

Access to Seeds and Plant Genetic Resources for Food and Agriculture

Their Role in Improving Rural Livelihoods in Lao PDR



**Joselito T. Sescon and
Renato Salazar**

2007

FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS



Livelihood Support Programme (LSP)

An inter-departmental programme for Improving support for enhancing livelihoods of the rural poor.

Access to Seeds and Plant Genetic Resources for Food and Agriculture

Their Role in Improving Rural Livelihoods in Lao PDR

Joselito T. Sescon & Renato Salazar

2007

Photograph by SEARICE

This paper was prepared under contract with the Food and Agriculture Organization of the United Nations (FAO). The positions and opinions presented are those of the author alone, and are not intended to represent the views of FAO.

The Livelihood Support Programme

The Livelihood Support Programme (LSP) evolved from the belief that FAO could have a greater impact on reducing poverty and food insecurity, if its wealth of talent and experience were integrated into a more flexible and demand-responsive team approach.

The LSP, executed by FAO with funding provided by DFID, is implemented through teams of FAO staff members who focus on specific themes being worked on in a sustainable livelihoods context. These cross-departmental and cross-disciplinary teams act to integrate sustainable livelihoods principles in FAO's work, at headquarters and in the field. These approaches build on experiences within FAO and other development agencies.

The programme functions as a testing ground for both team approaches and sustainable livelihoods principles.

Email: lsp@fao.org

Access to natural resources sub-programme

Access by the poor to natural resources (land, forests, water, fisheries, pastures, etc.), is essential for sustainable poverty reduction. The livelihoods of rural people without access, or with very limited access to natural resources are vulnerable because they have difficulty in obtaining food, accumulating other assets, and recuperating after natural or market shocks or misfortunes.

The main goal of this sub-programme is to build stakeholder capacity to improve poor people's access to natural resources through the application of sustainable livelihood approaches. The sub-programme is working in the following thematic areas:

1. Sustainable livelihood approaches in the context of access to different natural resources
2. Access to natural resources and making rights real
3. Livelihoods and access to natural resources in a rapidly changing world

This paper looks into issues of access to seeds and Plant Genetic Resources for Food and Agriculture (PGRFA), and the importance of these resources to rural livelihoods of small-scale farmers in the Vientiane Province of Lao PDR. It draws attention to the many ways in which access to seeds contribute to dynamic livelihood systems, which are characterized by a shift from mainly subsistence production to market-oriented farming and wage labour. The paper discusses how the Sustainable Livelihoods Approach can be a useful holistic framework to show linkages between assets, livelihood strategies and the use of seeds. An overview of these linkages can aid planners and policy makers in achieving both goals of increasing food security and poverty reduction in rural areas of Lao PDR.

TABLE OF CONTENTS

1.	BACKGROUND.....	10
2.	METHODOLOGY.....	12
3.	CONTEXT, POLICIES AND INSTITUTIONS.....	14
3.1.	Short Description of Lao PDR.....	14
3.2.	Policies and Institutions.....	15
4.	LIVELIHOOD ASSETS AND STRATEGIES.....	17
4.1.	Viengkham District.....	17
4.2.	Hinheup District.....	23
5.	UTILIZATION AND ACCESS TO PLANT GENETIC RESOURCES.....	29
5.1.	Rice.....	29
5.2.	Cash Crops.....	32
5.3.	Home Garden crops.....	34
5.4.	Wild and Weedy Plants.....	35
6.	FINDINGS.....	36
7.	EVALUATION OF THE TOOLS USED.....	39
7.1.	Examples of added value using the SLA tools.....	39
7.2.	Major lessons learned.....	40
	REFERENCES.....	43
	ANNEX 1: HOME GARDEN CROPS.....	44
	ANNEX 2: FARM GATE PRICES OF CASH CROPS.....	48

Acknowledgements

This report contains the results of a study to gain a better understanding the access of poor households in Lao PDR to Plant Genetic Resources for Food and Agriculture and seeds and their contribution to sustainable livelihoods in the Vientiane Province of Lao PDR.

We thank the implementing agency: the National Agriculture and Forestry Research Institute (NAFRI) that made this study possible. We also thank the supporting role of the Ministry of Agriculture and Forestry and the FAO Lao office, as well as the technical support from the FAO Headquarters in Rome, Italy.

Our national team consisted of a national focal point and two field assistants. Therefore we thank the national focal point Mr. Bounkong Souvimonh (Deputy Director Haddokeo Horticulture Research Center, NAFRI) and the field assistants Mr. Phetmanyseng Xangsayasane, NAFRI and Mr. Phonexay Khamavong.

The field research was carried out over a four-month period during which the research team made considerable demands on many people who generously gave their time: first and foremost, the residents of villages involved in the study (Pakcheng, Nongkhouay and Mayphosy are in Viengkham District while the villages of Phonekham, Phonethong and Hinheup Neua are in Hinheup District), then the Agriculture Research Centers and Lao Women Union and of course all of the colleagues associated with the study.

The results presented in this report reflect the findings and opinions only of the authors, and not of the FAO.

SUMMARY

Laos depends heavily on rice based agriculture systems and there is evidence that the traditional diversified diet and income base is being eroded, resulting in a negative effect on the livelihoods of the people. The opportunity to gather food in forests is diminishing and dietary diversity is being narrowed. In order to gain a better understanding of the relationship between this situation and access to and use of PGRFA, a project entitled “Plant Genetic Access and Utilization: Understanding and Contributing to Sustainable Livelihoods in Lao PDR” was carried out in the Vientiane province (May 2005 to February 2006).

Looking at PGRFA/seeds using a livelihoods perspective focuses on the many ways in which these contribute to dynamic livelihood systems, exposing a range of complex, and often neglected, issues related to access. Moreover, understanding access to PGRFA/seeds, using a livelihoods perspective, will contribute to implementing activities under the National Agricultural Biodiversity Programme (NABP). Achieving this is a vital element of food security and sustainable development in Lao PDR.

The outcomes of a study that was carried out under the “Plant Genetic Access and Utilization: Understanding and Contributing to Sustainable Livelihoods in Lao PDR” project show that small scale rural farmers in the Vientiane province are increasingly shifting from mainly subsistence production to market-oriented farming and wage labour. The main livelihood strategies are rice and vegetable crop production for the market, livestock production, off-farm wage labour and small enterprises. At the same time these farmers still rely on a diverse number of home garden crops and collected wild and weedy plant resources for their domestic food consumption.

Access to seeds and PGRFA is an important asset that allows farmers to increase their market-oriented production. Improved varieties and hybrids are important elements for market-oriented and intensive production systems. Farmers’ seeds systems, which primarily produces seeds for domestic food crops, cannot develop new cultivars and produce quality seed lots that meet new and fast changing demands (of new varieties standards of seeds) in intensive market oriented cultivation. In production for the market there is a demand for improved varieties that have different characteristics, e.g. improved disease resistance, better shelf life, improved appearance etc. The national agricultural research institutes have a limited capacity to develop improved varieties that can feed into the commercial sector and will eventually be marketed to farmers. At the same time a limited number varieties and quality seeds are now bought from foreign seed companies. These imported varieties are being marketed to farmers but do not always meet their demands and needs.

In order to achieve both goals of increasing food security and poverty reduction it will be important to develop the capacity of national and formal institutions to produce diverse varieties and high quality seeds. These varieties and seeds should fulfill both the farmer’s traditional and intensive cultivation needs and standards.

The Sustainable Livelihoods Approach is a useful holistic framework to show linkages between assets, livelihood strategies and the use of seeds and PGRFA. The framework and methodology could be further improved to allow a more targeted approach by focusing on target groups within households and by focusing on specific target crops. A

more detailed overview on how access to seeds and PGRFA contributes to rural livelihoods allows policy makers to make better informed decisions on poverty alleviation and seed / food security programmes, linking them to diverse needs of different livelihood strategies.

List of Acronyms:

ARC	Agriculture Research Center
DED	German Development Service
DOA	Department of Agriculture
DUS	Seed distinctness, uniformity and stability
FAO	Food and Agricultural Organization of the United Nations
FGD	focused group discussion
GNI	Gross National Income
IUCN	The World Conservation Union
LECS	Lao PDR Expenditure and Consumption Survey
LPRP	Lao People's Revolutionary Party
LSP	Livelihood Support Programme
LWU	Lao Women Union
MAF	Ministry of Agriculture and Forestry
NABP	National Agricultural Biodiversity Programme
NAFRI	National Agriculture and Forestry Research Institute
NEM	New Economic Mechanism
NGO	non-government organization
NGPES	National Growth and Poverty Eradication Strategy
NTFP	non-timber forest products
PGRFA	Plant Genetic Resources for Food and Agriculture
SLA	Sustainable Livelihoods Approach
STEA	Science, Technology and Environment Agency

1. BACKGROUND

Livelihoods and access to PGRFA/seeds

In 2003, a Working Paper was completed on access to PGRFA/seeds within the context of sustainable livelihood approaches. This study was carried out under the "Livelihood Support Programme" (LSP), a DFID-funded project, and as part of Sub-programme 3.1 which addresses access to natural resources (Seshia & Scoones, 2003). The paper was prepared with the support of the Institute of Development Studies at the University of Sussex.

The paper demonstrates how a livelihoods perspective can: (i) facilitate understanding of the role played by PGRFA/seeds in rural people's livelihoods and (ii) strengthen understanding of issues of access. This was done by presenting case studies that were deliberately selected to demonstrate that the issues and questions of access vary across contexts of emergency seed relief, wild and weedy foods, and farmer engagement with agricultural research systems.

