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

Luang Phabang Province

MARCH 1997

The Asian Population and Development Association

MAP of LAO P.D.R.

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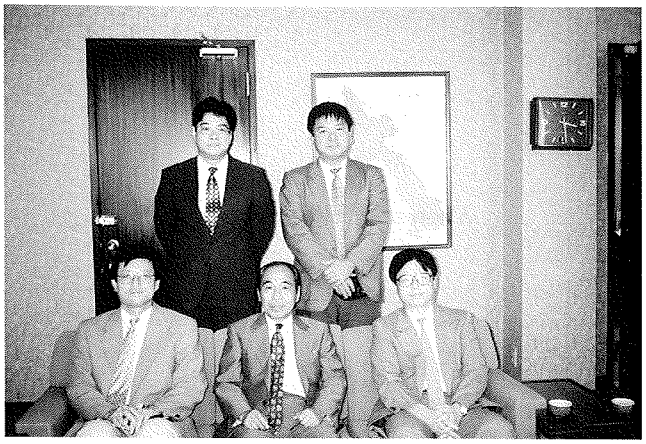

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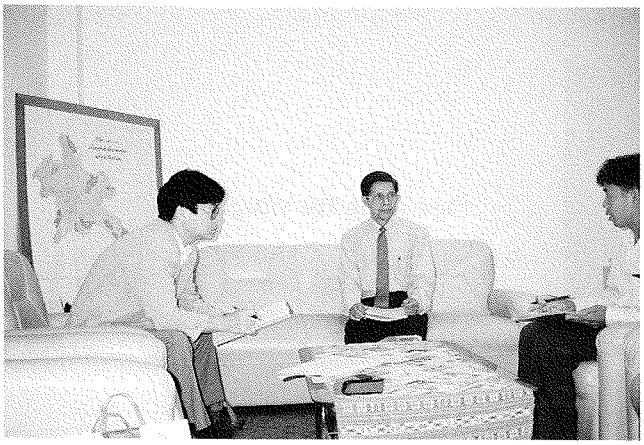
Dr. Seiichi Fukui, Team Leader
H.E. Mr. Hiroomi Sakai, Ambassador
Mr. Akihiko Ohno, Team Member

Rear row from right
Mr. Tomomi Otsuka, Team Member
Mr. Osamu Kusumoto, Team Member



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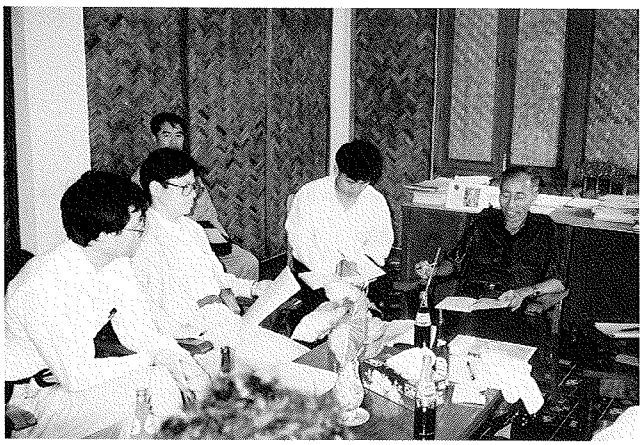
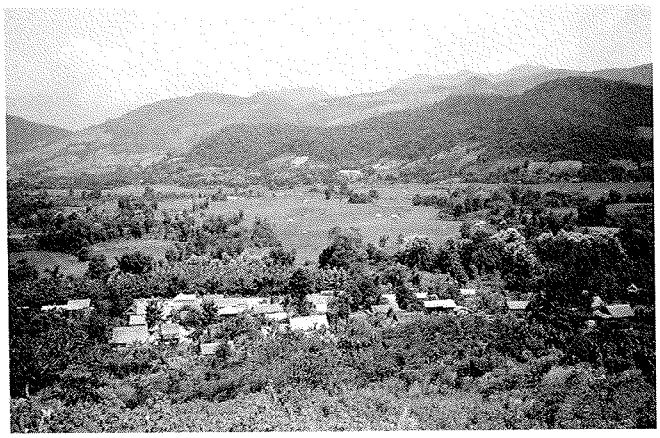
Deputy Director General,
Ministrial Cabinet



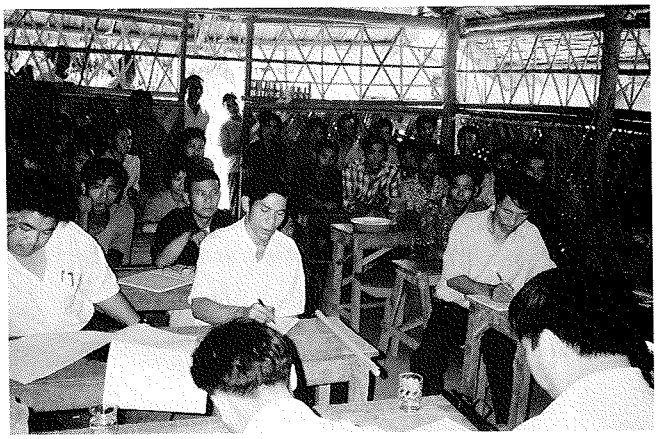
Mr. Onechanh Boonnaphol, Director,
Provincial Agricultural and Forestry Service

Slash and burn cultivation in rainy season
Silalek Village

Afforesttation of teak tree



View of Pak Tho Village



Village perosn at elementary school in Pak Tho village

Land degradation

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 1996. 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; Ambassador Hiromi Sakai and Second Secretary Mr. Yoshio Ishizaki of the Embassy of Japan in Laos PDR; and Japan International Cooperation Agency (JICA) experts working in Lao PDR.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 and by the First South East Asia Division, Asian Affairs Bureau, the Ministry of Foreign Affairs. 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 Laos 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 1997

Fukusaburo Maeda
Chairman
The Asian Population and Development Association

Contents

Summary

Introduction: Viewpoint of the Survey

This report presents a compilation of results from a survey on agriculture and rural development conducted in Lao PDR. It is not rare for many of the developing countries to be in a situation where a strong industry capable of entering the international market is either undeveloped or lacking. Depending on imported farm products under such circumstances will break the balance of international payments and sacrifice the economic soundness of that country. For this reason, securing self-sufficiency of staple food is extremely important in developing countries.

In this country where there is no strong industry except for agriculture and forestry, promotion of agriculture and forestry is one of the policies that are given the most important position in national policy. However, it is said that the regions that are constantly growing crops in Lao PDR account for only 4% of national land and that slash and burn farming is practiced in other regions. Slash and burn farming, in which forests are cut, dried and set on fire to plant dry field rice using ash as fertilizer, accounts for the largest percentage in the agriculture of Lao PDR. This slash and burn is practiced all over Lao PDR (particularly in the northern region) and is said to generate so much smoke during its peak season that airplanes are not able to land in Vientiane in midday.

Slash and burn farming is attracting attention from the viewpoint of environmental

conservation and many projects are being undertaken to urge a switch from slash and burn migratory farming to settled farming.

Promotion of agriculture is also important in terms of a country's ability to support its population. Lao PDR is importing food and has not established its self-sufficiency system. However, Lao PDR has the highest population increase rate in Southeast Asia that will double its number every 23 to 25 years. Whether Lao PDR will be able to maintain this population in a sustainable manner that is harmonious with the environment, i.e. the issue of population increase and food production that supports this population, is not only an issue for Lao PDR but an issue confronting the humanity as a whole on a global scale.

In conducting the survey, our tasks were: 1) to examine the issue of how to realize increased food production that will keep pace with increasing population and address the present situation where natural increase as well as social increase of population resulting from repatriation of refugees from Vietnam War and Laos Revolution are occurring; and 2) to collect and compile information and knowledge about agriculture in Lao PDR which had been insufficient up to now.

Structure of this Report

Data was collected based on this awareness of the issues and field survey was conducted with focus on understanding the present situation of slash and burn farming and taking measures against slash and burn practices that are destructive to the forest. The structure of this report is aimed at responding to these tasks.

Chapter 1 begins with an overview of the relationship between population and food production, followed by prediction of the future relationship between population and food and indication of importance of increasing food production.

Chapter 2 gives an overview of agriculture in Laos and its fundamental tasks, and explains the policy-related measures that must be taken.

Chapter 3 analyzes and describes the socioeconomic characteristics of the surveyed region as well as the survey results on employment structure of farm households engaged in slash and burn, farm household economy, rural industry and population/family planning. In this field survey, information was collected from the viewpoint of: 1) grasping the present situation of population pressure, education and family planning, 2) identifying the realities of slash and burn farming and rural economy, and 3) exploring the development potential of rural industries with emphasis on textile industry.

Chapter 4 analyzes and describes the tasks and outlook of agricultural development in the Lao P.D.R.

Chapter 5 describes the coperators , collected materials and survey itinerary.

As mentioned earlier, the first purpose of this survey was to obtain knowledge about the factual interrelationship between population, slash and burn farming and the environment. The second purpose was to obtain knowledge about the policy that must be introduced to enable the farmers of the region to switch to settled farming, provided that they have the desire to do so.

There are two answers to this question regarding the policy that will enable the farmers to settle down. One is to think about methods that will enable them to settle down from an agricultural point of view and the other is to consider industries and methods outside agriculture that can be realized in rural areas and provide opportunity for cash income.

Based on this information, "Tasks and Outlook of Agricultural Development In Lao PDR" are analyzed in Chapter 4.

Information Obtained from the Field Survey

The measures obtained from the results of the field survey and analysis of statistical materials collected were as follows.

Regarding agriculture and forestry:

1) There is an urgent need for approaching the increased food production from a long-term point of view. Diffusion of paddy land rice cropping techniques and early implementation of irrigation projects in central and southern provinces are essential for this purpose.
2) Impact on the environment shall be minimized through proper implementation of zoning which requires dispatch of land use planning experts, training of local staff and participation of farmers at the site of implementation. For this purpose, there will be a need for staff who can look at the problems and their solutions from the viewpoint of farm households in addition to dispatching experts.
3) Paddy farming shall be developed by improving gravity irrigation in small-scale rivers. Urging participation of beneficiaries is indispensable and therefore the key lies in utilizing the staff that can work on a local level.
4) Stock raising shall be encouraged. Low-interest loans from APB among others would be effective in encouraging stock raising. However, income gap in rural areas is likely to expand in such cases. In addition, development of grass resources must be considered at the same time to encourage cattle raising. Measures must also be taken with regard to improvement of cows and pigs and epidemic prevention. Offering vaccination and technical guidance would

be beneficial in this regard.

5) Dissemination of cash crops. For instance, semi-forest crops such as cardamon can be grown on swidden land. Planting teak seedlings will restore the forest and increase the opportunities for cash income at the same time. In addition, introduction of beans to swidden land may be considered because of their fertility restoring effect.

Regarding rural industry:

1) Promotion of market-oriented textile industry is important. Areas with poor access are particularly at disadvantage in terms of marketing their products due to difficulties they experience in terms of distribution. Transportation base in Lao PDR is undeveloped because it is a mountainous country where infrastructural improvement has lagged due to its historical background, making it difficult to travel long distances. It is even difficult to travel short distances if roads are not developed. Consequently, areas with poor access cannot distribute their products outside of their region even today. In view of the present situation, it will therefore be necessary to promote textile industry in regions where access is relatively good.

2) It is also necessary to match the standard of textiles to the international standard so that they can be accepted in the international market. In addition, as a requirement for textile industry in general, there is a need for improving the quality and changing the design to enable acceptance by the international market.

Regarding development of human resources:

Conveying the skills related to agriculture and rural industry accurately requires experts who are familiar with the local area. In addition, training local staff who will be learning from these experts is an indispensable and urgent task. As Lao PDR does not even have sufficient staff for receiving foreign assistance, realizing the proposal for development of Lao PDR is not easy from human resources point of view nor from financial point of view.

Conclusion

Lao PDR has renewed its national policy by adopting the 4th Five Year Plan in November 1996. Only the outline of this plan had been announced at the time when the survey group was visiting Lao PDR. The outline included the following 8 priority development targets:

1) To realize grain production that enables self-sufficiency
2) To cut down on slash and burn farming
3) To carry out rural development
4) To shift from natural economy to market economy
5) Development of human resources

6) Development of infrastructure

7) Expansion and promotion of economic cooperation

8) Development of service sector, particularly tourism industry

All of these measures are considered appropriate in view of the present situation of the country. They also indicate that Lao PDR will continue to place emphasis on its agricultural sector.

Lao PDR is a mountainous country with the majority of its land occupied by mountains and lacking transportation network for connecting its regions. During our hearing survey, we were told by the person in charge of national planning at the central government that the problems existing in Lao PDR are those encountered by "economy in transition." We interpreted this comment to mean that Lao PDR, like many other former communist countries, is experiencing difficulty in making the transition from planned economy to market economy. However, the words that followed this comment was that they were "having problems making the transition from natural economy based on gathering to market economy."

As symbolized by many languages and ethnic groups that exist in the country, Lao PDR has steep topography and undeveloped transportation system. As a result, most of the country has been beyond the reach of the wave of modernization and maintained the traditional gathering economy based on self-sufficiency.

Nevertheless, the country has no choice but to be incorporated into the market economy as it is scheduled to join ASEAN by the end of 1997. The country is faced with the difficult task of carrying out its economic development while maintaining its environment.

There is shortage of infrastructure and human resources. While roads are regarded as infrastructure in other countries, they are considered by some in Lao PDR as "basic human needs" to reflect the fact that its poor transportation system is hindering all kinds of development.

On the other hand, Lao PDR plays an important role in the cultivation of water resources for the Indochina Peninsula as a whole. Destruction of natural environment in this country through excessive development would affect the entire region. When attempting to realize a viewpoint with emphasis on the environment in a situation where everything is lacking, the impact of population problem is by no means small.

This survey has shown that the population pressure in the surveyed area was caused not by natural increase in the area but by migration. The problem of population pressure which is related to destruction of forest is also considered to be the result of migration. Extremely high natural increase rate of population will result in population pressure that would place enormous burden on the entire country. However, attention must be given to the fact that the pressure

Fig. 1 Areas Most Affected by UXO

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caused by population migration is greater than natural increase. There are a number of reasons for the population migration, however extensive bombing of Ho Chi Minh Trail during the Vietnam War and the resultant existence of Unexploded Objects have caused national wide migration (Figure 1). Almost a half of land had been bombed, therefore immediate measures are needed. In reality nothing has been done. One should not overlook the serious impact caused by warfare in Indochinese peninsula.

Therefore, international cooperation is required for the development of the country. The development should not merely be an economic development, but full consideration must be given to the fact that environmental degradation of the country may adversary affect all of the neighboring countries in the region.

Chapter One

Rural/Agricultural Development and Population

Chapter One

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I. Rural/Agricultural Development and Population

Introduction

This chapter provides an overview of areas in rural/agricultural development that are related to the issues of population and an analysis of population and agricultural development in Lao PDR in view of the field survey. The purpose of the first section is to outline how various issues of population are related to agricultural and rural development while identifying what efforts are needed to realize harmonious relationship between population and agricultural production on a global scale. Needless to say, full attention must be given to the fact that various opinions exist and that only one view does not represent the entire truth.

However, the matters discussed here are one of the models based on the common understanding on the relationship between population and agricultural/rural development that was formed at the international conference sponsored by the United Nations in the recent years.

The second section of this chapter comprises an analysis of population in Lao PDR based on the results of the field study.

1 Agricultural/Rural Development and Population

(1) Agricultural/rural development and population issue

The areas of population that are involved with agricultural/rural development can be roughly divided into the following three layers:

1) A Malthusian issue of whether agricultural production that supports population increase is possible.
2) Impact of changes in population structure on the economy of respective countries.
3) Agricultural/rural development and population issues on microeconomic level such as improvement of reproductive health through improvement of living conditions of individuals and development of human resources.

Providing an overview of each of these layers will reveal the importance of the population perspective in agricultural/rural development as well as the importance of agricultural/rural development in coping with the population issue.

① A Malthusian issue of whether agricultural production that supports population increase is possible.

This is the oldest and yet the newest issue. To begin with, it is no exaggeration to say that the approach towards population issue started from the famous statement made by Robert Malthus that "whereas population tends to increase in geometric progression, its means of subsistence increases only in arithmetical progression" (quoted from Malthus, "An Essay on the Principles of Population," translated by Yoshio Nagai, Chuko Bunko).[1]

In fact, population increases geometrically while means of subsistence (food) can only increase arithmetically. As the rate of population increase is determined by multiplying population parameters by increase rate, the same increase rate will apply to the increased population in the next generation. In this sense, population increase is basically exponential. Assuming that there was no limit to elements of food production such as land, water and fertilizer, and that climate did not fluctuate and productivity remained the same, the volume of production will only increase proportionately to the amount of labor input.

The world population in 1798 when Malthus had this sense of crisis about the population issue is estimated to be less than 1 billion. The apprehension Malthus felt when population was 1 billion was not recognized until today when population is approaching 6.0 billion.

At present, however, this Malthusian population issue and the issue of agricultural development are coming to the fore. Examining why this issue of "unbalance in population and food" (which had been regarded with sense of crisis at the end of the 18th Century but has been avoided) in an effort to understand why the Malthusian theory is gaining importance today, one realizes that there are social factors as well as technical.

In particular, remarkable increase in food production that even surpassed the rate of explosive

population growth was realized after World War II. Despite population explosion which could have caused food shortage, food intake per person increased by 15% on a calorie basis.
This paradox was realized through introduction of "Green Revolution" which required irrigation, improvement of seeds, increase of agricultural input and development of human resources among farm workers. As a result of Green Revolution, food production exceeded population increase and seemed to have negated the Malthusian thesis.

However, it was indeed a "revolution" that succeeded because there was room for "technical innovation" as well as social and natural environment that made it possible to realize such innovation. Pessimistic views are prevalent when it comes to the question of whether a second Green Revolution comparable to the first one can be realized[2].

Moreover, we must consider as a premise the fact that food production on this planet Earth, no matter how it is done, is ultimately based on plant resources and that maximum production of plant resources is limited by solar energy that enters the Earth and the absolute quantity of water and carbon dioxide available. This signifies an existence of some absolute limit no matter how we look at the situation. There is no consensus regarding this matter as many estimates have been made as to the number of population that the Earth can support under this premise. However, an estimate by Uchijima, which asserts that the number of population that can be supported while preserving biodiversity is between 8 billion and 10 billion, can be regarded as a generally accepted view.[3] In other words, it is clear that increase in food supply is a phenomenon that was materialized under certain conditions and that it cannot keep improving indefinitely although it could exceed population increase temporarily.

Therefore, population increase is the greatest variable when discussing the issue of food and population today. In addition, population increase in the post-modern era is undoubtedly an abnormal phenomenon in terms of both human history and global ecosystem.

Although many different views exist, it is said that humanity's population remained at the level of several million until about 6000 B.C. when agriculture started. That population level did not exceed several million throughout most of humanity's history when we look at ourselves as a specie is a noteworthy fact when considering the position of humanity in the global ecosystem.

Even after agriculture started, the world population at the time of birth of Jesus Christ is estimated to have been around 200 million. It was not until the 19th Century that the population reached 1 billion for the first time in human history, which meant that several million years were needed before the population reached 1 billion.

It was in 1930 that the world population reached 2 billion. One hundred thirty years were needed for the population to increase from 1 billion to 2 billion. Then the world population reached 3 billion in 1960. This time, it took 30 years for the population to increase by 1 billion from 2 billion to 3 billion. In 1975, the population reached 4 billion, increasing by 1 billion in 15 years. In 1987, the population reached 5 billion, increasing by 1 billion in 12 years. The 6 billion mark is predicted to be reached by 1998, which means that 1 billion people are currently

added to the world population every 11 years.[4] (Figure 1)

The question arises as to whether it is possible to produce enough food to support this population. When the relationship between population and food is seen in a simpler way, food consumption is directly proportional to population. The volume of food consumption per capita naturally fluctuates considerably depending on standard of living and diet. For instance, improvement of living standard generally brings about an increase in meat consumption and rapidly forces up food demand when seen in terms of grain equivalent. Therefore, while the relationship between food supply and population is not so simple, there is no doubt that food demand is directly proportional to increase in population.

What we need to keep in mind, even though it tends to be taken for granted, is the fact that this increase in food demand becomes a direct burden on the Earth. That is, in contrast to the humanity of the past that required several million years before placing the burden of 1 billion people, the humanity of today is placing the same amount of burden in just 11 years.

This increased population directly translates into burden on the global environment and threatens the global environment which is the premise of food production. In the area surrounding the Sahara Desert, the number of livestock has increased as a result of increase in population and has led to rapid advancement of desertification as grass and trees are depleted by being used as their feed, resulting in accelerated deterioration of living conditions of nomads who are dependent on the land. Population increase and industrial development have also brought about urbanization on a global scale. Urbanization first occurred in the lowlands where food productivity is high and transformed the plains into land unsuited for food production by using it for residential and industrial purposes. The question of whether the Earth can support this ever-increasing population is indeed a new Malthusian issue. Details on this subject can be found in the *State of the World* published by the World Watch Institute.[5] At the end of the 18th Century, Malthus raised an issue about the relationship between population and food within the framework of classic economics. However, it has become difficult in this present age to regard this issue as a mere economic issue. When contemplating on the Earth's population carrying capacity, i.e. sustainable development that is harmonious with population and environment, no discussion can be made without considering the factors that had been regarded by modern economics as non-economic, such as the extent to which environmental conditions and global ecosystem can bear the burden imposed by human activities.

Therefore, Malthusian issues we are confronted with today are issues that go beyond the framework of modern economics and require a new approach. From a global point of view, this Malthusian issue is likely to become the greatest challenge the humanity will be facing in the future.

What kind of impact will this Malthusian issue have on the countries of the world? Many of the countries that are experiencing explosive population growth belong to the category of poorest countries. Rapid population increase in these countries give rise to a need for food

import, although many of these countries do not have any key commodity crops that are needed to enter the international market. The strategy of growing commodity crops under the principle of relative superiority and importing food with profit obtained from these crops is practically unfeasible in these countries, while food import significantly destabilizes the economy of developing countries. Therefore, developing countries will have to control their population and improve their food self-sufficiency unless they have products that are exceptionally profitable.

2 The phenomenon of Population Increase

Let us consider how this population increase, which is exerting greatest pressure on the global environment and threatening food security, is taking place. Robert Malthus thought that balance between population and food is lost as a result of intrinsic nature of population and food production.

Considering the fact that it took several million years before global population reached 200 million, the population increase rate during that period was infinitesimal. Assuming that a population of 200,000 increased to 200 million over a period of 4 million years, average annual population increase rate during that period would be approximately 0.000175%. As it is assumed that there was no increase in population until the beginning of agriculture, human population did not necessarily maintain a constant increase rate and often experienced negative growth. In any event, the increase rate was not anywhere near the level that is being discussed now and was either nonexistent or negligible.

A close relationship is said to exist between population increase and technical innovation. For instance, the first population increase in the history of humanity is said to have occurred with advent of agriculture. This increase occurred when population carrying capacity increased as a result of revolutionary technical innovation called "agriculture."

The turning point for the next major population increase was the industrial revolution which gave rise to increase in population carrying capacity through progress in science and technology and decline in mortality rate through advancement in medicine. It was this progress in medicine and increase in food production that created the unprecedented level of population in human history and is posing a problem today.

Put in simple terms, birth and death are the factors that comprise population. Population increases when births outnumber deaths and decreases when deaths outnumber births. An average woman is said to give birth to 8 children under natural conditions in which she breast-feeds her child and used no contraceptive methods in particular. In many societies, however, the majority of children that were born died during their infancy, and population exceeding the carrying capacity of the area was subject to natural selection in the form of starvation.

In addition, advancement in agriculture resulted in rapid expansion of population carrying

capacity, although this leeway was filled immediately by population increase. How was the equilibrium between population and population carrying capacity maintained in a society where this equilibrium had been reached? The first thing that comes to mind is the fact that extremely high mortality rate (particularly infant mortality rate) of the pre-industrial revolution era has played a role of controlling population. Moreover, in regions where natural conditions are favorable and mortality rate is low, birth control had been incorporated into the culture in some form or another.

In any event, natural conditions, public health conditions and sociocultural conditions made it almost impossible to attain the kind of rapid population increase we are experiencing today. As a result, humanity did not have to become aware of population increase throughout most of its history. The concept which still remains today of "more children bring more happiness" originated from a sincere desire of couples to maximize the possibility for securing their support at old age in a society where social security did not exist and most of the children died after they were born. When seen in the light of the fact that countries that can no longer bear the burden of social security cost are calling for restoration of family values rather than further promotion of public social security, this "more children bring more happiness" concept must have been valid in the context of the age in which it was prevalent.

Population increase will not occur if the level of mortality corresponds to that of birth. In other words, population will not increase even at high birth rate as long as mortality rate is just as high. Population will also not increase if birth rate and mortality rate are both low. In many of the developed countries today, birth rate has become so low that it is lower than the replacement level (which corresponds to between 2.1 and 2.05 children per couple). Needless to say, infant mortality rate has been kept down to its limit. In Japan, for instance, maternal mortality rate, which is an important index of infant mortality rate, is so low that a death in a prefecture is enough to significantly change the national figure.

In other words, population increase occurs under circumstances where birth rate is high and mortality rate is low. Population is said to follow modernization of society and shift from high birth/high mortality to high birth/low mortality, and then to low birth/low mortality. These changes in population dynamics are referred to by demographers as demographic transition, and the problem we have of population increase (explosive increase of population) occurs during the high birth/low mortality phase. A case of this high birth/low mortality phase which is particularly problematic has the following characteristics.

a. The concept of "more children bring more happiness" is still prevalent

b. Infant mortality rate dropped due to dissemination of medical care and public health

b-1. However, infant mortality rate is not low enough to assure that children that are born will live or is believed that it is not low enough.

c. Women in readult are not made aware of options such as family planning including modern contraceptive methods or are aware of these options but are unable to use them.

To simplify the matter, high birth/low mortality occurs under these circumstances and leads to population increase. Thus all of these conditions will have to be met to solve the population problem. We know from our past experience that population increase can be stopped if the efforts to meet these conditions are made on the political level.

There was an argument in the past that held that economic development is indispensable in meeting these conditions. Such an argument predicted that economic development will improve the standard of living and the foregoing conditions will be met, thereby enabling the society to shift automatically in the direction of low birth/low mortality. At present, however, it has become difficult to apply this process experienced by developed countries to developing countries because the Earth will probably not be able to bear the environmental burden long enough to wait for demographic transition which follows economic development to occur. Therefore, the key to coping with these problems would be the method through which social development including dissemination of family planning is achieved.

3 Demographic Transition, Demographic Structure and Economic Activities

Such demographic transition also has significant economic impact. In terms of the relationship between population and economy, Malthusian issues go beyond the framework of economics, giving more importance to migration from rural to urban areas that accompany changes in industrial structure and to changes in demographic structure that accompany demographic transition.

① Demographic transition and migration between urban and rural areas

The matter of importance when it comes to the relationship between urban and rural areas in regard to demographic transition is the migration from rural to urban areas which occurs with changes in industrial structure. Up to now, the experience has been that demographic transition occurs during the industrialization process of agriculture-based communities. Employment opportunities are created in cities with the development of industrialization, and young workers in the prime of their lives migrate from rural areas to cities to take advantage of such opportunities. This would lead to rapid increase in urban population as these people are also in the reproductive age population which is responsible for demographic reproduction.

As a result, rural areas will see a reduction in the reproductive age population accompanied by depopulation and aging of population while urban areas experience rapid influx of readult population. This migrant population will maintain the norms and lifestyle of rural areas and therefore engage in high birth rate reproduction. In addition, overpopulation will occur from lower mortality rate caused by relatively improved access to medical care.

