would be an inevitable choice as long as the government budget is limited. Considering the fact that hardly any paddy had been planted in dry season, dry season paddy realized through irrigation would enable farmers to pay a corresponding amount for this purpose. Under the present circumstances, however, terminal waterways for taking advantage of the irrigation infrastructure built by the government have not been built and has had negative effect on the efficiency of investment. This is the result of shortage of loans from the Agriculture Promotion Bank, which is supposed to support the farmers in paying for their facilities. So long as foreign aid is deeply involved in both the construction of irrigation facilities and financing for the Agriculture Promotion Bank, aid policy must be prepared in view of the balance between the two. Although many problems have been pointed out with regard to the present situation of the Agriculture Promotion Bank, they do not negate irrigation strategies implemented under government-private complementation. Investment in irrigation through government-private complementation is indispensable for the Lao government suffering from shortage of funds in diffusing irrigation. Moreover, payment for irrigation development by the beneficiaries by way of the Agriculture Promotion Bank can be seen as agricultural taxation for the increased

agricultural income of farm households. In this sense, it is necessary to raise the effective interest rate and increase the amount of loans offered by the Agriculture Promotion Bank.

The experience of many developing countries suggests that operation and management of water use facilities will encounter many difficulties. It is necessary for water users' associations in charge of managing the water use facilities to function fully and an organization having the function of supervising water users' associations is indispensable for this purpose. DAFSO is the direct supervisory body in Lao PDR. Whether fully trained personnel can be fully secured will largely determine the future of operation and management of irrigation facilities. Training such personnel would have to be considered as the subject of aid as well.

Table 1 Rice Cropping in Lao PDR

		1980	1985	1990	1995	1996
Harvested Area	Rain Season	426.9	383.1	392.4	367.3	363.1
('000ha)	Dry Season	7.7	10.0	12.0	13.6	18.0
	Slush and Burn Cultivation	297.4	270.3	245.9	179.0	172.6
	Total	732.1	663.5	650.3	560.0	553.7
Production	Rain Season	705.0	1023.3	1081.1	1071.3	1076.0
('000ton)	Dry Season	11.9	26.5	41.1	50.4	71.5
	Slush and Burn Cultivation	337.0	345.3	369.4	296.1	266.0
	Total	1053.1	1395.2	1491.5	1417.8	1413.5
Productivity	Rain Season	1.65	2.67	2.76	2.92	2.96
(ton/ha)	Dry Season	1.44	2.65	3.40	3.71	3.98
	Slush and Burn Cultivation	1.13	1.28	1.50	1.65	1.54
	Average	1.44	2.10	2.29	2.53	2.55

Source: Ministry of Agriculture and Forestry, Agricultural Statistics of Lao PDR 1996, 1997.

Table 1-2 Irrigated Area by Type (in Dry Season) 1996

	Total	Weir	Pump	Gravity Irrigation	Reservoir
Northern Region	7193	3040(7887)	-	3974 (251)	66 (19)
Phongsaly	1025	975(2961)	-	50 (6)	- (1)
Luangnamtha	674	93 (36)	-	435 (16)	34 (2)
Oudomxay	932	604 (703)	-	328 (29)	- (2)
Bokeo	578	500 (70)	-	65 (26)	12 (6)
Louang Phabang	1606	126 (71)	-	1480 (107)	-
Huaphanh	1005	250(2156)	-	755 (30)	- (1)
Xayaboury	1373	492(1890)	-	861 (37)	20 (7)
Central Region	19250	785(5455)	12141 (96)	2784 (132)	2857 (65)
Vientiane Municipality	7458	267(2000)	5846 (62)	31 (3)	1262 (3)
Xiengkhuang	-	-(1714)	- (2)	- (38)	- (12)
Vientiane	2320	38 (209)	1110 (9)	1097 (29)	30 (6)
Borikhamxay	210	189 (433)	-	11 (10)	10 (12)
Khammuan	4390	- (300)	3075 (12)	1110 (13)	165 (5)
Savannakhet	4853	272 (655)	2110 (11)	535 (32)	1390 (26)
Special Region	19	19 (144)	-	- (7)	- (0)
Southern Region	2417	273 (233)	799 (27)	1320 (70)	5 (1)
Saravan	710	143 (20)	130 (17)	412 (19)	5 (1)
Se Kong	82	- (0)	-	82 (11)	-
Champasak	1550	80 (207)	669 (10)	801 (20)	-
Attapeu	75	50 (6)	-	25 (20)	-
Dry Season Irrigated	28860	4098(13575)	12940(123)	8078 (452)	2928 (85)
Rain Season Irrigated	156000	77299	26014	38174	9265

Table 2 Rate of Irrigated Area Dry Season / Rain Season

Northern Region	14.68%	10.82%	-	20.63%	5.43%
Central Region	21.20%	1.90%	50.98%	21.55%	35.52%
Southern Region	14.92%	5.30%	36.33%	22.04%	100.00% *
Rate of Rain Season /Dry Season	18.50%	5.30%	49.74%	21.16%	31.60%

Source) Same as Table1

Note 1 Although the weir is temporal, Gravity Irrigation facility is permanent

Note 2 Parentheses shows No. of the irrigation units.

Note 3 Noted that irrigated area is only 5ha.

Table 3 Irrigated Area by Irrigation Unit

(ha)

	Weir	Pump	Gravity Irrigation	Reservoir
Northern Region	0.39 (3.56)	-	15.83 (76.74)	3.47 (64.00)
Central Region	0.14 (7.59)	126.47(248.07)	21.09 (97.88)	43.95 (123.75)
Southern Region	0.85(33.45)	29.59 (81.44)	18.86 (85.57)	5.00 (5.00)
Average	0.30 (5.69)	105.20(211.49)	17.83 (84.27)	34.44 (109.00)
Rate of Dry Season and Rainy Season	5.3%	49.7%	21.2%	31.6%

Source) Calculated from same source of Table1

Note) in parentheses is irrigated area in rain season

Table 4 Budget Allocation of Ministry of Agriculture and Forestry (not include foreign aid)

1,000,000Kips

	1990/91		1991/92		1992/93		1993/94		1994/95	
In Detail	Kip	%	kip	%	kip	%	kip	%	Kip	%
Cabinet Office	87	5.2	22	0.9	20	0.7	57	1.5	126	2.4
Agricultural Extension	116	7.0	168	7.2	151	5.2	157	4.2	381	7.4
Cattle	70	4.2	119	5.1	138	4.2	138	3.7	169	3.3
Irrigation	743	44.4	817	34.7	2213	62.4	2213	59.7	3302	63.8
Meteorology and Hydrology	35	2.1	86	3.6	118	2.7	118	3.2	146	2.8
Forestry	71	4.2	249	10.6	235	6.0	235	6.3	294	5.7
Rural Development	208	12.4	533	22.7	436	8.6	436	111.8	517	10.0
Personnel	342	20.4	359	15.3	354	10.1	354	9.5	239	4.6
Total	1673	100.0	2354	100.0	3709	100.0	3709	100.0	5173	100.0

Source) World Bank, Lao PDR Public Expenditure Review, 1997.