The final section of the paper offers a framework and checklist of questions to facilitate thinking about access to PGRFA/seeds and appropriate entry points. After identifying further steps that may be taken to improve understanding of issues around access to PGRFA/seeds, the study concludes with a call for the development of new kinds of thought and practice to better understand how PGRFA/seeds are located within livelihood systems and to enable locally grounded work that spans institutional scales.

National Agricultural Biodiversity Programme in Lao PDR

FAO is providing technical assistance to support implementation of the National Agricultural Biodiversity Programme (NABP) in Lao PDR. This is consistent with the Government's stated priorities to achieve food security and improve the livelihoods of the rural communities. The NABP demonstrates the commitment by the Government of Lao to the implementation of the Convention on Biological Diversity and particularly its commitment to the implementation of the Programme of Work on Agricultural Biological Diversity.

One of the components of the NABP focuses on Crop and Crop-Associated Biodiversity. Improved management of crop and crop-associated biodiversity is essential to achieve food security and rural development goals in Lao PDR. Activities under this component include:

- Promoting sustainable agriculture through diversification of crop production and broader diversity in crops (introducing cropping systems programmes e.g. intercropping, rotational cropping through demonstration sites); and
- Support seed system development (including both formal and informal systems)

Understanding the access of poor households in Lao PDR to PGRFA/seeds will be vital for implementing these activities.

Project: “Plant Genetic Access and Utilization: Understanding and Contributing to Sustainable Livelihoods in Lao PDR”

Lao PDR depends heavily on rice based agriculture systems and there is evidence that the traditional diversified diet and income base is being eroded and this is having a negative effect on the livelihoods of the people. The opportunity to gather food in forests is diminishing and a nutritionally varied diet is being narrowed. In order to gain a better understanding of the relationship between this situation and PGRFA access and use a project entitled “Plant Genetic Access and Utilization: Understanding and Contributing to Sustainable Livelihoods in Lao PDR” was undertaken in the Vientiane province (May 2005 to February 2006).

The project was approved in the framework of FAO Netherlands Partnership Programme (FNPP)-agrobiodiversity in Laos and included in the Memorandum of Understanding (MOU) signed between the Government and FAO in August 2005. The fieldwork was done, in consultation and collaboration with NAFRI, by a team consisting of a consultant (Mr. Josalito Sescon) and two assistants (Mr. Phetmanyseng Xangsayasane and Mr. Phonexay Khamavong) who were technically supported by an international consultant (Mr. Renato Salazar). The implementation was supported by the FAO Lao office and received technical support from the FAO Headquarters in Rome, Italy.

The project was following up on the recommendations that were made in the final part of the LSP 3.1/IDS working paper on livelihoods and access to PGRFA/seeds to:

- use analysis grounded in concrete activities going on in the field, further develop work to look at ways of strengthening access to PGRFA/seeds in the context of emergency relief, access to wild and weedy foods and farmer engagement with agricultural research systems; and
- extend the range of areas or cases where a Sustainable Livelihoods Approach (SLA) perspective may be used, drawing on field-based activities.

Looking at PGRFA/seeds using a livelihoods perspective focuses on the many ways in which these contribute to dynamic livelihood systems and exposes a range of complex, and often neglected, issues related to access.

Moreover, understanding access to PGRFA/seeds, using a livelihoods perspective, will contribute to implementing activities under the NABP and achieving this is a vital element of food security and sustainable development in Lao PDR. Examining access to PGRFA/seeds will also result in possibilities to enhance access and use so as to improve livelihoods through appropriate methods to improve seed security.

In general the project contributes to a better understanding of ways to strengthen access to PGRFA/seeds and increase the food security of rural communities in Laos. Strengthened access should be seen in the context of improved access to a larger amount and number varieties of higher quality seeds, at the time when farmers need them. The objectives of the project were:

- to initiate testing and validating the framework and checklist of questions that was presented in the LSP 3.1/IDS working paper on livelihoods and access to PGRFA/seeds in the context of the rural areas in Lao PDR;
 - to gain a better understanding of how seeds contribute to livelihoods of a few selected rural communities in Lao PDR;
-

- to illustrate how a better understanding of the contribution of seeds to livelihoods of rural communities can be communicated into practical recommendations to strengthen farmer seed access; and
- to build farmer capacity in improving seed access / seed production.

Purpose of this document

This document describes the methodology and outcomes of a study (from herewith referred to as the study) that was carried out under the “Plant Genetic Access and Utilization: Understanding and Contributing to Sustainable Livelihoods in Lao PDR” project. The outcomes described in the document relate to both the findings of the study and methodological issues.

2. METHODOLOGY

Short description of the Sustainable Livelihoods Approach framework used in the study

This study uses a livelihoods perspective to facilitate understanding of the role played by seeds and PGRFA in rural people’s livelihoods, and considers how a livelihood perspective may strengthen understanding of issues of access. A sustainable livelihoods perspective offers a way of thinking about the linkages among vulnerability, poverty and environmental or natural resource management. In addition, this perspective is grounded and contextual, looking at how different people pursue a range and combination of livelihood strategies given a particular vulnerability context, combination of assets and set of opportunities and constraints presented by institutional structures and processes.

Livelihoods perspectives demonstrate how seeds and PGRFA are important assets that are linked to other livelihood resources and strategies in complex ways. This study maps out some of the ways that seeds and PGRFA contribute to livelihood security, going beyond their direct contributions to food and income to consider more dynamic and less visible ways in which they enable households to manage various forms of uncertainty and risk, maximize use of other productive assets, and facilitate diverse livelihood strategies. A livelihoods approach is therefore a complement to conventional seeds/PGR interventions, but one that requires a different outlook. It encompasses more than just technical or genetic approaches, but also draws on social, political, economic, and institutional perspectives.

The Sustainable Livelihoods Approach (SLA) framework is first and foremost an approach to development based on a set of principles. While the livelihoods framework comprises a development objective, as well as a set of tools for analysis, it is the approach to development that is its distinguishing hallmark. The SLA principles embody a commitment to poverty eradication based on accumulated best practice policies in development. SLA is a people-centered approach that aims to identify means to meet local needs and opportunities to support local capacity that are not dominated by individual sectors or disciplines. In pursuing this objective the framework adopts a responsive and participatory approach that links local perspectives into higher level processes of policy design; builds on partnerships between sectors; and builds local capacity to maintain sustainable livelihoods.

Seshia and Scoones (2003) presented a framework and checklist to map out how access to seeds and PGRFA contribute food security, income generation, environmental sustainability, poverty reduction and other livelihood outcomes that increase livelihood security and resilience (see figure 1).

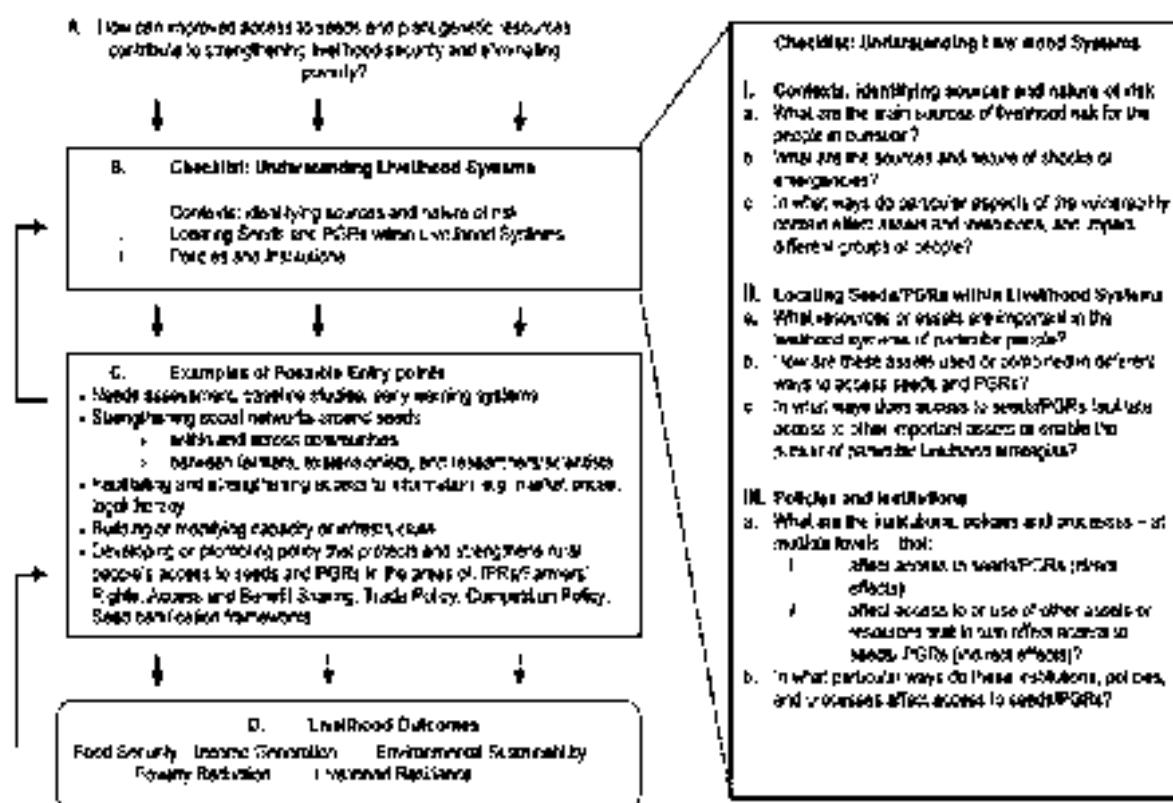


Figure 1: Strengthening access to seeds and PGRFA: a framework to assist informed decisions and actions

This framework and checklist formed the basis for the questionnaire and issues used and discussed in interviews and Focal Group Discussions.