However, the population that has migrated to cities will start leading a more urbanized lifestyle as they become more established in their new environment. As a result, they realize that existence of children will not lead to higher income but rather require investment in education if they wanted to provide them with better employment opportunities. Consequently, the birth pattern itself changes and shifts to low birth rate and low mortality rate. Ultimately, the migrant population starts to return home as employment opportunities increase in local small and medium-sized cities, living environment in rural areas is improved and living condition of overcrowded cities deteriorates. This is the process of demographic transition that Japan experienced.

Such experience has given rise to a generally-accepted view that economic development is accompanied by demographic transition. In other words, changes in our lifestyle as a result of being incorporated into economic development also creates a shift in the demographic pattern from high birth/high mortality to low birth/low mortality. However, we now have examples which indicate that changes in behavioral patterns is possible without economic development through strong promotion of family planning.

As experienced by Japan, rural population in many developing countries migrate to cities in the early stages of economic development for employment opportunities. Such migration is characterized by dependence on friends and relatives who already live in the city. However, opportunities for employment in cities are limited during stages where rapid economic development has not occurred, and migration will inevitably concentrate in the largest city of the country.

As a result, there are many cases where a large number of migrants cannot find stable employment opportunities in the city and engage in reproductive activities while maintaining rural lifestyle and norms. This is the cause of the problem occurring in developing countries in which primate cities turn into mega-cities through expansion of slums.

On the other hand, there are situations where population increases in both urban and rural areas as depopulation does not occur in rural areas owing to high birth rate while mortality rate drops through slight improvement in public health. There are also cases where birth rate drops among people who migrated from rural areas to cities as they internalize urban lifestyle with time. This occurs even when they are unable to find stable employment and continue to live in slums.

② Demographic structure and socioeconomic development

Aside from historical background and realities of demographic transition process brought about by the aforementioned economic development, there are two factors that strongly influence the so-called economic activities in general. They are:

a. Relationship between population in economically active age and population not in economically active age (dependent population)
b. Issues related to human resources

i Demographic transition and economically active population

The impact of demographic transition must first be considered. Demographic transition occurs with dissemination of medical care, economic development and social development. In particular, dissemination of technology as typified by dissemination of public health reduces infant mortality while economic development makes social development possible and dissemination of education lowers the birth rate. In Western Europe and North America, demographic transition occurred over a very long period. In other words, dissemination of medical care and improvement of production took place gradually, and it was not too difficult for social values to keep up the changes in the society. In these countries, demographic transition advanced by keeping pace with technological innovation. Therefore, the demographic transition process did not lead to rapid increase of population.

However, in Japan and other non-Western countries, technological advancement was introduced all at once and dramatically reduced the mortality rate. As this improvement took place in such a short period of time, changes in social values, effect of economic development and social development could not accommodate such rapid changes in mortality rate. The rapid population increase in the developing countries occurred as a result.

Such rapid decline in mortality rate also had significant impact on the demographic structure. The age structure of population known as population pyramid forms a pyramid which is extremely broad at the bottom because many of the newly born population die during their infancy under high birth/high mortality situation (Figure 2-a). However, the scale of population does not change because the resulting reproduction rate is at replacement level.

The triangular-shaped pyramid that we normally see indicates a state in which mortality rate has dropped through introduction of public health and the generation that survived as a result is engaged in reproduction (Figures 2-b and 2-c). Under these circumstances, high birth rate continues while values and behavioral norms concerning birth remain the same and infant mortality rate is reduced dramatically. As a result, they with continue to reproduce at the same birth rate as before when they reach readult and the population pyramid will keep expanding. This is the condition under which exponential increase in population occurs.

The factor that becomes important when considering the relationship between demographic structure and economy is the relationship between the population engaged in economic activities and the population supported by such economic activities. The population engaged in economic activities is referred to as "economically active population" and those not engaged in such activities are referred to as "dependent population." While the definition of economically active population differs from country to country, they are normally people between ages 15 and 60.

To put it simply, the burden on a country will become larger when population supported by this population in economically active age is greater. Dependent population can be divided into elderly dependent population and young dependent population. The former is referred to as "elderly dependent population" and the latter "young dependent population."

ii Young dependent population

Population problem in developing countries that are at an early stage of demographic transition is characterized by the large number of youth dependent population. Large amount of expenditures required for such young dependent population place increasing burden on the government budget which, in turn, makes it impossible to perform sufficient investment in education, resulting in a large number of unskilled labor that has only received insufficient human resource development.

In today's industry, the highest demand exists for labor equipped with advanced technical skills, not simple labor. Supplying simple labor alone will not enable developing countries to bring in the foreign capital which they need more than anything else. Consequently, they cannot offer sufficient employment to the ever-increasing population in economically active age and, from an economical point of view, turns them into dependent unemployed population that needs support.

In other words, they repeat the vicious cycle in which increase in population deteriorates government expenditure, which causes insufficient human resource development, which leads to loss of employment opportunity, which triggers further deterioration of government expenditure, which makes it difficult to improve public health, which preserves mothers' motivation to give birth and results in further population increase, ultimately giving rise to a Malthusian issue.

iii Elderly dependent population

In contrast, the population issue in developed countries is how to go about supporting the elderly dependent population. It will become an important issue in Japan which has experienced such rapid demographic transition. The ratio of elderly dependent population and population in economically active age is balanced in Western Europe where demographic transition occurred over a long period of time. One can go so far as to say that its demographic structure will have a cylinder-shaped population pyramid. Seen in terms of population by generation (cohort), there is no generation that stands out in its scale.

In contrast, countries like Japan that achieved rapid demographic transition with birth rate falling below replacement level, the social burden of supporting elderly dependent population will be hanging over the young generation like a mushroom-shaped umbrella when seen in terms of cohort (Figure 2-d). China, which is trying to achieve demographic transition at a rate that is even faster than in Japan, will be experiencing a super-aging society in the future. However, the entire humanity will go under and face a Malthusian issue if high birth rate is continued to avoid such situation.

iv Economic development and demographic transition

The rate of burden imposed by the dependent population on the society is high both in early and

late stages of demographic transition and hinders economic development. Provided that other conditions remain the same, the demographic structure most suited for economic development is that in which young dependent population is reduced through family planning and elderly dependent population is yet to increase (Figure 2-e). The percentage of dependent population in demographic structure was low in Japan during the period of high economic growth while China is just entering a period of low dependent population.

Avoiding a Malthusian collapse requires demographic transition despite the aging issue. The countries will have to fully deal with the demographic golden age that arrives in the process of demographic transition.

(4) Rural development and measures against population issues

When considering the concrete method for solving the population problem, it is obvious that the attempt to control population by realizing economic development is not a viable option because of the burden it imposes on the environment.

A practical approach would be to control population growth by introducing public health, education and family planning all at the same time and to perform various types of development during the period when the burden of dependent population diminishes as a result of such control.

Needless to say, population problem is not by any means an issue that can be solved through coercion. Further, it is impossible for a country to interfere with the population problem of another country and such interference is not proper in the first place. However, it is possible for a country to understand this problem and offer support in coping with it. Although it may be indirect, these measures against population problems also serve as measures against agricultural and rural development problems.

Rural population is rapidly increasing in many developing regions of the world. The reasons for such increase include insufficient form in which reproductive health service is introduced, encouragement of fecundity in social and cultural customs, confinement of women in economically dependent position, lack of women's right to make their own decisions in giving birth and lack of access to birth control means.

Human resource development and development of rural community, which are necessary for solving these problems, are also necessary for increasing food production. It is necessary for underdeveloped countries in particular to carry out agricultural development for establishing self-sufficiency and population control at the same time as the basic requirement of development. For realization of sustainable development and increased food production, "social development and education" for realizing "choice based on good understanding" among farmers as well as "education integrated with both social development and agricultural diffusion" with focus on women whose labor has not been properly appreciated up to now must be pursued urgently. Such an effort will strongly affect food security on a global scale by not only improving the living environment in rural areas but controlling population increase and promoting higher agricultural productivity.

II. Population of Lao PDR

1 Fundamental Characteristics of Lao Population

First of all, the characteristics of population in Lao PDR shall be understood by comparing the fundamental population indices of Lao PDR and her adjacent countries. Fundamental population indices of respective countries (population size, crude birth rate[6], crude death rate[7], natural increase rate) are shown in Table 2 below. As can be seen from this table, Lao PDR has the smallest population among these countries of approximately 4.7 million[8]. In addition, Lao PDR has the highest crude birth rate (43‰) among her neighboring countries while her crude death rate (15‰) is close to the average of these countries. As a result, the country's natural increase rate (= crude birth rate - crude death rate) is ranked highest among all the countries included in the table.

This natural increase rate of 28‰ corresponds to only 2.8% when converted into percentage. In demography, however, the increase rate of 2.8% has a significant meaning. For instance, the population of Lao PDR will double in only 25 years (= 70 ÷ 2.8) if the increase rate of 2.8% is maintained over a long period of time. Such rapid increase of population in Lao PDR suggests that the country's population has young and energetic age composition. In fact, the age composition of Lao PDR indicates that youth population (ages 0 through 14) and adult population (ages 15 through 64) together account for 96.1% of total population and that elderly population account for only 3.9% of the total population (refer to Table 3).

This fact becomes clearer from the population pyramid of Lao PDR (refer to Figure 4). The population pyramid of Lao PDR has a mountain shape in which the size of population by age is highest for ages 0 through 4 with the size of population by age gradually declining as you go up the age ladder.

Such condition of population is not necessarily favorable for the future of Lao PDR as rapid increase of population hinders economic development. This fact can be understood easily from the following example. Gross domestic product per capita is one of the indices for indicating the degree of economic development. This index can be calculated easily through the following formula.

Gross domestic product per capita= Gross domestic product ÷ Population

If total population increases at a rate exceeding gross domestic product, gross domestic product per capita (which is one of the indices for showing the degree of economic development) will go down.

From such viewpoint, it can hardly be said that Lao PDR has smooth economic development.

Although the country's real gross domestic product increased 7.0% during the 1994-1995 period[9], the increase in gross domestic product will only amount to 4.2% (= 7.0% - 2.8%) when population increase is taken into consideration, assuming that population increased at an annual average rate of 2.8% during the same period[10].

The point that must be kept in mind here is the demographic reality in which such rapid increase of population is not the only factor that negatively affects the economic development of Lao PDR. Said in more concrete way, the "young age structure" of Lao population also affects the economic development in a negative manner.

As noted earlier, total population can be divided into three age groups; youth population (ages 0 through 14), adult population (ages 15 through 64) and elderly population (ages 65 and higher). Among them, youth population and elderly population are dependent population supported by adult population. Thus, the economic sustenance burden of adult population, which indicates the number of dependent population that must be supported by 100 persons in adult population, can be identified by dividing youth population and elderly population with adult population to calculate the dependency ratio of youth population[11] and the dependency ratio of elderly population[12] and then obtaining the dependency ratio[13] which corresponds to the sum of the two ratios.

The dependency ratio in Lao PDR, as can be seen from Table 4, is 92.8. In other words, 100 persons belonging to adult population must support 92.8 persons belonging to dependent population. This economic burden on adult population is quite high in comparison to the adjacent countries of Lao PDR (refer to Table 5). When economic sustenance burden of adult population is as heavy as in this case, savings ratio will naturally decline, which, in turn, slows down economic development by causing shortage of capital. The relationship between the dependency ratio and savings ratio in Japan is shown in Figure 5. As can be seen from this diagram, decline in the dependency ratio in Japan gave rise to increase in savings ratio and contributed to rapid economic development. In this sense, high dependency ratio in Lao PDR has become an obstacle to economic development.

2 Demographic Transition in Lao PDR

Common sense in demography says that the demographic condition in a particular country changes according to demographic transition theory. Demographic transition theory, which is an empirical rule derived from historical experience of the Western countries, is now widely accepted in demography as a result of being quoted frequently for its outstanding ability in explaining the population phenomena. The outline of this theory is as follows.

With the advancement of socioeconomic development, a country's demographic condition shifts from high birth and high death (high birth/high death rate) to low birth and low mortality

(low birth/low death rate). This phenomenon is called demographic transition. The process of this transition, however, is not uniform and can be divided into four phases which are comprised of different aspects. In the first phase, birth rate and death rate are both at high levels (high birth/ high death rate) because development and natural increase rate (which is the difference between the two) both remain at low levels. In the second phase, death rate declines rapidly as a result of economic development that has started. Meanwhile, natural increase rate rises sharply as birth rate remains at a high level due to strong influence of belief formed during the first phase that welcomes high birth rate. The third phase is that in which significant decline in natural increase rate is observed as birth rate rapidly decreases, as if it were following the decline in death rate, with development of economy. Birth rate, death rate and natural increase rate all stabilize at low levels during the fourth phase as a result of high level of economic development that has been attained (refer to Figure 6).

Then a question arises as to whether the demographic condition in Lao PDR has been changing in accordance with the path predicted by demographic transition theory. Table 5 shows the changes in total population, crude birth rate, crude death rate and natural increase rate of Lao PDR and Figure 4 is an illustration of these changes. As can be seen from this table and diagram, crude death rate in Lao PDR has been steadily dropping from 25.3‰ (1950-1955) and 15‰ (1995) while crude birth rate has been maintaining the level around 45‰ since the 1950-1955 period. It was not until 1995 that a trend of decline appeared in crude birth rate. Consequently, natural increase rate went up from 20.4‰ (1950-1955) to 28.2‰ (1985-1990) and then dropped slightly to 24‰ (1995). Rapid population increase in Lao PDR was the result of all these changes.

Judging from these statistical data, demographic condition in Lao PDR corresponds to the early third phase of demographic transition theory even though some uncertain aspects are observed in the trends of recent years.

However, a point that requires consideration still remains with regard to demographic transition in Lao PDR; i.e. the relationship between economic development and demographic transition. In the aforementioned demographic transition theory, the transition from high birth/ high death rate to low birth/low death rate was considered to take place following the socioeconomic development of the country concerned. In other words, it is an endogenous demographic transition. However, it is also a clear fact that Lao PDR is still one of the low income nations even though its economy has started to prosper very recently, and that its economy has not been developing steadily. Then a question arises as to why demographic transition occurred in Lao PDR.

Although we were unable to obtain sufficient information on this subject, we should be able to infer from the experience of other developing countries. Demographic transitions have occurred in many developing countries despite their lack of socioeconomic development. It is believed that they were caused by heterogeneous factors such as introduction of advanced medical

technology, effective medicines and contraceptive devices from developed countries and implementation of family planning programs by the government. What had taken place in the developing countries was heterogeneous demographic transition.

When the situation of Lao PDR is applied to such experience of the developing countries, lowering of death rate in Lao PDR is believed to be caused by introduction of effective medicines. Moreover, the fact that birth rate has been maintained at a high level and did not go down easily can be attributed to unwillingness on the part of the government towards family planning program, not to mention the lack of interest in family planning among the people[14]. In other words, demographic transition in Lao PDR is also believed to have been a heterogeneous phenomenon.

These circumstances related to fertility in Lao PDR can also be explained through statistics. Figure 8 below shows the results of analysis using the decomposition method of birth restraining effect.

This diagram shall be interpreted as follows. In average, a woman has the biological ability to give birth to 15.3 children. If all women demonstrate this ability fully, average number of children that are given birth to by one woman, i.e. total fertility rate, will be 15.3. However, such situation does not occur in reality because not all women marry at young age, birth is controlled by contraception and abortion, and breast feeding is practiced (breast feeding has the effect of extending the menopause period). In other words, this diagram shows the extent to which women's potential fertility of 15.3 is controlled by factors such as birth control effect of breast feeding, contraception, abortion and changes in marriage patterns to bring about the actual total fertility rate of 6.0 in Lao PDR.

As can be seen from the results of this analysis, breast feeding, contraception and changes in marriage patterns have birth control effect amounting to 4.0, 2.1 and 3.2, respectively, in realizing total fertility rate of 6.0 (= 15.3 - 4.0 - 2.1 - 3.2). The results of this analysis, i.e. i) the actual total fertility rate is 6.0, ii) contraception has the smallest birth control effect (3.2), iii) breast feeding has the largest birth control effect (4.0), and iv) birth control effect of changing marriage patterns is positioned between the first two (3.2), have a significant meaning.

It suggests that the dissemination rate of family planning is Lao PDR is low due to the reasons mentioned earlier and that this is being compensated by the birth control effect of breast feeding and changing marriage patterns. We were able to confirm the results of this analysis directly. In this study, a hearing survey based on questionnaire sheet was conducted at two villages of Pak Tho and Long Lueut. The facts that were confirmed from the results of this survey include; i) average number of children per household is high at 5, ii) dissemination rate of family planning is low at 33%, and iii) breast feeding is performed over a long period exceeding 1 year. These survey results support the adequacy of analysis results from the decomposition method.

This situation, however, is not favorable. Figure 9 shows the result of time series analysis of birth trend in Japan according to the decomposition method. As can be seen from this diagram, the birth control effect of breast feeding decreases and the effect of conscious birth control

methods such as contraception and abortion increases towards the latter years of analysis as socioeconomic development advances. In this sense, it can be said that Lao PDR is in an underdeveloped phase of birth control.

3 Population Problem in Lao PDR

The characteristics of population and demographic transition in Lao PDR have been discussed above. The analysis indicates the demographic condition of the country which, although small in scale, is in the early part of the third phase and growing at an extremely high pace partly due to low dissemination rate of family planning. Such demographic condition is predicted to have negative impact on the future growth of Lao economy. This conclusion can be confirmed by using a simple simulation.

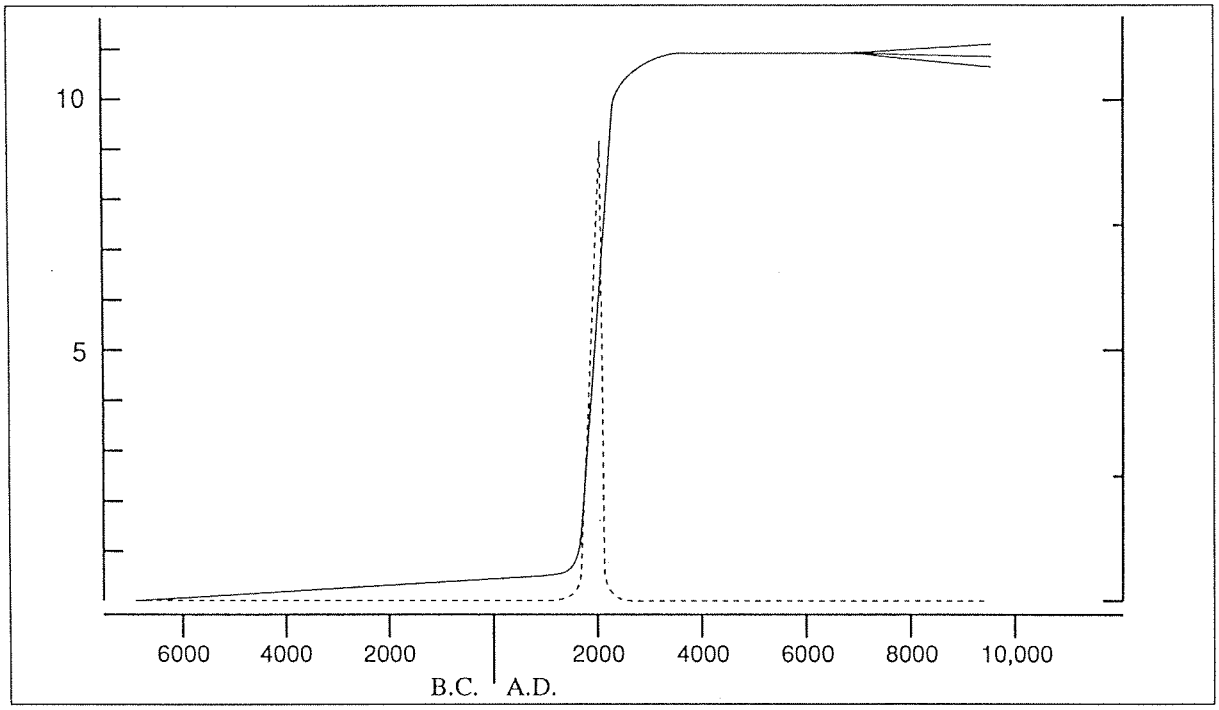
First, the future population is estimated up to the year 2020 by using the cohort-component method under the assumption that total fertility rate in Lao PDR will go down from the present level of 6.31 (in 1995) to 2.1 by 2025, and that expectation of life at birth increases from the present level of 52.5 years for women and 51.0 years for men (in 1995) to 67.2 years for women and 64.0 years for men by 2025. Then the future demand for rice is calculated by multiplying the rice requirement per person (as announced by the Lao Government) of 350 kg by this estimated population. The result of this estimation is shown below (refer to Table 7). The noteworthy point here is the fact that, as clear from the discussion up to this point, this estimation is made under an optimistic hypothesis in which the birth rate in Lao PDR will drop to 2.1 in the near future despite the factors existing in Lao PDR that prevent birth rate from dropping easily.

An important information obtained from this simulation is that the population of Lao PDR will increase 1.8 times in only 25 years according to the estimation made under an optimistic hypothesis and that demand for rice will skyrocket accordingly. The question arises as to whether the country's agricultural sector has the capacity to meet such rapidly increasing demand. Considering the fact that present rice production (in 1995) has amounted to only 1.418 million tons, one should be able to understand the difficulty of achieving this goal and the seriousness of this problem.

In Lao PDR where expansion of slash and burn farming is creating serious environmental problems, the method for preserving natural resources has become an important task. Although population density of Lao PDR is as low as 19 persons per square kilometer, population density per cultivated area is extremely high because the majority of its land is mountainous. Population itself is also increasing rapidly. When these conditions of Lao PDR are taken into consideration, it must be said that vicious cycle in which increasing population pressure due to booming population drives more farmers to engage in slash and burn farming is likely to occur.

In this sense, it can be said that population control is becoming an important policy issue in Lao PDR.

Figure 1-a Increase Rate of World Population and Increase in Total Population



Source: Jones Salk, The Next Evolutionary Step in the Ascent of Man is the Cosmos, Laonarde, vol.18, No.4, 1985, p.238

Figure 1-b Estimation of Future World Population (high medium, and low variant estimation) 1950-2050

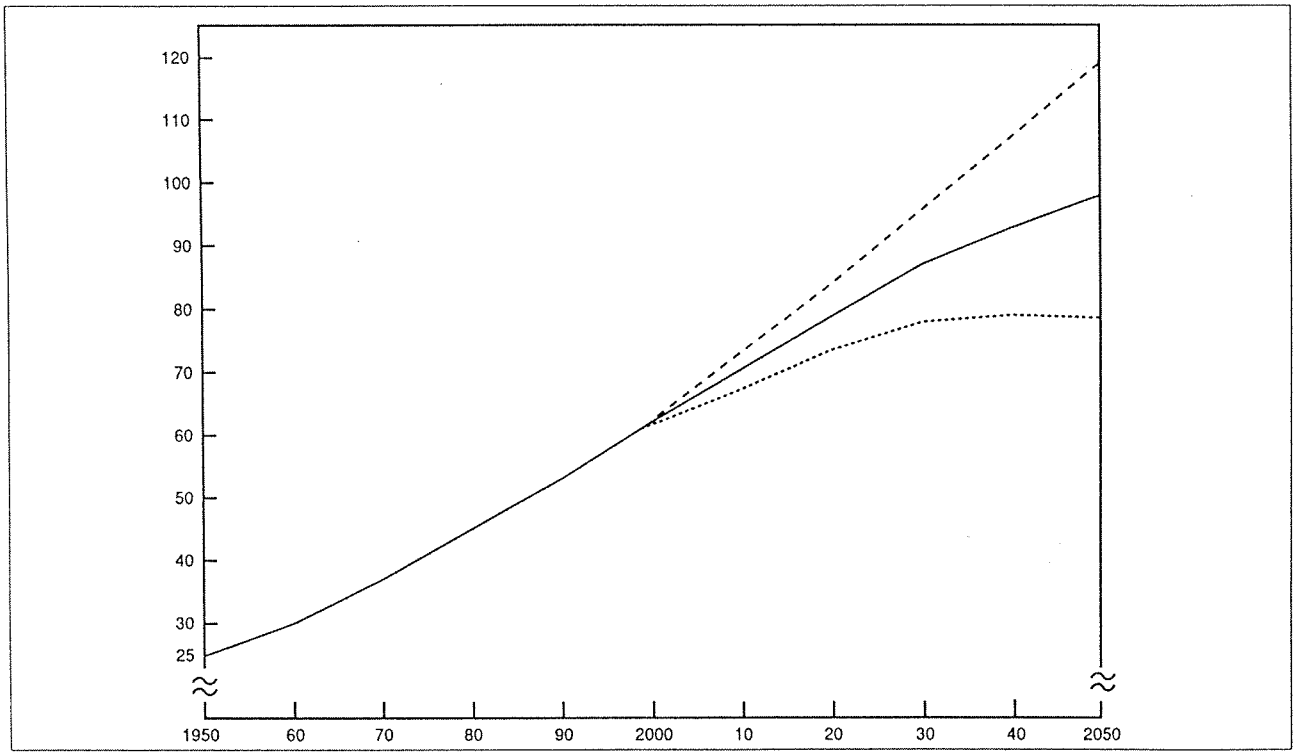


Figure 2

Fig. 2-a

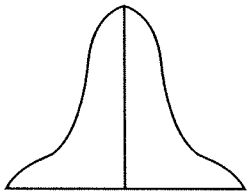


Fig. 2-b

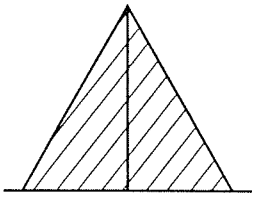


Fig. 2-c

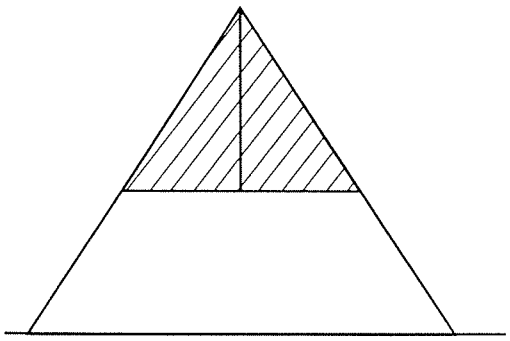


Fig. 2-d

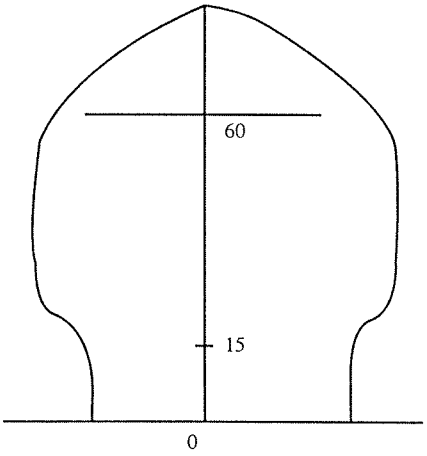


Fig. 2-e

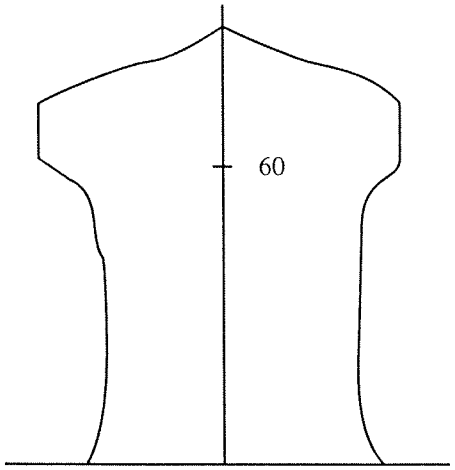


Fig. 2-f

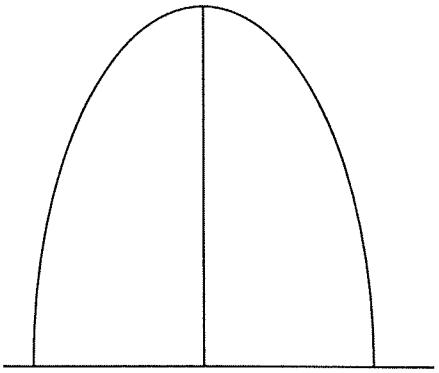


Table 1 Demographic Transition and Economic Development

Country name	TFR'96[1]	DTI'96[2]	HDI'95[3]	GDP/Cap.'93[4]	ALE'96[5]
East Asia	1.92				71.05
China	1.95	0.8960	0.594	361	69.95
DPRK *	2.23	0.8902	0.733	- - -	71.95
Hong Kong	1.21	1.0000	0.905	20,004	79.25
Japan	1.50	1.0000	0.937	33,667	79.85
Mongolia	3.27	0.7527	0.604	267	68.85
Korea	1.80	0.9362	0.882	7,497	72.45
Southeast Asia	3.03				65.55
Cambodia	4.86	0.4018	0.337	232	54.00
Indonesia	2.63	0.7595	0.637	844	65.15
Laos	6.03	0.2886	0.420	290	53.50
Malaysia	3.24	0.8005	0.822	3,325	72.10
Myanmar	3.81	0.5827	0.457	1,238	60.15
Philippines	3.57	0.7191	0.677	839	68.40
Singapore	1.73	0.9926	0.878	20,486	76.05
Thailand	2.10	0.8527	0.827	2,157	68.40
Vietnam	3.51	0.7086	0.539	181	67.25
South and Central Asia	3.77				62.60
Afghanistan	6.37	0.1465	0.228	- - - - -	45.50
Bangladesh	3.39	0.5931	0.364	208	58.15
Bhutan	5.44	0.3387	0.305	- - - - -	53.25
India	3.42	0.6057	0.439	279	62.75
Iranì	4.52	0.6050	0.770	1,782	69.65
Nepal	4.95	0.4284	0.343	180	56.50
Pakistan	5.59	0.4744	0.483	422	64.00
Sri Lanka	2.29	0.9014	0.704	578	73.15
West Asia	4.13				68.20
Iraq	5.25	0.5609	0.617	2,692	68.00
Israel	2.65	0.9264	0.907	13,362	77.30
Jordan	5.13	0.5926	0.758	1,372	69.75
Kuwait	2.90	0.8877	0.821	13,601	76.15
Lebanon	2.75	0.8145	0.675	1,955	69.90
Oman	6.67	0.4748	0.715	5,721	71.10
Saudi Arabia	5.94	0.5412	0.762	7,431	71.60
Syria	5.36	0.5640	0.761	1,396	68.95
Turkey	3.04	0.7700	0.792	3,027	68.60
UAE	3.88	0.7854	0.861	19,592	75.20
Yemen	7.14	0.1689	0.424	322	52.15

Source: UNFPA, World Population 1996, UNDP "Human Development Report 1995 - Gender and Human Development," The World bank "World Development Report"

* Democratic Peoples Republic of Korea.