Table 5 Public Investment

(Unit: 1,000,000,000kips)

	1995			1996		
	Domestic	Foreign	Total	Domestic	Foreign	Total
Gross Total	365.5	1454.4	1819.9	483.9	1577.6	2061.5
Agriculture and Irrigation	46.6	205.3	251.9	74.1	164.4	238.5
Manufacturing and Handicraft	15.7	221.8	237.5	25.4	427.6	453.0
Communication and Construction	158.2	706.2	864.4	193.1	630.9	824.0
Education	46.2	181.9	228.1	48.3	112.8	161.1
Health	16.1	61.5	77.6	26.4	112.0	138.4
Culture	17.2	0.0	17.2	22.6	3.6	26.2
Social Welfare	6.0	11.7	17.7	10.6	88.3	98.9
Dwelling	49.5	12.0	61.5	70.0	0.0	70.0
Rural Development	10.0	54.0	64.0	13.4	38.0	51.4

Source: State Planning Committee, Basic Statistics, 1996.

Table 6 Ownership and Sales of Cattle

Table 6-1

	Owned					Sold (Past one Year)										
	Oxen	Cows	Male Buffalo	Female Buffalo	Pigs	Chicken	Duck	Oxen	Cows	Male Buffalo	Female Buffalo	Pigs	Chicken	Duck	Cultivated Area ha	Shortage of Rice
Pakse																
a	3	4	1	1	0	20	0		2						2	800kg
b	1	6	3	2	1	30	0	1		1			10		2.12	150kg
c		5		2	1	30									2	150kg
d			3	2		50							35		1(2)	180kg
e			3	1	1	12	30		1			1	20		3.7	400kg
f				2		10						1	10	10	2	200kg
g	5			1	1	15		1					20		(1)	750kg
h	1	1	1	1		15							20		1.5(1.5)	1800kg
i			1	4		9	14			2					1.5	1100kg
j					1	30	14				1				2.32	1000kg
k				5		10									2	300kg

Table 6-2

Savannakhet (One Crop Farm Household)																
a.				6	1	10					1				2	
b.	2		1			10		5			2	2			2.5	
c.	2		1		1	5	1								2	
d		2	1		1	5	1								2	120kg
e	2	4	1		1	6									2	
f	1				2	20									2	
g	3	2	1		3	25									1.6	
h				3	3	10		1		1					3	
i					3	30	10					5			2.5	280kg
j	2	4	1		1	10						1	10		1	100kg
k			1		1	10	1								1	
l				1		10									1.4	
m			2		1	13		1				1			2.5	100kg
n			1			20				1		1	20		3	
o										1					2.89	for funeral
p			1		6										1	36kg

Table 6-3

Savannakhet（Two Crops Farm Household）																
a			1		1	5									1.5	
b		2		1	1	32	8								1.2	250kg
c		1	1		2	30									2	
d	1	1	2	1		20									2	100kg
e		3	2		1	10							10		2	
f		6	1			10	2								1.5	
g	7		2	2		30			1	1					2	

Table 7 Water Courses

	Kips	Length (m)
1	10,270,177	450
2	9,103,081	500
3	8,264,490	525
4	23,988,568	550
5	3,841,434	200
6	10,734,908	600
7	8,349,927	382
8	5,025,509	225
9	15,310,049	725
10	24,861,378	900
11	5,270,497	300
12	7,195,408	400
13	12,246,339	575
Total	144,461,765	6332

Note: Data on the 13 water courses approved by Agricultural Promotion Bank

Table 8 Application to and Approval of Loan for Irrigation Facilities from Agricultural Promotion Bank

1,000,000kip

	Application		Approval	
	Amount	Size (ha)	Amount	Size (ha)
1991	150	200	150	200
1992	-	-	-	-
1993	326	400	326	350
1994	5335	4290	144	150
1995	9650	11100	1000	2540