Selection of research sites

Six villages were selected for this study. These villages are located in two districts of Vientiane Province. The villages of Pakcheng, Nongkhouay and Mayphosy are in Viengkham District while the villages of Phonekham, Phonethong and Hinheup Neua are in Hinheup District. The total number of households of the three villages of Viengkham District is 284, while that of the three villages in Hinheup is 323.

The villages of Viengkham district were chosen to represent lowland irrigated farming systems. The villages of Hinheup district were selected to represent rainfed farming systems. The villages of the two districts were also selected to represent communities with varying degrees of adaptation of their farming systems to increasing market forces to capture current trends and current farmers' livelihood strategies in a period of economic transition, and its impact on farmers' access and use of plant genetic resources.

Research Instruments and activities

Data were gathered through one-on-one structured interviews, focused group discussions, community meetings, key informant interviews and special group workshops with village officials.

The focused group discussion (FGD) covered the following areas:

- a) Wealth ranking of households (by village officials)
- b) Seasonal calendar of livelihood activities
- c) Lists of cultivated crops, the rank of importance of these crops to family income and consumption, and the percentage of the harvests that are sold
- d) List of wild and weedy food species
- e) Assessment of traits of varieties of the identified main crops
- f) Assessment of cost of inputs for major crops
- g) Assessment of seed lots and seed sources
- h) Prices of crops; farm-gate and farmers' floor prices
- i) Women's focused group discussion on all the topics above

In Viengkham District, 49% of household respondents interviewed were women and 32 percent attended the FGDs. There were all-women FGD meetings held for each village with the assistance of the Lao Women Union (LWU). In Hinheup District, 43% of household respondents interviewed were women and about 37 percent attended the FGDs.

Data

The data on household and one-on-one interviews were entered in statistics software including the prices of cash crops. The reference period of interview is the past two growing seasons or past year. FGD data on the above topics was disaggregated by each village. Consolidated data or tables per the two districts on Cultivated Crops and Wild and Weedy Species are annexed in the report.

3. CONTEXT, POLICIES AND INSTITUTIONS

3.1. Short Description of Lao PDR

Lao PDR is a small landlocked country. It has a population of 5.5 million and is experiencing annual population growth of about 2.3%. With a land area of 236,000 sq. km, urbanization is low - at about 20% - and agriculture accounts for over half of the GDP in Lao PDR. Gross National Income (GNI) per capita stands at around 310 US\$. Reliance on external support remains high.

Infrastructure and market integration

Lao PDR is a small, mountainous, landlocked country surrounded by five other countries – China, Vietnam, Cambodia, Thailand and Myanmar. Owing to a sparse population and rough topography, improvement in transportation is difficult and costly. During the past decade some improvements have been achieved in rehabilitating the national road system. Major improvements have been achieved in Route 13, the North-South route connecting the Chinese, Thai and Cambodian borders and passing through the country's major urbanized areas. Major investments in Routes 8 and 9 have connected Lao PDR with the Vietnamese ports of Hoa Vinh and Danang. Longstanding Thai road investments have meant that Vientiane has long been well connected with Bangkok and the Thai ports. This progress has permitted substantial national and international access for the capital and a number of

provincial capitals to important centers of economic activity. The major problem lies with provincial and district roads and is likely to remain serious for some time to come since not enough resources are available to rehabilitate or provide appropriate maintenance for them. As a result, a substantial part of the Lao PDR population will remain without adequate transport links for the foreseeable future.¹

Lao PDR economic and social indicators fall below the average for low-income countries and are among the poorest in the region. Two-thirds of the households have no electricity, and every other household is without access to safe water. Life expectancy is low, child malnutrition is high.

In 1986, the Government of Lao PDR adopted its New Economic Mechanism (NEM), a measure aimed at transforming the centrally planned economy established in 1975, upon the accession of the People's Democratic Republic into a market-driven economy. The NEM set out to liberate prices, eliminate subsidies, align the exchange rate with the market rate; and encourage private and foreign commercial activities in most sectors of the economy. Since the inception of NEM, the Government has launched many structural transformations to build up the basic economic, physical and social infrastructure of the country, focusing on the development of transport and communication networks. Overall, the reforms have contributed to steady increases in annual GDP growth, averaging 6.7% between 1991 and 1996. However, in 1997, Lao PDR felt the negative effects of the Asian financial crisis, despite its relatively low degree of integration. This led to a soaring inflation and depreciation of the exchange rate. Indeed, food shortages dating to 1996 set in a motion a spiral of rising prices resulting in an inflation rate of 167% in March 1999. Stabilization measures undertaken brought down inflation to 23% by 2000. Since the implementation of far-reaching changes triggered by the crisis, Lao economy remains vulnerable to shocks that might result from inflation abroad or domestic supply shortfalls caused by floods or disruptions in agricultural production. If a stable environment is developed, specific policies will be effective in maintaining the GDP growth of Lao PDR, targeted at seven percent.²

The government policies that favor the ownership of farmlands by farmers, the relaxation of the movement of their citizens within the country, the economic policy that favors free market forces over that of centrally planned economies, and the priority given to agricultural development, all pushed the general economic upswing of the country.

3.2. Policies and Institutions

Economic policies

Lao PDR was one of the earlier countries with centrally planned economies to attempt the move to a market transformation. In 1982, the use of the "market forces" in the development of Lao PDR was promoted at the 3rd Congress of the Lao People's Revolutionary Party (LPRP). Many of the priorities highlighted were related to investment climate, governance, and human resource development issues which are still relevant today. In 1986, the Government officially abandoned a central planning system and introduced the New Economic Mechanism (NEM).

¹ "Realizing the Development Potential of Lao PDR", Lao PDR Economic Memorandum, The World Bank, December 2004

² "Advancing Rural Development", National Human Development Report Lao PDR 2001, UNDP 2001

Lao PDR has recorded reasonable economic growth. Real GDP growth rates averaged 6.1% during the first half of the 1990s and reached 6.7% in the latter half of the 1990s. Manufacturing and services were the main growth drivers during the early 1990s, while agriculture was the main driver during the latter half of the decade.

As a result of the economic growth, the percentage of the population whose per capita consumption is less than the national poverty line fell from 46% in 1992/93 to 39% in 1997/98, representing 1.9 million poor. Based on Lao PDR Expenditure and Consumption Survey (LECS) III data, poverty fell to 32%, representing 1.67 million poor in 2002/03.

The National Growth and Poverty Eradication Strategy (NGPES) of Lao PDR stated that long-term national development goal is to be achieved through sustained equitable economic growth and social development, while safeguarding the country's social, cultural, economic and political identity.

Food security has always been a top priority of the Government. The achievement in Year 2000 of national rice sufficiency, for the first time in the history of the Lao PDR, was a major milestone. The NGPES stated further that overall rice sufficiency does not necessarily mean that sufficient food is available everywhere. The task is to ensure that all people have access to sufficient food to meet their basic needs throughout the year.

Agricultural policies and institutions

The Lao Government, through the National Agricultural Biodiversity Programme (NABP), has identified as national priorities the improvement of the contribution of agricultural biodiversity in enhancing knowledge and improving management capacity in the agriculture sector. The NABP has been prepared to support two of the main development priorities for Lao PDR, i.e., to achieve food security and improve the livelihoods of the rural communities, and to enhance the Government's capacity to ensure the sustainable use of natural resources. The Programme is consistent with, and has been designed to be integrated with the implementation of the National Biodiversity Strategy and Action Plan, the Strategic Vision for Agriculture Sector (2000-2020), and the National Poverty Eradication Programme – Poverty-Focused Agricultural Development Plan. It is also consistent with other national sustainable development strategies and plans.

Key government institutions are involved in the implementation of the NABP are the Ministry of Agriculture and Forestry (MAF) and many of its Departments, which are responsible for various components of agricultural biodiversity. At the national level, the participation of the Science, Technology and Environment Agency (STEA) and the National Agriculture and Forestry Research Institute (NAFRI) are also crucial, the latter being identified by MAF as the primary implementing entity. STEA plays a key role in ensuring that environmental impact assessments are undertaken as necessary, where developments pose a threat to the environment, including agricultural biodiversity. Participation in further planning and implementation of the NABP of the Provincial Agriculture and Forestry Offices and the District Agriculture and Forestry Offices is also extremely important. Moreover, village-level organizations and social units are recognized as critically important implementing partners for all field-based activities, as are relevant national non-government organizations.

There are at least two well equipped institutions for in-country training in the area of rice production and vegetable production. These are the Hadokkeo Horticultural Institute and the Agricultural Research Center. In addition, on-going technical assistance is funded by projects in the areas of horticultural and rice crops production. Recently the coordination amongst the Hadokkeo Horticultural Institute and the Agricultural Research Center is placed under NAFRI.

With regards to rice, the production of rice breeder and foundation seeds are the responsibility of the Agriculture Research Center (ARC) under NAFRI. Mass production of certified breeder and extension seeds are the responsibility of the Department of Agriculture (DOA). The ARC produces foundation seeds of 40 tons a year comprising more than 10 rice varieties. Forty tons of foundation seeds can produce 1,600 tons of certified seeds. With a seeding rate of 100 kilos per hectare, the 1.6 million kilos of certified rice seeds can cover 16,000 hectares only. Clearly, the government institutions are not the main source for good quality rice seeds for Laotian farmers. However, the research showed that farmers acquire certified seeds mainly to access seed lots of new varieties, and that their main rice seed source are from their local communities. Sixteen tons of certified rice seeds of 10 varieties are enough to effectively diffuse good rice varieties.