Table captions

1) Total fertility rate 1996

2) Demographic transition index

3) Human development index

4) Gross domestic product 1993

5) Average life expectancy at birth

Demographic transition index (DTI)

$DTI = 0.5\ [(7.6 - TFR)/5.5] + [1 - (79 - e_0)/36]$

Demographic transition index gives numeric values to the process from high birth/high mortality rate to low birth/low mortality rate. Here, the average number of children a woman is expected to give birth to in her lifetime is estimated at 7.6, average life expectancy at birth is estimated at 43 years while total fertility rate and average life expectancy at birth after the transition to low birth/low mortality rate has been completed are estimated at 2.1 and 79 years, respectively. The closer the index value becomes to 1 indicates that the process of demographic transition is approaching its completion.

Human development index (HDI)

Human development index is calculated from average life expectancy, level of educational achievement (adult literacy rate and school attendance rate) and income adjusted by purchasing capacity par. The closer the index value becomes to 1 indicates further advancement of human development. Refer to UNDP, Human Development Report 1996, Oxford Press, 1996, p.106 (Technical Note) for details.

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Table 5 Dependency ratio in Laos and Its Neighboring Countries (1995)

Country name	Dependency ratio (unit: persons)
Vietnam	64.2
Thailand	54.1
Myanmar	62.6
Malaysia	61.3
Cambodia	79.9

Source) United Nations, World Population Prospect.

Table 6 Birth Rate and Death Rate in Laos

Year	Total population (1,000 persons)	Crude birth rate (‰)	Crude death rate (‰)	Rate of natural increase (‰)	Year
1950	1175	--	--	--	
1955	1944	45.7	25.3	20.4	1950-1955
1960	2177	45.4	22.8	22.6	1955-1960
1965	2432	44.9	22.7	22.2	1960-1965
1970	2713	44.4	22.6	21.8	1965-1970
1975	3024	44.4	22.7	21.7	1970-1975
1980	3205	45.1	20.7	24.4	1975-1980
1985	3594	45.1	18.7	26.4	1980-1985
1990	4139	45.1	16.9	28.2	1985-1990
1995	4605	39.0	15.0	24.0	1995

Source) United Nations, World Population Prospects. National Statistical Centre, Basic Statistics about the Socio-Economic Development in the Lao PDR (1995).

Table 7 Estimated Lao Population and Future Estimation of Food

Year	Total population (1,000 tons)	Rice demand (1,000 tons)
1995	4605	1611.8
2000	5372	1880.2
2005	6107	2137.5
2010	6844	2395.4
2015	7579	2652.7
2020	8304	2906.4

DTI

Fig. 3 Demographic Transition and Economic Development

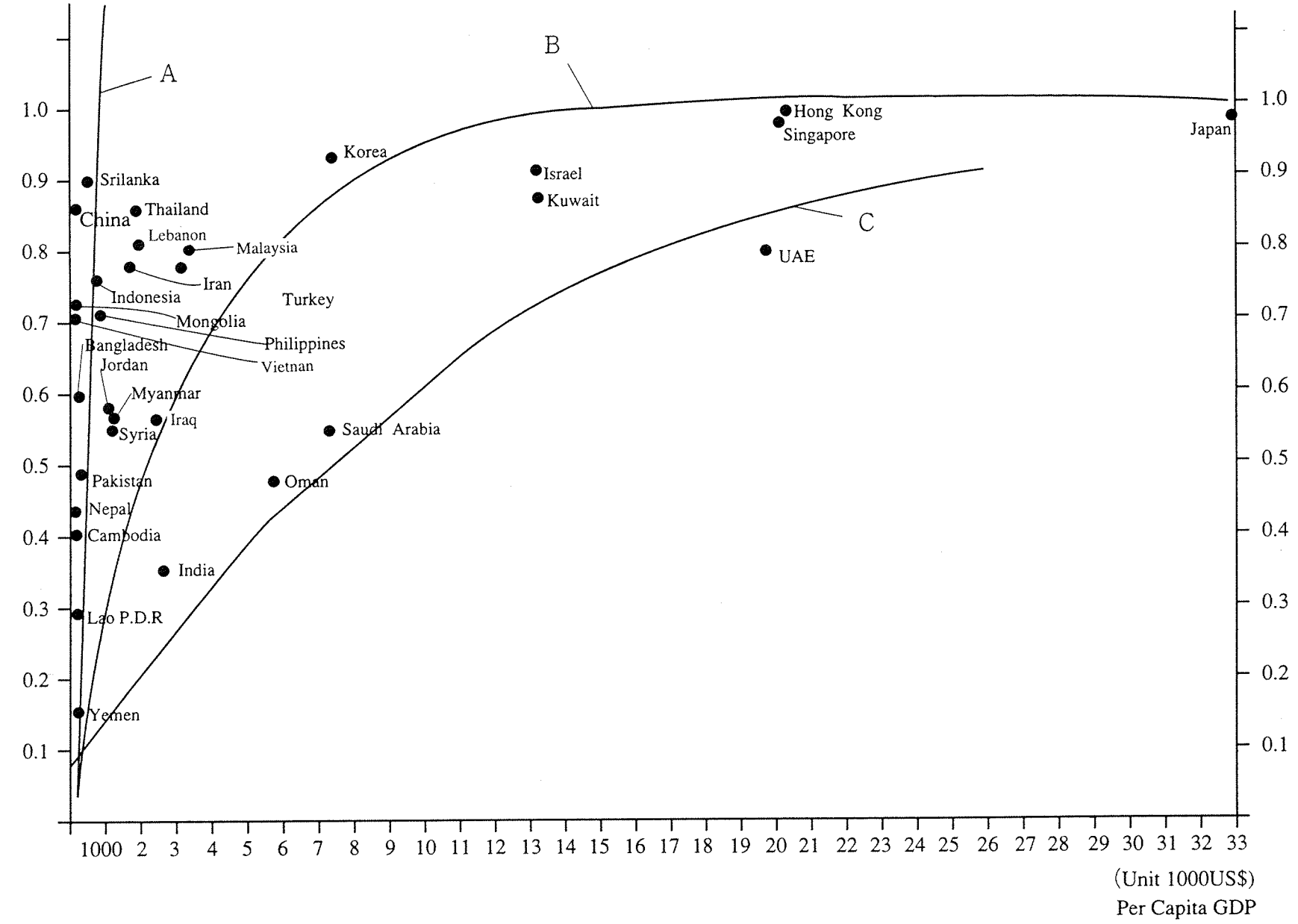


Figure 4 Population Pyramid of Laos

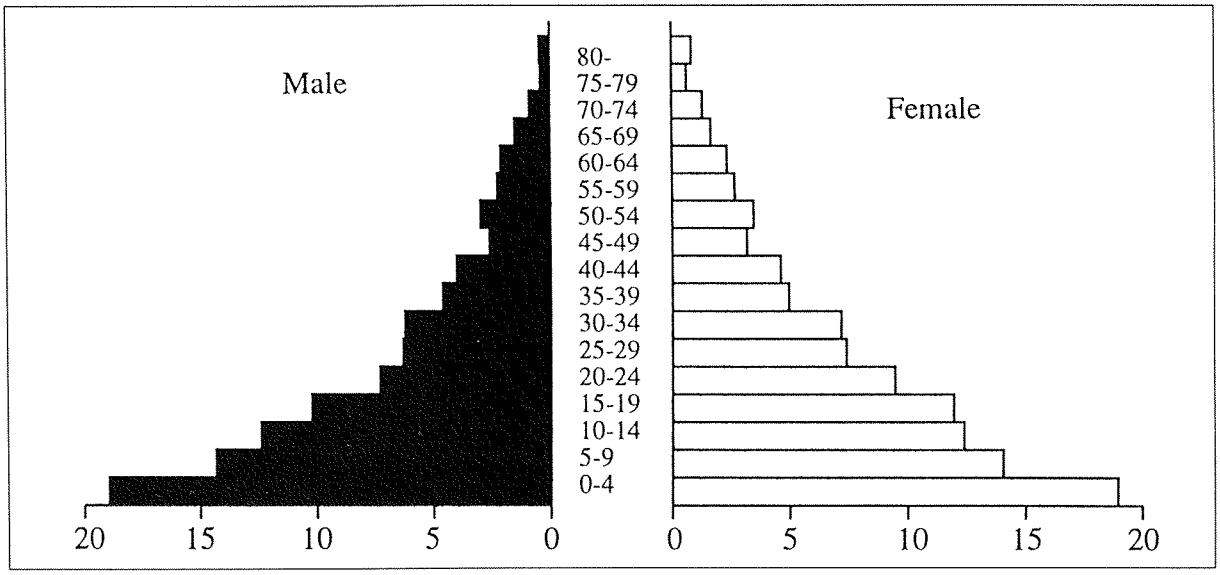
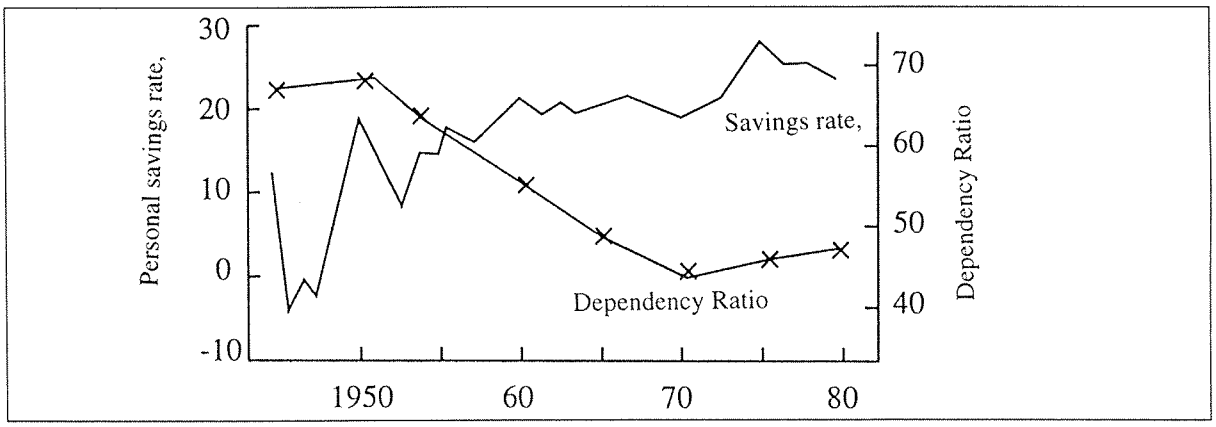


Figure 5 Personal Savings Rate and Dependency Ratio in Japan



Source: Hiroshi Obuchi, Hitoshi Morioka "Economics of Population" Shin Hyoron, June 1981, p.201

Figure 6 Theory of Demographic Transition

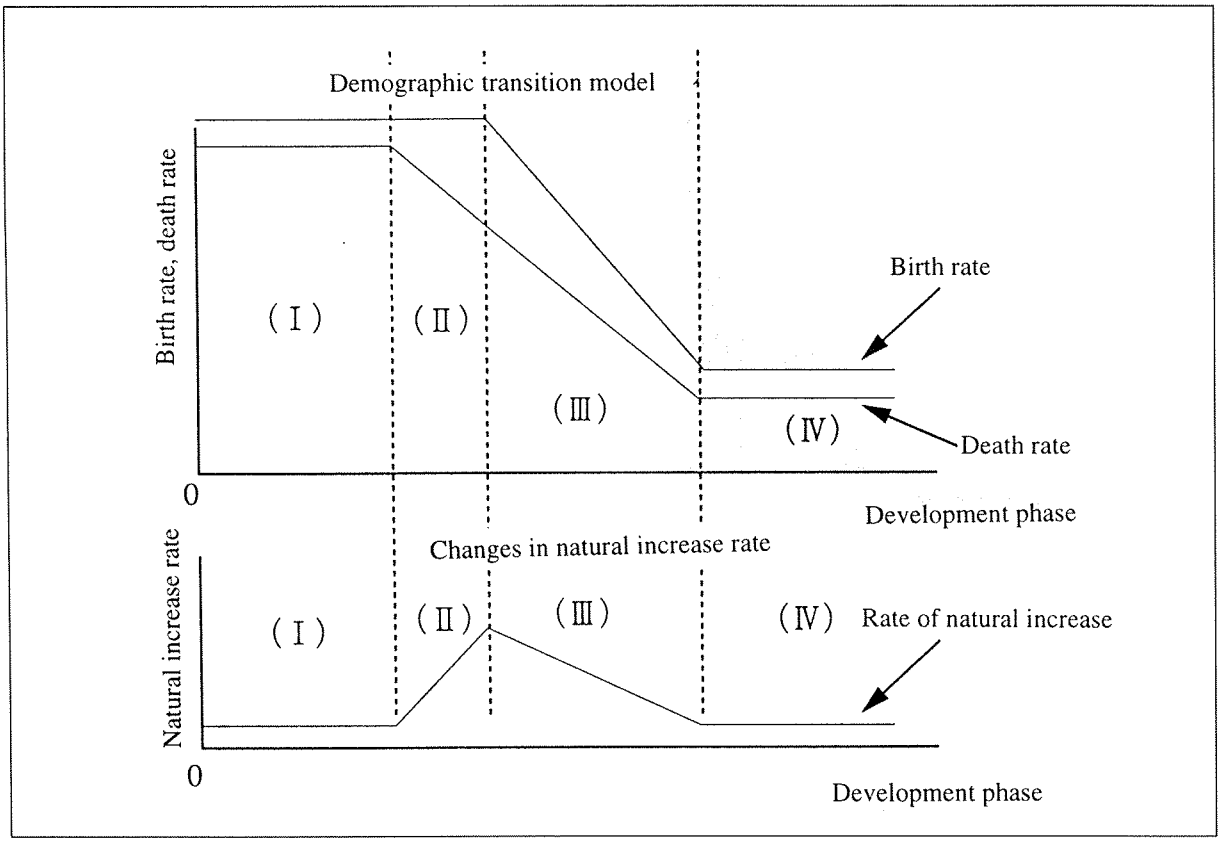


Figure 7 Changes in Birth Rate, Death Rate and Rate of Natural Increase

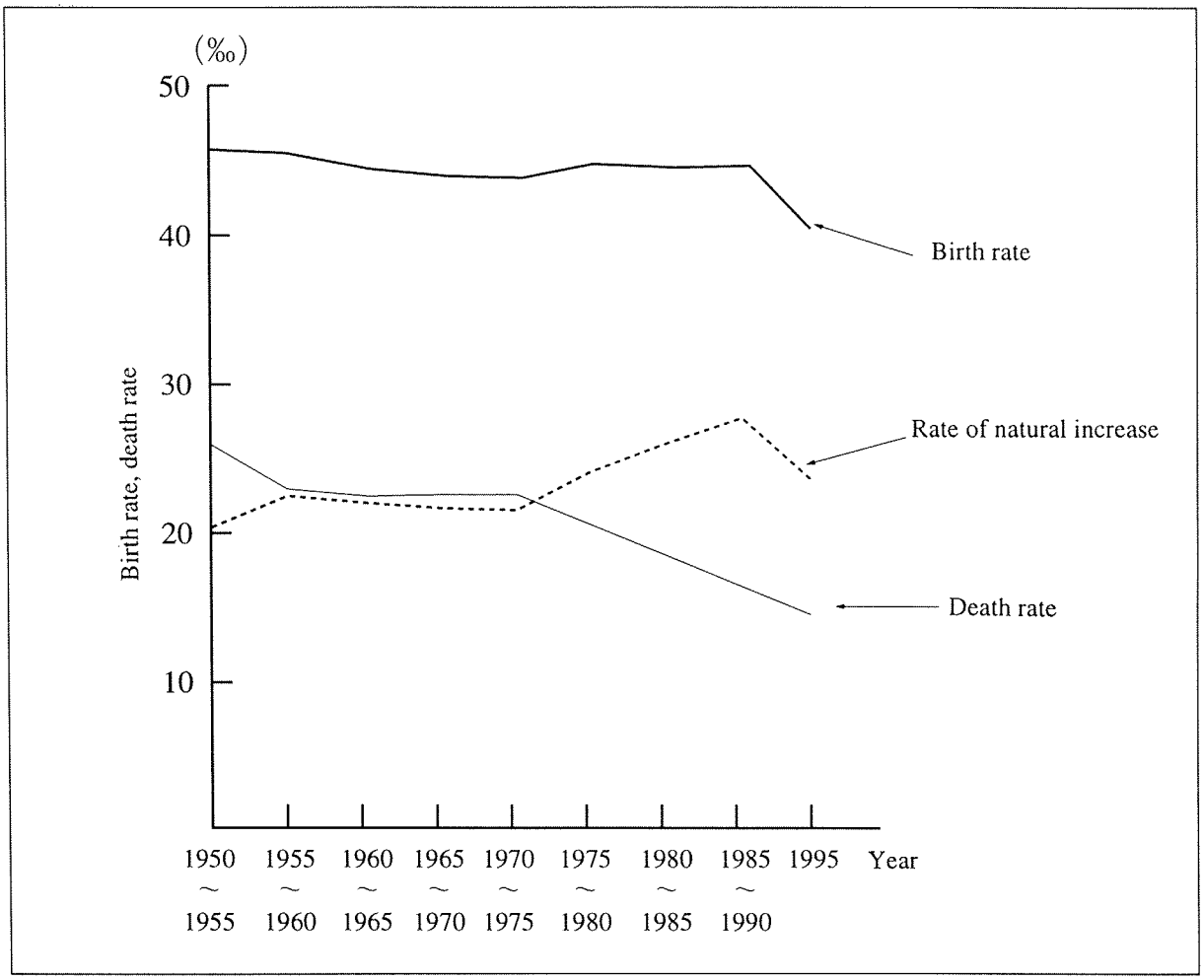


Figure 8 Proximate Determinants of Fertility in Laos

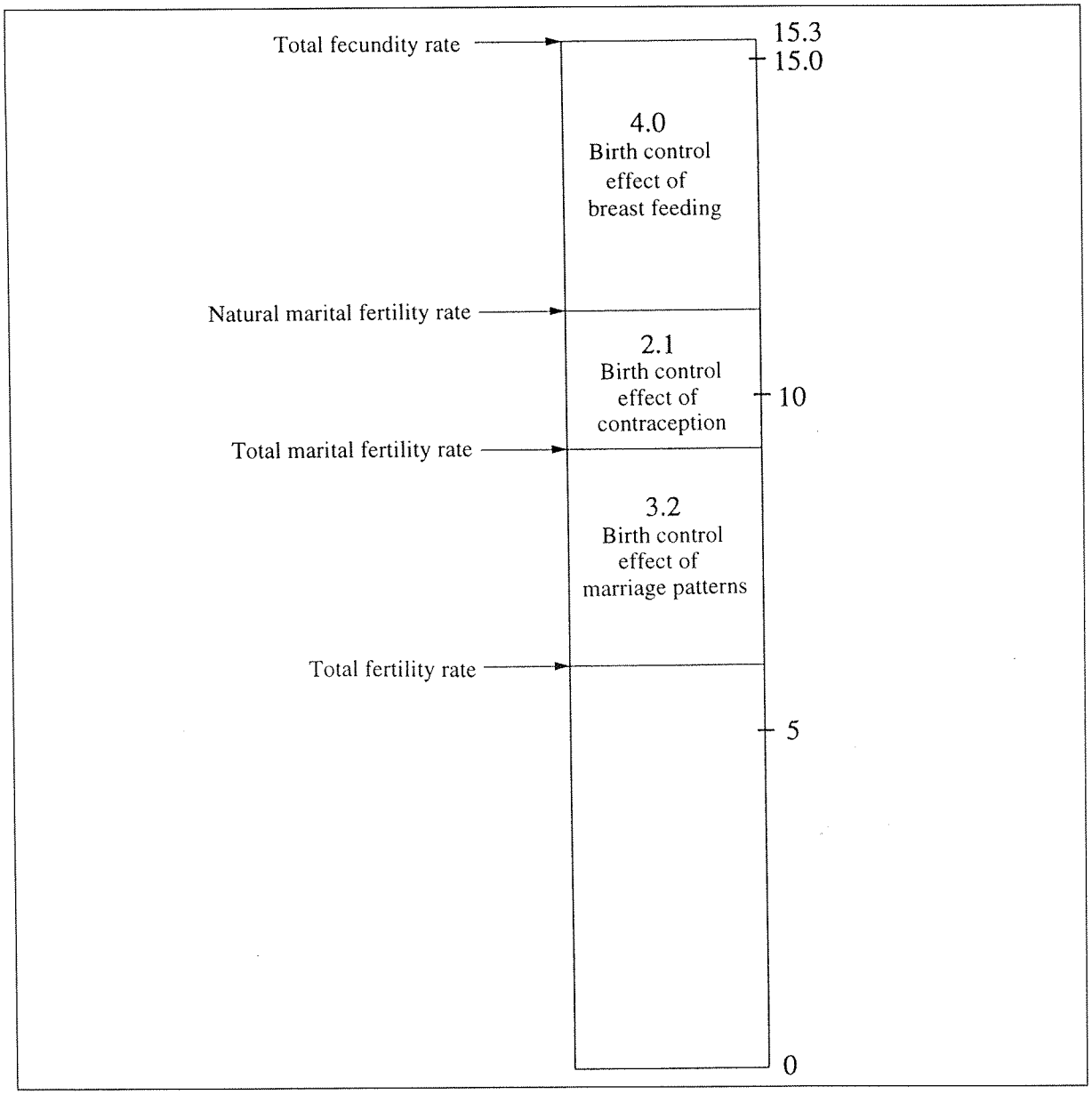
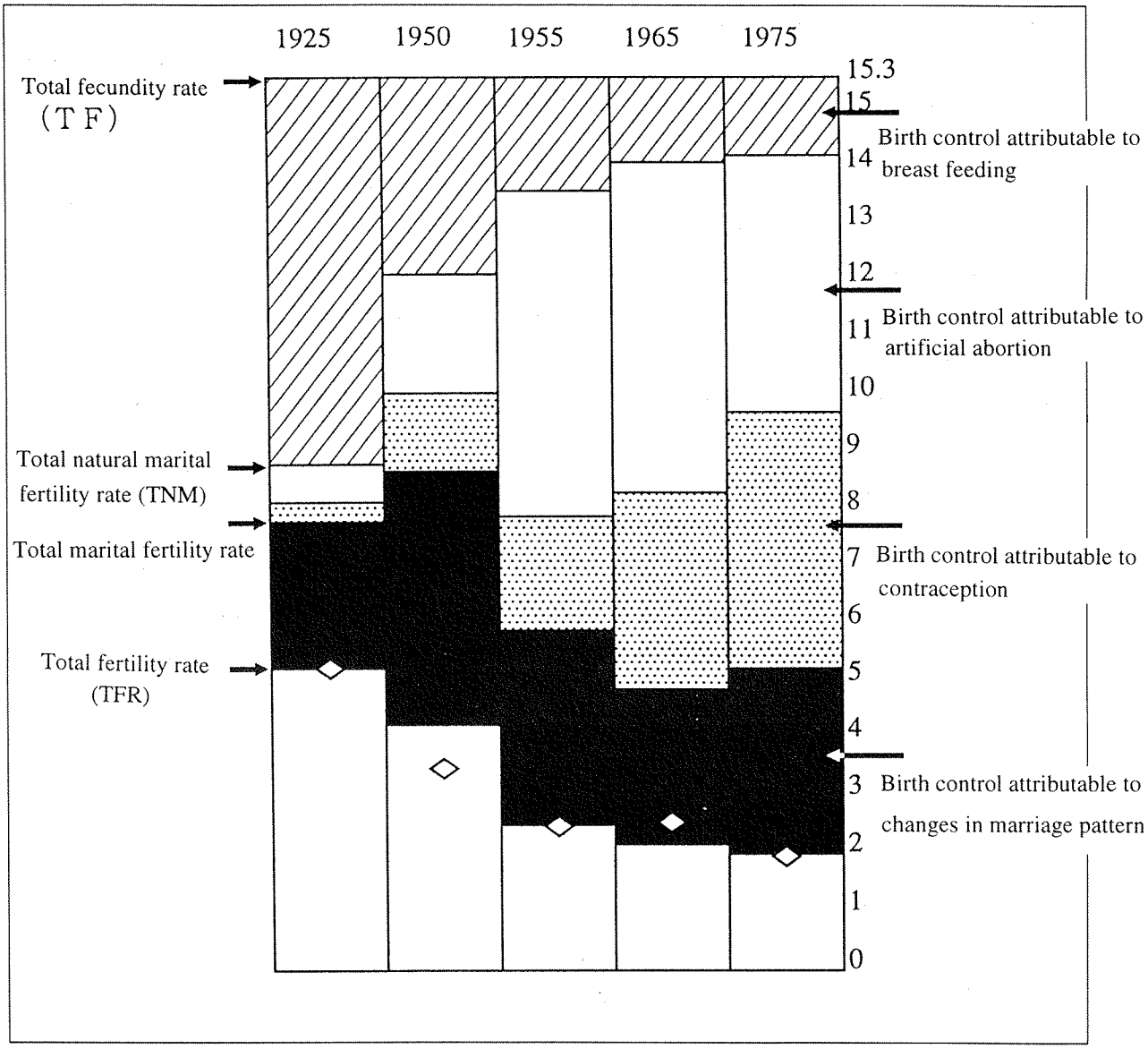


Figure 9 Proximate Determinants of Fetility in Japan



Note) Actual values shown by ◇.