Source: Department of Irrigation

Figure 1 Map of KM 35 Project Area

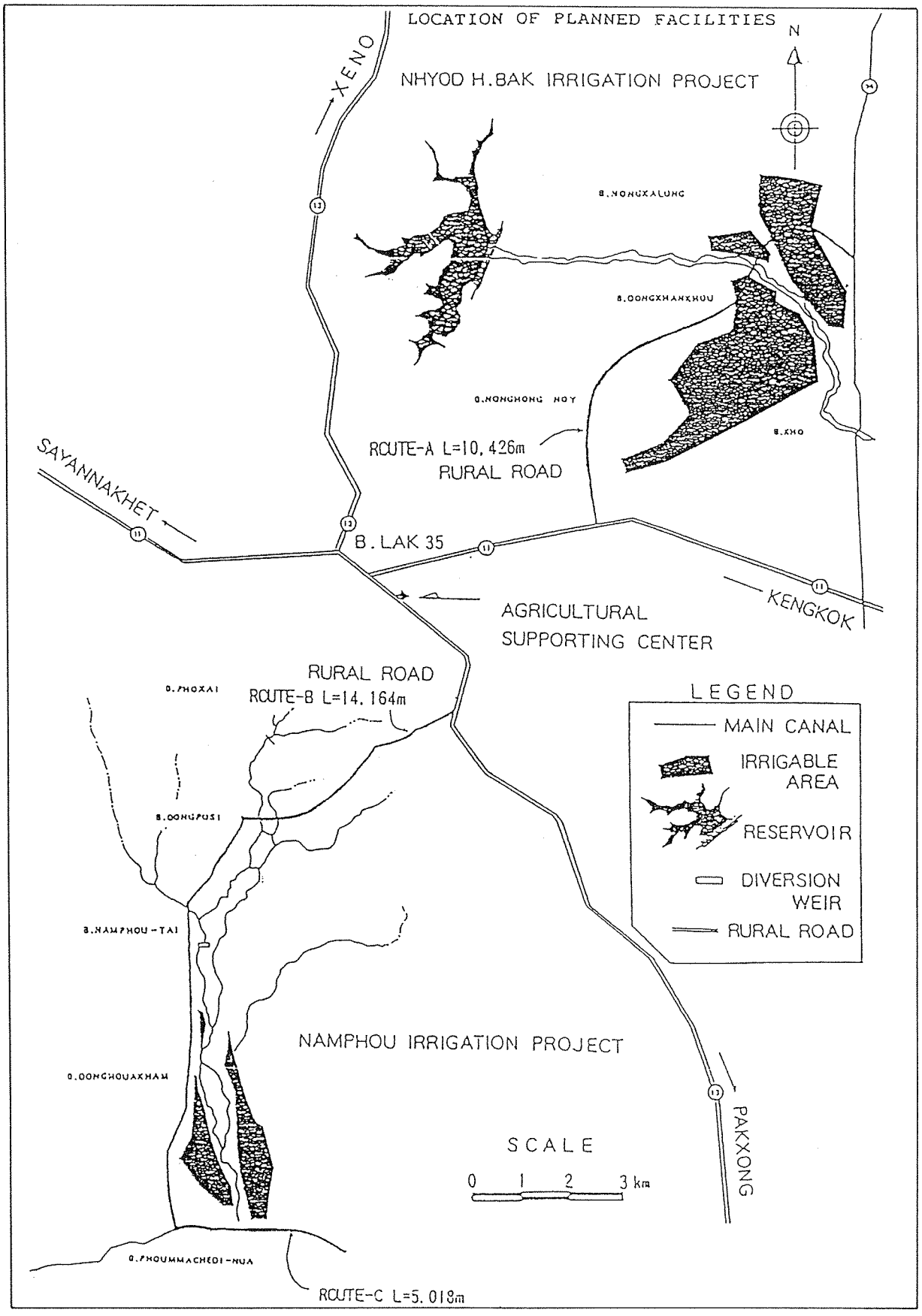


Figure 2 Main Distributary in Houai Xail District

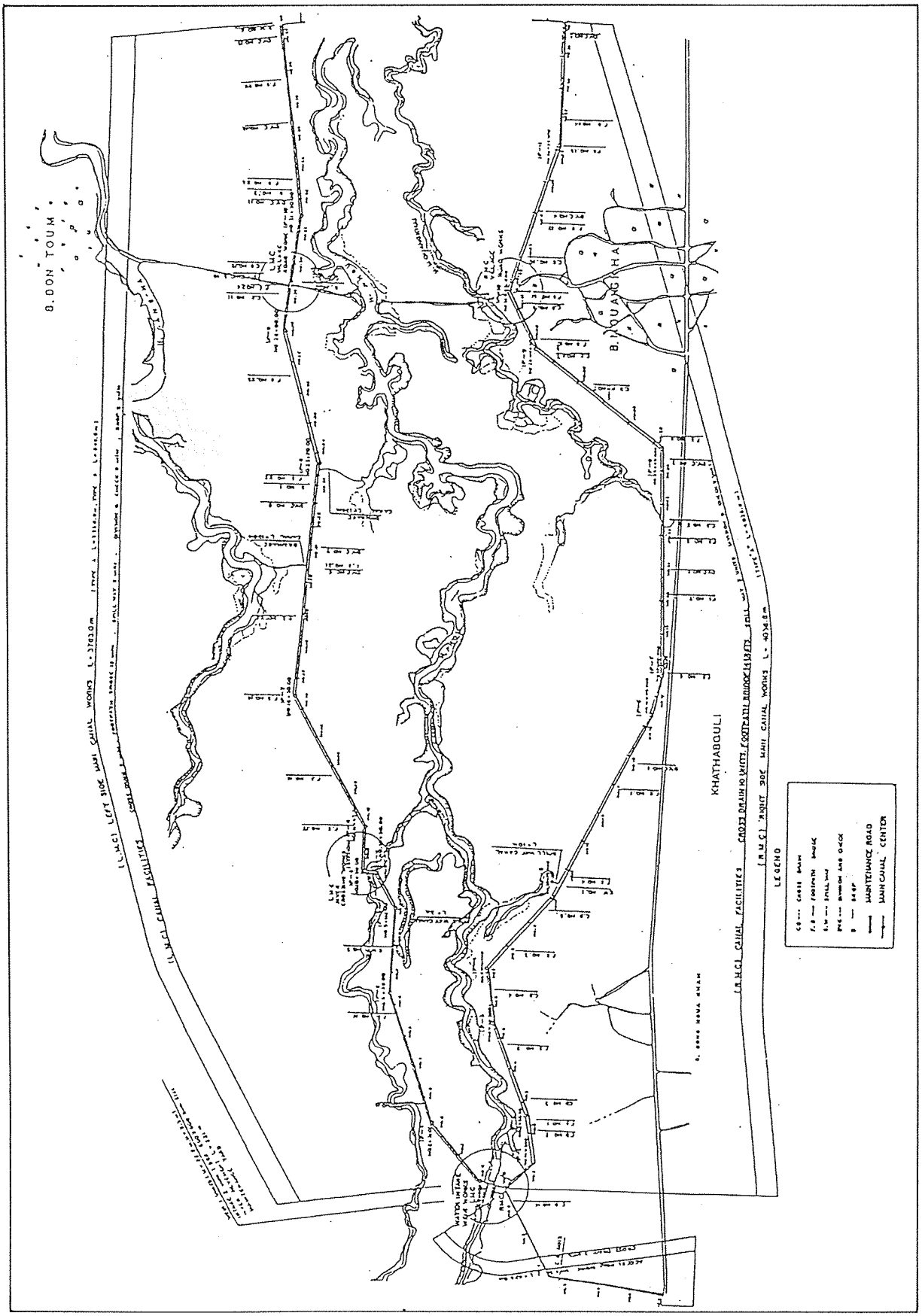
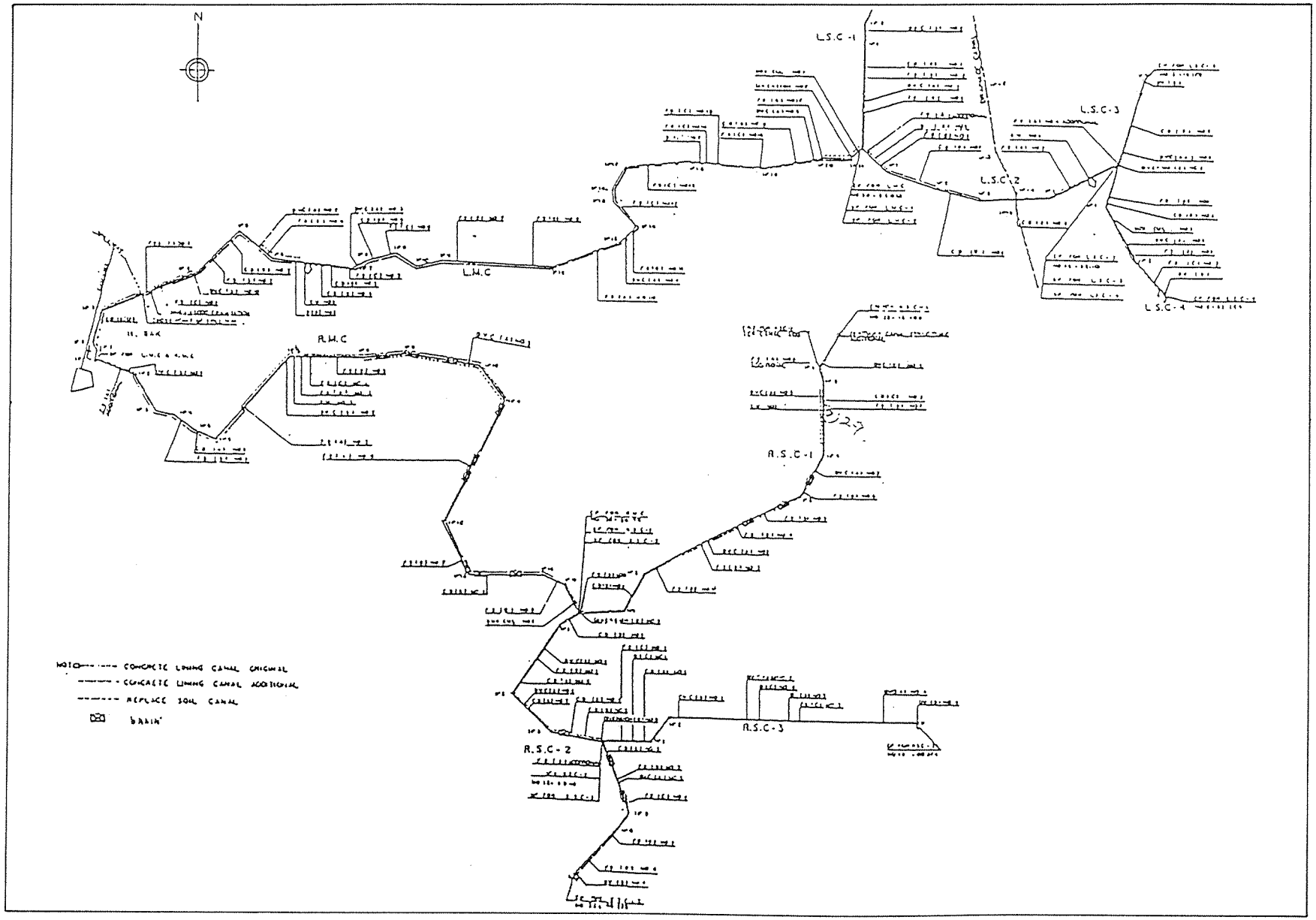