Regarding vegetable and other crops, the German Development Service (DED) provided support to the (Haddockkeo) Horticulture Research Center in building a germplasm collection of more than 450 accessions of several vegetable crops from 9 provinces in Lao PDR, and has been working with farmers to find well-adapted seeds for multiplication and supply in the future.

4. LIVELIHOOD ASSETS AND STRATEGIES

4.1. Viengkham District

Short description of Viengkham District

Viengkham District is around 75 kilometers away from the national capital of Vientiane. The total number of households in the 3 villages covered by the study is 284 with a total population of about 1,704 individuals.

Good roads connect the villages to the market in the capital. Most of the villages have electricity and are covered by mobile telephone services. Elementary schools are accessible to most children. High schools and even a tertiary level state college are located in the capital of the district. Village roads also crisscross the district. Small barges and boats connect villages across the Namngun River.

The three villages have irrigation systems constructed by the government. The land is flat or not mountainous. The district has a relatively active agricultural research station closely linked with research centers in the capital. New crops, technologies, varieties and seeds are experimented with in the center and are easily observed by farmers. Secondary growth forests, fallow lands, communal grazing areas, uncultivated riverbanks, etc. are found in these villages.

The Namngun is a major tributary river to the Mekong, and along with other minor waterways, is an important source of aquatic resources, especially of fish.

Livelihood Assets

Infrastructure and formal institutions

Infrastructures such as roads, mobile phone services, bridges and river barges that connect the villages of the district to each other and to the market in Vientiane are all economically useful to farmers. Goods and information from the capital city reach the village easily, and products from the villages are easily transported to Vientiane. Most of the villages have access to electricity. Everybody has radios and many have television sets.

Government-run schools, from elementary to tertiary levels, are adjusting the long-term livelihood strategies of local farmers as they send their children to school rather than spend most of their time as agricultural labor. Medical clinics help farmers maintain their health. An agricultural research station located at the center of the district provides farmers with new technologies, plant genetic resources and related information. The District government also provides the villagers “agricultural extension officers” that actually interact closely with farmers to identify and find solutions to production problems, and introduce government projects and technologies.

Irrigation construction being one of the government’s top priorities, the Government of Lao PDR constructed irrigation facilities in the villages. Hence, while the pumps and canals are below standard and are not fully maximized by local farmers, the infrastructure has improved the drainage systems.

Local institutions and social assets

The existence of formal organizations from the village level up to the district levels are social infrastructures that allow farmers to exchange ideas, make and agree on some rules, and even plan and implement development projects. These organizations can be village-wide, or can be by sector, such as women’s union chapters, youth organizations, or farmers’ organizations.

Traditional social infrastructure also exists, such as village temples (where many of the FGD meetings were held), where many religious and social norms are enshrined. Food is shared through the temples for the weaker sector of the community, and seeds are offered and also exchanged. Families and the clans that encompass these families are strong social institutions that are sources of support among all households.

The family system is strong, along with the extended family clan. Farmers report that their extended families are their first source of aid in cases of emergency and other types of assistance. With no formal credit institutions, production loans and other credit services are granted along family lines or along the person’s relationship and behavior in the community.

Many social norms are observed, like respect for the elderly, common care of village natural resources, respect for the crops and gardens of neighbors. Social norms - such as the free collection (for anybody) of wild and weedy food - no matter where these are located, in the forest or in farms or in yards of private houses, ensure the free sharing of these foods. Another important norm is the free exchange of genetic resources and their related information.

There are also unwritten rules and norms, for example, the pollution of potable water sources and/or the breeding grounds of fish are considered taboo.

Natural resources

Small secondary forests and grazing lands, fallow lands, rivers and creeks, fertile riverbanks, etc provide the people access to wild and weedy food and aquatic resources. Ninety five percent of the families own their agricultural lands. The average land holding is one hectare. Other households whose capacity to cultivate more land than they owned often rent additional lands.

Family assets and human resources

At the family level, most of the houses are made of concrete or wood. Only 3.5% of the houses are constructed with cheaper bamboo materials. Ninety-three percent has sanitary toilets and 98 percent has access to potable water wells. As mentioned, all have access to electricity.

Five percent of households do not own land and have moved away from direct farm production into other livelihood activities, such as trading, buying farmers' harvests, selling farm inputs and other household items, services like transport and food stalls, employment in urban centers, motorcycle repair shops and supplies, etc. They are part of the 40 families who claim to have no access to land although most of them do not belong to the "poorer" percentage of the population.

Eighteen percent (18%) of the total households are ranked as relatively rich, 39% middle and 43% poor. Most of the poor and the middle-income families own between .48 to 1.6 hectares of irrigated rice lands, while the richer families own 80% of the irrigated rice lands.

About 51% of the households own a motorbike and 18% own a four-wheeled vehicle. The motorbikes are used as private transport related to the families' economic activities, while others are used as motorbikes for hire. Most of the four- wheeled vehicles are used to transport goods.

Because of the changes in livelihood strategies that will be further discussed below, access to tractors had become an important family asset. Sixty-six households own tractors - 26 of them from the richer group, 30 from the middle and 10 from the poor. The rest rent these tractors.

Table 1: Distribution of access to tractors by household wealth classification

Households	Own	Rent
Rich	11%	6%
Medium	13%	30%
Poor	4%	33%
Very poor	0%	1%
Total	29%	71%

All households have extensive home gardens except for a few families in the "commercial center" of the village. All households have access to wild and weedy food, and to aquatic resources in the rivers and lakes.

Of the 264 men in the villages of Viengkham District involved in the study either as key informant or part of the FGD, 39% finished elementary school and 20% finished secondary education. Only 6.7 percent listed themselves as illiterates. Of 260 women in the villages of Viengkham District involved in the study, 44% finished elementary education while 18% finished secondary education. Most of the children of elementary age are in school.

About 11% of the households reported to have members of the families that are chronically sick or unhealthy. They all have access to the district medical clinic, or to the local medicine man/woman, and to local medicinal herbs.

Livelihood Strategies in Viengkham District

The overall economic changes and development of the country and the proximity of Viengkham district to the market in Vientiane City also resulted in socio-economic changes in the district (such as increased market oriented production and increased household income) and changes in people's livelihood strategies.

The main economic activity is in agriculture. Of the 284 households, 244 rely mainly on agriculture, especially in crop production. Ten percent of the households engaged in agriculture as main source of livelihood also listed seasonal labor as a secondary source of income. However, 40 households, or around 14 percent of the households, earn their income from other sources other than crop production. Most of these households belong to the rich and middle income families. These families are engaged in a combination of such different livelihood strategies: these families may have businesses, or be involved in the service sector such as trading, retail store, small restaurants, and financial lending, as well as transport services, employment in government and private businesses, etc. These relatively new livelihood strategies create new opportunities and economic activities in the villages. However, these families are also equally reliant on their home gardens and in the collection of wild and weedy food.

At the same time, farmer families are investing in their children's education as a longer-term livelihood strategy.

All of these changes and adaptations in livelihood strategies impact on households' management of their assets, in priority setting and in decision-making. The overall changes of the country - the shift to free market-driven development, the building of infrastructure that helped integrate rural economies with urban centers, the introduction of new technologies including seeds (driven by the government, private sector or by production changes across the national borders), new economic opportunities, and new threats to livelihoods - caused farmers to innovate and adapt new livelihood strategies.

Rice cultivation

Understanding the livelihood system of family households in Laotian farming communities requires the study of the main crop - rice. It is in fact safe to assume that the dominant farming systems are rice-based. Rice is cultivated both for home consumption and for the market. Thirty to seventy percent of the rice harvest is sold to traders by middle income (39%) and richer households (18%) serving the urban centers, especially Vientiane. The poorer families cultivate rice mainly for home consumption.

Rice is cultivated once per year (during the rainy season), with an average productivity at 4.2 tons. Unlike in the past when most of these farms lay fallow, today portions of the farms are immediately used as vegetable gardens after the rice harvest. Family labor has to be shifted quickly to the cultivation of vegetable cash crops after the harvesting of rice. Tractors have replaced water buffaloes in land preparation. Tractors prepare the land faster and farmers use

their extra time caring for the animals and for other livelihood activities. Children who traditionally helped with animal care are in school (a major long-term livelihood strategy), and older children work part-time as motorcycle drivers, mechanics, waiters, vendors, etc.

The availability of irrigation facilities and the construction of a drainage system increase farmers' capacity to manage the flow of water during the rainy season. As water supply from government pumps and canals are considered by the farmers to be unreliable, farmers in the villages often use their own or rented water pumps to pull water from shallow water wells.

The presence of irrigation systems in the villages allows farmers to cultivate rice during the dry season, which is the general norm in most rice farm areas in Southeast Asia (once irrigation water is available year-round). However, the additional cost of irrigation water, and the higher potential income of vegetable cash crops in Viengkham make the farmers in the district forego the cultivation of rice in favor of vegetable crops. The minimum price of paddy rice that farmers want in order to grow rice in the dry season is around .20 US cents per kilo. This is 15% higher than the farm-gate price in the Philippines and around 25% higher than the farm-gate price in Vietnam.

Cash Crop Production

In the villages of the Viengkham District, the production of market-oriented crops is relatively well developed. Vegetables, together with watermelon, have become the main sources of income for a majority of the 244 farming households that are directly engaged in crop production.

The 244 households have cultivated 541 vegetable farm lots in the past two agricultural seasons, ranging from .16 hectares to .8 hectares. It is estimated that the three villages produced around 1,260 tons of vegetables and watermelons in one year. Twenty-nine percent (29%) of the vegetable farms were planted to long bean, twenty-three percent (23%) to leaf mustard, sixteen percent (16%) to Luffa, twelve percent (12%) to watermelon and thirteen percent (13%) to sugar pea. The rest were planted to cucumber, cabbages and other vegetables.