1 Malthus, Thomas Robert, "An Essay on the Principle of Population", translated by Yoshio Nagai, quoted from p. 23

2 Xuan, Vo Tong, "Food Production in Post Green Revolution", Report at the 10th Anniversary of the Regional Research Institute of Agriculture in the Pacific Basin, College of Agriculture, Nihon University, Tokyo, 3-7 March, 1996

3 Uchijima, Zenbei, "Population and Food", Population and Development Vol. 56, Asian Population and Development Association, 1996, pp. 49-55

4 Kuroda, Toshio, "Twenty Year History of United Nations International Population Conference Vol. 3", Population and Development Vol. 56, Asian Population and Development Association, 1996, pp. 43-48

5 Brown, Lester, "State of the World 1996", translated by Hironori Hamanaka, Diamond Publishing, 1996

6 Crude birth rate is an index signifying the number of births per 1,000 population.

7 Crude death rate is an index signifying the number of deaths per 1,000 population.

8 A large gap exists between the population of Lao PDR estimated by ESCAP of 47.42 million and that estimated by the Government of Lao PDR 46.05 million (in 1995). This bespeaks of the urgency of improving the accuracy of statistics system and statistical data in Lao PDR.

9 National Statistical Centre, Basic Statistics About the Socio-Economic Development in the Lao PDR (1995)

10 United Nations, World Population Prospects

National Statistical Centre, Basic Statistics About the Socio-Economic Development in the Lao PDR (1995)

11 Youth population index = (youth population ÷ productive age population) x 100

12 Elderly population index = (elderly population ÷ productive age population) x 100

13 Dependent population index = (youth population + productive age population) ÷ productive age population x 100 = youth population index + elderly population index

14 Many developing countries are implementing their population policy including family planning based on the notion that rapid increase of population must be controlled in order to promote economic development. According to the information obtained from the field study, however, the Lao Government does not appear to have such notion nor the will it actively promote population policy.

Reflected in this stance is the demographic condition of Lao PDR in which the size of population itself is small and population density is low despite the rapidly growing population.

Chapter Two

Overview of Agriculture in the Surveyed Country

1 Basic Agricultural Policy of Lao PDR

2 The government's medium strategy

3 Importance of Agriculture Sector in Lao Economy

4 Lao Agriculture System

5 Infrastructure

6 Rural Infrastructure, Market Accessibility and Rural Industry

Chapter Two

Overview of Agriculture in the Surveyed Country

1 Basic Agricultural Policy of Lao PDR

Policy reforms were introduced since 1985 by the new concept (Chin-ta-na-kan-maii) aimed at creating a new system of economic management, utilizing the market-oriented economy adjusted by the stage, in place of the centralized bureaucratic management mechanism.

In June 1986, based on the two national programs (Food Security and Reduction of Shifting Cultivation), specific reforms concerning the Agriculture and Forestry sector, were consolidated at the First National Agriculture Conference, in which the following basic objectives and directives were pronounced by the government:

- to turn from rice monocropping to crop diversification (extencification and intensification of lowland rice and exported crops).
- development of livestock with accent on cattle for export.
- rationalization of Agriculture (zoning and specification of crop and livestock production according to the potential of each region).
- water as a precondition for life, the provision of on-farm water storage is a good means of alleviating the drought problem, irrigation development with preference for small and

medium scale projects.

- forest industry improvement, reforestation and environmental protection, allocation of land and forest to villages and families for agriculture and agroforestry.
- the family to be considered as a cell from which planning of production must start based on demands.
- organization of production units at village level (7-10 families/unit) for mutual aid and for receiving technical financial and cultural assistance from the district or community.
- assure supply of inputs and services to production, and purchase of agricultural products.
- improve financial system and make agricultural credit available;

recognize the role of the private sector in the development of agriculture and the economy;

- recognize the role of non agricultural sectors (Education, Transport, Public Health, Finance, Commerce...in agricultural development);
- the food security program, the agriculture and forest development the establishment of new villages and rural development must be carried out simultaneously;
- enlarge cooperation abroad and encourage investment;
- pricing based on supply and demand.

Since that conference, the 6th, 7th, 8th, 9th resolutions of the Party have been gradually formulated and applied during the 2nd Five Year Plan 1986-90. Thus many changes are ongoing : exchange rates have been unified and aligned to the free market rate; a commercial banking and credit systems have been established; the private sector allowed to operate. For the agriculture sector, the collective forms of production (the stage farms and cooperatives) have been abandoned; and private farmers given equal access to institutional credit, farm inputs and support services; subsidies for farm inputs have been eliminated; parcels of cooperative paddy lands have been returned to their previous owners. Thus, production by household is improving gradually. Procurement prices of rice and other crops have been aligned to the free market. Trade barriers have been dismantled.

2 The government's medium strategy

The government's medium strategy was outlined at the fifth Party Congress in April 1991, with the following broad objectives/programmes:

- food self-sufficiency and security;
- increase production and circulation of basic commodities and consumer goods;
- sustainable development of the forestry subsector with a reduction towards stopping in slash and burn agriculture;
- development of small and medium scale industries that utilize the country's natural resources;

- development of infrastructure, particularly transport communications and irrigation schemes;
- improvement in education

The role of Government in agriculture is to :
- provide support services to farmers and communities.
- regulate where necessary the production environment of farmers and communities.
- provide to the extent possible, relief support in the event of natural calamities.

MAF policy/programmes has been stated to be to :
- promote food security.
- diminish towards stopping in slash and burn cultivation.
- promote cash crops, livestock and plantation of commercial fast growing tree.
- develop Agricultural infrastructure especially irrigation schemes.
- establish agriculture and forestry research facilities
- develop human resources.

Issues include :

*Irrigation rehabilitation.

Preference for small to medium scale farmer managed schemes; farmers participation in planning, financing, construction, operation and maintenance, attention to cost recovery increased technical support to farmers.

*Rural roads.

Privatizing road construction contraction; supporting local constructors; emphasis on local and district roads.

*Agricultural Development.

Developing area of specific comparative advantages, reorientation of forms from subsistence or market based, intensification of lowland rice production and expansion of areas planted to cash and tree crops, reduction in slash and burn upland rice cultivation, stabilizing rotational cultivation in upland areas.

*Research, extension and training

Rationalization of research facilities; reestablishment of key regional centers,; developing sustainable technology for upland farming systems; delineation of farming systems which maximize returns; adaption of existing technology; establishment of national extension

system with strong linkages to research and the farmer.

*Rural Credit

Rural credit provided through the banking system; private sector to play a key role in the provision and distribution of agricultural inputs.

*Marketing

Creation of a free market environment to stimulate the involvement of traders in the marketing chain; policies to provide incentive for private traders; improve multilateral/ bilateral relations with regional trading partners.

*Rural Development:

- Strengthen the administration structures at village level,
- Promote for diversification of agriculture in the rural areas to improve diet and income of the village population; attention should be paid on the transfer of advanced and adapted technology for the improvement of rice production, other cash crops and animal husbandry.
- Promote for small scale agro-processing factory implantation and food processing application
- Improvement of the non-agricultural production that are specific to the ethnic group.
- Rationalization of Agriculture according to the potentiality of each region (region for coffee/ legumes/cotton, and other crops production, region for stabilized upland agriculture, region for cattle production based on natural pastures and its improvement. Accent must be on the family production which represent a large part of the total production, and obviously the development of animal production should be linked with the veterinary network expansion at village level.
- In conducting rural development, the District will act as center point, the Province as coordinator.
- If necessary, villages have to move from important water sources, reserve forests, dense forests to resettle in proper site and to learn in doing agro-forestry based on natural resources, in the way of reducing the slash and burn cultivation.
- Rural roads, irrigation system, rural electricity, water reservoir, deep will, watering by gravity...can be done by cooperation between local administration and village population.
- In developing the poorest mountainous areas, the government contributions must be the most important part, while the villagers can only contribute as laborers.
- Re-develop local artistics and cultures, with appropriate artistic innovations in order to create ambiance and solidarity, and at the time, organize an information-training unit to train people especially on agroforestry experiences and it would try to discourage the non progressive customs.

- Improve the credit system services to the farmers; activate the private sector in the provision of agricultural inputs, the creation of market to stimulate rural production.
- Setting up village regulation systems concerning land/forests protection, fish-environment protection, the construction and management of village infrastructure: (school, dispensary, dam, road...); village security, defense, hygiene sanitation.
- Education.
- Health.
- The international/bilateral/NGO aids for different rural development projects should be used efficiently with an harmonized coordination between concerned institutions and disciplines, and with reference to the responsibilities and duties assigned to each party. Local administration committee where the project will be implemented, must know about the project, its objectives and content; and ensure the project having qualified personnel.

3 Importance of Agriculture Sector in Lao Economy

The agriculture sector, including crops, livestock and fishery and forestry, dominates the economy of Lao PDR. Agriculture is an important source of income, employing about 85% of the labor force, and as a source of foreign exchange earnings accounting for 40 percent of officially recorded exports. Unofficial agricultural exports are estimated to contribute and additional 15 percent. Agriculture currently contributes 54.3 percent of GDP. Following the normal pattern of structural change among countries that have developed economically, agriculture's contribution to GDP (and to the share of employment) has clearly begun to decline, especially after 1988 as buoyant growth in manufacturing expanded industry's share.

4 Lao Agriculture System

About 60% of population is concentrated in the central and the southern provinces along the Mekong river (Vientiane prefecture, Vientiane, Savannakhet, Champassak) and Saravane on the Sedone effluent. The average population density of 19 persons/km2 is among the lowest in Asia.

The cultural and socio-economic diversity of about 47 ethnic groups, living in some 12.000 villages or in isolated mountainous areas with limited mobility and limited access to information are important constraints in the agricultural development of the Lao PDR. Officially, ethnic tribes are classified into 3 main groups, according to the elevation of their habitat: Lao Lum (Lowlanders 56%), Lao Theung (uplanders 34%), and Lao Sung (highlanders 9%), found respectively on the plains, lower terraces, and upper terraces or slopes of mountains.

Lao Lum practice lowland rice cultivation with preference for glutinous rice. Secondary crops are sweet corn, Vegetables legumes, fruit trees. Livestock comprising buffalo, cattle, swine, poultry...where they have insufficient lowland paddy land, they grow upland rice on slopes, using a slash and burn method.

The major crops are: rice, maize, sweet potatoes, mungbean, peanut, tobacco, cotton, sugarcane, vegetable, sesame, coffee, tea, and cardamom (Agricultural statistics, 1995).

Table 1 Area, Yield and Production of Major Crops in 1995

	Harvested Area(Ha.)	Yield(T/ha)	Production(T)
Rice paddy	559,900	2.5	1,417,800
Maize	29,100	1.7	50,400
Starchy-Root(Tubers)	14,000	7.1	99,200
Vegetable	9,500	6.5	61,700
Mungbean	3,300	0.7	2,300
Soybean	5,800	0.8	4,800
Peanut	8,200	1.0	8,400
Tobacco	7,400	3.6	26,600
Cotton	9,600	0.9	8,800
Sugar Cane	2,700	23.1	62,300
Coffee	20,200	0.4	8,600
Tea	600	1.3	800

Source) MAF, Agricultural Statistics 1976-1995

Rice is the staple food of the Lao people, with the estimated annual consumption rate of 350 kg/ person. There are two different geographical locations, and therefore two ways for rice production in Laos: (I) rice production in lowland areas, and (2) rice production in upland areas. Different varieties of rice are grown under different conditions. There are described below.]

(1) Rice production in lowland areas;

1) Rainfed Lowland Rice Ecosystem

Most of the total Rainfed Lowland paddy (367.300 ha in 1995) is monocropped to rice with a single rice crop being grown during the six month rainy season period from mid April to mid October. Cultivars are largely glutinous > 90% of the rice area and traditional 80%. Secondary crops either before or after rice is rare in the paddy lands, apart from small plots of vegetables being grown mainly to meet household needs.

With the May rains, fields are plowed by using a single mold board plow and a single buffalo, a second plowing, 1 or 2 harrowings by a simple comb harrow and random transplanting with spacing of approximately 15x15, 20x20, 25x25, 30x30, or 35x35 according to soil fertility and landscape position seedlings from wet seedbeds from 30 to 45 days old are transplanted depending on water availability. Upper paddies are transplanted after lower areas are finished and often only 1 plowing 1 harrowing and transplanting on the same day, are done on sandy soil parcels, that rapidly harden after each land preparation step.

Facing the declining fertility of paddy soil and encouraged by a doubled rice price, farmers in Champasack province in this wet season of 1995, increased organic and chemical fertilizers application.

Each farmer plants 2-5 varieties of rice, each adapted to either low or upper paddy. This allows farmers to stagger labor demands for the two most demanding activities: final land preparation for transplanting, and harvesting-threshing. The seasonal rice varieties mostly cropped in the Lao country are local Indica photosensitive varieties which vegetate up to five months duration from May to October. Early maturing varieties, Japonica hybrids are also important because, given earlier harvests, it provides rice when family stocks are exhausted. In addition to good yield and good eating quality of varieties, farmers look for flood tolerance, drought tolerance, lodging tolerance, heavy grain, more grains/panicle and high milling recovery. Diseases and insect pests are not regarded by farmers as production constraints. However, serious gall midge, army worm, crab damage is often reported. Weeds control is almost neglected; after transplanting is finished, farmers have to accomplish religious activities and other necessary works.

2) Irrigated dry season lowland rice based ecosystem

Farmers practices

Rice environment is the same as for rainfed lowland rice, with the exception that farmers have to use more pesticides, more chemical fertilizers and improved rice varieties for nearly 100%; but in wet season, cultivars with low or no inputs continue to dominate in the areas.

In 1994-95, up to 13,000 ha nationwide produce an irrigated dry season rice crop and account for only 3% of the lowland rice area. Poor water management and maintenance problems and poor drainage contribute to minimal yield gains in dry season irrigated areas. Rice multilocal tests in wet season 1990 in Vientiane Plain showed that in irrigated areas, yields were low, with a maximum average of 2,9 t/ha, while in non irrigated areas, yields were up to 5 t/ha. Poor drainage-flooding, water lodging, and weed problems would not be the main cause in lowering yields in irrigated areas, but the two rice crops would be the principal factor responsible for reducing the nutrient content of the soil.

In addition to poor water control, weed problems, and limited use of fertilizers due to limited purchasing power, the more difficult dry season land preparation combined with low

availability of labor appear to be constraints. Good Land preparation practices using buffalo from one parcel to another, as is done in wet season paddy, is largely replaced by the unsuitable big tractors in the Vientiane municipality, which accounts for about 50% of the country's dry season irrigated areas. The paddy hardpan is destroyed, water and nutrients leach out and competition from weeds becomes increasingly severe, other constraints are poor seedling production and poor insect control. In fact, old and weak seedlings of shorter duration varieties are transplanted e.g. Using the same practices as in the wet season for the long duration cultivars. And instead of using non glutinous high yielding varieties which are resistant to stem borers are brown plant-hopper of Lao PDR, significant insects in dry season, farmers still prefer glutinous non resistant to insect pests and lower yielding rice only for it good eating quality. Some farmers in applying the whole package of technology, got yields which ranged from 4-5 t/ha, depending on varieties, level of inputs, and level of soil fertility.

(2) Rice Production in upland area:

1) Rainfed upland rice based ecosystem

General description

Rice production in upland areas or upland rice is broadly known as a shifting cultivation, called by the farmers "Hay" in Lao.

Shifting cultivation is a form of agriculture in which fields are cleared from forests. The cut tree and dried biomass is burned, and crops are planted for one or a few years, and then the field is abandoned while another part of the forest is cleared (Rambo, 1989). It is an indigenous technique which has been used on all of the continents. It is still practiced in many countries and allows the feeding of a numerous population, which are often isolated from communication networks and markets and which are without much access to education and new techniques(Chazee, 1994).

In former times, though shifting cultivation was criticized by many observers, it was not seen as a major problem in most parts of the world. Today the situation has dramatically changed. Shifting cultivation, as a form of forest destruction, is now a social, economic and legal problem.

The rapid growth of population has led to tremendous changes in national land use patterns. While the population continues to grow, the land area remains the same. The expansion in population causes increased pressure for more dwellings, food, roads, social services and other infrastructures. Increasing tribal populations coupled with a shortage of lands for cultivation, encourage migration to new forest areas, which are put under crop production.

The need for new and fertile land is of course one of the main reasons for shifting cultivation. After the cleared forest has been used for food production for a few years, soil fertility declines, and weeds and pests invade the land and become a major farming problem. These factors cause

continuing poor crop production and hence encourage farmers to seek another area of forest for food production.

Since shifting cultivation has been done in different locations, altitudes, and environments, and with various resource available, shifting cultivation practices might be different from place to place, and from country to country.

Occupationally, shifting cultivation can be classified into two types: part-time or partial shifting cultivation, and full-time or integral shifting cultivation (Warner, 1991).

(a) Part-time shifting cultivation is sometimes called supplemented shifting cultivation. It has been done unoccupationally in both uplands and highlands but mostly at the foot of mountains, with a lack of experience and a lack of knowledge of sustainable agriculture, or that shifting cultivation causes environmental problems. In case of Lao PDR, it is mostly done by Lao Lum (lowlanders) in the area of lower 600 meters above sea level.

(b) Full time shifting cultivation has been done as a major occupation. The shifting cultivators rely on it for their livelihood. It can be classified into two sub-types of shifting cultivation: Rotational or Established shifting cultivation and Pioneer or Abandonment shifting cultivation. In case of Lao PDR, it is mostly done by Lao Theung (uplanders) and Lao Sung (highlanders) between 600 to more than 1,000 meters above sea level.

(b.1) Rotation or Established shifting cultivation

Rotational or established shifting cultivation refers to the practice of rotation and a well-managed organization. It is normally done in secondary forests for 1-2 years, and then, cultivation moves to other places which have long been fallow, and then moves back to the same plots later. Farmers of this type do not need to move the whole village. This system is not very harmful to the ecology or environment, but has a serious impact on the economy, and on the exploitation of the forest. In case of Lao PDR, it is mostly done by Lao Theung (uplanders) around 600 to 800 meters above sea level.

(b.2) Pioneer or Abandonment Shifting Cultivation

Pioneer shifting cultivation usually involves non-permanent villages that move into areas of primary forest and cultivate fields intensively for a longer period, perhaps 10-15 years, till fertility permits, or until most of the nutrients are severely depleted. At that point, the fields and village sites are abandoned and moved to a new location in another area of primary forest. Typically, the loss of soil fertility and the intensity of cultivation greatly inhibit the natural process of re-vegetation and succession, even after years of abandonment. In many cases, only grasses, such as Imperata Cylindrica, will grow and these become the permanent vegetative cover. As a consequence, the valuable forest and timber resources of the primary and secondary forests are lost and cannot be recovered. In case of Lao PDR, it is mostly done by Lao Sung (highlanders) at around 1,000 meters above sea level.

Different researchers delineate different types of shifting cultivation and shifting cultivators in different part of the world, depending on their views and on the practices in each country,

but the descriptions almost always refer to the same aspects and practices. In Lao PDR, as mentioned by UNDP (1994), there are three types of shifting cultivation and cultivators, as follows:

(a) On the plains, practiced by the Lao Loum

In this case, the people have no lowland paddy lands, or limited lowland paddy lands, or rice production on their lowlands has declined due to low soil fertility and limited application of improvement techniques. The people, therefore, have to employ slash and burn methods to supplement their lowland rice production. This practice is considered part-time shifting cultivators or partial type as mentioned earlier.

(b) At the feet of the mountain, practiced by the Lao Theung

In this case, some areas still contain dense forests. The population are normally Lao Theung who live at the altitudes of around 600-800 meters above sea level. They carry out traditional shifting cultivation in this area. They use crop rotation allowing fallow periods of 5 to 15 years, depending on soil conditions and land availability. The main crops are rice, maize, cassava, and chili. Generally, their practices are not a serious threat to forest resources and land. This type is considered the same as the rotational or established types as mentioned earlier.

(c) On the steep slopes, practiced by the Lao Sung

The Lao Sung and Yao people who live in the uplands approximately, 1,000 meters above sea level mostly cultivate poppy as a cash crop, together with a number of subsistence crops such as rice, maize, tobacco and vegetable. In view of the nutrient requirements, maize and poppy are usually intercropped. The Lao Sung also plant peas and beans with poppies in order to improve soil fertility. They use only the best soils in the primary forest for poppy growing. They use soils for agricultural purposes for a period of 5 to 10 years. This is considered the same as the pioneer or abandonment types as mentioned above. Rambo (1989) said that pioneering shifting cultivation involves the clearance of plots in primary forests. The intensive cultivation of these take place for several years, until soil fertility is destroyed, and, all too often, the permanent replacement of the forest by Imperata Cylindrica grassland. Shifting cultivation as practiced by Lao Suong groups (e.g., the Hmong) is often of the pioneering type. It is not sustainable and often results in significant long-term environmental degradation. Because it involves clearance of primary forest, it also destroys valuable timber resources. Its practitioners are of necessity nomadic, being forced to migrate every decade or so to find uncleared forests.

Understanding swidden cultivation, and why it continues to be practiced in the upland areas of many Southeast Asian countries, including the Lao PDR, must be an important element in any strategy to reduce the perceived negative environmental impacts resulting from the practice (SUAN, 1991).

Shifting cultivation is considered a major cause of deforestation in Lao PDR. Over the past fifty years Laos has lost a great area of dense forest with more than 170 tree species, eighty of which were of high economic value. There were also other forest resources, of wildlife species. According to surveys done in 1968, 1982, and 1989, and the estimation in 1993 by the Ministry of Agriculture and Forestry, the original total forest area has been reduced, as shown in Table below.

Table 2 Forest Decreasing in Lao PDR

Year	Total Remaining (ha)	Total Remaining in Percentage
1968	16,102,400	68
1982	11,603,200	49
1989	11,129,600	47
1993	10,845,440	45.8

Source) MAF (1993)

This is because that, for many generations, the people of Laos, especially the mountainous people, have earned their living by practicing shifting cultivation combined with increasing population pressure (MAF, 1993)

This results in forest destruction and causes many negative effects on the country's environment: degradation of many forest areas, creation of bare mountains and empty land without forest, soil erosion, soil degradation, low soil fertility not favorable for cultivation, irregularly dry rivers and streams causing reduction in waterlife, wildlife reduction, droughts and floods which threaten people and production almost every year, and diseases and pests occur continuously. All the above mentioned causes alarming signals to the country (MAF, 1993).

Upland rice is the principal crop in slash and burn shifting cultivation systems and accounted for 271,000 ha (40% of rice area) practiced by an estimated of 253,000 families or more than 1 million people. These people live in the mountainous areas which cover 75% of the total country land area and where most primary or dense forest are available. Yield averaged 1.3 t/ha for 1984-1987. And in 1995, area planted is about 179.000 ha. (133.790 ha. in the north, 27.896 ha. in the central and 17.347 ha. in the south of the country (Agricultural Statistics, 1995)

The largest areas are planted in rice, in monocropping or in mixed cropping. The areas of wet season rice under shifting cultivation covers 34% of the national rice area and accounts for 20% of the annual production (MAF, 1993). The other slash and burn areas are planted in maize, cassava, vegetables, fruit-trees, oil crops, cotton, cucumbers, indigo, aromatic plants, etc.

The above figures show that production of upland rice is very small but the area of production is quite large compared to lowland rice production.

In order to solve such problems, the Lao PDR Government has set up a certain policy for the reduction of the shifting cultivation practice by seeking suitable alternative ways of living (in rice production) for shifting cultivators. Different strategies have been implemented as development projects and pilot projects by governmental, non-governmental and international organizations in the forms of integrated agricultural and rural development, the stabilization of the shifting cultivation practice, the reduction of the shifting cultivation practice, reforestation, foodstuff production, irrigation construction, fruit tree production, livestock production, community development, and so on. So far it can be seen that the number of both shifting cultivators and areas of shifting cultivation has been reduce gradually (about 40.000 ha. decrease compared with 1994).

(3) Main Cash crops, vegetables and fruit trees

Cash crops include sesame, cotton, soybean, flint-corn in the north, sugar cane flint corn, tobacco, mungbean and vegetables in the central region, groundnut, cotton, vegetables, tobacco, mungbean in the south. These are cultivated out of paddy lands, either before sowing rice in April, May or after transplanting rice at the end of August-September. Many farmers have fields located far from their houses, adding to labor constraints. Those living on the bank of the Mekong and other rivers, produce more cash crop and vegetables. Each family grows vegetables and fruit trees in home gardens.

(4) Livestock:

Livestock ownership is a significant feature of all agricultural households, and they form an integrated part of current production systems. Both buffalo and cattle are found in all villages, the buffalo generally being used for land preparation and cattle for pulling carts and beef production. The relative level of ownership of each tends to vary with regions, Pigs are often raised individually as a source of cash income, although pig ownership is not a feature of all households. Poultry are common to almost all households.

(5) Other Agricultural products

When not engaged directly in farming, family members used to fishing, hunting and gathering of wild food and other forest products. In the absence of pesticides use, most rainfed lowland paddy land still be populated with native fishes, frogs, snails, crabs, rats, snakes, birds, various

types of insects... Forest products gathered include mushrooms and bamboo shoots of different species, a diversity of wild vegetables, honey. Wild animals and birds are also hunted against interdiction. If the total fish yield under this system is less than 30 kg/ha in a season, a major part of harvested fish comes from the Mekong river and effluents, while the fish culture is still developing.

(6) Other dry season activities

Outside of paddy lands, most Lao families grow vegetables in the dry season for home consumption. Those living in the cities or near the district market, produce surplus or cut firewood for sale. Some activate their commercial activities since the transportation problems diminishes in dry season. Some people work as laborers in the existing factories or in construction enterprises. A few crops in paddy lands are: garlic, water melon, mungbean, long yard bean, tobacco.

5 Infrastructure

Transport and communication infrastructure is underdeveloped in Lao PDR. Most of the road network which is the main component of the transportation system is in disrepair or of poor quality in both urban and rural areas. Most of the bridges are of steel and are in need of repair. It is estimated that over 50 percent of the bridges should be replaced. Over the past years considerable progress has been made in expanding the national road network, especially the north-south link. The road network is estimated at 3,387 km of national roads of which only 1,571 are paved, 5640 km of provincial roads and 4,000 km local roads. Of the total road system, 3,463 km are tarred roads, 4,724 km are gravel roads, and 5,943 km are dirt road. An estimated 50 percent of the population is without road access.

Given the large distances in Lao PDR, air transport is an important mode for passenger transport. Lately the volume of domestic air traffic has increased considerably. Lao aviation has been up-grading its aircraft fleet and its airports.

Most of the 1970 km of the Mekong River flowing through Lao PDR is navigable. However, conditions are seasonal, and navigation on parts of the river are difficult or impossible. The only total obstruction is the Khone Falls close to the border of Cambodia. Since 1986, three ferries, eleven cargo ships, four air carrier ships and four passenger ships have been put into service. Tributaries of the Mekong provide an additional 3,000 km of navigable rivers where small tree to five ton boats and canoes are used for the transport of passengers and light consumer goods. The Australian supported Friendship bridge, connecting Lao PDR with Thailand, is the only bridge over the Mekong. One more bridge is planned at Parkse, Champasack province.
There is no rail transportation in Lao PDR but an agreement has been signed with Thailand to

extend the present line from Nong Khai to Vientiane.