Figure 3 Main Distributary in Houai Bak District



Chapter Five

Tasks and Outlook of Agricultural Development in Lao PDR

1. Agricultural development in socioeconomic development plan
2. Food self-sufficiency
3. Promotion of cash crop and stock farming
4. Stabilization of shifting cultivation
5. Fundamental strategy for agricultural development

Chapter Five

Tasks and Outlook of Agricultural Development in Lao PDR

1. Agricultural Development in Socioeconomic Development Plan

Agricultural sector (including forestry, fisheries and stock farming) is still the most important sector in the national economy of Lao PDR. In terms of gross domestic product, 52% is produced from the agricultural sector and some 90% of the workers are engaged in the agricultural sector. Therefore, agricultural development should be the most important task not only for solving the food problem but for the development of the entire national economy of Lao PDR.

It was in 1986 that the government decided to adopt the "New Economic Mechanism" and carried out a systematic reform in the direction of strengthening the market incentive for individual farm households in the agricultural sector. This resulted in liberalization of the market and elimination of trade barrier as well as redistribution of production resources to individual farm households. Although the subsidies toward production factors were discontinued from the viewpoint of government finance, giving economic incentive to individual farm households had a significant effect and enabled the agricultural sector of Lao PDR to increase its production.

The 1991-1995 Mid-Term Socio-economic Plan prepared in 1991 included the following as priority items for agricultural sector: 1) stable supply of food; 2) reduction of slash-and-burn farming; 3) promotion of cash crop, animal products, tree planting and fisheries; 4) improvement of agricultural infrastructure, particularly irrigation; 5) establishment of agricultural and forestry research institutions; and 6) human resource development. They were the items positioned as the priority area for realizing the basic policy for carrying out agricultural development in line with the market mechanism.

Moreover, the Lao government announced the New Socioeconomic Plan with the target year of 2000 in view of each economic development in October 1996 (see Chapter 2 of this report). In this plan, actual development target and strategy in agricultural sector were provided as described below.

i) Increase rice production to 20 million tons by the year 2000. Increase of paddy rice field and expansion of paddy rice cropping area are needed to achieve this goal. In concrete terms, paddy rice planted are a will be expanded by 100,000ha, of which 25,000ha are dry season crop realized through expansion of irrigation facilities. In addition, yield will be increased by 26% in rainy season and by 10% at irrigated paddies through diffusion of improved varieties and adequate use of machinery, fertilizers and agrichemicals.

ii) Promote cash crop, stock farming and fisheries. Production of sugarcane, maize, tobacco, cotton, vegetables, coffee, legumes and forestry byproducts (e.g. cardamom, benzoin) will be promoted.

iii) Stabilization of slash-and-burn shifting cultivation, while seeking settlement of moving farmers through conservation and restriction of forest cutting.

These are the development targets and strategies in the agricultural sector that are currently being emphasized by the Lao Government. The challenges faced by agricultural development and the potential of such development will be examined in the following based on our study, including the last year's study

2. Food Self-Sufficiency

A large gap currently exists between the target value and actual situation with regard to the target for increasing rice production, and the achievement of the target seems to be difficult. Rice production remained stagnant partly due to flood and drought that continued for 2 years from 1995 to 1996 in the southern region. Although it recovered in 1997 to the extent that

achievement of self-sufficiency was said to be possible, the likelihood of significant increase in stable supply for meeting domestic demand being achieved under the present trend is small. Rain-fed paddy cultivation during the rainy season in Lao PDR is a reasonable farming method for the farmers that organically links farm animals with forests and lives along with the law of nature. Therefore, no major problem seems to exist under the present system. Thus, one of the major causes behind slow progress of intensification and area expansion of rice production sought by the government is the passiveness towards innovative attempts that are accompanied by pain and risk such as reclamation of farmland and introduction of irrigation investment and new technology.

Aside from those issues related to motivation of farmers, the following tasks still exist in increasing rice production.

The first task concerns reclamation of unused land in 6 major plains for expansion of lowland rice paddy during the rainy season. However, there are apprehensions about such reclamation of unused land resulting in depletion of roughage resource for buffaloes and cattle during the dry season. This is because much of unused land is forest and the undergrowth of forests in plains is offering precious roughage for buffaloes and cattle.

In addition, a plan to increase land productivity for rainy season crop by 26% at rain-fed paddies is under consideration. However, introduction of new technology mainly consisting of improved varieties run the risk of magnifying production fluctuations with little expectations for improved productivity.

The chances of irrigation stabilizing rainy season crop and expanding dry season crop area must also be examined. In Lao PDR, irrigation development projects have been implemented in some regions to offer supplementary irrigation in rainy season and full-scale irrigation in dry season through construction of weirs and reservoirs, and through installation of pumps on Mekong River and its tributaries. Examples of such projects include small-scale gravity irrigation project in the northern montane area, KM6 in Vientiane (pump irrigation from rivers), KM35 in Savannakhet (irrigation project through weir and dam construction) and projects using pump irrigation from rivers at Savannakhet and Champasak.

These irrigation development projects are expected to bring about significant investment effect once the irrigation facilities are completed and the farmers are able to maintain and effectively utilize the facilities as public goods. However, the existence of the following problems must not be overlooked.

With the exception of small-scale irrigation development projects that are implemented under the NGO system, construction of dams, weirs, reservoirs and main canals as well as purchase of pumps are financed by the government. Nevertheless, as the Lao Government is unable to fully secure the irrigation budget because of its serious budget deficit, a system based

on the benefit principle in which farmers are taking loans from APB (Agricultural Promotion Bank) for construction of irrigation facilities and purchase the construction materials has been adopted. However, a large gap exists between the amount of funds available for loan and the amount of funds desired by farmers due to the shortage of funds at APB. This has resulted in inefficient use or no use of facilities as plans to build terminal canals are delayed. Moreover, a big question exists as to whether the farmers' water users organizations that will have to be in charge of managing and maintaining the irrigation facilities for their effective utilization, will be formed after such facilities are built.