Cultivation of vegetable cash crops started in the district around eight years ago, a calculated risk taken by farmers. The first "driver" for this was market accessibility (good roads) and demand for vegetables in the capital city of Vientiane. Farmers were also motivated by the higher cash income these crops were earning. However, the risks that farmers took were backstopped by a high degree of family food security. First, farmers had access to farmlands. Second, the productivity of their rice farms was increasing due to irrigation, mechanization, new seeds and new technologies. The availability of the most important food – rice - to Southeast Asians was ensured. Third, the extensive home gardens (tens of vegetables and minor crops) ensured the provision of around 30% of the food needs of the farmers' families. Fourth, wild and weedy food that most rural Laotian families relied on was still relatively abundant. Estimates of the contribution of wild and weedy plants to the food supply of rural Laotian families range from 25 to 40 percent. Fifth, other sources of off-farm income allowed farmers to take risks and invest in the cultivation of new crops.

Rice is still one of the most important crops but looking at the area planted by farmers' rice seems to be of equal importance as other vegetable cash crops for middle and small scale farmers (see Table 2).

Table 2 Household wealth rank and percentage of farm lots planted with cash crops, Viengkham District

Name of Crop	Rich	Middle	Poor
Rice	34%	19%	22%
Leaf Mustard	9%	21%	23%
Long bean	17%	25%	28%
Cucumber	3%	3%	6%
Water melon	9%	6%	5%
Cabbage	3%	6%	3%
Chili*	6%	3%	0%
Luffa	11%	7%	9%
Sugar pea	3%	11%	3%
Corn	6%	0%	0%

Home Garden Crops

It must be emphasized that a great number of cultivated crops for home consumption is produced by households, as shown by the annexed table on Cultivated Crops (Annex 1). These are crops routinely planted and maintained mainly by women in home gardens and plots near their homes, and have an important role in household nutrition. Crops grown in home gardens often require less intensive management.

The home gardens grow different types of taro, bananas, cassava, sweet potato, and other sources of carbohydrates, which in addition of rice make up the bulk of crops used for domestic food consumption. However, these species are also vegetable sources like the leaves of taro, sweet potato and cassava, and the flowers of the banana plants. There are also tens of vegetable species and spices. One garden showed 7 types of mint leaves, two types of lemon grass, 4 types of basil leaves, 4 types of ginger plants, two types of morning glory, and many more.

During focal group discussions farmers estimated that these home gardens provide 30% of the food needs of family households in the country. Their contribution to nutrition is possibly greater in terms of minerals and vitamins. Furthermore, all households in the district rely on home gardens, even those whose livelihood activities no longer include crop production.

Wild and Weedy Species

Farmers cited their access to wild and weedy species as one of the main sources to achieve domestic food security. There are about 60 collected wild and weedy species listed by the villagers in Viengkham District. In addition to the 30% contribution of home gardens to the food needs of the household, the collection of wild and weedy food provide another 30%.

Almost all collection activities are for consumption; however, there are a few numbers of species that are collected and sold as shown in Table 3. Collection is done wherever the plants are available – in secondary forests, fallow lands, grazing areas, uncultivated riverbanks, farm borders, etc.

Interviewed villagers stated that they manage the areas where they collect wild food species in such a way as to ensure the availability of these species for the next years.

Table 3 A portion of important collected wild vegetables as listed by the “Poor Group”, Pakcheng, Viengkham District

Name of wild and weedy species	Rank in Importance*	
	Consumption	Sell
Bamboo shoot	1	0
Asiatic penny wort	1	0
Floating heart	2	0
Pickerel weed	2	0
Indian oak	0	1
Eugenia	0	1
Indian trumpet flower	0	1
Mushroom	2	0
Horse tamarind	1	0

* 1 = high importance, 2 = medium importance, 3= low importance, 0 = no importance

The local tradition also allows the free collection of these wild and weedy species. These species are part of the “commons”. Even if the wild and weedy plants (e.g. mushroom) appear in private lands or even in the yards of private houses, villagers claim that access is still free to all on a first-come basis.

However, some species, because of market demands, are over-harvested. Over-harvesting is a threat to farmers’ access to wild and weedy food, as farmers’ access are now limited. However, some of these species are now being cultivated domestically. For example, farmers learned how to gather seeds and grow a type of rattan that produces very marketable shoots. Another threat is population pressures impinging on the maintenance of diverse agricultural landscapes.

In addition to the collection of wild and weedy species, the contribution of wild animals to the food needs of the villagers is also substantial. Frogs, fish, shrimps, snails, some insects, and some birds are also collected and contribute to the food needs of the households.

4.2. Hinheup District

Short Description of Hinheup District

The mountainous district of Hinheup is more than 75 kilometers north of Viengkham or around 200 kilometers from the capital city of Vientiane. While the main road of the district connecting it to Vientiane is good, its distance reduced their access to the market of the big city as they compete with villages nearer the city. However, the main road is paved and transport is easy. Electricity is available and villages are connected by all-weather dirt roads. Mobile phone services are increasing their coverage but are not yet fully reliable in the district.

The Hinheup district was chosen to represent a rain-fed production system and an area where the influence of market forces is weaker. Three hundred twenty three (323) households lived in the three villages covered by the research, with a total population of 1,938.

In the three villages of Hinheup, agricultural production is practiced both on sloping land and lowland. Its soil is often more shallow and less fertile than the Viengkan district. Development of irrigation systems is poor. Namlik River is a major waterway in the district and, together with minor tributaries, is a source of aquatic food.

Livelihood Assets

Infrastructure and formal institutions

Goods and information from the city reach the villages, and the products of the villages find their way into the city due to the increasing infrastructure being built and improved such as roads, electricity and mobile phone services.

Elementary and secondary schools are accessible to villagers. An agricultural research station is located in the district center where new technologies, seeds and information are disseminated. The “District Agricultural Extension Officers”, a major source of information, actually go around the villages to discuss farmers’ problems and help find solutions. A district medical clinic is also accessible and education on health issues including HIV/AIDS is conducted everywhere.

Formal organizations from the village up to the district levels are extensive and operational. These government-mandated institutions allow local farmers to share their ideas and participate in decision-making. These are the same institutions that participate in development projects of government and non-government organizations (NGOs). The same formal organizations that are found in Viengkham district are also functional in Hinheup District.

Local institutions and social assets

As discussed in the same section in Viengkham district, the villagers of the Hinheup district observe the same informal and traditional institutions and norms. The Buddhist temples are cultural centers where some of the resources of the richer families are shared with the poorest. Plant genetic resources and related information are shared freely.

Family ties are tight and there is close interaction even with extended families. The family and the clan are the first source of institutional strength and safety net. Community relations, following certain norms and rules that have survived the war and recent socio-economic changes, help keep the villagers together.

Natural resources

There are far more forests and fallow lands in the Hinheup district compared to Viengkham. These are the sources of wild and weedy food and other “non-timber forest products (NTFP)” for the villagers. The villagers listed 10 NTFP species that they collect and sell for cash.

Ninety percent of the respondents claim to own their lands. Seventy (70%) have grazing lands that are at least one hectare in size. Middle-income households own 50% of the grazing areas, 34% by the rich households, and 17% by the poorer households. Flat and rain-fed rice lands are rare in this mountainous district. The poor households own only 24% of these lands and most are less than half a hectare. Rice lands that are one or more than 1 hectare are owned by the richer families of the villages.

The Namlik River and other tributaries are sources of aquatic resources like fish, shrimps and shellfish. There are sixty nine. Sixty-nine households (or 22%) out of the 323 have boats powered with small engines used for transport and fishing.

Family assets and human resources

At the household level, the FGD with village officials revealed that of the 323 households, 28% are relatively rich, 47% at the middle and 25% are considered poor.

Fifty two percent of the houses are made of sawn timber, 13% of concrete and 31% are constructed using a combination of wood and concrete. Almost 90% have their own sanitary toilets, 55% obtain their household water supply from individual deep wells, while 37% get their water from community hand pumps (to bring out water from deep wells).

Thirty four percent of the households own motorcycles and 4.1 % own four-wheeled vehicles such as cargo jeeps and small trucks.

Tractors used in land preparation have replaced the water buffalo. Out of 288 households who are involved in crop production, 83 households own tractors while the other 205 households rent these. Of the 83 tractors, 53 tractors are owned by the richer families, 20 tractors by middle income families, and the poorer families own 10.

Table 4 Distribution of access to hand tractors by Household wealth classification, Hinheup District

Households	Own	Rent
Rich	18%	11%
Medium	7%	45%
Poor	3%	15%
Total	29%	71%

Families invest in their children by sending all of them through the elementary school system. Among the 316 men of the villages in the Hinheup District involved in the interviews and FGDs, 37% finished elementary education and 26% finished secondary education, while 3.1% were illiterate. Of the 316 women involved in the Hinheup District, 40 % completed elementary education and 16% finished secondary schools. The illiteracy rate was high among women, at 15%.

Livelihood Strategies

Hinheup District was chosen as a research site to represent villages that are at the earlier stage of market integration, and to represent rain-fed and relatively more marginal lands, as compared to the flat and irrigated lands of Viengkham.

The sources of income in the villages of Hinheup are more diverse, with not one single source being dominant. Seasonal wage labor is listed by 22% of the villagers as being their main source of cash income. However, livestock raising and vegetable production are also main activities involving 70 to 90 percent of the households. The production of staple food - rice - remains a major livelihood strategy with 279 households cultivating rice during the rainy season. All households have extensive and rich home gardens, and all households have access to wild and weedy food found in the extensive forest and fallow lands in the district. The farmers also collect “non-timber forest products (NTFP)” for additional cash income. All households have access to aquatic resources in the Namlik River and other minor rivers and tributaries. Sixty-nine households actually own boats powered by engines.