The government and the international development agencies have identified poor infrastructure to be the major impediment to development of the country. Consequently, about 50 percent of public capital expenditure is allocated to this sub-sector of which foreign development assistance contributes 90 percent. The transport priority is to link provincial towns and district centers to each other so that year-round access becomes possible by plane, car or boat. Efficient intra-district transportation is unlikely for sometime, particularly during the rainy season when a large number of villages are completely isolated.

6 Rural Infrastructure, Market Accessibility and Rural Industry

Infrastructure is strongly related to the development of off-farm employment opportunities, farmer's integration into the market economy and increased agricultural productivity, which in turn are key to increasing rural incomes and alleviating rural poverty. Table 3 provides an overview of access to rural infrastructure and services by expenditure quintiles; it shows that there is a clear correlation between the availability of rural infrastructure and per Capita expenditures, the rural population in the lowest two expenditure quintiles is significantly less well served by rural roads, public transportation, electricity, markets and safe water supply than the population in the top expenditure quintiles. Similarly, the lowest expenditure quintiles have significantly less access to support services such as visit by extension officers. Table 3 shows that rural areas in Lao PDR in general face severe infrastructure constraints. About 1/3 of all villages and 22% of the population are in areas which are not accessible by truck, only 11% of the population lives in villages with access to electricity and only 7% live in villages with a permanent market.

Accessibility is essential to promote rural development in general and agricultural development. Difficult accessibility conditions hinder farmers' adoption of new technologies, use of information and support services and result in higher input and lower output prices or prevent the reach of input and output markets altogether. Accessibility is also important for the development of off-farm employment because it increases the rural population's mobility, allowing those seeking off-farm employment to travel to areas with demand for unskilled labor. Although these relationships prevail in many countries, as in Lao PDR, it is not clear from this baseline survey data whether higher incomes led to demand for roads, electricity and markets, etc. or whether the supply of such infrastructure stimulated the growth of incomes.

Social Indicator Survey (1992/93)(LSIS) data indicates that access to various services and rural infrastructure are highly correlated with each other in Lao PDR. Over three quarters of villages which have a permanent market are always accessible by truck, and 81% of villages where at least half of all farmers use fertilizer or pesticides in areas which are never accessible

Table 3 Access to Rural Infrastructure and service by Expenditure Quintile

	Expenditure Quintile				
	20	40	60	80	100
Village can be reached by truck:					
Never	36	29	16	14	6
Always	30	41	57	63	75
Dry season only	33	31	26	22	20
<1K.M. from public transport	25	26	40	48	61
>10K.M. from public transport	36	25	17	14	11
Connected to electricity	3	5	14	17	21
School in village	88	91	95	94	96
Permanent market in village	3	5	8	12	12
Agri. ext. worker visited in last 12 month	30	38	44	42	38
Livestock ext. worker visited in last month	21	27	33	35	36
Access to safe water	21	29	41	37	41

Source) MAF, Agricultural Statistics 1976-1995

by truck (Table 4). Similarly, market integration, as demonstrated by the share of village which do not consume their most important crops (Table 5), is strongly related to accessibility.

Table 4 Accessibility and Existence of Markets in Village

% of village

	Permanent Market in Village	At least 1/2 of all farmers using	
Villages accessible by truck:			
Never	22	0	0
Always	78	81	48
Dry season	0	19	52
All	100	10	10

Source) Social Indicator Survey 1992/93

Table 5 Relationship between Accessibility and Market Integration

% of Villages

Village Accessible by Truck	How much Important crop is sold					
	Eaten	Local Market	Other Market	Private Trader	Government	Neighbors
Never	100	0	0	0	0	0
Dry Season only	85	1	2	10	0	2
Always	70	4	16	8	2	0

The data furthermore confirms that there is a strong relationship between accessibility and poverty, with the prevalence of poverty being significantly lower among households living in villages which are always accessible by truck than among households living in villages which are never accessible or only accessible in the dry season. The data also shows that accessibility is much more of a constraint in the North than in Center and the South. Almost 55% of villages in the north are never accessible by truck, while the same only applies to 7% of villages in the Center (Table 6).

Table 6

Village Accessible by Truck	North				Cente			
	Percent of		Avg. p.c. Ex-	Head Count	Percent of		Avg. p.c. Ex-	Head Count
	Population	Village	penditure	Index	Population	Village	penditure	Index
Never	48.9	54.9	107,085	65.7	5.0	7.2	96,454	83.8
Dry season only	17.7	11.4	103,736	65.7	33.2	38.6	151,419	61.4
Aways	33.4	33.7	139,536	37.9	61.8	54.2	172.081	51.1

Village Accessible by Truck	South				National			
	Percent of		Avg. p.c. Ex-	Head Count	Percent of		Avg. p.c. Ex-	Head Count
	Population	Village	penditure	Index	Population	Village	penditure	Index
Never	13.2	14.0	130,225	79.3	21.7	33.5	109,030	70.4
Dry season only	35.3	35.0	114,354	78.8	28.4	29.4	131,019	66.9
Aways	51.5	51.1	146,142	62.9	49.9	37.2	158,947	50.7

Given the critical importance of infrastructure to raise rural incomes and alleviate rural poverty and the severe infrastructure bottlenecks in large areas of rural Lao PDR, increased investments in the development of infrastructure, particularly rural access and farm to market roads are an essential part of Lao PDR's rural development and poverty alleviation strategy. Accessibility is essential to the development and integration of in-and output markets for agricultural products, improved access to services and to facilitate labor mobility. Increased investments in the rural infrastructure development, however, must be accompanied by a strategy to help maintain such investments, so that their full benefits can be reaped. In many areas, the benefits of investment in rural roads has so far been limited, as the absence of maintenance renders roads impassable after only a few wet seasons.

Development of in-and output markets alone, however, will not be able to fully convince the majority of rural producers to shift from substance to surplus production. The Government has an important role to play in technology development, provision of agricultural support services (e.g. research extension, animal health services, market information) and infrastructure investments in support of agricultural production. Lao PDR's expenditures in favour of the agriculture sector have been insufficient over the past, large amount of funds have been allocated for the construction of irrigation schemes, therefore little funds have supported activities like support services.

Development of Factor Markets. As the rural economy becomes more market oriented the existence of will functioning labor, land and capital markets in rural areas will become increasingly important to raise rural incomes and provide increased opportunities for income diversification. According to the survey, opportunities for income diversification, particularly through off-farm employment, remain limited in rural Lao PDR. Besides investments in rural infrastructure, lifting the remaining restrictions on the free movement of people within Lao PDR will be an important step to help develop rural labor markets. As labor markets develop and information flows more freely between regions, migration from the resource poor areas in the North to areas with better employment opportunities and natural resources endowment may also contribute to poverty alleviation and should hence not be discouraged.

Availability of rural savings and credit facilities will also become increasingly important to the modernization of the agriculture sector and investment in off-farm income generating activities. Development of rural financial markets will thus be essential and the Government's strategy should focus on encouraging financial institutions to lend to the rural areas. Innovative mechanisms, such as group based lending and linkages of village based informal savings and lending groups with formal lending institutions can be important mechanisms to allow those who are less will off to gain access to financial services.

To raise agricultural productivity and diversify their income base, rural producers will need to rely increasingly on markets to sell their outputs and procure inputs. LSIS data show that a large share of the rural population in Lao PDR still has very limited access to markets and

that they produce their most important crops mainly for own consumption. Only 4% (Table 7) of villages are within a one kilometer reach of a permanent market, while more than half of all villages are more than ten kilometers away from a permanent market. Distance to markets is not necessarily a binding constraint, as long as there is good communication infrastructure, but as the LSIS survey shows, accessibility remains a serious issue in much of rural Lao PDR and the existence of markets is closely to accessibility.

Table 7 Distance to Permanent Market by Region

	North	Center	South	National
	% of Village			
<1km	2%	4%	8%	4%
1- 4 km	5%	11%	18%	10%
4-10 km	32%	41%	2%	30%
>10 km	61%	44%	72%	56%

Vast majority of villages produce their most important crops for own consumption and that 50% of all villages do not market any of their three most important crops, but produce them for own consumption or local barter trade. Lao PDR Expenditure Consumption Survey data further underline the rural population's high dependence on their own production: over 75% of a rural household's food expenditure is covered by own produced products.

Table 8 How Most Important Crops are Marketed (% of Villages)

	North		Center		South		National	
	Most important crop	Three Crops	Most important crop	Three Crops	Most important crop	Three Crops	Most important crop	Three Crops crop
Direct consumption	96%	33%	74%	33%	67%	33%	83%	33%
Local Market	0%	2%	4%	5%	3%	2%	2%	3%
Other Market	3%	18%	12%	23%	8%	11%	7%	19%
Private Trader	1%	10%	9%	21%	13%	16%	6%	15%
Government	0%	30%	0%	1%	6%	9%	1%	3%
Bartered with Neighbors	0%	18%	1%	18%	3%	14%	1%	17%
Other	0%	2%	0%	2%	0%	0%	0%	3%

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Chapter Three

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Chapter Three

Field Study Report

Introduction

In the field study, it was necessary to select a region in Lao PDR where agriculture based on slash and burn was performed to consider the correlation between slash and burn farming and population carrying capacity under population pressure caused by rapid population increase.

Slash and burn farming is performed in rotation whereby forests are logged, dried, burnt and cultivated, returning to the same area every few years. Normally, farmers do not return to the place where they performed slash and burn, cultivation and harvesting for several years until the forest is rejuvenated. Therefore, slash and burn farming, which is generally considered to be environmentally destructive is not necessarily so if performed in long intervals that will allow forests to rejuvenate completely.

In structuring this survey, we examined the method of survey based on an understanding that extremely high population increase rate in Laos is creating population pressure, shortening slash and burn intervals and turning slash and burn into an environmentally destructive method. The slash and burn farming in Laos is attracting attention on a global scale because of the destruction it is causing to the forests of the country. Many projects have been launched to stop slash and burn for environmental conservation purposes and promote settled farming. Japan has

started a project for fostering water resources and conserving forests in the northern region of Nam Ngum Dam. Sweden and EU have also started numerous forms of projects.

The subject that was chosen as the main theme for this survey was exploration of measures that would prevent such population increase (including natural increase and social increase) from destroying the forest and negatively affecting the environment by changing how slash and burn farming is performed, while supporting this ever-increasing population at the same time.

Three types of survey, i.e. 1) survey of farm household economy in the surveyed villages, 2) survey of population and social structure including family planning, 3) rural industries, were performed according to this theme. Introduced in this chapter are an analysis based on the survey results and a description of "rice banks" in the surveyed area.

1 Selection of the Surveyed Area

Discussions were made repeatedly with the Ministry of Agriculture of the Lao Government during the preliminary survey to meet these requirements. The mountainous region in the north near the Chinese border was selected as one of the candidate areas in consideration of its poor living environment but was ultimately removed from the candidates because population increase was not an issue there owing to high mortality rate (particularly infant mortality rate) caused by the extreme difficulty of the living environment. As a result, there was enough interval in slash and burn rotation and environmental destruction has not become a serious problem. In addition, one of the requirements for offering cooperation from Japan is that the area is suited for receiving such cooperation. Also considering the fact that the period of survey is limited, Luang Phabang Province was selected because of its good access by plane from the Lao capital of Vientiane.

The field survey was started with a policy to allot as many days as possible in the entire survey period to field study. The purpose of the survey was communicated to the Agricultural Department of Luang Phabang Province through the Ministry of Agriculture of the Lao Government, asking them to select in advance 6 villages with characteristics that are suitable for the purposes of the survey. The final discussion regarding the villages were made with the Agricultural Department after arriving in Luang Phabang from Vientiane, and the basin of Khan Stream, which is the branch of Khan River in Xiang Ngeun District, was selected as the area for the survey.

The area is located along the road that branches off from the main road connecting Luang Phabang with Vientiane and continues on to Xayabury Province. The 6 villages that were selected by the Agricultural Department were Pak Tho (hereinafter "Village PT"), Phone Xay, Long Lueut (hereinafter "Village LL"), Houay Chong, Phone Thone and Shilalek (Fig. 1-1).

The survey group visited all of these 6 villages and conducted a hearing survey with the village chief on the general condition of the village. The results have been compiled in "Overview

of Surveyed Villages."

Based on this hearing survey, 2 villages were selected for conducting household economy survey and demographic/social structure survey. They were Pak Tho Village (Village PT) which is located only 2 to 3 kilometers from the junction of the road that goes to Vientiane, and Long Lueut Village (Village LL) which is located about 20 kilometers from the same junction. Village PT has a complex racial composition and is inhabited by highland Lao tribe, midland Lao tribe and lowland Lao tribe. It has relatively high population density which means that the area of swidden land available per capital is small. Village LL is comprised of mostly midland Lao tribe who are mostly related and of several households of highland Lao tribe. This village is in contrast to Village PT as the villagers were engaged in stock farming in their former village prior to migration.

The survey was conducted by dividing the group into two subgroups and performing farm household economy survey on the villagers that responded to the survey on demographic and social structure. The villagers were asked to gather at the village primary school. As 1 hour was required to perform each survey, about 2 hours were spent on each villager to complete both the farm household economy survey and the demographic/social structure survey.

The selection of villagers was made by village chiefs after explaining our request in advance. Villagers in Village PT are mainly comprised of lowland Lao tribe and midland Lao tribe with some mixture of highland Lao tribe, and considerable income gap exists between those who are well off and those who are not. On the other hand, Village LL is mainly comprised of midland Lao tribe with some mixture of highland Lao tribe. Considerations were given so that villagers included in the survey will maintain their diversity in terms of race and income.

As a result, the 18 households that were included in the survey out of 54 households in Village PT were comprised of 6 households that were in relatively good condition, 6 households that were in average condition and 6 households that were in below-average condition. In Village LL, survey was conducted in15 out of 33 households, with 5 households selected for each of the income category used in Village PT. Survey was conducted on householders in all cases.

In making the selection, an attempt was made to obtain the statistics on agriculture and population for Luang Phabang Province and Xiang Ngeun District. However, the only statistics that we obtained were excerpts from the national statistics that had already been made public. We were told that no other statistics were available. A question remains as to how they are compiling national statistics without having detailed statistics on a district level. Therefore, reliable local statistics were limited to information that was obtained from the limited survey.

Partly due to these circumstances, the survey was conducted by making slight modifications of survey items on the spot according to the survey sheet and asking questions while engaging in direct dialogue.

As mentioned in the overview, hardly anyone in Lao PDR countryside speaks a foreign language, particularly English. Therefore, a total of 4 people, 3 from Vientiane and 1 from the

Ministry of Agriculture, accompanied our group throughout the survey period as our interpreters.

As incomplete as it may be, we were able to identify the labor input and various conditions that surround the farm households in these villages and reveal to a certain extent the realities of population increase, family structure and social structure in these villages.

The survey on rural industry was conducted in 2 villages other than those mentioned above. We have realized during our stay in Lao PDR that rural industry (textile industry in this case) was mainly supported by the lowland Lao tribe that had settled down in Laos. Midland Lao tribe and highland Lao tribe rarely engage in textile industry which requires facilities because they are constantly migrating. As the village that was selected for studying the relationship between population and slash and burn, a different lowland Lao tribe village had to be selected. The reason for conducting a survey on rural industry comes from the need to find opportunities for employment and income in place of slash and burn farming to prevent the practice of this environmentally destructive farming method in high population density situations. While detailed description can be found in the latter part of this report, Lao PDR has traditional (silk) textiles that are exported to Thailand and serving as a means of earning foreign currency. However, they do not have a full-fledged market in developed countries even though they are exported in small quantities to Lao people living in the United States.

If this textile industry develops and makes Lao textile a successful commodity in the market of developed countries, diffusion of rural industry founded on textiles has the potential of becoming one of the alternatives for slash and burn farming. As the production of silk for this industry requires mulberry except for tropical silkworm breed, Japan may be able to offer technical assistance in this area. In Laos, silkworm chrysalis becomes a source of protein after taking out the silk. It is consumed as food by people and as important feed for freshwater fish breeding. Furthermore, production of cotton as cash crop for cotton fabric may lead to cash income. From this perspective, a relatively detailed study was performed with focus on textile industry.

2 Characteristics of Agriculture in Luang Phabang Province

Luang Phabang Province is a region surrounded by mountains and hills with relatively high population density. At the center of the province is an old city of Luang Phabang.
Its annual precipitation of 1,300 mm is not sufficient for paddy rice farming without some form of irrigation.

Percentage of irrigated area is low both during wet and dry seasons, and the main form of irrigation is gravity irrigation using river as its source. Reflecting the topographic condition of limited cultivated area, the size of farmland cultivated per household is 0.99 hectares which is smaller than other areas (Table 2-1).

Land use-oriented farming in Luang Phabang Province is mainly comprised of rice,

particularly upland rice (glutinous rice) grown on slopes, using a slash and burn method (Table 2-2). In addition to upland rice, food grains such as paddy rice and maize are important. Cash crops such as cassava, peanuts, cotton and sesame are also grown.

Aside from crop farming, the development of livestock farming, particularly the increase in number of cattle, pig and chicken, is conspicuous (Table 2-2)

Table 2-3 shows the status of land use in Luang Phabang Province. According to this table, the percentage of forest is low at 22.2% (lowest in the country) and the percentage of potential forest is as twice as high as national average (second highest in the country after Oudomxay Province). This data suggests that expansion of slash-and-burn cultivation for food production has been advancing considerably in Luang Phabang Province.

Expansion of slash-and-burn cultivation is starting to seriously affect the productive environment of agriculture and forestry through frequent occurrence of flood and drought and loss of nutrients in the soil. For this reason, the prefectural government has placed preservation of forest and control of swidden land expansion in designated areas as the top priority item in its development policy.

3 The Results of Hearing Survey: Overview

(1) Villages included in the survey

The results of hearing survey have been compiled in a separate table (Table 3-1~5). This section will take a general look at the peripheral information obtained from the survey. The villages included in the survey were formed after the villages that were originally located on the hillside or near mountain top were moved in response to the Lao Government's appeal for permanent settlement at present locations. In this sense, they are relatively new villages.

We also used our holidays to visit midland and highland Lao tribe villages that were not included in the survey. What we discovered through these visits was that, with the exception of lowland Lao tribe, there are no old villages that had existed for more than 50 years in Lao PDR because people never settled down in one place and moved constantly to perform slash and burn.

When people of surveyed villages were moved according to the permanent settlement policy, the Government allowed the village organizations to remain when people moved in certain scale or larger. As a result, most villagers moved together and formed the core social group at their new village. Living together with this core are small number of people who had moved in from other villages under the guidance of the Government.

(2) Geographical location of the surveyed villages

As mentioned earlier, the surveyed villages are located along the highway that runs through the

Khan River Basin toXayabury Province. In this region, the altitude is lowest at the junction where the highway crosses the road going in the direction of Vientiane and increases with distance from this junction.

(3) Education

All six villages in the survey had primary schools. However, 5 out of 6 villages only had 2 year primary schools, and the only 4 year school was located at the most remote village of Silalek. However, since public education is free in Lao PDR, children with good academic record move on to secondary schools, teachers' schools and military schools (including military medical schools).

Those who moved from the mountains according to the permanent settlement policy promoted by the government are currently said to be receiving incentives in the form of livelihood protection, although these incentives did not exist at all when the surveyed villages were established.

When asked about the reason for moving to their village without any incentive, their response was that improvement of living environment including education and medical care provided the main opportunity. With the exception of Pak Tho (PT) Village which has a slightly heterogenetic aspect, nearly 100% of children attended primary school in all the villages in the survey unless there was some inevitable reason that prevented them from doing so.

Questions about academic background and literacy rate were asked during the hearing survey. As the survey was done by interviewing the householder of each household, the response that was given concerned the householder and his wife. We found that, out of 18 sample households, i.e. 36 husbands and wives, in Village PT, 17 can read and write. They were comprised of 11 (out of 18) men and 6 (out of 18) women. Among 15 sample households in Village LL (30 persons), 20 people that were literate included 13 out of 15 men and 7 out of 15 women.

However, the literacy of the majority of these people only meant first or second grade academic ability which meant that they could barely read and write. Literacy in this case is not functional literacy indicating one can read and write in the true sense of the term. Only 5 out of 36 persons in Village PT and 3 out of 30 persons in Village LL had academic background of secondary school and above.

Village chiefs in many of these villages are not same the elderly village leader type found in Japan and are very young people in their twenties and thirties. The reason for this lies in how municipality chiefs are elected in Lao PDR. In Lao PDR, municipality chiefs are elected by the administrative authority immediately above the municipality concerned (e.g. district for village and province for district) after recommending a candidate to the higher municipality for approval. As village chief has an obligation to record and report the present situation of the village to the district, villagers with some academic background (graduated from high school or its equivalent)

will inevitably be chosen as the candidate. As a result, young people are appointed to the post. The survey results also indicate that education opportunity for children was one of the reasons people moved to the present village. When asked about the desired academic background for their children, the following response, clearly higher than their own academic background, was obtained from the subjects.

Desired academic background in Village PT		Desired academic background in Village LL	
University	5 persons	University	2 persons
High school	4 persons	High school	8 persons
Secondary school	3 persons	Secondary school	2 persons
Nothing in particular	3 persons	Nothing in particular	3 persons

In response to a question about the reason they did not receive any education (or did not allow their children to receive education), the response from upland Lao people was that they did not such an opportunity existed.

4 Present Situation of Population, Family Planning and Public Health in Surveyed Villages

(1) Population/family planning

In this study, hearing survey was also conducted about the desired number of children and the status of family planning implementation. The results of this survey is already described in Section 2 of Chapter 1, "Population of Lao PDR."

An impressive finding in the hearing survey was the discrete difference in perception of family planning among different generations in the village. Generations of age 50 and above had no interest whatsoever in family planning nor any intention of implementing it. Birth control among these people took effect in the form of breast feeding (Table 4-9). Among the younger generation in their thirties, however, the need for family planning is recognized.

This is the result of guidance provided by the district office about the need for family planning. Although some villagers in the survey admitted that they had more children than they wanted, there were households that did not have as many children as they had hoped for. There are two ways of achieving this goal: one is to provide guidance through Laos Women's Union (LWU) and the other is to send a representative from the village to a nurse's school in Luang Phabang Province and have that person communicate what he or she has learned to the villagers. In the case of Village LL, the former village chief was studying at the nurse's school and was providing guidance. Understanding and awareness of family planning also varied significantly among the villagers as there were people using a combination of base temperature method and

pills on the one hand and people that did not do anything on the other. It seemed that people in general were starting to understand the need for family planning but did not know how to practice it.

Anyhow, these villages are in the stage of attempting to disseminate family planning. As a result, the response to a question "Are you practicing family planning?" is a mixture of those who are and those who aren't with the latter outnumbering the former (Table 4-7). In addition, even those who responded that they were practicing family planning had never seen a condom. When these people were shown a condom and asked whether they had any intention of using it, almost all of them refused. Furthermore, those who said were practicing family planning through "natural method" ranged from cases that "did not do anything" to cases that "measured base temperature" (Table 4-8). The most prevalent method is the use of pills that are distributed through LWU. Their cost is one tenth of that of condoms.

(2) Medical care

Another main reason for migration is medical care. People living deep in the mountains hardly have any hope of receiving medical treatment. As the villages included in the survey were located along the highway, drugs were purchased from Luang Phabang and injections were being given by former doctors in the village when symptoms were moderate. For serious conditions, however, patients were treated at a district hospital in Xiang Ngeun District or in a provincial hospital in Luang Phabang.

Source of drinking water and diffusion rate of toilet are important indicators of public health. Out of 6 villages surveyed, only Silalek had a small-scale water supply system that was built at the highest point in the residential section of the village through assistance from Korea. Khan stream was the water source in all other villages (Table 4-11). Possibly an influence of Chinese culture, all villagers said they boil their water before drinking. They drink Lao tea and also boil tree roots to prepare their drinks. It appears that public health is improved significantly by boiling water.

No strong odor was experienced in the surveyed villages. The situation was same in other villages that were visited by the survey group. When asked whether they owned a toilet, none of the villagers except one had a toilet (Table 4-10). The response to the question about the place of their excretion was that they go to the forest. Pigs followed them into the forest to create a natural cycle. However, it is not difficult to imagine that it would be extremely difficult to prevent and limit the range of infection once an infectious disease breaks out.

(3) Population pressure

It is worth noting that the present population pressure in the surveyed region was not brought about by increase of population in the region but by immigration. The main reason for immigration was encouragement of immigration based on Government's permanent settlement policy. While

the majority of people moved to improve their living environment, some of the upland Lao tribe moved so that the Government could set up forest reserves. Matter deserving special mention in connection with this immigration is the impact of Vietnam War and Laos Revolution.

There was a village in the region created by people who immigrated from Xiengkhuang Province. Xiengkhuang Province is an area that was bombed by Americans during the Vietnam War because it was on the Ho Chi Minh Trail. The damage caused by unexploded shells was the reason for the immigration. About half of the land in Lao PDR requires unexploded shell disposal. The issue of unexploded shell disposal is predicted to become an obstacle to future development of Lao PDR. In addition, the effect of drastic migration caused by the return of people who took side with the former government from the U.S. will have to be fully taken into account when attempting to understand the present situation of Lao PDR.

As for rotation of swidden land, the present interval in this region is about 3 years which is extremely short considering the fact that sustainable slash and burn requires 15 to 20 year intervals. However, this is more the result of guidance from the Agriculture Department of Luang Phabang Province and Agriculture and Forestry Office of Xieng Ngeun District (DAFO) which is given in accordance with the settlement policy of the Lao Government than that of population pressure. This naturally indicates that the implementation of such policy by the Lao Government in this region is causing this impact of slash and burn on the environment. It signifies that the reduction of rotation intervals is not a voluntary action of the villagers caused by population pressure.

However, the population of the region is approaching the limit that can be supported by swidden land. If the present birth rate continues, the region will not be able to support its population after 10 years or so. The region, whose alternative to slash and burn for earning cash is limited to cattle breeding, migrant labor, collecting cardamom and collecting materials for Japanese paper and selling them in the market, will have to make difficult decisions in the near future as the population pressure increases and food supply situation deteriorates.

5 Agriculture and Forestry in the Villages and Farm Household Economy

(1) Basic characteristics of agriculture, forestry and farm household economy in Villages PT and LL

Table 5-1 shows basic characteristics of agriculture, forestry and farm household economy in Villages PT and LL .

The per capita income of two villages is a little over 100,000 kips. In the case of Village PT, swidden land is the only land available to farm households because there is hardly any usable paddy land. The area of swidden land per household (including permanent field) is as small as 1.4 hectares (1.48 hectares average for sample farm households). Village LL has room

for paddy land cultivation and 2.25 hectares of paddy land is currently being cultivated. The area of swidden land averages at 0.76 hectare per household[5-1] (Table 3-1).

As will be explained later, there is hardly any room for cutting down the forest and expanding the farmland in Village PT because the land use plan (zoning) has already been completed. Therefore, there is an absolute shortage of area if one is to make a living by growing crops on swidden land. On the other hand, in Village LL where uncultivated land including forest remains in abundance, swidden land is decreasing despite all the room left for slash and burn as a result of expansion of paddy land area. In addition, preparation of land use plan has not been completed.

In Village PT, rice yield is less than 1 ton per hectare (of harvested area), and only two thirds of cultivated area can be harvested because of damage caused by rats, birds and blight. Meanwhile, Village LL has an yield of nearly 2 tons per hectare (of harvested area) which is considerably higher than the average in Luang Phabang Province between 1991 and 1995 which is 1.4 tons[2]. However, it has the same problem as Village PT of unstable yield and can only harvest from two thirds of the cultivated area.