Furthermore, even if irrigation facilities are successfully built, the following difficulties are expected to arise at the time of introducing new technology (such as mechanization of fertilizer management) subsequent to the introduction of dry season crop. Firstly, there is a problem of seed rice renewal, i.e. the drop in yield after 2 to 3 years when farm households continue to use their own seeds. When dry season crop is introduced, it would be reasonable enough from the economic point of view to use tractors and threshing machines to avoid competition between rainy season crop and dry season crop over production resources. However, the purchase of these machines by individual farm households would result in over-investment. Therefore, it would be necessary to develop a rental market of such machinery. Such market has not been sufficiently formed in Lao PDR. Another problem is the absolute shortage of technical staff that is crucial for diffusion the new technologies in the rural areas.

3. Promotion of Cash Crop and Stock Farming

Cash crops such as cotton, tea, maize, sugarcane, groundnuts, fruits and vegetables are either finding their outlet only in the local market or losing the market to imports because of their low quality that results from the use of local varieties. Meanwhile, despite its increase in export, coffee has low quality due to lack of proper drying, threshing and sorting, and is being trade at low prices worldwide.

It is necessary to secure the outlet to expand the production of cash crops, and this requires introduction of new technology, especially improvement of host harvest techniques and improvement of marketing. However, many of the farmers in Lao PDR are accustomed to the old farming method that follows the law of nature. Under the present circumstances where farmers and merchants can obtain a certain amount of income from the traditional method, it would seem difficult to motivate them to engage in transactions beyond their traditional realm of business and introduce new technology or trade with overseas. Although hopes are high for

expansion of cash crop and stock farming production in highland regions such as Bolaven and Xieng Khuang, village roads have not been built except in the coffee region.

Emphasis is being placed on promotion of stock farming as a method for increasing the cash income of farm households. The number of cattle and buffaloes raised per household is large compared to neighboring countries, making them one of the few export items. However, the existence of market licensing system and export allotment system may lower the net profit of farm households and hinder the intention to invest in cattle raising. In addition, as these large animals have been raised by linking them organically with traditional rice cultivation and forest, considerations must be given about maintaining balance with cultivated area/forestland and securing roughage resource when increasing the number of cattle. High mortality rate of livestock in general owing to incomplete epidemic prevention system has been pointed out, and measures against contagious diseases such as hemorrhagic septicemia are insufficient.

Native breeds of swine and poultry are being raised in a very extensive manner. Although they are not fattened efficiently, they are raised at low cost and offer important source of side cash income and source of food for the farm household. While certain number of small and medium animals will have to be raised to increase their number, many questions including "how to procure feed," "would the use of purchased feed pay if it is used for native breeds" and "whether improved breed and the system for diffusion of their breeding technique are in place" will have to be answered.

As for fisheries in Lao PDR, the government does not have any strategy for fisheries development, and the incompleteness of fisheries statistics as well as unavailability of fisheries research and development system, fry production and distribution system have been pointed out as obstacles for development.

4. Stabilization of Shifting Cultivation

In Lao PDR, upland rice crop being grown through slash-and-burn is more important compared to other countries because of her prevalent inclined surfaces (accounted for 31% of harvested rice crop area in fiscal 1996). However, the upland rice crop area has continued to drop at an annual rate of 2.6% between 1980 and 1996.

Cash crops such as maize, cassava, vegetables and opium are being grown in addition to upland rice in slash-and-burn cultivation, and total slash-and-burn area expanded by 73% mostly in the north during the '80s. In addition, its causal relation with rapid decrease in forest area in the recent years has been pointed out. The destruction of forest has been accelerated by the reduction in fallow period of slash-and-burn farming due to increase in population, as well

as the degeneration of slash-and-burn, an environmentally-friendly farming method by nature, into an environmentally destructive farming method as a result of migration triggered by political and social factors. According to the Lao Ministry of Agriculture, forest destruction will not only assert negative impact on the environment but inflicts enormous damage to agricultural production through soil erosion, soil degradation, abnormal reduction of river water volume and frequent occurrence of drought and flood.

The Lao Government is trying to stabilize slash-and-burn shifting cultivation by recommending a switch from the old slash-and-burn cultivation to stock farming, paddy rice cropping and cash crop cultivation on slash-and-burn field. In such slash-and-burn cultivation, conversion from upland rice to paddy rice will also have an important meaning.

As for measures for stabilizing slash-and-burn, zoning of agricultural land and non-agricultural land as well as projects for fixing land use rights are being carried out in some areas in addition to conversion from slash-and-burn to promote stabilization and preserve the forest. Knowledge and skills in surveying and hydrology are needed in addition to collection of large amount of information, in order to perform the zoning properly in the light of its forest protection and water conservation. Also work such as surveying and creation of land record are needed for fixing land use rights. Although the cooperation of experts having sufficient knowledge and skills as well as the existence of many competent local staff are essential for extensive implementation of such work, the number of these people are extremely limited under the present circumstances.

5. Fundamental Strategy for Agricultural Development

To reiterate the point, rural and agricultural development, which involves the majority of population, is the key to economic development for entire Lao PDR. The three pillars of agricultural development are: stable supply of food; promotion of cash crops that also contributes to earning foreign currency; and stabilization of cultivation in slash-and-burn regions including resource conservation.

Despite these developmental tasks, agricultural development in Lao PDR is currently placed under enormous restrictions in terms of human resources and social infrastructure. The financial base of the government is also very weak especially in the current stage of systemic transition to market economy.

Therefore, it will become indispensable to approach development in a small-scale yet comprehensive manner by combining agricultural development and human resource development such as education and medical care at the local level, instead of making all the

decisions from the above such as the central government level. It will also be important, when planning assistance and cooperation from overseas, to take the weakness of the Lao PDR government's capability to implement development plan and receive foreign cooperation into consideration and take an approach that would require active participation of local residents.

Chapter Six

Survey Members and Itinerary

1. Survey Members
2. Cooperators
3. Itinerary
4. Collected Materials Lao PDR1996-1997

Chapter Six

Survey Members and Itinerary

1. Survey Members

(1) Committee in Japan

Shigeto Kawano	Professor Emeritus, the University of Tokyo
Yonosuke Hara	Professor, Institute of Oriental Culture, the University of Tokyo
Seiichi Fukui	Professor, Faculty of Economics, Osaka Gakuin University
Akihiko Ohno	Associate Professor, Faculty of Economics, Osaka City University
Motoyoshi Suzuki	Associate Professor, Mie National University
Tomomi Otsuka	Associate Professor, College of Humanity and Science, Nihon University
Tsuguo Hirose	Executive Director/ Secretary General, The Asian Population and Development Association
Osamu Kusumoto	Senior Researcher, The Asian Population and Development Association
Haruyo Kitabata	Manager, International Affairs, The Asian Population and Development Association

(2) Preliminary Survey Members (20th July -27th July)

Osamu Kusumoto	Team Member (See above)

(3) Survey Members (7th September---21st September)

Seiichi Fukui	Team Leader (See above)
Akihiko Ohno	Team Member (See above)
Mitsuru Sonoe	Team Member Visiting Research Fellow, (Kyoto University), Institute of Research on Culture, Lao PDR
Osamu Kusumoto	Team Member (See above)

2. Cooperators

(1) JICA and Others

Akira Hashimoto	Expert (Irrigation), JICA
Yasuyuki Kono	Resident representative, Bangkok Liaison Office The Center for Southeast Asian Studies Kyoto University
Hiroshi Ogawa	JOCV Senior KM 35 Project
Manabu Hayashida	JOCV Senior KM 35 Project
Tsutomu Watanabe	Resident Representative, Mitsui Co. Lao PDR

(2) Government and Institutions

Khampiou Vissapra, Deputy Director General, Ministerial Cabinet, Ministry of Agriculture & Forestry.