Livestock raising is a major livelihood strategy in the villages of Hinheup. Ninety percent of the households own at least one hectare of grazing lands. This is in addition to the large forest and fallow areas available for grazing in the district. While there are only 323 households in the 3 villages covered by the research, the villages have 442 water buffaloes and 875 heads of cattle. There were also a number of chicken, ducks, and pigs in every household.

These different livelihood sources, each with their own requirements, potentials and risks, are managed by each household according to their own resources and priorities, and by the potential and limitations of the natural resources that they have access to. Family labor and other resources have to be allocated accordingly. Farmers now find the use of tractors for land preparation as a better way to manage their resources and labor capital. This gives them time to earn additional income from off-farm employment, from the gathering of NTFP, and for the management of livestock.

The mountainous and sloping terrain of the district makes it less suitable for rice farming in the Hinheup district. The productivity of the rice farms is lower, at 2.8 tons per hectare. The lack of irrigation water and the reportedly poor quality of the soil are main production bottlenecks.

Per capita, the farmers in the villages of Hinheup produce less than one seventh of the vegetable output of the villages in Viengkham. There is also some difference in the diversity and types of vegetable species grown between the Hinheup and Viengkham districts. The farmers in Hinheup focus more on leaf mustard, yam bean, lettuce, Chinese cabbage and chili while in Viengkham; the most important are long bean, leaf mustard, luffa and watermelon.

Like in Viengkham District, all the households have extensive home gardens that provide them with additional energy food³, vegetables, spices and fruits. It is estimated by other research reports that these home gardens provide 30% of the food needs of the farmers.

Other main sources of food are wild and weedy plants, and farmers also have access to aquatic resources. Frogs, wild animals and some birds are actively hunted.

Rice

Rice production in Hinheup is mainly for home consumption. Only 13 families out of the total 323 generate enough rice surpluses to sell. These are the few families that own at least a hectare of rice lands. Most households have access to one fifth or less than a hectare of “bonded” rice lands. With this limited land, 266 households produced their own rice and ensured supply of this staple crop. A few of these households’ rice farms are in the upland. The Wealthier 28% of the households dominate the ownership of rice lands that are one hectare or more.

An all women FGD in one village in Hinheup ranked rice cultivation as the most important livelihood activity vis-à-vis the labor input of the households. Livestock raising followed very closely (only 2-points difference). Home gardens were third and the collection of wild and weedy food fourth. Vegetable cash crop ranked last.

Rice is primarily produced to ensure household food supply, and not for the market. Varieties with traits that are adapted to farmers’ tastes like aroma, and traits that fit the marginal

³ Such as: taro, bananas, cassava, sweet potato, and other crops that are rich in carbohydrates

conditions of their farms, are popular. Many local and traditional rice varieties have these traits. However, many improved varieties also have some of these traits and are adapted to farms with better water management and control. The farmers in Hinheup utilize the potential of both types of varieties, although there is higher use of local and traditional varieties in these villages than in the irrigated lands of Viengkham.

As discussed above, farmer households are engaged in other livelihood activities, like home gardens, off-farm employment, gathering of NTFPs, livestock care, and gathering of wild and weedy food. These activities compete for the limited labor resources of farming households, hence, tractors are the preferred method of land preparation as they are faster and allow for the allocation of family labor to other activities. This greater complexity of livelihood strategies is also having an impact on the type of rice cultivars that is increasingly preferred.

Cash Crops

Vegetable cash crop production in Hinheup District is a less important source of livelihood than in Viengkham District. This is probably caused by the poorer quality and size of arable lands in Hinheup, as well as its greater distance from the main market of Vientiane.

There were about 373 vegetable farm lots producing 130 tons of vegetables, far lower than what is produced in Viengkham District. The majority of farms are planted with leaf mustards, yam bean, lettuce, Chinese cabbage, chili, long bean, corn, garlic and cabbage. The relatively wealthy farmer group owned 118 (32%) of these vegetable farm lots; middle income households owned 212 (57%), and the poor only 42 (11%). More than two thirds of these farm lots are under .08 hectare in size.

Leaf mustard and yam bean are the most important cash crops in Hinheup. The farm households of the village of Hinheup Neua produced the entire yam bean in the district because the farms are accessible through the Namlik River, going upstream, through motored canoes. No poor household grows yam bean.

Table 5 Household wealth rank and percentage of farm lots planted with cash crops, Hinheup District

Name of Crop	Rich (No.)	Middle (No.)	Poor (No.)
Leaf Mustard	31%	31%	52%
Yam bean	24%	17%	0%
Long bean	15%	6%	0%
Lettuce	12%	15%	0%
Corn	4%	9%	0%
Chinese Cabbage	4%	11%	9%
Chili	8%	6%	30%
Garlic	4%	6%	9%

Market price data were gathered from the farmers during FGD discussions (see Annex 2). These include floor prices agreed by farmers during FGD discussions. Floor prices are the minimum prices that farmers consider profitable. If prices fetched on the market are below floor prices, farmers will decide to no longer produce that particular vegetable or cash crop in the next season.

In terms of profit margins, the most risky among these cash crops are leaf mustard, Chinese cabbage and chili. Leaf mustard is also a high-risk cash crop in Viengkham district but the farmer's floor price in Hinheup is higher, implying a higher cost of input. This means, using actual prices of sale by the farmers, about 40% of them lose profit on leaf mustard. Using the lower floor price of Viengkham, it would mean that about 20% of them lose profit. Hinheup, though, may have a comparative advantage in lettuce as they have a lower floor price.

Home Gardens

Home gardens remain an important source of livelihood in the villages in Hinheup. However interviewed farmers in the Hinheup district ranked it less important compared to villages in Viengkham. The reason for this is probably because of the greater availability of wild and weedy food plants that are gathered in the Hinheup district.

However, observation and responses from the villagers illustrate the major and important contribution of these home gardens to family food security. Diverse species, as those observed in Viengkham, are also found in Hinheup. Staple crops like sweet potato, cassava, taro and banana are grown together with a great number and diversity of vegetables and spices.

Wild and Weedy Species

The collection of wild and weedy plant species may be slightly higher in Hinheup than in Viengkham District simply because there are wider forests and fallow lands in the district, and because the availability of arable land is also less. Similar species as those collected in Viengkham are also collected here. However, collection of wild and weedy species for sale is more pronounced in Hinheup than in Viengkham. Around ten types of NTFP are collected. Rattan and bamboo shoots, together with 10 species of mushrooms, are collected mainly for selling.

Villagers interviewed reported that over-harvesting of rattan and bamboo shoots is becoming more of a problem, comparable to villages in Vientiane Municipality (nearer the city) where these resources have become scarce. The villagers did not mention problems due to over-harvesting of other resources.

Livestock

This is an important livelihood source, ranked second by women in one of the villages. Access to grazing lands in general, and to forage crops in particular, is a major concern in the district. Ninety percent, or around 290 households, are engaged in livestock-raising with each household actually owning at least a hectare of grazing lands. With 875 heads of cattle and 442 water buffaloes, each household will own an average of 4 heads of these large animals. There was no reported difficulty of access to grazing areas and forage crops. The presence of forest areas and fallow lands, aside from ownership of at least a hectare of grazing lands per household, is, at present, enough to provide fodder. These livestock are raised for the urban market. Pigs and chicken found in all households are usually fed with kitchen waste and crop residues.

5. UTILIZATION AND ACCESS TO PLANT GENETIC RESOURCES

The rural villages in both Viengkham and Hinheup Districts combine different strategies in agriculture, and have diversified their livelihood strategies to include off-farm sources of income. All of these have an impact on their agricultural production systems, and on their use of and access to plant genetic resources.

For purposes of this report, and based on household livelihood systems, four basic groups of plant genetic resources have been considered. Fruit trees have not been included in the study.

- a) Rice
- b) Cash crops (mostly vegetables but also including rice)
- c) Plant genetic resources in home gardens that are mainly for home consumption (minor crops, vegetables and spices)
- d) Wild and weedy species

5.1. Rice

In Viengkham, of the 22 rice varieties listed by farmers and currently grown in the district, 13 are improved varieties while 9 are local cultivars. In the district of Hinheup, farmers were cultivating 26 rice varieties of which 19 were improved and 7 were local cultivars. However, the improved varieties used by the farmers in Hinheup are older introductions than the varieties used in Viengkham, possibly indicating greater local adaptation. The relatively newer introductions, TDK4 and RD10 that ranked highest in Viengkham, were at the bottom of the ranking in one village in Hinheup where soil fertility and water control were major constraints.

The existence of marginal rice lands and areas where water control is difficult necessitate the continued use of local and traditional varieties. The reasons for continued use of local cultivars in prime rice lands are taste, local adaptation and pest and disease resistance. However, these last traits are also found, to a degree, in introduced improved varieties.

The displacement of farmers' local varieties therefore occurs among short and medium-term duration cultivars. In addition to shorter duration traits, the other traits cited by farmers in the order of rank are high yield, pest and disease resistance, good eating quality, local adaptation, milling quality, flood resistance and drought resistance.

Trends in Access and Use of Rice Plant Genetic Resources

There are three main developments that set the trends for access to and use of rice plant genetic resources. These trends are redefining the type of cultivars that are currently favored by rice farmers. It is also changing the sources of these cultivars.