Reflecting the differences in condition of land use and yield level, volume of rice production in Village PT is 33.4 kg per year when converted into volume per person, which is markedly low compared to 218.7 kg of Village LL, and self sufficiency rate of rice is only 12%. However, farm household income is significantly higher in both villages and exceeds the required rice production by more than three times when converted into unhulled rice. In Village PT, however, there are a considerable number of upland Lao people who have not had their farmland allocated and were not given the opportunity to obtain income because they had moved to this region only recently. Thus, the question remains as to whether these households have been successful in securing their rice requirements.

Table 5-2 shows the sources of farm income in the two villages. As mentioned earlier, the percentage of income from rice crop is negligibly low while that of stock farming (cow, pig, buffalo, poultry) and cash crops (cotton, fruit, beans, teak seedling) together account for more than 40% of all income in Village PT. Among cash crops, income from teak seedlings is particularly high. This is related to the fact that an experimental forestry station of the Government Forestry Bureau is located in this village. In addition, the percentage of income from occupations not related to agriculture and forestry, including kitchen knife production and tailoring of folk costume for highland Lao people, is relatively high.

Meanwhile, income from rice crop accounts for more than 20% of total income in Village LL. Percentage of income from stock farming is also high at 27% but that from cash crop is low. In addition, income from semi-forest products such as cardamon and herbs and collection/sales of firewood account for 30% of income.

The characteristics that are commonly found in both villages include low level of cash crop production (except for seedlings), extremely important role of forest in farm household economy, and the fact that income from live stock exceeds one fourth of all income and is playing an

important role in supporting farm households.

High percentage of income from stock farming in these two villages is largely attributable cheap credit for live stock promotion offered by Agricultural Promotion Bank (APB) and Swedish International Development Authority (SIDA).

The majority of debts incurred by farm households in the villages surveyed were sourced by these system financial institutions. Average debt per household at the time of survey was 219,000 kip in Village PT and was mainly taken to procure funds for stock breeding, for production of seedlings to be used for planting and for growing cotton. Source of financing differed depending on purpose and was offered by APB for stock breeding, by a commercial bank named Lane Xang Bank for seedling production, and by the county cotton project office for cotton production. The amount of total liability in Village LL was 62,667 kip, corresponding to only 30% of the amount in Village PT. In Village LL, the majority of debt was intended for stock breeding and was financed by APB and SIDA. Another difference with Village PT was the fact that consumption loans for some poor farmer from rich farmer had been reported in Village.

Loans from APB are offered at annual interest rate of 8.5% and required a 10% deposit. Although no collateral is required, a guarantee from the neighborhood group (unit) or village chief is required in Villages PT and LL, respectively. On the other hand, loans from SIDA are offered for the repayment term of 18 months at 4% interest and requires a guarantee from the village chief. LaneXang Bank requires an annual interest of 28% and collateral for repayment of borrowed money in the form of certificate of land use right and livestock. The amount of debt incurred by farm household is proportionate to farm household income and suggests that financing by APB and SIDA is not offered to low income households to help the poor class.[3] Furthermore, two types of financing, namely cases of usury that imposes a monthly interest of 10% and interest-free loans among relatives, were both observed in Village LL. Collateral was not required in either of these cases.

Regarding ownership of farmland, a comparison of its average scale (including the land owned outside the village) reveals that Village LL has much larger farmland. Table 5-3 shows the status of farmland distribution between swidden land and permanent agricultural land/paddy land. It indicates that farm households with greater percentage of swidden land has smaller percentage of permanent agricultural land.

The characteristics of slash and burn in the villages surveyed can be summarized into the following three points. First, as will be mentioned later, swidden land is allotted to individual farm households and its production activities will be limited to the allotted land. Therefore, farm households will not move to other land after cultivating for a certain period of time as in traditional slash and burn. Secondly, partly due to the fact that swidden land has been fixed on a household basis, fallow period has been markedly reduced compared to traditional slash and burn cases (Table 5-4).[4] Average fallow period between the two villages against 1 year of cultivation was approximately 1 year, which is one tenth of that in traditional slash and burn

farming. Thirdly, mono-culture of upland rice is the most common crop pattern in the two villages and accounts for more than half of all crops, followed by combinations of upland rice with crops such as cotton, maize and sesame. Mixed planting of different crops is hardly seen with the exception of that with fruit trees.

Slash and burn cultivation in the villages surveyed is performed in the following manner.

Table 5-5 shows the work procedure and labor input for single crop dry field rice of a case in Village LL. In this case, 1.5 hectares of swidden land is cultivated by rotating the field over a period of every 3 years. Following the selection of swidden land which takes place every year around mid-January, preparation work such as maintenance of farming tools (ax, hatchet, digging stick, sickle) will continue until early February. Selection of swidden land and preparation of farm tools will be made by the household head (H.H). Then another month is spent on cutting down small trees in the lot selected for slash and burn, lopping down branches from the trees that are cut and weeding, and another month drying the area with sun. Trees are cut by husband and wife along with 10 exchange laborers offering their labor in exchange or for remuneration (10 persons/day total). The two children of H.H.also participate as assistant labor. Firing is performed after the drying is completed and is done jointly with the owners of neighboring swidden lands. In this case, householders of 5 families jointly set fire to their fields and completed the work in one day. Removal of plant cinders starts 3 days after the firing and a fence is created at the same time to prevent animals from entering the field. The former is performed by 10 to 15 exchange laborers while the latter is carried out by H.H, his wife and their 2 children. Both work require approximately 10 days to complete. By mid-May, a group of 10 people including the families of neighboring swidden lands sow the seeds all at the same time. A hundred kilograms of seed rice is sown on 1.5 hectares of land. After the sowing is completed, weeding is performed almost every day until the harvest period in early October. Weeding is performed jointly by the H.H. his wife and 5 to 10 persons offering exchange laborers. The work for preventing damage from rats and birds is performed by children from September when ears of rice come out until harvest is completed. Harvesting is performed over a period of 2 weeks starting in mid-October. This work is also performed jointly by the group consisting of the couple, their 2 children, 10 to 20 persons offering exchange laborers and 2 to 3 hired laborers. The rice that has been harvested will be dried for about 3 days and then threshed over a period of 10 days. During this period, threshed paddy are stored one after another in a warehouse built on the swidden land. Following the completion of threshing, these paddy are carried to their home at the foothills, a process that takes the H.H. and his wife and their 2 children 1 month to complete.

Thus the work for slash and burn farming in the surveyed village goes on almost continuously from mid-January to end of November, giving farm households little time to rest. As draft animals, machinery, fertilizers and agricultural chemicals are hardly used, the extremely labor-intensive aspect of slash and burn farming can be reconfirmed.

The foregoing has been an overview of realities of agriculture, forestry and farm household

economy in the surveyed villages. In the next section, the projects that are undertaken to prevent destruction of forest from expansion of slash and burn will be examined with emphasis on zoning and land allocation project and paddy land development project.

(2) Zoning and allocation of land title

As mentioned in the previous section, zoning has been completed and allocation of land title land for agricultural and residential purposes have been established in Village PT.

Zoning and establishment of land use right are projects that are carried out by the Lao Government with assistance from SIDA and others as a measure for stabilizing the volume of river water through preservation of forest in an effort to prevent floods and water shortages as well as soil erosion at sloped land.

In the surveyed region, DAFO and village council discuss the land use demarcation and divide the land that has been allotted to the village into preservation forest, forest preserve, production forest, afforestation area, slash and burn area, paddy land area, and residential area among others. DAFO does not involve itself in preparing and employing the regulations in utilizing the village community forest and instead puts each village in charge of these matters.

Allocation of right to use slash and burn farmland to each household in each village is performed by DAFO. 0.5 hectares to 2.0 hectares of swidden land is allocated to each Economicaly Active Population (15 years of age or older) in each family, with the area of swidden land adjusted according to the area of ordinary field and paddy land to which they have access.

Swidden land is called *hai* and is distinguished from permanent agricultural land which is called *seun*. The difference between the two lies in whether the fallow period is required or not. In addition, trading and inheritance of right to use is not approved for swidden land.[5] On the other hand, the right to use permanent agricultural land and paddy land authorized by DAFO can be traded and inherited. It appears that the right to trade and inherit permanent agricultural land is approved to promote afforestation and planting of fruit trees for forest preservation. In addition, the amount of land tax is same for swidden land and permanent agricultural land but higher for paddy land (double cropping) (Table 5-7). Newly reclaimed paddy land and permanent agricultural land are exempt from taxes for the first 5 years.

The aforementioned projects involving zoning and allotment of land title appear to be effective for preventing flood and protecting water source in the Khan Stream Basin when the following conditions are met. Firstly, in cases such as Village PT where slash and burn area is demarcated to allot relatively small swidden land to each farm household, farmers will shorten their fallow period which will inevitably result in soil erosion and lowering of fertility if left as it is.[6] Therefore, it will not be possible to reduce swidden land and prevent advancement of soil erosion and lowering of fertility unless efforts are made to increase the opportunities for income other than slash and burn and lower the degree of dependence on slash and burn for income.

Secondly, there is an issue of whether zoning is performed properly according to the purpose

of preserving forest and water resources. Proper demarcation of preservation forest and production forest requires advanced knowledge, skills and large amount of information. As it has become clear from the experience in Thailand, cooperation of experts equipped with full knowledge and competence as well as existence of competent local staff are indispensable when carrying out zoning over a considerably broad area of land.[7]

Thirdly, even if zoning were proper, the issue remains on whether the regulations on the use of demarcated village common land has been prepared properly and whether they are observed. In traditional slash and burn, regulations on the use of forest reserve and production forest were provided strictly and in detail to maintain slash and burn farming, the observance of which resulted in preservation of the forest.[8] The point in smooth utilization of village common land would depend on the possibility of forming the regulations that can be agreed and observed by the villagers.

(3) Paddy land development project

In Xiang Ngeun District where the survey was conducted, slash and burn cultivation area is estimated to be between 4,000 and 5,000 hectares (according to a hearing from district office) while paddy land area is 355 hectares (according to data at Dept. of Irrigation the Ministry of Agriculture and Forestry) which is less than one tenth of slash and burn cultivation area. However, as there is room for developing additional 545 hectares of paddy land (according to data at Dept. of Irrigation the Ministry of Agriculture and Forestry), it is assumed that the potential for reducing slash and burn cultivation area through paddy land development is not necessarily small.

Among the villages surveyed, 16.5 hectares of paddy land development is currently scheduled in Village LL as a measure for reducing slash and burn cultivation area. This section will examine the effect of paddy land development based on the information obtained from the interview.

In determining to what extent paddy land development is effective for reducing slash and burn cultivation area, profitability per unit area will be estimated after identifying the reality of rice farming in Village LL.

Existing paddy rice farming is a double crop consisting of native *Maeto* breed which is planted during the rainy season and an improved RD16 breed developed in Thailand which is planted during the dry season. Yield level is 2.5 tons per hectare during the rainy season and 3.0 tons during the dry season, which is 1.25 to 1.5 times greater per crop compared to dry field rice crop in the same village. The paddy supplies its own seeds for local traditional variety but buys the seeds for improved variety. Tilling is performed by the household head and hired labor using buffaloes. Wage workers are hired for tramsplanting. Fertilizers are used in small quantities during the nursery planting variety period but not used at all after transplanting. No agricultural chemicals are used. Weeding is required during the dry season as weeds grow rampantly. Weeding is performed twice mainly by using hired labor. Harvest and threshing are performed

by family labor.

Table 8 estimates the profitability of paddy rice farming in Village LL. According to this table, the profitability of paddy rice farming per hectare (gross income - operating expenses) is estimated to be about 170,000 kips for rainy season alone and about 340,000 kips for two seasons combined. Comparing these figures with those of dry field rice grown in swidden land, profitability is 1.6 times higher for rainy season alone and over 3 times higher when two seasons are combined.

Moreover, family labor input can be reduced by 70% per hectare for rainy season crop alone and by 40% for two seasons combined. Furthermore, hired labor input for work that cannot be substituted by family labor such as tilling, planting and weeding increases 3.5 times for rainy season crop alone and 8 times for two seasons combined, suggesting its effect in creating employment.

Thus the introduction of paddy land farming is expected to have significant effect in reducing slash and burn cultivation area since it not only brings about increase in income but reduces hard labor on sloped land. Creation of new employment in rural areas is a secondary effect that cannot be neglected.

Paddy rice farming in Village LL is a low-tech farming method that hardly uses fertilizers or agricultural chemicals. Therefore, there is much potential for increasing its yield level significantly through improvement of its irrigation facility and diffusion of intensive rice famiry. However, improvement and maintenance of irrigation facilities require active participation of beneficiaries in paddy land development, while dissemination of farming technologies such as seeding, terlilizer application, plant protection calls for increase of extension staff. Considering the present situation of Lao PDR, it is also true that solving these problems is not so easy.

6 Rice Bank

Susceptibility of agricultural production to climate calls for the need to stabilize the livelihood of farmers. Rice bank is one of the ways through which this is sought. In Long Lueut Village where field study was recently conducted, rice bank system already existed and was actually being operated. Therefore, the system and activities of rice bank will be introduced by using this village as an example (the outline of which is as shown on the diagram below, and the numbers (1) through (10) in the following text correspond to the numbers (1) through (10) in the diagram).

(1) History of establishment for rice bank

Rice could not be harvested last year (1995) in Long Lueut Village due to drought. This has led to a resolution by the village general assembly participated by all villagers to apply for free aid

in the form of rice to the county authorities. The county declined to offer free aid but made a counteroffer of establishing a rice bank. The village accepted this offer and established a rice bank with 700 kg of rice hulls that were given to the village from District Welfare Office (1). Judging from these circumstances, it can be said that rice bank is operated as a part of welfare policy.

However, rice bank is not established unconditionally upon application to the county authorities. A village will have to fulfill certain requirements after determining the damage from natural disaster (e.g. drought) and from blight in a comprehensive manner. In addition, the county authorities seem to contribute rice to be used as capital for rice bank but require the village to pay for the cost of its shipment (Long Lueut Village covered the shipment charge of rice upon establishment of its rice bank).

Incidentally, all households of Long Lueut Village have joined the rice bank (2) and the person presently responsible for rice bank is the former village chief.

(2) Activities and prospective activities of the rice bank

As mentioned earlier, the main activity of rice bank is to lend rice to households with rice shortage in an effort to stabilize the livelihood of villagers (3). While approval and disapproval of lending rice and the quantity of rice lent are decided by taking into consideration factors such as diligence of each household, condition of cultivation and status of damage from blight and natural disaster, the decision is made by the village general assembly (4). Moreover, lending (borrowing) contract does not exist although the responsible person keeps a list of those who have taken the loan.

The rules concerning the loan is to 1) repay the loan with unhulled rice corresponding to twice the quantity of rice borrowed (5), and 2) repay in the form of service such as labor in the event the borrowed rice cannot be repaid (6). Although repayment in the former appears to be excessive, one can understand that it is not the case by looking at it in the following manner. For instance, if 4 kg of rice is borrowed, 8 kilograms of unhulled rice will have to repaid (= 4 kg [borrowed, rice] X 2).

However, 8 kg of unhulled rice weighs about 4.8 kg when converted into polished rice (8 kilograms of unhulled rice X 0.6). Actual interest therefore amounts to 0.8 kg

To explain the latter penalty in concrete terms, a farmer who would normally receive a wage of about 1,000 kip per day for helping other households during the busy season can only receive 700 kip if he is a farmer who could not repay his loan. These penalties are decided by the village general assembly (6).

The capital offered by the county welfare office (700 kg in unhulled rice) is probably not sufficient to allow rice bank to operate smoothly. For this reason, a proposal has been made in Long Lueut Village to require all member households to contribute 10 kg of unhulled rice when harvest is good (5 kg when harvest is poor) to increase the reserve at rice bank and will be put to

practice starting next year (7).

When there is abundance of rice in reserve at rice bank, the village has a plan to convert a part of this reserve into cash by selling it in the market, depositing this fund in a bank (8) and utilizing its profits for the welfare of the villagers (e.g. to cover the transportation to visit the hospital in town) (9). However, this plan was not implemented this year because all rice was lent out to the villagers.

(3) Other Matters

The foregoing has been the overview of present and future activities of rice bank in Long Lueut Village. However, there are some other points that need to be explained about the rice bank in this village. Firstly, the responsible person at the rice bank is required to report the status of its operation to the village general assembly (10). This system is extremely effective in increasing motivation of the villagers to participate in rice bank and smoothening its operation.
The second point is that the responsible person at the rice bank is required to report the status of its operation to the county welfare office (11). A monitoring function such as this is natural considering the background of rice bank's establishment and is probably necessary for it smooth operation.

As the roles and functions of rice bank were one of the subjects of concern in this survey, efforts were made to collect information in the most detailed manner possible after witnessing the actual rice bank in Long Lueut Village. However, it was found that the rice bank of this village had no written agreement and that everything was decided at the village general assembly. Such circumstances of the rice bank in this village must be natural from the viewpoint of villagers exercising their autonomy. Furthermore, while such system of rice bank appears to be ideal for this village, various information available suggests that rice banks in many other villages are aiming for the system that is similar to that of Long Lueut Village.

7 Rural Industry and Formation of Market Economy: Case of Handwoven Textile Industry

The schemes for promoting market economy in rural areas through fostering of rural industry is examined in this section. In the rural areas of Lao PDR, energetic activities of rural handwoven textile industry that ships its products to the domestic market in the cities as well as to the overseas market are observed, even though no special protection and fostering policies have been adopted. Through observation of actual cases, we will identify the requirements for materialization of rural handwoven textile industry. Such an effort will also explore opportunities that are available to rural societies in taking initiative in permeating within their own community the formation of market economy which is sought by the Lao PDR Government in the process of

economic liberalization. At the same time, rural handwoven textile industry is worthy of note as an effective measure to correct the economic gap between rural and urban areas resulting from city-oriented industrialization which is observed universally during the process of economic development.

(1) Viewpoint of discussion

When the present situation of the Lao economy, particularly that of rural economy, is considered, its most notable characteristic lies in the immaturity of its market. Incidentally, immaturity of the market and the accompanying degree of trade-related difficulties differ depending on the characteristics of the goods that are being traded. Goods that vary widely in quality and require experience in determining this difference in quality such as handwoven textiles would incur prohibitively high transaction costs before reaching the equilibrium price, which, in turn, hinders smooth market transactions. Furthermore, the prices of handwoven textiles are affected significantly by changes in consumers' preference towards design (fashion), which means that producers will have to obtain accurate information about consumer preference before they start commercializing their product and enter the market. However, it would be impractical to expect individual producers that are scattered in rural villages away from consumption centers to have such ability to collect information. In other words, handwoven textiles are not suited for competitive market-oriented transactions between producers and retailers. This sector will explore the possibilities for rural handwoven textile industry to flourish despite such characteristics.

(2) Marketing channel in handwoven textile industry

The main economic units involved in handwoven textile industry of Lao PDR are weavers, master weavers and retailers. Since handwoven textile industry has been passed on as side business for farm households, the majority of weavers are women living in villages. Retailers have their shops in urban markets. For instance, over 100 textile shops, all small shops run by families, are located at the large morning market and its vicinity in Vientiane. They can be described as merchants of city (modern) origin. Figure-7-1 shows the system of trade (marketing) that was observed. The marketing channel from weaver to retailer is comprised of two stages; from weaver to master weaver, and from master weaver to retailer.

The following characteristics were observed in this system. The stage from weaver to master weaver is the putting-out system in which the yarn supplied by master weaver is woven into a product and delivered to master weaver by weavers. Meanwhile, the advance order system is the general form of trade between master weaver and retailer. Under this system, instructions regarding design and color are given in the opposite direction of the flow of the product, i.e. from retailer to master weaver and from master weaver to weaver, in an effort to convey market information from the former to the latter. While efficient communication of market information would be of particular importance when the market is still undeveloped, the form of trade observed

in textile industry allows for communication of information through long-term business relations as well as alleviation of difficulties faced by rural industries such as securing the outlet for product and collecting information on the market. This fact indicates that the relational contracts including the putting-out and the advance-order systems are functioning properly under long-term business relations as an alternative for the market systems.

It is the master weavers that play the most important role in this marketing process. In this survey, hearing was attempted on 10 master weavers. The number of handlooms they owned ranged widely from 9 to 200. Eight out of 10 master weavers were also designers who possessed the skills for vertical heddle technique. The Lao weaving technique is characterized by extensive use of a vertical heddle with a lacy mesh which can be stored and reused as a master temolate. With this method, even less experienced weavers can weave twill and satin textile with interacting design. As a rule, master weavers are prominent designers who can knit various types of meshes for a vertical heddle by taking motifs in vogue into account.

In addition to having the channel for selling the goods to retailers, master weavers also obtain information about demand (what is in fashion) from retailers and convey it to weavers by incorporating it into their vertical heddle technique. In this way, master weavers control the textile market by having the outlet for product and communicate information about demand. This justification of the existence of master weavers lies in the rural economy of Lao PDR where market economy is underdeveloped.

(3) A case study of master weaver

A clue regarding the flourishing textile industry shall be sought from the case study of 3 master weavers (Mrs. A, B and C). A contrast exists in a sense that while Mrs. A and C are both designers themselves, Mrs. B hires a designer in her village to prepare the vertical heddle.

Mrs. A (age 36) is from Houa Phan District and moved to Vientiane during the Vietnam War. She started a small textile business in a village outside Vientiane 10 years ago. She currently runs a weaving business equipped with 7 handlooms (each costing 150,000 kip and lasts 20 years in average) and hires 15 weavers at her residence. In addition, she has entered into a putting-out agreement with a total of 200 weavers in 2 villages that are located 35 kilometers and 40 kilometers from Vientiane, respectively (see, figure 7-1).

The 15 weavers working at the residence of Mrs. A are mostly women between ages 18 and 20 who have come from Houa Phan District which is the home of Mrs. A. After working for an average of 2 years, they return to their village to marry. Mrs. A provides food and accommodation at her residence during this period. They work from 6 in the morning till 5 in the evening with 1 hour lunch break in between. They receive 5,000 kip for each sin they weave and weave an average of 4 sins a month.

Mrs. A also does business with a total of 200 weavers in 2 villages. The following is the situation in Village N which is reached by going 30 kilometers south on National Highway 13

and another 5 kilometers on an unpaved road. It is a village of people who, like Mrs. A, escaped from the devastation of the Vietnam War and moved from Houa Phan District (lowland Lao tribe). A farm household owns an average of 1 hectare of farmland. Mrs. A started doing business with the people of this village 8 years ago. The people of this village were originally skilled in weaving but had problems with the performance of their handlooms. Therefore, Mrs. A started renting out handlooms free of charge. The number of handlooms has now reached 140 and weaving is performed at almost all households.

In this village, people start weaving at the age of 5 or 6 and become a qualified weaver at the age of 14 or 15. Weavers use the dyed silk provided by Mrs. A to weave sins. Vertical heddles that determine the design are provided entirely by Mrs. A. A sin takes an average of one week to complete (4 days for experienced weavers) and results in payment of 9,000 kip. The difference with the 5,000 kip paid to the weavers staying at Mrs. A's residence is said to be attributable to food expenses. As the wage earned by farm workers in this region is 1,500 kip (for 10 hour work), weavers are earning more than farm workers.

During the dry season, an average of 500 to 600 sins are woven every month from the handlooms that are rented out by Mrs. A (corresponding to 2.75 sins for every handloom). The number drops to about 250 sins per month during the rainy season when farm work reaches its peak. Workshop weavers can weave an average of 4 sins per month because they are full-time weavers. The difference between the two suggests the sideline nature of outside weavers.

Although there are some companies in the vicinity of Vientiane that hire weavers as wage-earners, they can hire 25 persons at the most. Difficulties that are encountered in managing a factory with large number of weavers, such as the problem of securing the space for handlooms and the history of weaving being regarded as a sideline for farm households, are the reason behind the incompatibility between handwoven textile industry and factory management. In contrast, the case of Mrs. A who coordinates rural weavers under the putting-out system can be seen as a typical example of organization based on community principle surpassing that of companies.

Mrs. B evacuated to Luang Phabang City in 1967 as the internal war escalated. The village Mrs. B lives in, like other villages in the vicinity, is a settlement created by refugees. As the area is located on a hill by a river, hardly any farmland exists—hence the thriving of weaving industry. Mrs. B became a master weaver 3 years ago. She purchased 9 handlooms (20,000 kip) and offered them to the weavers, and weavers repay the price of handlooms through their product. Only the cotton fabrics are produced because of the high price of silk in Luang Phabang. The products are also sold in Luang Phabang Province and Vientiane City but are mostly exported to Thailand through a wholesaler in Hong-sa City located upstream of Mekong River with whom she has been doing business for the last 3 years.

High quality cotton supplied by the wholesaler in Hong-sa City is used for export products. Product price and marketing margin differ according to the quality of the fabric woven as shown

in Table 1. Margin rate that takes weaving quality into consideration [(C/B - 1) X 100] is small for low quality product intended for domestic market but exceeds 10% for exported product. However, the level of marketing margin is not necessarily high, apparently owing to the large number of middlemen in this region trying to export products to Thailand.

Mrs. C lives in a village located along National Highway 13 about 80 kilometers north of Vientiane City with a population of a little over 1,000. Hardly any paddy land exists in this area and people make their living mainly by slash and burn. There are 5 master weavers in this village (cotton fabric). One of them, Mrs. F, purchased a handloom 3 years ago by taking advantage of the group loan system offered by the Agricultural Promotion Bank. A handloom cost 50,000 kip each, and she currently owns 11 handlooms. Her husband is engaged in slash and burn and she helps him from time to time.

Mrs. C buys her dyed cotton yarn in Vientiane. She can only get 3,000 kip for each fabric if she sold it to a middleman but can sell it for 3,200 kip if she brought it to Vientiane herself. She therefore sells her products to retailers when she has large quantity in stock.

The income of a master weaver can be calculated in simplified terms (i.e. assuming that everything was woven on a wage basis, that yarn was purchased in the village, and that the product is sold to the middleman who visits the village to make a purchase) as follows. A master weaver sells an average of 100 sins per month. As a sin requires 160 grams of yarn, the cost of yarn would be 120,000 kip. The labor cost would be 100,000 kip. Since the amount of sales is 300,000 kip, a master weaver will be earning 80,000 kip a month. The depreciation of handloom amounts to only 230 kip per month. For the people of the mountain region who have to subsist on slash and burn, 80,000 kip is a sizable income considering that the retail price of 1 kg of nonglutinous rice is 700 kip. If a shift of labor from swidden land is achieved, it would have the potential of mitigating the dependence on slash and burn farming which is accompanied by many problems.

Lao PDR is a country that has various weaving techniques and an active rural weaving industry. This economic activity is supported by master weavers who link different cultures of urban and rural areas. Long-term business relations are formed around these master weavers, and these relations in turn enable product marketing as well as communication of market information to the producers. A large amount of foreign assistance is currently being offered to the textile industry. This effort is centered around inviting the people of remote areas to Vientiane and having them master the hand weaving technique under the condition that they will teach what they learned to their neighbors when they return. However, many of these efforts have failed because of the difficulty in commercializing the product in these remote areas. It is not possible to foster a competitive industry through dissemination of textile technique alone. Anticipated results cannot be attained unless assistance that takes marketing into account and includes acquisition of market information is offered. To touch on the subject of sustainable assistance from the viewpoint of sustainable growth, sustainability should be understood as

production activity that is compatible with market mechanism. The present policy of assistance for textile industry that conveys weaving techniques to remote areas cannot adapt itself to the market mechanism and suffering from failure. Assistance to subjects that cannot demonstrate competitiveness in the market cannot be regarded as effective assistance.