Oudone Sisingkham, Deputy Chief of the Division, Committee for Cooperation & Investment, Ministry of Agriculture and Forestry.

Tanousay Ounthouang, Deputy Director General, Department of Irrigation, Ministry of Agriculture and Forestry.

Herman Rodenburg, Expert Participatory Training in Gender in Development, Farmer Irrigated Agriculture Trainig Project (FIAT), FIAT/ UNDP

Sonedala Phinioth, Deputy Chief, Planning, cooperation & Investment Division, Department of Irrigation, Ministry of Agriculture and Forestry.

Khampou Phanthavong, Irrigation Engineer, Department of Irrigation, Ministry of Agriculture and Forestry.

Vixay Xaovana, Deputy Director, National Statistical Center, State Planning Committee.

Khamlien Pholsena, Deputy Director, Department of Planning, State Planning Committee.

Boun Nhou Hanvichid, Program Officer, UNFPA.

Soukaseum Bodhisane, Vice- Governor, Savannakhet Province.

Phoumy Phoumanivong, Director of PAFSO, Savannakhet Province.

Bouakham Sisoulath, Coordinator, Savannakhet Provincial Administration office, Savannakhet.

Thong Rasphone, Project Director, Km 35 Project, Savannakhet.

Sing Phachansithy, Deputy Project Director, Km 35 Project, Savannakhet.

Thong Ohune, Deputy Administration, Provincial Agricultural and Forestry Service Office (PAFSO) Champasak.

Ponh Phet-oneta, Deputy of Agriculture, Provincial Agricultural and Forestry Service Office (PAFSO) Champasak.

Saly Siriphokha, Haed Irrigation Sectoion, Provincial Agricultural and Forestry Service Office (PAFSO) Champasak.

Nokham Ounesavanh, Chief, Office of Land and Forestry allocation, Provincial Agricultural and Forestry Service Office (PAFSO) Champasak.

Boona Phannavong, Deputy of Livestock and Fishery Section, Provincial Agricultural and Forestry Service Office (PAFSO) Champasak.

Saksy Thavone, Head Credit, Agricultural Promotion Bank.

Phouang Phouthavong, Acting Head of Department, Electrical Engineering Department, Faculty of Electrical and Architect Engineering, Lao National University.

Pheuiphet Sadaoheung, Lecturer, Department of Electronics, Faculty of Electrical and Architect Engineering (National Polytechnic Institute), Lao National University.

3. Itinerary

Preliminary Survey

From July 20th to 27of July

Date		
July 20 (Sun.)	・11:00 Depart from Narita by JL 717 Arrive at Bangkok 15:15	
July 21 (Mon.)	・10:30 Depart from Bangkok by TG690 Arrive at Vientiane 11:40 ・Visit to UNDP Representatives. Briefing on international cooperation in southern region from Ms Mikiko Saksaki, Assistant Representatives UNDP ・Visit to the Ministerial Cabinet, Ministry of Agriculture and Forestry. Discuss about the programme of preliminary survey. ・Visit to JICA Expert Office. Discuss about the programme of preliminary survey with Mr. Akira Hashimoto, JICA Expert.	
July 22 (Tue)	・Visit to the Ministerial Cabinet, Ministry of Agriculture and Forestry. Briefing on the Agricultural and rural development policy , and major issues on Agriculture in Laos from Mr. Khamphiou Vissapra, Deputy Director General and discuss about the preparation for field survey (Whole program and etc.). ・Visit to Department of Planning, State Planning Committee. Briefing on the 4th five year plan, population policy, and rural development program in Lao PDR from Dr. Khamlien Pholsena, Deputy Director, Department of Planning. ・Visit to JICA Expert Office. Briefing on present situation of assistance from JAPAN from Mr. Akira Hashimoto.	
July 23 (Wed.)	・Visit to Ministry of Labour and welfare. Discuss about wedge differences between agricultural and industrial sector with Deputy Director Mr. Somnuk Vorasarn. ・Meet with Mr. Sonoe Mitusru, Visiting Research Fellow, Institute of Research on Culture, Ministry of Information and Culture, and discuss about agricultural feature in southern part of Lao. ・Material Collection. ・Visit to Department of Statistics, State Planning Committee. Discuss about the statistics with Mr. Visay Xaovana, Deputy Director of Department.	
July 24 (Thu.)	・Visit to MITSUI Co. LTD in LAO PDR representative office. Discuss about agricultural and rural development in Savanakhet and Champasak with Mr. Tustomu Watanabe, Representative of MITSUI Co.LTD. ・Discuss about survey programme coordination with Dr. Seiichi Fukui. ・Visit to UNFPA Country office. Briefing on population programme in Lao PDR from Dr. Boun Nhou Hanvichid, programme officer of UNFPA.	

	・Visit to Department of Irrigation, Ministry of Agriculture and Forestry. Briefing on irrigation agriculture of southern part of Laos and discuss about the field survey site with Mr. Tanousay Ounthouang, Deputy Director General join with Mr. Akira Hashimoto, JICA Expert. ・Visit to the Ministerial Cabinet, Ministry of Agriculture and Forestry. Discuss about the agricultural and rural development policy of Lao PDR as a member of ASEAN with Mr. Oudone Sisongkham, programme officer.	
July 25 (Fri.)	・Visit to Namgum Dam. Briefing of hydro power electric generations. Generation from staff of LAO electric Co. Ltd. ・Visit to the Ministerial Cabinet, Ministry of Agriculture and Forestry. Discuss about main program and coordination of main survey with Mr. Khamphiou Vissapra, Deputy Director General. ・Meet with Dr. Siho Bannavong M.P., Vice president of LAO Front for National Construction and discuss about the survey programme.	
July 26 (Sat.)	・Meet with Mr. Yutaka Hirata, Minister of the Embassy of Japan in Lao PDR and report the survey result. ・12:40 Depart from Vientiane by TG 691 arrive at 13:50 Bangkok. ・Meet with Mr. Shiv Khare, executive director of AFPPD and discuss about the preliminary survey to be conduct in September. ・22:30 Depart from Bangkok (Kusumoto) by JL 719	
July 27 (Sun.)	06:30 Arrive at Narita (Kusumoto)	