1. The central role of the rice crop in farmers' livelihood strategies has been reduced. Competing with it is the cultivation of vegetable cash crops (more pronounced in Viengkham), livestock management (more important in Hinheup), home gardens, and collection of wild and weedy species, off-farm income, and seasonal wage labor.

Farmers in the two districts farm and ensure the supply of rice for their families. However, the diversity of their livelihood activities means that land, labor and other family resources

have to be re-allocated from rice cultivation to other livelihood activities. In Viengkham, land, water and labor have to be shifted to vegetable cultivation and other sources of income. In Hinheup, off-farm employment, livestock management, vegetable cultivation, and the gathering of NTFP demand the resources of farmer families. Because of these, shorter-term and medium-term duration cultivars are favored against many local and traditional varieties that are of long duration.

2. Changes in farm conditions, like the construction of irrigation systems and more especially the improvement of drainage systems, are also changing the stresses faced by the rice crop in terms of flooding or drought.

The improvement of irrigation and drainage systems also allows greater water management and control. Tall and long-duration rice varieties that are popular for drought-prone or flood-prone rice farms are now less needed and are cultivated in areas where water is difficult to control. There are also traits that are favored by the market, like milling recovery and reduced percentage of broken grains. These traits are more often found in improved varieties that were bred for intensive and market oriented systems.

3. Rice is produced not only for home consumption but also for the market. This is especially true in Viengkham, where thirty to seventy percent of the rice harvest is sold to traders by middle income (39%) and richer households (18%).

Sources of Rice Cultivars

It is important to note that the rice grown and consumed in Laos is what are popularly known as glutinous or sticky rice types. This type of rice is used by other rice growing cultures only for making special types of rice cakes, not as a main staple food. But in Laos and in the northeastern provinces of Thailand whose population and land were once part of Laos, sticky rice is a staple food.

Local and traditional sources. The rice accessions at the Agricultural Research Center of the Lao government have a collection of more than 10,000 accessions. The local rice cultivars planted in Viengkham and Hinheup are a minute part of the vast diversity of rice genetic resources that Laotian farmers had been using to fit different tastes and to manage the different biotic and abiotic stresses. These cultivars were handed down through generations or were introduced from other villages, districts or provinces. Traditional rice cultivars were also exchanged with Thai farmers across the border.

Farmers' access to local and traditional cultivars and related information was and still remains free. Markets, visits, feast days, marriages, religious festivals, traditional gifts, simple exchange of seeds, and community rituals are the usual avenues that allow these resources to flow. Farmers, faced with ensuring rice supply and faced with the biotic and abiotic stresses are always keen on observing and testing "new" cultivars. As long as farmers belong to families/clans, local religions, community groups, and other social groups, access will always be facilitated.

Access to improved rice varieties, once these varieties are already cultivated in the community, is governed by the same rule of free access. The initial introductions are usually initiated by the government. Farmers sometimes observe and admire new varieties cultivated in other provinces, especially near the city of Vientiane. Some farmers buy certified seeds of

these varieties from the government agricultural station. Other farmers can either buy seed-lots from farmers cultivating a new variety, or they can ask, for free, for a few hundred grams of seeds to multiply into a seed lot.

Formal institutions. The introduction of an improved variety is usually initiated by research institutions, often through their provincial and district demonstration farms. After that, improved rice varieties are diffused to the villages from simple exchanges with other farmers in other districts, or from farmers across the national border.

Of the improved rice varieties, the TDK lines, bred by the Agriculture Research Center of Laos, are the most popular. These are followed by the RD lines bred in Thailand. The government of Thailand allows the free use of their rice varieties in Laos but discourages the trading of rice seeds of the same varieties back into Thailand. Some rice varieties come from Vietnam (for example, CR 203 is cultivated to sell to the beer factory). All of these varieties are of short to medium-term duration and are medium in height. The one common characteristic of these varieties is that they are products of plant breeding by research institutions.

Based on farmers' feedback, both in Viengkham and Hinheup, the problem of access to improved rice varieties is simply due to the limited availability of varieties released and the infrequency of research institutions to breed and release new and additional lines and varieties. However, this problem has a more profound implication. In the past, the farmers themselves were the sources of cultivars to fit their different needs and the growing conditions. The changes in livelihood strategies caused by the overall socio-economic changes in the country have shifted the source and generation of diversified rice genetic resources. These no longer come from farmers but are produced by research institutions, such as the Agricultural Research Center of Laos, by research institutions in Thailand and Vietnam, and even contributions from the International Rice Research Institute in the Philippines.

Natural and mass selection by farmers, even if introgression is encouraged by different local techniques, is not fast and effective enough to serve the demands for adapted varieties geared towards market-oriented rice farming. Farmers need to improve their knowledge and skills in the management of plant genetic resources if they are to continue playing a major role in the conservation, improvement and access to seeds for intensive and market-oriented rice varieties.

Quality of Seed Supply

The standards of quality for good seed lots are also changing. Qualities such as high germination percentage, uniformity in plant height, uniformity in flowering and ripening, milling quality and purity are now very important parameters for market-oriented production. These parameters are also important for farmer families who have to devote their labor and other resources to other sources of income. In the past, low germination percentage was easily corrected by replanting the seedlings. Non-uniformity in height and ripening period can be managed through selective hand-knife harvesting. A degree of mixture is even encouraged to facilitate introgression and to increase the resilience of the crop. Good milling recovery and low percentage of broken grains are not important traits as broken grains do not reduce the quality of cooked rice, and milling residues are recovered for family food or used as feeds to chicken, ducks and pigs.

The table below lists the number of problems that farmers cited, and the desired traits of rice seed lot in Viengkham.

Table 6: Problems and Needs of Farmers on Rice Seeds in Viengkham District

Problems Reported	Needs
<ul style="list-style-type: none"> ◆ Problems on farmer’s collection and selection – There are problems of un-uniformity of plant height, ripening period, and flowering time. Not enough good quality seeds. ◆ Problems on access and information on improved varieties – NAFRI-ARC has released TDK-5 about 5 years ago and TDK-6 about a year ago but the farmers in Viengkham only started planting TDK-5 this year (while the farmers in Hinheup still have to know of TDK –5). 	<ul style="list-style-type: none"> ◆ In terms of desired traits of seeds, the farmers ranked highest the following <ol style="list-style-type: none"> 1. good germination 2. purity 3. seed vigor 4. cleanliness 5. free from pests and diseases

The demand for additional qualities of rice seeds affects both improved and traditional varieties. The demand is greater for improved rice varieties grown intensively for the market. The standards for quality of local cultivars cultivated for home consumption, although less stringent, are still more strict than in the past in terms of germination percentage, cleanliness, and on the “distinctness, uniformity and stability (DUS)”, especially uniformity. Uniformity of the seed lot allows for better efficiency of the family labor.

5.2. Cash Crops

In the past, most if not all of the vegetables were grown in home gardens. Now, relatively larger plots aimed for the urban market are cultivated for one or two vegetable species. The villages in Viengkham rank vegetable production at par or at least second to the cultivation of rice in importance for their livelihood. While the vegetable cash crop plots in Hinheup are smaller and ranked fifth and last among their major livelihood strategies, vegetable cultivation is mainly for the market, as in the villages of Viengkham.

In this intensive cultivation of cash crops, the traits of the varieties used are dictated by traits desired by the market. Some of these traits are: long shelf life, good shape and color, good weight, and in the case of some species, short duration of harvests (the vegetables mature more or less at the same time). These traits are of far less importance when these crops are grown for home consumption.

The species cultivated in Viengkham were ranked according to the number of farmers cultivating them. According to this ranking, from first to last, the species are leaf mustard, long bean, cucumber, water melon, cabbage, chili, luffa, and sugar pea. The ranking in Hinheup, also from first to last is leaf-mustard, yam bean, long bean, lettuce, Chinese cabbage, chili and garlic. Corn is also cultivated for the market, and is ranked fifth in Hinheup and last in Viengkham.

Sources of Seeds and Varieties

Similar to the new and higher standards for rice seeds grown intensively for the market, cultivation of cash crops requires new and higher qualities for the seed lot. Greater uniformity, vigor, and germination percentage are now of great concern.

Table 7: Varieties and Seeds of Cultivated Vegetable Cash Crops, Viengkham District

Crop name	Varieties	Price of Seeds	Source
Long bean	Hybrid	50,000 kip /kg	(Thailand) Sold in cans or tanks in the village market and stores
Cucumber	Hybrid	180,000 kip/ 200 gm	Market
	Local (wet)	40,000 kip/ soft-drink btl ⁴	Own collection and neighbors
	Local (dry)	180,000 kip/ soft-drink btl	Own collection and neighbors
Leaf mustard	Hybrid	32,000 kip/ kg	(Thailand)
Flowering cabbage	Hybrid	2,000 kip/ 20 kg	(Thailand)
Chinese cabbage	Hybrid	50,000 kip/ can	(Thailand)
Cabbage	Hybrid	180,000 kip/100 gm	(Thailand)
Chili*	4 - Local	Own collection	Own collection
Lettuce	2 - local	50,000 kip/ 4,000 seedlings	
Sugar pea	Hybrid		(Thailand)
Cauliflower			
Coriander			
Luffa	2 - local	90,000 kip/ kg	Own collection
Watermelon	Hybrid	90,000 kip / can	Market

As presented in Table 7, seeds and varieties of two of the most important vegetable cash crops – long bean and leaf-mustard – now come from foreign seed companies. Seeds for cabbage, watermelon, and sugar pea are also supplied by seed companies. All of the varieties of these 4 species are hybrids. The seeds are imported from Thailand and are normally available in village markets and in stores of the district’s commercial centers. The options for seed varieties these companies provide are very limited. There are, for instance, only two varieties of long bean available.