The following policy proposal can be made in view of this reality. The matters of fundamental importance are, 1) linking retailers and master weavers with both parties recognizing the difference of their respective functions, and 2) conveying information about designs and colors that are accepted in the international market mainly to master weavers who are well versed in weaving techniques.

[A] Trade fairs: The purpose of this is to link urban retailers and exporters with master weavers in an effort to form a marketing network. The need for merchants was explained here; the fact that urban retailers and master weavers are supplementing each other to play the merchant role in the textile industry must be taken into account. Holding trade fairs that would connect overseas marketing entities directly with Lao exporters or master weavers is also effective. This is a process that connects rural industries with overseas market and would enable demand-side information regarding product color and design to flow in the opposite direction of the marketing channel and reach the producer (master weaver).

[B] Seminars for master weavers: Master weavers and weavers in Lao PDR are isolated from information about foreign demand. Holding seminars should be an effective attempt in communicating information about product color, design and diversification. The following points must be taken into consideration in particular. Textiles of present day Lao PDR are colored with chemical dye while traditional vegetable dye is on the decline owing to preference of vivid tones of chemical dye in the domestic market. In developed countries, however, vegetable dye is preferred and has higher added value. In addition, the width of sin ranges from 82 centimeters to 84 centimeters and differ from cloths that are measured according to international standard unit such as yard or meter. Such information about the international market must be conveyed accurately.

[C] Fostering designers: In the long term, it would be desirable to perceive demand in the overseas market to produce products with design conforming to such demand. The designers will have to take some initiative instead of simply relaying on foreign merchants for this information. Naturally, such designers will have to be familiar with Lao weaving.

[D] Improvement of handlooms: Throw-shuttle shall be converted into fly-shuttle to weave wider cloths. Since handlooms are manufactured in villages, technical guidance must be offered to loom manufacturers.

[E] Identification of production centers and classification of techniques and products: Needless to say, basic information about the textile industry of Lao PDR is important in effectively carrying out the strategies for promotion of rural industry. Fostering of talents who are well versed in weaving in other countries and can contribute to the textile industry policy

well versed in weaving in other countries and can contribute to the textile industry policy by clarifying the position of weaving techniques and products in Lao PDR is desired.

[G] Exchange with traditional textile industry of Japan: Although various weaving techniques have been succeeded in Lao PDR, they are far inferior in terms of quality to traditional craft that still remains in Japan. Exchange of techniques with Japanese traditional crafts is desired to improve the quality of Lao textiles. There are countless ikat patterns in Japan. Technical transfer appears to be easier for ikat and demand in Japan can be anticipated for bathrobes. Ikat weaving should open the way for exchange with Japan.

[H] Lastly, the following points are considered to be most important in terms of agriculture. Lao PDR is mainly dependent on import from Vietnam for silk because of the backwardness of sericulture technique and lack of progress in selective breeding for silkworms. In addition, silk-reeling technique is undeveloped, making it impossible to secure high quality silk domestically. Cotton comes from a native breed with short filament and therefore is poor in quality. Improvement of raw materials is also a pressing task. The textile industry of Lao PDR is depending most of its raw materials on import. If this situation continues, contribution of textiles in improving trade balance will be limited even if its orientation towards import is increased. Domestic production of raw materials is therefore an urgent task.

Moreover, the following points must be taken into consideration from the viewpoint of making a transition from slash and burn farming. Hand weaving offers an income opportunity in lieu of slash and burn as side business for farm households. The chief of a famous weaving village of Luang Phabang has said, "We were using 80 to 90 hectares of land in 1975 for slash and burn. As a result of encouraging weaving, we only used 12 hectares for slash and burn this year (1996)." However, it is only the lowland Lao people who have the weaving technique. Midland and highland Lao people who have been engaged in migratory cultivation do not have any weaving tradition of their own. For this reason, income opportunity in lieu of slash and burn can be created for midland and highland Lao people by affording them sericulture techniques in addition to direct conversion of swidden land to mulberry field. As climate becomes cooler at higher altitudes in Lao PDR, there is a possibility of introducing similar species of silkworms as those in Japan instead of tropical species. Although there is a sericulture experiment station in the suburb of Vientiane, it is totally inadequate for the purposes mentioned above. Active assistance is desired in this industry as it is expected to contribute to the macro balance of Lao PDR.

Fig. 1-1 Map of Surveyed Area

Table 2-1 General Characteristics of Luangphabang Province

Population	365,333
No. of Household	59.4 (thousands)
Farm Household	42.5 (thousands) (71.5%)
Area	16,875km^2
Population Density	21.65/km^2 [Whole Country 119.35/km^2]
Irrigated Area	
Rainy Season	4,332ha
Dry Season	1,606ha
	(Mainly Gravity Irrigation)
Farm Size	0.99ha/Household
	[Vientiane 1.64ha, Savannakhet 1.28ha]
Annual Rain Fall	1331.1mm
(1991-1995 Average)	[Vientiane 1.64ha, Savannakhet 1.28ha]

Source) Ministry of Agriculture and Forestry, 20years Agricultural Statistics; 1976-1995, Vientiane, 1996.
-------, Rice Crop Survey 1995 Analysis of Results, Vientiane, 1996.

Table 2-2 Harvested Area of Major Crops and Livestock in Luangphabang Province

	1985	1990	1991	1992	1993	1994	1995
Crop (ha)							
Rice	60076	69414	63284	49847	47782	65076	46412
Low land Rice Paddy	8118	8370	7967	7731	8642	8772	8449
Dry season Paddy	519	848	904	1044	770	392	742
Upland Rice	51439	60196	54413	41072	38370	55912	37221
Maize	5922	3998	4519	6289	5610	6268	4976
Starchy roots	286	553	785	1642	571	946	886
Peanuts	833	722	400	1692	724	942	995
Cotton	662	241	750	800	633	676	809
Vegetables	–	282	250	693	1250	900	601
Sesami	na	na	na	1591	1299	1256	na
Livestock (1000heads)							
Water Buffalo	5146	5146	5301	5831	6107	6290	6416
Cow	1379	2267	2403	2802	3033	3215	3407
Pig	10218	11642	11990	14968	14745	15187	15643
Goat/Sheep	831	1655	1837	1696	1891	2099	2267
Poultry	3978	68930	73060	81600	85800	90948	96405

Source) Same as in Table 2-1.

Table 2-3 Land Use in Luangphabang Province (1989, ha)

	Forest	Ratio of Forest	Potential Forest	Other Forest	Permanent Agric. Land	Others	Total
Luanprabang	443.8	(22.2%)	1416.5	52.6	9.8	78.5	2001.2
Whole Country	11167.9	(47.2%)	8949.2	1444.1	849.4	1269.7	23680

Note) Forest: Density of Trees over 20%
Ratio of Forest : Forest Land Area/Total Land Are
Potential Forest : Bamboo Forest, Forest with Density of Trees below 20%
Slush & Burn Cultivation Area
Other Forest : Savanna/Deforested ares, Bush & Shrub area
Permanent Agricultural Land : Paddy Field etc.

Source) Hiroyuki Tuburaya, "Forest and Forestry Industry in Laos Statistical Appendix", June 14, 1996.

Table 3-1 Base Data of Villages Surveyed/Land Use

Name of village	Who allot swidden and among villagers?	What standards are onsidered in allocating widden land	Any trouble in allocating land?	Whether the village chief recognizes the shortage of swidden land and measure taken, if any.
Pak Tho	DAFO	Persons of age 15 and above. No differentiation is made between the sexes.	None. Difficulty encountered due to limited land area.	Yes but there is no solution. Efforts are being made to earn cash by raising livestock and growing cash crop and vegetables.
Phonexay	DAFO	Persons of age 15 and above. No differentiation is made between the sexes.	None.	Yes. Growing Maize According to Lao IRRI Project. Experienced no problem.
Long Lueut	DAFO	Persons of age 15 and above. No differentiation is made between the sexes.	None.	No. There is sufficient amount of land.
Houay Chong	DAFO	Persons of age 15 and above. No differentiation is made between the sexes.	None.	No. There is sufficient ammount of land.
Phon Thong	DAFO	Persons of age 15 and above. No differentiation is made between the sexes.	None.	Not sufficient. Planning to grow maize, trees for pulp (Japanese paper) and broom cypress.
Silalek	Assistant village chief (DAFO is involved up to village. Division within the village is decided by assistant village chief.	Persons of age 15 and above. Area sufficient for sowing 8 kg of rice hulls per person. No dirrerentiation is made between the sexes.	None.	Sufficient land is available now but the availability is becoming less and less. Do not want to accept any further migrants. Measures for the future include complete dissemination of double cropping, selling raw materials for paper and promotion of stock farming.

Table 3-2 Basic Information of Selected Village/Outline

Name of village	Popu lation	No. of house holds	Village area size	No. of hos- pitals	Distance to hospital	No. of primary schools	Distance to primary schools	No. of secondary schools	Attendance rate of pri- mary schools	Distance to secon- dary school	No. of persons attending secon- dary schools
Pak Tho	350	54	Swidden land 75.49ha Paddy land 2.25 ha	0	1km Over	1 (2 years)	(2 years) 0km (3-6 years) 2km	65%	0	2km	5 persons
Phonexay	607	102	Swidden land 306 ha Paddy land 17.07 ha	1*	0km Dispensary	1 (2 years)	(2 years) 0km (3-6 years) 2km	93% 123/131 persons	0	2km	Not available
Long Lueut	244	32	Swidden land 24.4 ha Paddy land 2.25 ha	0	2km Health Center	1 (2 years)	(2 years) 0km (3-6 years) 2km	100%	0	10km	18 persons
Houay Chong	219	37	Swidden land 29.1 ha Paddy land 4.6 ha	0	4km Health Center	1 (2 years)	(2 years) 0km (3-6 years) 11km	100%	0	More than 11 km	3 persons
Phon Thong	329	55	Swidden land 62 ha Paddy land 4.7 ha	0	15km Distric Hp	1 (2 years)		100%	0	17km	Nonw
Silalek	373	62	Swidden land 71.75 ha Paddy land 7.64 ha	0	25km District Hp	1 (2 years) 2 teachers	(4 years) 0km (5-6 years) 20km bicycle 21 persons	94.9% 56/596 persons (2 mentals disease, 1 family circumstances)	0	20km	6 persons 1 high school student

Table 3-3 Basic Information of Villages Surveyed/Measures Against Fluctuation Risks

Name of village	When a particular family suffers from poor vield, is there any attempt to save the family on the side of the village society?	Experiences of poor yield in the village. Please specify the cases during the last 10 years. What did the villagers do to cope with popor yield?	What standards are considered in allocating swidden land?
Pak Tho	No assistance if offered from the village. Assistance is offered by the district in the form of social welfare using government stock.	Not particularly during the last 6 years.	Persons of age 15 and above. No differentiation is made between the sexes.
Phonexay	No assistance if offered from the village. Assistance is offered by the district in the form of social welfare	N/A	Persons of age 15 and above. No differentiation is made between the sexes.
Long Lueut	Ten families suffered from shortage one year and were supported by 20 families. Method of reimbursement differs from case to case (interest rate is 2% a year or less).	Two or 3 times in 10 years (at the previous location). Rice bank was established in 1995. Mutual aid was practiced in the village before that.	Persons of age 15 and above. No differentiation is made between the sexes.
Houay Chong	On years of poor yield, farm households that are suffering from poor yield are asked to harvest the farm of other households that have harvestable crop to be used as food for the farmer. Reimbursement is made by returning 300 kg of rice hulls for every 100 kg of polished rice borrowed.	Shortage occurs every year. Rice loan.	Large households are given more than 1 hectare and small households are given less than 1 hectare.
Phon Thong	No assistance is offered from the village. Assistance is offered by the district in the from of social welfare.	Shortage has been occurring for the last 4 years with this year being the worst. Rice is loaned from district office.	Persons of age 15 and above. No differentiation is made between the sexes.
Silalek	Has not experienced poor yield since migration, although there is a rice bank.	Not since moving to new location.	Persons of age 15 and above. NArea sufficient for sowing 38 kg of rice hulls per person. No differentation is made between the sexes.

Table 3-4 Basic Information of Villages Surveyed/Labor Supply

Name of village	Do you have any labor shortage during the peak season? if so, when and for what operation?	In there seasonal migration of labor from neighboring areas? If so, when and for what operations?	Do villagers go out of the village to work in nearby places? Who, when and in what occupations?
Pak Tho	No labor exchange.	No.	Yes. Eighty percent of villagers (80% male and 20% female) February to October (construction work, weeding, laborer) 1,500 kip/day
Phonexay	No labor exchange.	No.	Yes. Twenty percent of villagers (June through December, November through December). Weeding paddy land, harvesting slash and burn. Weeding of fields. Harvesting 700 kip. Road construction 1,000 kip or more/day.
Long Lueut	No. Everyone in the village help each other when someone in the family is sick and cannot work.	Yes. Migrant workers come to work from the next village between February and October. They receive 1,000 keip/day or its market equivalent in rice.	Yes. To adjacent areas. Not for rice but for going to school and building houses. Daily wage workers.
Houay Chong	Yes. For weeding during the rainy season	Yes. During rainy season harvest. They receive 600 kip/day of 5 kg of rice hulls.	No. Used to go to Lao- Sun Village to work in the past.
Phon Thong	No.	None.	Yes. Mostly men go in November and December for rice harvest.
Silalek	Yes.	Yes. For wedding and rice harvesting (500 kip/day last year, 800 kip/day this year) Lumber costs 250 kip/m, 1,500 kip/day, 25,000 kip/house	No.

Table 3-5 Basic Information of Villages Surveyed/Comments on Rice Bank

Name of Village	Comments of rice bank	Note
Pak Tho	None.	SIDA Project is involved and has prepared a land use map of the village. Mixed habitation of Lao-Lum, Lao- Teung and Lao- Sung.
Phonexay	Yes. Everyone has become a member. Riceiving advice from the district.	Established in 1971. Moved from 4 regions in Xiengkhuang (because of Vietnam War and revolution). Growing cotton, 1,000 kip for 2 m of fabric. Weaves 6 m/day, 200 m/year and stops weaving after the cotton runs out. Exchange with neighbors. Can plant 35 kg of rice hulls per person harvesting 300 kg, 900 kg/ha. Paddy land for the second crop is rented out in the even of poor crop. Harvest is divided in half if the tenant uses his buffalo. Tenant received 30% of harvest or 500 kg/ha if the landowner uses his buffalo.
Long Lueut	Since '95. The village chief has an intention to develop 16.3 hectares of area that can be developed in addition to 2.25 hectares of paddy land. Surplus rice production is converted into cash and used for those who become sick.	New village. Good repport around the village chief with strong sense of community. Eager and enthusiastic about education. Attempting to convert swidden land to paddy land.
Houay Chong	From next year.	The former village was located near the top of mountain. Lao-Teung. Double-cropping of paddy land possible. Food shortage has been solved and life is better compared to before. Difference exists within the village (depending on ownership of paddy land). Harvesr 2.8 ton/ha in rainy season and 3 ton/ha in dry season without using any chemical fertilizers. Water supply is sufficient. No irrigation associations. Fish farms for home use.
Phon Thong	From next year.	Divided from No. 10 Vilage due to rivalry. Returned to nearby location. Lack of rapport in the Community. Poor accuracy of information.
Silalek	Started 5 years ago through aid from Korea. At that time 20 to 30 kg was delivered depending on the yield of each household. Starting this year, an assistance organization is buying rice and delivering it to the rice bank. Project is used to pay school teachers.	Twenty two first graders and 13 second garders. Nine dropped out (reason: shortage of attendance, not wanting to go ro school) Yield: 1.5 ton/ha in August-December season and 1.8 ton-2.0 ton/ha in February-July season (1.2 ton/ha at swidden land). Reason for high yield: Frequent weeding, uplant location is cool and good for growth. Raising pigs and chickens. Saved money and started to raise cows since last year.

Table 4-1 Population of Two Villages

PT village	name of village	LL village
18	number of household	15
	age structure	
34	0 - 9	38
26	10 - 19	40
20	20 - 39	17
21	40 - 59	14
4	more than 60	0
104	total	109
5.8	average size of household	7.3

Table 4-2 Number of Household by Tribe

name of village	PT village	LL village
Lao Loum	5 households	1 household
Lao Theung	6 households	2 households
Lao Sung	7 households	12 households
Total number of household	18 households	15 households

Table 4-3 Inheritor of property in Household

name of village	PT village	LL village
eldest son	2 households	7 households
eldest daughter	1 household	1 household
youngest son	1 household	4 households
youngest daughter		
equal	6 households	
another	7 households	2 households
NA	1 household	1 household
Total number of households	18 households	15 households

Table 4-4 Ideal Number of Children

name of village	PT village	LL villate
average	3.2	4.8

Table 4-5 Average Number of Children per Household.

name of village	PT village	LL villate
average	4.4	5.7

Table 4-6 Average Number of Infant and Child Deaths

name of village	PT village	LL villate
number of deaths	2.1	2.1

Table 4-7 Attidude to Family Planning

answer/name of village	PT village	LL village
practice (a)	5 households	8 households
not practice (b)	13 households	7 households
total number of household (c)	18 households	13 households
practicing rate a/bx100	27.8%	61.5%

Table 4-8 Methods of Family Planning

method/name of village	PT village	LL village
modern method		
pill	2 households	4 households
injectables	—	1 household
rhythm method	1 household	3 households
traditional method and another	2 households	—

Table 4-9 Average Duration of Beastfeeding

name of village	PT village	LL villate
average duration	14.6	15.3

Table 4-10 Sanitation (lavatory)

method/name of village	PT village	LL village
furnished	5 households	0 household
not furnished	13 households	15 households
total number of households	18 households	15 households

Table 4-11 Source of Drinking Water

name of village	PT village	LL villate
river	17 households	15 households
well	1 household	0 household

Table 5-1 Socio-economic Characteristics of Study Villages

Village	PT	LL
No. of Sample Household	18	15
No. of Family Members Living Together	5.8	7.5
No. of Family Labor	2.3	2.6
Farm Size (ha)	1.51	4.49
Slash & Burn	1.19	3.00
Upland	0.29	1.07
Paddy Field	0.03	0.42
Farm Household Income (kips)	628,187	826,470
MAX. (Ten thousand kips)	264.8	191.9
MIN. (Ten thousand kips)	0	31.0
Fixed Farm Asset (kips)	255,833	547,511
Yield of Rice [per area harvested]		
[per planted area]	0.926	1.979
(Paddy t/ha)	0.5765	1.2615
Per capita Paddy Production (kg.man)	33.4	218.7
Paddy Converted per capita		
Household Income (kg/man) [1]	901.7	918.3
Required Per Capita Paddy Production (kg/man) [2]		280

Note.1) Calculated by the following equation: (Money Term Household Income)/(Price of Paddy: 120kips/kg)
2) Calculated by deducting the expected loss (20% of production) from 350 kg of the target per capita paddy production of the Laos government.

Table 5-2 Farm Household Income by Source: Kip (%)

	PT		LL	
	kip	%	kip	%
Farm Household Income	628,187	100	826,470	100
Agric. & Forestry Income				
Rice Income	23,333	3.7	128,200	21.6
Livestock Income	163,444	26.0	225,333	27.3
Cash Crop Income (incl. nursery plant production)	107,639	17.1	41,867	5.1
Non-agric. & forestry Income				
Agric-Related Income	55,597	8.9	92,367	11.1
Forestry-Related Income	100,678	16.0	251,666	30.5
Non-agric. & Forestry-Related Income	147,278	23.4	35,900	4.3
Remittance & Grant	30,218	4.8	1,137	0.1

Table 5-3 Land Holding in the Study Villages

Slash & Burn (ha) / Paddy Field & Upland (ha)	0	0< 0.5	.5< <1.0	1.0< <1.5	1.5< <2.0	2.0<
0	[2]	[1]	[2]		[2]	[3] [2]
<0.5			[2] [1]		[2]	[1]
0.5< <1.0	[1]		[3]	[1]	[1]	[1]
1.0< <1.5	[1]					[1]
1.5< <2.0						[1]
2.0<	[1] [2]					

Note: [ ] Village PT; [ ] Village LL.

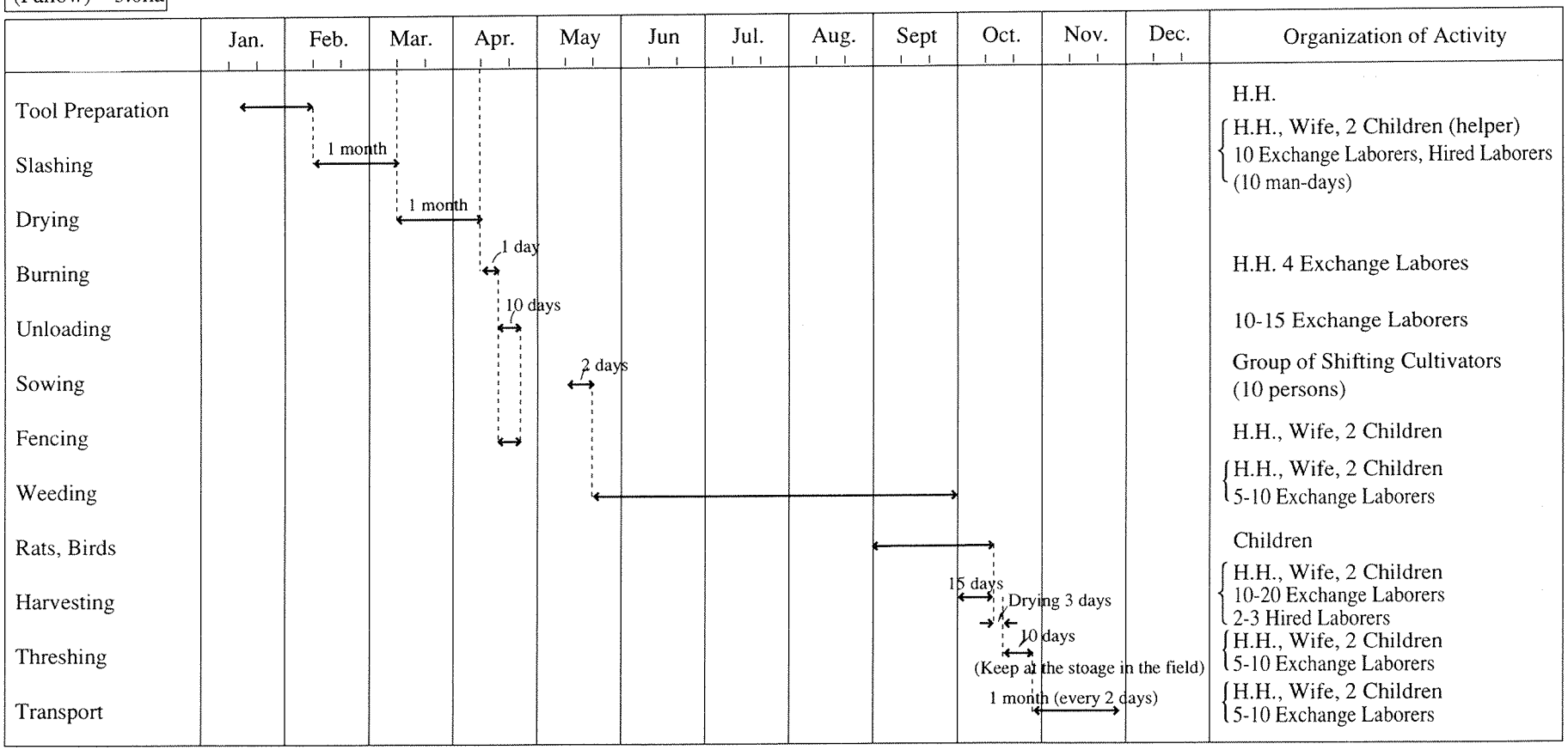
Table 5-4 Cropping Pattern of Slash & Burn Cultivation

Village	PT	LL
Upland Rice Mono Culture	4	7
Upland Rice Cotton	3	0
Upland Rice-Maize	0	3
Upland Rice-Sesami	0	2

Table 5-5 Slash and Burn : Calender of Activities in Study Villages (L.L.)

[Upland Rice]

Cultivated 1.5ha
(Fallow) 3.0ha



Note: Wage of Hired Labor ►800 kips/man. day (Slashing, Harresting), 1000 kips/man. day (Weeding)
Seed ►100 kg/1.5ha (150 kips/kg if purchased)
Production ►1.8 ton/1.5ha

Table 5-6 Fallow Period of Slash & Burn Agriculture

Farm Household No.	Village =1 Paktho =0 Lonluet	Fallow Period Index
1	0	0
2	0	2
3	0	0.33
4	0	0
5	0	2
6	0	0
7	0	0
8	0	0.5
9	0	2
10	0	2
11	0	2
12	1	1
13	1	1
14	1	1
15	1	2
16	1	1
17	1	3

Note) Fallow Period Index = Fallow Period per One Year of Cultivation

Table 5-7 Land Tax

Land Classification	Mountanious & Hilly	Low land (Double cropping)
Paddy Field A	5000kips/ha	6000kips/ha
B	3000	4500
C	2500	3000 * In the case of single cropping, tax is the same as in mountanious & hilly region.
Slash & Burn, Upland	1500kip/ha	
Compound	3kip/m^2	

Table 5-8 Profitability of Low Land Rice Farming in the Village LL (per ha)

	Rainy Season	Dry Season
Variety	Maeto	RD16
Yield	2.5 t	3.0 t
Gross Income	250,000Kips	300,000Kips
Production Cost	217,883	273,216
Operating Costs	80,867	128,200
Seeds	2,667	8,000
Land Preparation	46,000	30,000
Trasplanting	27,200	27,200
Chemical Fertilizer	3,000	3,000
Manual Wedding	—	60,000
Imputed Cost of Family Labor [1)]	120,800	128,800
Imputed Land Rent [2)]	16,216	16,216
Net Income (=Gross Income-Operating Cost)	169,133	171,800
Profit (=Gross Income-Operating Cost)	32,117	26,784

Note 1) For the imputation of family labor cost, 800 kips/day of daily wage rate was used.
2) For the imputation of land price, the purchase land price was multiplied by the interest rate of 28% per year.