Main Survey

From September 4th to September 21st

Date		
Sep. 4 (Thu)	・11:00 Depart from Narita by JL 717 Arrive at Bangkok 15:15 (Kusumoto) ・11:45 Depart from Kansai by JL 623 Arrive at Bangkok 15:30 (Ohno) ・Discuss about preliminary survey in Thailand with Mr. Shiv Khare, Executive Director AFPPD.	
Sep. 5 (Fri)	・Material Collection (at Chulalongkorn University in Bangkok)	
Sep. 6 (Sat)	・Material Collection (at Chulalongkorn University in Bangkok) ・11:45 Depart from Kansai by JL 623 Arrive at Bangkok 15:30 (Fukui). ・Discuss about geographical and climatic situation of southern part of Lao PDR with Dr. Yasuyuki Khono, Resident Representative, The Center for Southeast Asian Studies, Kyoto University Bangkok Office.	
Sep. 7 (Sun)	・10:30 Depart from Bangkok by TG690 Arrive at Vientiane 11:40 ・Discuss about the survey Program in Lao PDR with Mr.Pheuiphet Sadaoheung, National University of Lao.	
Sep. 8 (Mon)	・10:30 Visit to Department of Irrigation, Ministry of Agriculture and Forestry. Briefing on irrigation agriculture of Laos and discuss about the field survey (irrigation aspect) from Mr. Tanousay Ounthouang, Deputy Director General. Join with JICA Expert, Mr. Akira Hasimoto. ・15:00 Visit to Ministerial Cabinet, Ministry of Agriculture and Forestry. Briefing on the outline of Agriculture and Rural areas in Laos from Mr. Khamphiou Vissapra, Deputy Director General and discuss about the preparation for field survey (Whole program and etc.).	
Sep. 9 (Tue)	・8:30 Visit to UNDP Representatives. Discuss about field survey with Ms. Mikiko Sasaki, Deputy Resident Representative of UNDP. ・10:30 Visit to Department of Planning, State Planning Committee. Briefing on the population policy and economic planning from Dr. Khamlien Pholsena, Deputy Director, Department of Planning. ・14:30 Visit to National Statistics Center, State Planning Committee. Briefing on the statistics of Laos from Mr. Vixay Xaovana, Deputy Director General, and Data Collection. ・15:30 Visit to UNFPA Representatives. Briefing on the population situation in LAO PDR from Dr. Boun Nhou Hanvichid, Program Officer (Kusumoto) ・15:00 Visit to Agricultural Promotion Bank (APB). Briefing on loan for irrigation in Savannakhet province (Dr. Fukui, Mr. Ohono).	

Sep.10 (Wed)	・08:00 Move from Vientiane to Savannakhet by car ・15:00 Visit to provincial agriculture and forestry service (PAFSO)of Savannakhet. Briefing on the outline of Agriculture and Rural Development from Mr. Phoumy Phoumanivong, Director of PAFSO Savannakhet and chose the site of field survey.	
Sep.11 (Thu)	・Visit to Km 35 project office. Briefing on outline of survey site and Km 35 project from Mr. Thong Rasphone, project director of Km 35. ・Visit to Ban (village)Dong Khan Khou (Irrigated area) and Ban Alang Vattana (non irrigated area). Conduct the questionnaire survey for Village chief of both village and collecting basic data of two village. ・Visit to Ban Dong Khan Khou. Conduct the questionnaire survey for village person.	
Sep.12 (Fri)	・Visit to Ban Dong Khan Khou. Conduct the questionnaire survey for village person. ・Visit to Water reservoir site for Km 35 project. ・Visit to Ban Allang Vattana. Conduct the questionnaire survey for village person.	
Sep.13 (Sat)	・Visit to Ban Allang Vattana. Conduct the questionnaire survey for village person. ・Visit to Km 35 project office. Discuss about paddy cultivation with Mr. Hirosi Ogwawa and Mr. Manabu Hayashida, JOCV Senior. ・Report the survey result of Savannakhet to Mr. Soukaseum Bodhisane, Vice Governor of Savannakhet Province.	
Sep.14 (Sun)	・Move from Savannakhet to Champasak by car.	
Sep.15 (Mon)	・8:30 Visit to agriculture and forestry service of Champasak province. Briefing on the outline of Agriculture and Rural development from Thong Phoune, Head Administration of PAFSO(Champasak Province) and discuss about the field survey with them. ・Visit to survey Ban Ngua Deang. Conduct questionnaire survey for village chief.	
Sep.16 (Tue)	・Conduct questionnaire survey at Ban Ngua Deang for paddy production area in flood plain. ・Visit to market and conduct hearing survey for price of agricultural product by Dr. Fukui and Mr. Kusumoto. ・Visit to Ban Saphai. Conduct the hearing survey on village industry (Hand weaving industry) Mr. Ono and Mr. Sonoe.	
Sep.17 (Wed)	・Field survey in Boraven Plateau on commercial crop production. Conduct hearing survey on Durian production, Coffee production, Tea production and Peanuts production (Dr. Fukui, Mr. Kusumoto). ・Field survey at Ban Saphai. Conduct the hearing survey on village industry (Mr. Ohno and Mr. Sonoe).	

Sep.18 (Thu)	・09:00 depart from Champasak 10:30 arrive at Vientiane by QV 202 ・Visit the FIAT(Farmer Irrigated Agriculture Training Project) Project office at Irrigation department, Ministry of Agriculture and Forestry. Briefing about the farmer training for irrigation from Ms. Hermlen Rodenburg, Expert FIAT.	
Sep.19 (Fri)	・10:30 Visit to Ministry of Agriculture and Forestry. Report the survey result to Mr. Khamphiou Vissapra, Deputy Director General, Ministry of Agriculture and Forestry. ・Visit to Irrigation Department, MAF. Discuss about APB loan Irrigation project.	
Sep.20 (Sat)	・12:30 Depart from Vientiane by TG961 arrive at 13:35 Bangkok. ・22:30 Depart from Bangkok (Kusumoto) by JL 718 ・23:59 Depart from Bangkok (Fukui, Ohno) by JL 622	
Sep.21 (Sun)	06:30 Arrive at Narita (Kusumoto) 07:30 Arrive at Kansai (Fukui, Ohno)	

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APPENDIX

QUESTIONNAIRES

1) Questionnaire for Village Chief

2) Questionnaire for Farm Household Survey

3) Questionnaire for Village Person
(Population, Family Planning and Public Health)

No.

Questionnaire

for

Village Head

Basic Survey of Agriculture and Rural Development by Progressive Stage in Asian Countries

LAO P.D.R.

Conduct by

The Asian Population and Development Association

September 1997

Village Information

1) Name of Village: 2) Village Population:

3) No. of Household: 4) Area size of this village:

5) No. of Hospital 7) How far from here to hospital.

8) No. of primary school 9) No. of secondary school

10) How far from here to primary school KM.

11) How many percentage of children are they going to primary school. %

a. entrance b. first grade c. second grade

d. fifth grade/ Graduation for primary school

12) How far from here to secondary school KM.

13) How many percentage of children are they going to secondary school. %

a. entrance b. first grade c. Graduation for secondary school

Land Area of Village

1) Size of Village Area

a. Cultivatable land b. Cultivate Land c. Forest

a-1 Swidden land a-2 Paddy field

Labor supply

1) Any labor shortage during peak season? When and for what operations?

2) Is there seasonal migration of labor from neighboring areas?

When and for what operations?

3) Do villagers go out of the village to work to nearby places?

a. Who

b. When

c. What occupations?