Fig. 6-1 Rice Bank in LL Village

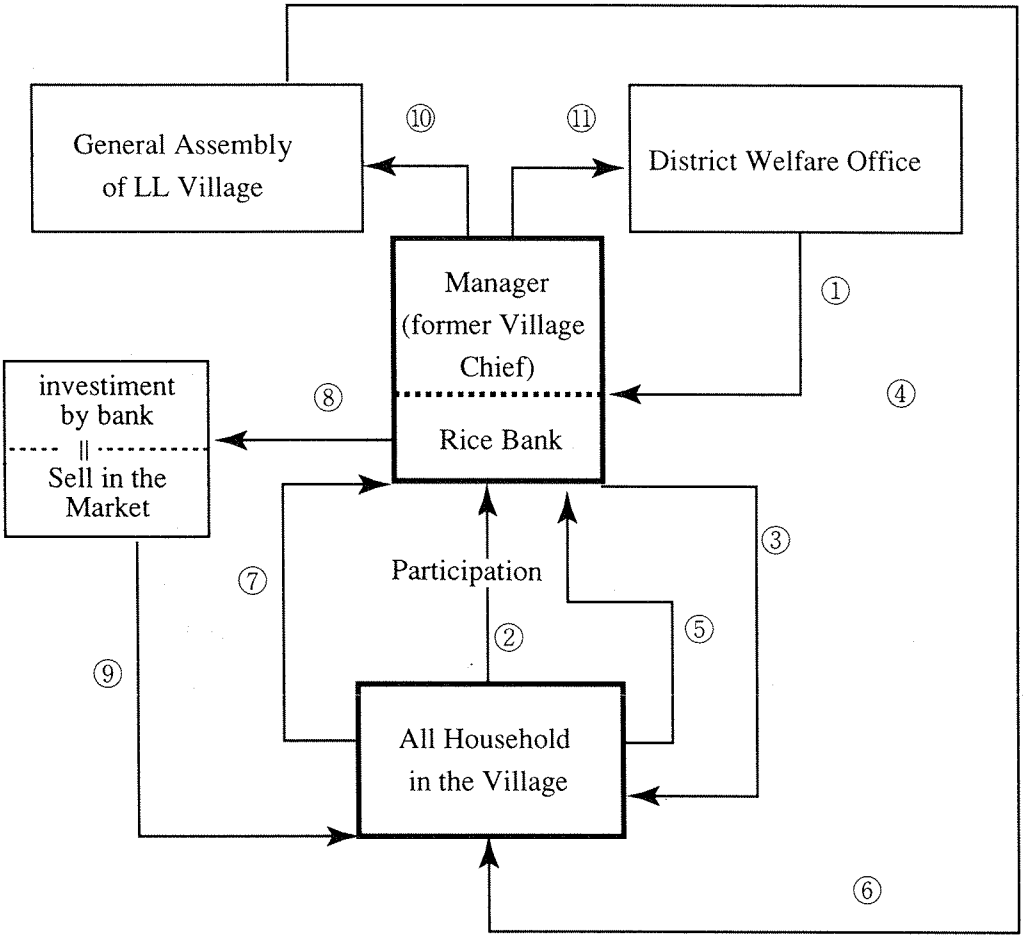


Table 7-1 Types of contract and its merit for weavers

	Transfer of Market information	Working Capital Bottleneck	Demand Uncertainity
Putting-out Contract	Yes	No	No
Yarn-credit-loan Contract	Yes	No	No
Advance-order Contract	Yes	Yes	Yes
in Market	No	Yes	Yes

Table 7-2

Type of Sins	Price of Yarn	Wage for Weavers	Retail Price	A/C	B/C	Margin rate
1	2,100	4,000	4,100	51.2%	97.6%	2.5%
2	3,100	5,000	5,500	56.4%	90.9%	10.0%
3	3,450	6,000	6,500	53.1%	92.3%	8.3%
4	4,300	9,000	10,000	43.0%	90.0%	11.1%
5	5,250	10,000	11,000	47.7%	90.9%	10.0%
6	9,100	15,000	17,600	51.7%	85.2%	17.3%

Figure 7-1 The Marketing Process of the Weaving Industry

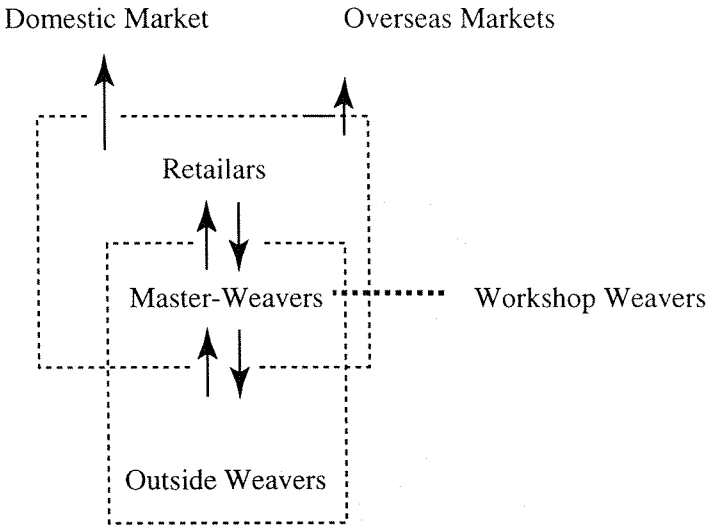
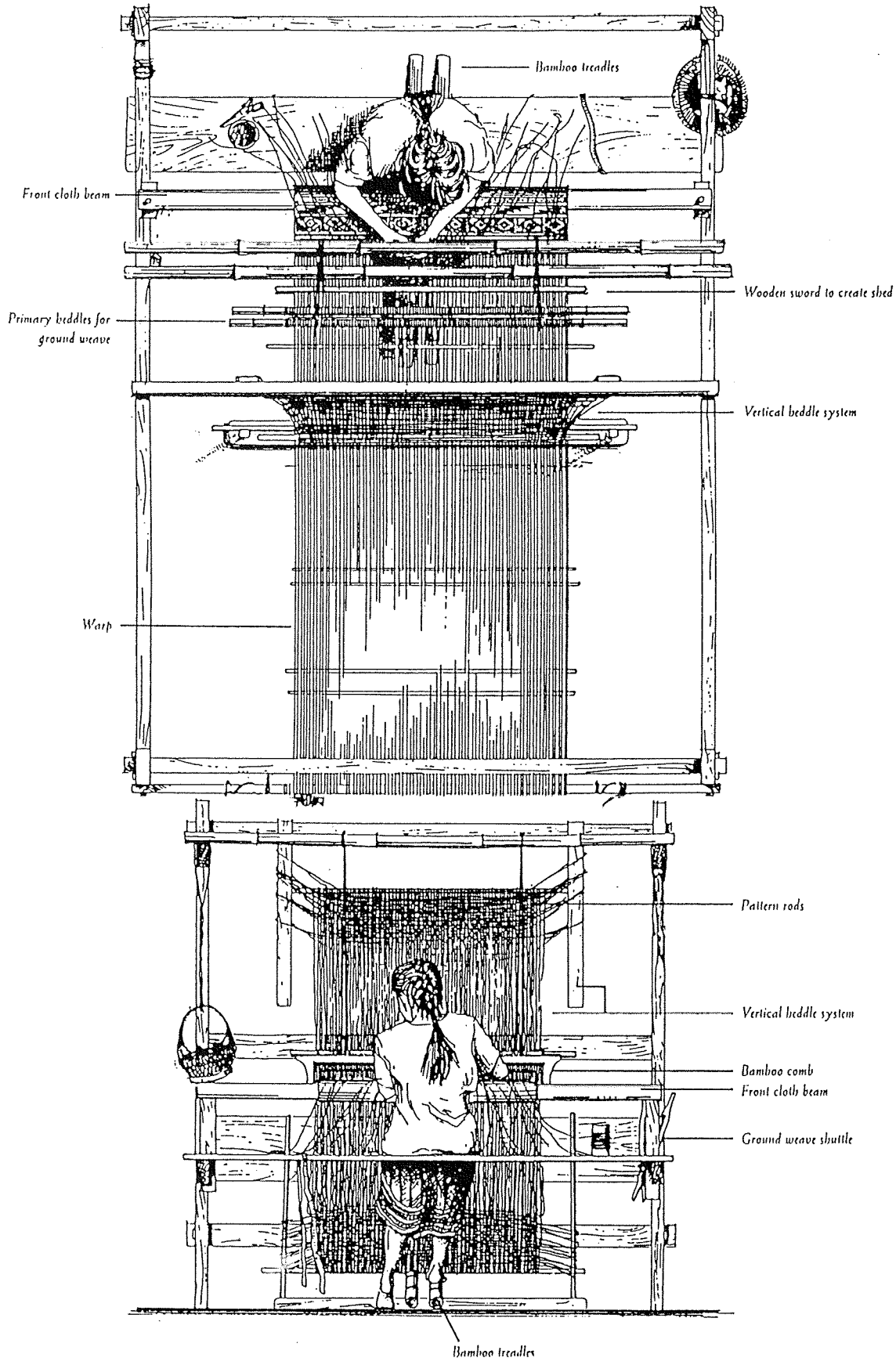


Fig. 7-2 Basic Lao Frame Loom



Chapter Four

Tasks and Outlook of Agricultural Development in Lao PDR

Chapter Four

Tasks and Outlook of Agricultural Development in Lao PDR

1 Premise for Considering Development and Cooperation

As the premise for Japan to consider international cooperation in agricultural development, it is necessary to have a firm understanding of the fact that Lao PDR is currently making a transition from a system of socialist planned economy to that of market economy.

In this process of transition to the market economy, the role and responsibility of the government is being reduced in all areas from agricultural production to distribution, and voluntary economic activities of farmers and merchants started to play the central role in the economy. The responsibility of the government in the area of agriculture in Lao PDR is currently limited to offering of credit through Agricultural Promotion Bank (APB) which was established in 1994.

Incidentally, the most important issue faced by agriculture in Lao PDR is more that of "development," i.e. how to escape from the state of underdevelopment with low productivity and undeveloped market system, not that of transition from planned economy.

Unlike Vietnam where collectivization and socialization of agriculture has been deeply realized during the socialist era, the legacy of socialist controlled economy is not so great in Lao PDR. The greatest problems confronting the Lao agriculture can be found in the existence

of low productivity agriculture which is strictly limited to ecological conditions of the flood-ridden plains and the mountain region and in the utterly insufficient development of the market mechanism for connecting the farmers who live separately in respective ecosystems with urban and global market.

As the experiences of agricultural development in many countries have shown, the government plays a crucial role in developing low productivity agriculture under such underdeveloped market economy. The fact that the role of the government is being significantly reduced following the transition towards market economy despite its crucial importance in development is the greatest problem regarding by the agricultural development in Lao PDR. Cooperation and assistance from overseas, both financial and technical, will be of extreme importance under the present circumstances where administrative as well as financial capacity of the Lao Government including finance is greatly limited.

2 The Tasks of Agricultural Development in Lao PDR

The characteristics of Lao agriculture shall be reviewed to identify the potential of agricultural development project in Lao PDR. Agriculture in Lao PDR is basically comprised of the following three types according to the geographic conditions of arable land.

(1) Geographic conditions as the task of agricultural development

The first type of agriculture is rice cultivation in the 6 main flood plains that develop along the Mekong River. It is the main agricultural region that accounts for nearly 80% of paddy land area in the entire country and is growing glutinous rice as the main crop. This region has natural inhibiting factors of flood and drought. Rain is concentrated in the rainy season from May to September and water for paddy land is fed by rain during this period. Irrigation is extremely limited except in the special municipality of Vientiane and is mainly pumped from Mekong River and its tributaries.

The second type of agriculture is dry field rice grown on swidden land in the mountainous region in the northern region and in regions bordering Vietnam where reduction of forest due to slash and burn is becoming a problem. As small gravity irrigation is possible in these regions, settlement of slash and burn farmers is being promoted through this method of irrigation.

The third type of agriculture is that seen in the plateau region of Xiengkhuang in the north and Bolaven in the south. They are regions in the altitude range of around 1,000 m with the former growing vegetables and raising livestock and the latter growing commodity crops including coffee, vegetables and fruits. As small-scale gravity irrigation is possible in these regions, they have become important for diversification of agriculture in Lao PDR. These geographic conditions

will have to be considered in full.

(2) Other agricultural development

As for other agricultural development that can be carried out throughout Lao PDR after implementing such development in view of geographic conditions, the first promising candidate is to explore the potential of stock farming where Lao PDR has advantage and can be implemented in any part of the country. Low interest loans through APB should be effective particularly for large animals such as cows. Cooperation in terms of grassland development, improvement of cows and pigs and prevention of epidemics can also be considered.

Secondly, the base of agricultural production in Lao PDR will have to be improved. Considering the fact that Lao PDR is presently making a transition towards market economy and that the government's financial base is weak, it will be necessary to consider a kind of development incorporating the burden-bearing of beneficiaries when attempting to improve the agricultural production base.

In the case of small-scale gravity irrigation in mountainous regions, materials such as cement and reinforcing rod can be offered free of charge through cooperation, while the beneficiaries contribute locally-available materials such as wood and aggregate as well as construction labor. Beneficiaries may also pay for the purchased materials themselves through agricultural loans from APB and other financial institutions. In such cases, however, the beneficiaries will have to increase their income by carrying out agricultural diversification to some extent so that they will be able to repay the loan. Such cooperation projects therefore will have to be linked with agricultural diversification.

The system of beneficiary burden-bearing using agricultural loan has also been applied to intermediate-scale irrigation development (covering an area of about 1,000 hectares) in the plains regions of Savannakhet, although construction of intake facilities (such as pumping station) and power lines are carried out as government projects. These kinds of irrigation development will be necessary particularly in flood plains.

(3) Development of human resources

Lastly, training of local staff involved in agricultural development will play a crucial role in view of the present situation of Lao PDR. Training of agriculture-related personnel is a very promising area of cooperation. In particular, intellectual cooperation that will enable the staff at APB to efficiently carry out long-term agricultural financing must be offered as the role of this bank becomes increasingly important in Lao PDR. While the need to consider two-step loans for agricultural development may arise in the not too distant future, training APB staff will be an important task for preparing the ground for such an effort.

Chapter Five

Survey Members and Itinerary

1 Survey Member

2 Cooperator

Preliminary Survey Itinerary

Survey Itinerary

Chapter Five

Survey Members and Itinerary

1 Survey Member

(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 (APDA)
Osamu Kusumoto	Senior Researcher, The Asian Population and Development Association (APDA)
Tomoe Hamada	Researcher, The Asian Population and Development Association (APDA)

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

Seiichi Fukui	Team Leader (See above)
Osamu Kusumoto	Team Member (See above)

(3) Survey Members (1 September- 15 September)

Seiichi Fukui	Team Leader (See above)
Akihiko Ohno	Team Member (See above)
Tomomi Otsuka	Team Member (See above)
Osamu Kusumoto	Team Member (See above)

2 Cooperator

(1) The Embassy of Japan and Others

Hiroomi Sakai	Ambassador
Yoshio Ishizaki	Second Secretary
Tsuneo Takahata	Resident Representatives, Japan International Cooperation Agency (JICA)

Hirotsugu Yoneda	Expert (Irrigation), JICA
Hiroyuki Tsuburaya	Expert (Forestry), JICA
Tamotu Imamura	Expert (Vegetable Cultivation, Seed Production), JICA
Atushi Ioki	Leader, The Forest Conservation and Afforestation Project, JICA
Junko Komoto	Coordinator, The Forest Conservation and Afforestation Project, JICA
Takeko IInuma	Expert, The Forest Conservation and Afforestation Project, JICA
Kimihiko Hyakumura	Expert, The Forest Conservation and Afforestation Project, JICA
Minobu Horie	Leader, The Agricultural and Rural Development Project in Vientiane Province, JICA
Yoshikazu Hasekura	Expert, The Agricultural and Rural Development Project in Vientiane Province, JICA
Yoshitoshi Tsutui	Expert, The Agricultural and Rural Development Project in Vientiane Province, JICA
Tatuo Fujita	Expert, The Agricultural and Rural Development Project in Vientiane Province, JICA
Yutaka Noshiro	Coordinator, The Agricultural and Rural Development Project in Vientiane Province, JICA
Mikiko Sasaki	Assistant Resident Representative, United Nations Development Program(UNDP)
Tsutomu Watanabe	Representative, MITSUI & Co., LTD

(2) Government and Institutions

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

Savanh Hanephom, Deputy Chief, Division of Statistics, Planning & Finance, Cabinet Office, Ministry of Agriculture and Forestry.

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

Sengphet Sommaniving, Assistant Director General, Head Cooperation Division, Department of Agriculture and Extension, Ministry of Agriculture and Forestry.

Srisavath Chasane, Project Director, The Agricultural, Rural Development Project in the Suburbs of Vientiane, Ministry of Agriculture & Forestry.

Carl Gustav Mosseberg, The Lao - Swedish Forestry Programme, Senior Forestry Advisor.

Diederik A. Koning, Rural Development Specialist, SIDA

Khampheuane Kingsada, Director General, Department of Forestry.

Khambai Khamsana, Head of the LAO- JAPAN Forestry Cooperation Unit, Planning, Finance and Co-operation Division, Department of Forestry, Ministry of Agriculture and Forestry.

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

Viengnakhone Oudomsone, Chief irrigation engineer, Department of Irrigation, Ministry of Agriculture and Forestry.

Khamhoo Phanthavong, Counterpart for JICA Expert, Planning Finance & Cooperation Division, Department of Irrigation, Ministry of Agriculture & Forestry.

Thonphachanh Sonnasinh, Director, Dept., of International Economic Cooperation, State Planning Committee.

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

Bounliep Chounthavong, Director, Agricultural Extension Agency, Department of Agriculture and Extension, Ministry of Agriculture and Forestry.

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

Boun Nhou Hanvichid, Programme Officer, UNFPA.

Onechanh Boonnaphol, Director, Provincial Agricultural and Forestry Service, Luang Prabang Province.

Khamkong Manikham, Coordinator, Project, Loung Namkhau Patana, Provincial Agricultural and Forestry Service.

Langsy Sayvisith, Director General, Department of Irrigation, Ministry of Agriculture and Forestry.

Saksy Thavone, Head Credit, Agricultural Promotion Bank.

Peer Hijmans, Representative, Food and Agriculture Organization of The United Nations.

Khamphanh Sisouvong, Manager, MITSUI & CO., LTD, Liaison Representative in Vientiane.

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

Preliminary Survey Itinerary

From July 20th to 27th

20 (Sat)	· 11:00 Depart from Narita by JL 717 Arrive at Bangkok 15:15 · 11:45 Depart from Kansai by JL 623 Arrive at Bangkok 15:30
21 (San)	· 10:30 Depart from Bangkok by TG690 Arrive at Vientiane 11:40
22(Mon)	· Visit to the Embassy of Japan. Briefing on agricultural and rural situation in LAO PDR from Mr. Yoshio Ishizaki, Second Secretary the Embassy of Japan. · Visit to JICA Representatives. Briefing on the present situation of international cooperation from Mr.Tsuneo Takahata, Resident Representative. · Visit to KM 6 irrigation farm. Briefing from Tamotsu Imamura, Expert of JICA. · Material Collection
23 (Tue)	· Visit to the office of The Forest Conservation and Afforestation Project in LAO People's Republic. Briefing on the present situation of development assistance. outline of the project from Ms. Junko Komoto, JICA Expert. · Visit to the office of The Agricultural and Rural Development Project in Vientiane Province. Briefing on the outline of the project from Mr. Minobu Horie, JICA Expert Team Leader. · Visit to FAO representatives Office. Briefing on the present situation of Agricultural and rural Development Assistance from Peer Hijmans, Resident Representative. · Visit to Morning Market.
24(Wed)	· 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. · Visit to Department of Irrigation, Ministry of Agriculture and Forestry. Briefing on irrigation agriculture of Laos from Mr. Tanousay Ounthouang, Deputy Director General. · Visit to bureau of forestry, Ministry of Agriculture and Forestry. Briefing on the situation of rural area and forestry from Mr. Khampheuane Kingsada, Director General.

25 (Thu)	· Visit to State Planning Committee. Briefing on the situation of Laos Economy and international assistance to Laos from Mr. Thongphachanh Sonnasinh, Director, Department of International Economic Cooperation. · Visit to National Statistics Center, State Planning Committee. Briefing on the statistics of Laos from Mr. Vixay Xaovana, Deputy Director General, and Data Collection. · Visit to Agricultural Extension Agency, Department of Agriculture and Extension, Ministry of Agriculture and Forestry. Briefing on System and present situation of Agricultural Extension in Laos from Mr. Bounliep Chounthavong, Director, Agricultural Extension Agency.
26 (Fri)	· Visit to Vegetable Market, observe the marketing and price of Agricultural produces. · Visit to State Planning Committee. Briefing on the population policy and economic Planning from Dr. Khamlien Pholsena, Deputy Director, Department of Planning. · Visit to UNDP Resident Office, Briefing on Foreign Aid from Ms. Mikiko Sasaki, Deputy Resident Representative. · 14:00 Depart from Vientiane by QV416 arrive at 15:35 Bangkok. · 17:00 Depart from Bangkok by KE631 arrive at 20:35 Singapore. · 22:45 Depart from Singapore (Kusumoto) by JL 710 · 23:10 Depart from Singapore (Fukui) by JL 722
26 (Sat)	· 06:25 Arrive at Kansai (Fukui) · 06:35 Arrive at Narita (Kusumoto)

Survey Itinerary

From 1st September to 15th September

Sep 1 (Sun)	· 11:00 Depart from Narita by JL717 Arrive at Bangkok 15:15 (Otsuka, Kusumoto) · 11:45 Depart from Kansai (KIX) by JL623 Arrive at Bangkok 15:30 (Fukui,Ono)
Sep 2 (Mon)	· 10:30 Depart from Bangkok by TG 690 Arrive at Vientiane 11:40 · Visit to the Embassy of Japan. Pay courtesy to H.E. Mr. Hiroomi Sakai, Ambassador of Japan. Discuss about the survey itinerary with Mr. Yoshio Isizaki, Second Secretary, The Embassy of Japan. · Visit to Ministry of Agriculture and Forestry. Briefing on Irrigation Development and Agricultural Situation in LAO PDR from Hirotsugu Yoneda, Irrigation Expert, JICA.
Sep3(Tue)	· Visit to Ministry of Agriculture and Forestry. Briefing on the agricultural situation in LAO PDR and coordination of Survey program by Khamphiou Vissapra, Deputy Director General, Ministerial Cabinet, Ministry of Agriculture and Forestry (MAF). · Visit to Irrigation Department, MAF. Discuss about survey site with Thanousay Ounthouang, Deputy Director General. · Visit to Forestry Department. Consultation for survey program by Khampheuane Kingsada. · Visit to UNDP LAO Representatives. Briefing on the International Cooperation and Aid by Mikiko Sasaki, Assistant Resident Representative UNDP.
Sep 4th (Wed)	· Visit to National Statistical Center, State Committee for Planning. Briefing on Population and Agricultural Statistics and data collection system by Visay Xaovana, Deputy Director, National Statistical Center. · Visit to SIDA Office. Briefing on SIDA activities (Aforestation and settlement program) by Carl Gustav Mossberg, Senior Forestry Advisor.
Sep 5(Thu)	· Move from Vientiane to Luang Phabang by QV200 · Visit to Provincial Agricultural and Forestry Service, Luang Phabang Province

Sep 6 (Fri)	· Visit to EU Project office. Briefing on outline of EU project in Luang Phabang. · Visit to SIDA Project office. Briefing on SIDA project in Luang Phabang. · Move from Luang Phabang to Xiang Ngun District Office. Briefing on agricultural situation in Xiang Ngun District from chief of Xiang Ngun district. select the villages.
Sep 7 (Sat)	· Visit to the six villages (Pak Tho, Phone Xay, Long Lueut, Hoay Chong, Phone Thong, Silalek). Briefing on the basic data of each villages form village chief. -Pak Tho Village (Fukui, Ohno, Otsuka, Kusumoto) -Phone Xay Village (Ohno, Kusumoto) -Long Lueut Village (Fukui, Otsuka) -Hoay Chong Village (Fukui, Otsuka) -Phone Thong Village (Fukui, Otsuka) -Silalek village (Ohno, Kusumoto) · Visit to villages -Lang Lao Village (Fukui, Ohno, Otsuka, Kusumoto) -Panno Village (Fukui, Ohno, Otsuka, Kusumoto)
Sep 8 (Sun)	· Visit to Kyajnu village (Fukui, Otsuka, Kusumoto) · Data processing for information from 6 Village chief. · Observing the survey on village industry (Ohno)
Sep 9 (Mon)	· Observing the field survey in Pak Tho village (Fukui, Ohno, Otsuka, Kusumoto) · Collection the information from village person.
Sep 10 (Tue)	· Observing the field survey in Long lueit village (Fukui, Otsuka, Kusumoto) · Collection the information from village person
Sep 11 (Wed)	· Observing the field survey in Pak Tho village (Fukui, Otsuka, Kusumoto) · Observing the field survey in Long Lueut village (Fukui, Otsuka, Kusumoto) · Observing the survey on village industry (Ohno)
Sep 12 (Tue)	· Move from Luang Phaban to Vientiane by QV 201 · Material collection

Sep 13(Fri)	· Visit to Ministry of Agriculture and Forestry. Repot the field survey in Luang Phaban. · Visit to the Embassy of Japan. Report of the survey result. · Visit to Agricultural Promotion Bank. Briefing of Rural credit project by Saksy Thavone, Head Credit (Fukui. Ohno). · Visit to UNFPA project office. Briefing of population activitics in LAO PDR from Dr. Boun Nhou, Program Officer (Otsuka, Kusumoto).
Sep 14 (Sat)	· Visit to State Planning Committee, Briefing of Economic Planning Model in LAO from Dr. Khamrien Pholsena, Deputy Director, Planning Division. · 12:30 Depart from Vientiane 13:35 Arrive at Bangkok (TG961) · 22:30 Depart from Bangkok- Otsuka, Kusumoto-(JL718) · 23:59 Depart from Bangkok - Fukui, Ohno- (JL622)
Sep 15(Sun)	· 06:30 Arrive at Narita (Otsuka, Kusumoto) · 07:30 Arrive at KIX (Fukui, Ohno)

List of Collected Materials

LAO PDR

1) National Statistical Center, Basic Statistics, National Statistical Center, Vientiane 1996

2) National Statistical Center, Report on The Fertility and Birth Spacing Survey in LAO PDR, UNFPA, Project No. LAO/93/P02, National Statistical Center, Vientiane 1996

3) UNDP, LAP PDR* Province Profiles Series No.5, Socio-Economic Profile of Oudomsay Province (First Draft), Rural Development Program 1997-2000, UNDP, Vientiane, May 1996

4) LAO Peoples Democratic Republic, Outline Public Investment Program 1994-2000, Presented to the 5th Round Meeting, Geneva, 21 June 1994, Government of the LAO Peoples Democratic Republic, Vientiane.

5) UNDP, Shifting Cultivation Systems and Rural Development in the LAO PDR, Report of the Nabong Technical Meeting, Nabong Agriculture College, LAO People's Republic, July 14-16, 1993, UNDP/ DDSMS/ LAO/ 92/017, Ministry of Agriculture and Forestry, Vientiane, 1994

6) Loes Schenk Sandbergen, Outhaki Choulamany Khaphoui, Women in the Rice Fields and Offices: Irrigation in Laos- Gender specific case -studies in four villages, Empowerment, Heiloo, The Netherlands,1995

7) Committee for Planning and Cooperation, Report on Population and Development Planning, Committee for Planning and Cooperation, Vientiane, 1995

8) Laurent Chazee, Atlas Des Ethnies Et Des Sous-Ethnies Du Laos, 1995

9) Committee for Planning and Cooperation, National Statistical Center, 1975-1995 Basic Statistics about the Socio-Economics Development in the LAO P.D.R., Committee for Planning and Cooperation, 1995

10) Committee for Planning and Cooperation, National Statistical Center, Expenditure and Consumption Survey and Social Indicator Survey (1992-1993), Committee for Planning and Cooperation, 1995

11) Committee for Planning and Cooperation, National Statistical Center, LAO Census 1995 Preliminary Report 2,, Committee for Planning and Cooperation, 1995

12) Ministry of Economy Planning and Finance, State Statistical Center, Basic Statistics 1975-1990, Ministry of Economy Planning and Finance

13) Food and Agriculture Organization of the United Nations, Laos Programme Mid Year Review 1996, Office of the FAO Representatives, Vientiane, 1996

14) UNDP, Development Cooperation-LAO People's Democratic Republic 1994 Report, UNDP Resident Representatives, Vientiane, 1995

15) Laurent Chazee, Practical Hand Book for the development of Rural Communities in Laos, United Nations Capital Development Fund (UNCDF)

16) Yoneda Hirotugu, Laosu nougyou ni okeru nougyou nouson kaihatu no tennkai ni tuite, June, 1996 (in Japanese)

17) International Development Center Japan (IDCJ), Sougou Kaihatu keikaku chousa-ajia shokokuno sanngyou shinnkou seibi keikaku chousa- Vietnam, Laos, March, (in Japanese)

18) Japan International Cooperation Agency and Ministry of Agriculture and Forestry, LAO P.D.R., Udomusai ken yakihatachiiki nougyou kaihatu keikaku chousa houkoku-sho, August,1994, Nihon kouei kabusikigaisha (in Japanese)