Number of Live Stock and Fish

	No.
1.Cows	
2.Calves	
3.Oxen	
4.Bufferloes	
5.Chickens	
6.Duck	
7.Turky	
8.Goats	
9.Pigs	

Risk Fluctuaions

Thank you very much.

Survey Questionnaire

Basic Survey on Agricultural and Rural Development by Progressive Stage

-Lao P.D.R.-

Village:

Date of Interview:

Name of family head:

Household number

APDA

Q.1 Please tell us of your household members who live together.

Relation	Sex	Age	Educational Background	Occupation		Remittance
				Main	Subsidiary	
1. Informant						
2						
3						
4						
5						
6						
7						
8						
9						

Q.2 Please tell us when you got your families land owned (Fill up plot by plot).

1. Paddy Field	(1) When	(2) Area
1)		
2)		
3)		
2. Other agricultural land		
1)		
2)		
3)		

Q. 3 Please tell us about land lease of your family.

Lease in/out	Area in Ha	Type of Contract	Rental	Remarks
in ( ) out ( )		0 1 2 (L S O)		
in ( ) out ( )		0 1 2 (L S O)		
in ( ) out ( )		0 1 2 (L S O)		

0: 1 harvest
1: 1year
2: more than 1 year

L: leasehold
S: sharetenancy
O: others

Q4 During the last year, how many ha did you plant and harvest on your agricultural land?

	Area Planted		Area Harvested	
	Rainy Season of Last year	Dry Season of This year	Rainy Season of Last year	Dry Season of This year
1				
2				
3				
4				
5				

Q5 What kind of machinery do you have?

	Year of purchased	Price when purchased	When shared (specify)	
1 Cultivator				
2 Tractor				
3 Thresher				
4 Plough				
5 Pump				
6 Sprayer				

Q. 6 Livestock holding

		current price	price when purchased	When shared (Specify)	
1 Cows	No.				
2 Calves					
3 Oxen					
4 She-Buffaloes					
5 He-Buffaloes					
6 Baby Buffaloes					
7 Chickens					
8 Goats					
9 Pigs					
10 Turkeys					
11 Others					

Q.7 Do you lease in or out cattle or machine?

Kind	Lease In/ Out	Rental Value per	How many
1			
2			
3			
4			
5			

Q.8 Please tell us about the historical change of agricultural technology and institutions practiced by your family(Technology or Institution).

Year	87	88	89	90	91	92	93	94	95	96
1. Rice variety (HYV adoption rate) and Productivity										
2. Multiple cropping										
3. Irrigation system										
4.Agricultural machines										
5. Buffalo										

Q. 9 During the last year, what was the production of agricultural or non agricultural products?

(1) Name of product	(2) production		(3) Amount of sales	(4) Average sale's value	(5) To whom
	Rainy season	Dry season			

Q 10 Please tell us how many you used hired labor, cattle or rental machine for your rice production during the last year.

Stage of Cultivation	Rainy season			Dry Season		
	Hired Labor	Tractor/Animal		Hired Labor	Tractor/ Animal	
1. Ploughing, harrowing, leveling						
2. Seedling						
3. Transplanting, broad casting						
4. Irrigation						
5. Fertilizer application Pesticide application						
6. Weeding						
7. Harvesting						
8. Threshing						
9. Transportation						
10. Others						
11						
12						
13						
14. Total						

Q 11 Please tell us how many you used family & exchange labor, owned cattle or owned machine for your rice production during the last year.

Stage of Cultivation	Rainy season			Dry Season		
	Family Labor	Tractor/Animal	Exchange Labor	Family Labor	Tractor/ Animal	Exchange Labor
1. Ploughing, harrowing, leveling						
2. Seedling						
3. Transplanting, broad casting						
4. Irrigation						
5. Fertilizer application Pesticide application						
6. Weeding						
7. Harvesting						
8. Threshing						
9. Transportation						
10. Others						
11						
12						
13						
14. Total						

Q.12 Please tell us how much did you spend for the following current inputs in rice production during the last year. And from whom you bought or to whom you paid its expenses?

	(1) How much	(2) From / to whom		(1) How much	(2) From / to whom
1. Seed			6. Cultivator		
2. Fertilizer			7. Other's repairment		
3. Insecticide			8. Machine Oil		
4. Herbicides			9		
5. Tracor repairment			10		

Q.13 May I ask your gross agricultural income of livestock / fish during the last year?

	Avarage selling price	Amount sold in the year	Estimated cost	Net Income
1 Cows				
2 Calves				
3 Oxen				
4 Buffaloes				
5 Chickens				
6 Duck				
7 Egg				
8 Goats				
9 Pigs				
10 Turky				

Q.14 How many days did each of your family members work in the following works during the last year? And how much did he / she earn during the same period?

No. of household members (See Q1)								
	How many	How much	How many	How much	How many	How much	How many	How much
1. Agricultural Wage labor								
2. Non agricultural wage labor								
3. Trading								
4. Rice milling and other manufacturing								
5. Artisan (carpentry,smithy,masonry, etc.)								
6. Transport								
7. Working in government office								
8. Household industry								
9. Total								

Q.15 History of the loans during last three years (Including borrowing from friends and relatives)

	When	Source from who	Amount	Interest Rate	Term of loans	How much left to pay	what used for	collateral
1)								
2)								
3)								
4)								
5)								
6)								
7)								

Any experience of collateral confiscated due to defaults?

Q. 16 How long dose your rice production cover your family food requirement? Month

Q. 17 On which month do you feel deficiencies of rice for your family?

Q. 18 How many of Kilo gram of rice do you have purchase in a year? Kg

No_____

Questionnaire

for Village Person

Basic Survey of Agriculture and Rural Development by Progressive Stage in Asian Countries

LAO P.D.R.

Conduct by

The Asian Population and Development Association

Basic Information

Name: Sex:

Age: Tribe:

Language: Religion

Land size of cultivation: Times of meal:

Household Structure

1) How many person are living with you? Person

2) How many person are kinship who living with you. Person

3) Who will success your property.

4) Your family structure.

Father Mother Father Mother

You Wife(Age:)

Children

Boy

Girl

Population

1) How may children do you have?

a. How many children have birth?

b. How many children are living now.

2) Your ideal number of children. Boy / Girl

3) What kind of measure have you use for contraceptive.

Condom, Pill, IUD, Natural (Rhythm) Method, Other (In detail:)

None.

a. Source of family planning information.

b. Where did you get your family planning measures?

c. Have you expense for getting the contraceptive measures?

4) Do you have a toilet in your house Yes /No.

5) Where do you go in case of illness or delivery?
a. Hospital, b. Clinic, c. Home , d. Others

6) Do you feed your children by breast milk. (Yes /No)

a. If you yes. How long did you feed the children by breast milk.

Education

1) Your final educational career. (Husband / Wife)

If no career. Can you read and write LAO language. (Yes / No)

2) Your ideal educational career for your children.

Migration

1) How many person migrated to other area from your family (or Village).

   a. Where did they go.

   b. Reason of why they move form this village.

   c. Do you have any remittance from migrants.

   d. Are there any family members who have willing to migrate to other area.

Living condition.

Source of drinking water.

Have you boil when you drink the water.

Thank you very much for your contribution.