Farmers who wanted to intensively cultivate the vegetable crops started to use hybrid seeds. The trade in seeds simply followed the increasing demand. However, since the labels and information on the seed packages are written in Thai (and in few cases in Chinese), farmers are unable to understand them. Farmers had to rely on their own experimentation, or on information from other farmers. One example of this problem was when farmers in Viengkham planted cucumber hybrids during the dry season when the Thai label stated that the variety was for the wet season.

Nevertheless, the farmers’ own seed collections remain a major source for cucumber, and even compete successfully with hybrids. There are no hybrid seeds available for other cash crop species, such as chili, luffa and lettuce. Farmers’ varieties and seeds dominate this sector.

⁴ Local seed varieties are often sold in soft-drink bottles which are used as a standard unit

Quality of Seed Supply

Quality control is also a problem. Farmers place their trust in certain seed suppliers to help not trick them (for example, selling them expired seeds). A new type of relationship of trust is developing between the farmer and the seed suppliers. In fact, some seeds are repacked inside soft-drink bottles. The only guarantee farmers can hold on to is the seed supplier’s word. Quality control is, therefore, informal and social, not institutional. The government does not have the resources to ensure the quality of seeds.

Table 8: Problems and Needs of Farmers related to Vegetable Seeds by Villages in the two Districts

Problems	Needs
<ul style="list-style-type: none"> ◆ Problems on limited access – Vegetable planting materials are bought from the market in Cans or in “Tanks” with written Thai labels. For each vegetable species, there are only up to a maximum of 2 choices of commercial seeds sold in local markets. Locally produced varieties are few. ◆ Problems in seed germination – There are problems in seed germination and the problem can be traced to labels on expiry dates of the planting materials. ◆ Lack of information and quality control. 	<ul style="list-style-type: none"> ◆ In terms of desired traits of seeds, the following are ranked highest: <ol style="list-style-type: none"> 1. good germination 2. purity 3. seed vigor 4. cleanliness 5. free from pests and diseases

5.3. Home Garden crops

Most of the crop cultivars cultivated in village home gardens are of local or traditional varieties, or introduced varieties that have adapted to extensive and low-input conditions. A list developed by the villagers enumerates more than 50 species (See Annex 1). The species range from energy food, like banana and cassava, to vegetables like morning glory and green papaya, and spices like mints, ginger and garlic. The list also includes fruit trees, roots and tubers. The family home garden in Laos is a major backbone for “in-situ” conservation of plant genetic resources.

The management of seeds of these species remains the responsibility of farmers. Seeds are exchanged freely. The village market day - part trade and part social event - is also a conduit for the free exchange of seeds.

Women farmers play a greater role in the management of home gardens. Most of the plants are planted only a few steps away from the kitchen. Women, in general, also manage the household kitchens in the villages. The traits of the cultivars in home gardens are therefore determined by women. The cultivars’ color, shape, weight, and shelf-life are traits that have no bearing on nutrition and taste. Ripening of cultivars in succession, rather than simultaneously, is desired as a family can only cook and eat so much for each meal. Low but

consistent yield spread across weeks or months is often better than high yield that disappears after a few days.

Sources of PGR and Seeds

Seeds are produced by the farmers themselves, in this case mainly by women farmers. Plant genetic resources from home gardens are also exchanged freely. Some of the modes of exchange are through village markets, exchanges among neighbors inside the village and through gifts. The seeds exchanged are founded on human and social relationships of each farmer. A level of communication is necessary. Farmers need information on the seeds; otherwise, its usefulness is reduced. Information such as how seed dormancy is broken, the ideal soil type and season for planting, and the pests and diseases that need to be controlled are all necessary. This information is also shared freely.

It is also worth mentioning that backyard poultry and livestock are managed simultaneously with the home gardens. Crop residues and kitchen waste are used to feed these animals. It is an efficient system of reducing waste, while the livestock contributes to the family's nutrition. The larger livestock, mainly pigs and cattle serve as a small savings bank, ensuring resources for feast days and family emergencies.

Table 9: Problems and needs related to on seed access and utilization of crops for home consumption

Problems	Needs
<ul style="list-style-type: none"> ◆ It was difficult for the project to generate a clear picture of the problems and needs of farmers on seed production on “minor crops” mainly produced for household consumption. This maybe because they are minor crops planted in small plots and home gardens and not subjected to demands of stricter standards and time periods of planting and harvesting. ◆ It is possible that in the drive towards farm commercialization resources used for home gardens will be allocated to commercial crop cultivation. 	<ul style="list-style-type: none"> ◆ In the villages, poorer farmers are selling these minor crops plant several times more than needed for their own consumption. With small plots they first strengthened their access to food and then earn more by selling the surplus to the market. They need enough local seeds and plant material to grow a surplus for the market. ◆ Promotion of home gardens is an important link between food security and maintaining biodiversity

5.4. Wild and Weedy Plants

The farmers related that one of the sources of their food security is their access to wild and weedy species. There are about 60 collected wild and weedy species listed by the villagers in Viengkham District. As mentioned, farmers estimated that these plants contribute to around 30% of their food needs. Some estimates, such as those cited in the IUCN NTFP project, even go as high as 40%.

Table 10: Wild and weedy species; problems and needs related to seed access and utilization

Problems	Needs
<ul style="list-style-type: none"> ◆ There are more than 50 wild and weedy species that are collected in the villages under study. Rich and poor families have the same access as a community norm and culture. The wide-open agriculture landscape do not hinder them from collecting wherever they are available. There are species though that are decreasing in quantities. ◆ The estimated potential total area for annual and perennial crops in Lao PDR is as high as 3.1 million hectares, compared to the 1.1 million hectares currently under cultivation. Coupled with an expanding labor force due to population growth of nearly 2.3% per year, such additional land and labor inputs will drive agriculture expansion. This in turn will exert pressure on the agriculture landscape which could potentially limit free access, collection and utilization of wild and weedy species. 	<ul style="list-style-type: none"> ◆ In the villages under study, households collect some specific species (e.g. bamboo and rattan shoots) mainly for selling rather than consumption – this could lead to over-harvesting. Some farmers are starting to cultivate these otherwise wild species. The specific needs of these farmers in terms of research, technology and seed management need to be identified.

6. FINDINGS

This report underscores the economic changes, growth and activities borne out of the NEM policies, and the consequent expansion of the range of livelihood opportunities available to farmers in Lao PDR. Crop production activities went beyond household consumption level to accommodate the demands of a transition towards market-oriented production. There are also households that have diversified away from farm-based to off-farm activities, such as trading and service-oriented businesses including food shops, repairs and transport. The villages and towns along the Mekong corridor across Thailand will remain influential in economic growth and urbanization (given that there remains the problem of provincial and district roads in mountain regions preventing easy access to farms and villages).

Economic changes, growth and activities borne out of the NEM policies and the improvement of road infrastructure along the main routes of the country, have created a greater role for open free market forces. The changes spur a new type of growth in which new market opportunities influence the orientation of household farming systems and where new economic roles, outside the traditional crop production, are emerging in the villages. This is especially true for the role of seasonal labor and off-farm employment, which is increasing in importance

At the same time, increases in crop production have resulted in a shift from subsistence production to increasing market-oriented production. For domestic food consumption, households maintain their traditional reliance on rice, home gardens and wild and weedy food species. In both villages studied, more market-oriented strategies started to emerge eight years ago since the NEM policies were developed. These strategies are:

- intensive cash crop and livestock production;
- as trading and service-oriented businesses like food shops, repairs and transport;
- wage labour outside the villages.

With increasing market orientation also comes increased risks and vulnerabilities. The impact of national and international economic crises are stronger at the village level. Price fluctuations are now related to other factors (including production activities and market demands in other provinces and/or neighboring countries, currency fluctuations, etc). Some technologies, including varieties and seeds, are now external inputs over which farmers have little control; and the genetic base of crops cultivated under intensive system is becoming narrow. Maintaining diverse livelihood strategies allows households to maximize opportunities and spread risks through the combination of livelihood strategies, seasonal priorities, use of diverse PGR for different types of farming, etc

Changes in livelihood strategies have two major impacts on the access and the role of PGRFA in achieving livelihood outcomes.

The first impact relates to the increasing allocation of assets to these new market oriented strategies. As a result less assets important to sustain livelihoods like land, household labor, social relations, capital, PGRFA, etc. are available for activities that maintain domestic food production. A diverse number of traditional long term rice varieties are increasingly displaced by short to medium-term rice varieties in order to free land, labour and other assets for crops cultivated for the market.

The second impact relates to the situation where both formal and informal seed systems do not meet the needs of small scale farmers in the studied villages. Traditional institutions are facing new challenges. Farmers' access to diversity of PGRFA remains the basis of the continuing strength of the traditional and subsistence level of production (rice, home gardens and wild and weedy food). Improved varieties and hybrids on the other hand, are important inputs to market-oriented and intensive production systems. Farmers' seeds systems, especially the systems' capacity to develop new cultivars and to produce quality seed lots, are failing due to new and faster demands of new varieties and due to newer standards of seeds in intensive cultivation.

The capacity of national research institutions to breed and release a greater (and faster) number of improved rice cultivars is currently reported by farmers to be inadequate. The capacity of the national institutions in plant breeding for the growing cash crops sector is even weaker (most of the cash crop seeds are supplied by foreign seed companies). In order to achieve both goals of increasing food security and reducing poverty, it will be important to develop the capacity of national and formal institutions to produce diverse varieties and high quality seeds. These varieties and seeds should fulfill both the farmer's traditional and intensive cultivation needs and standards. The following recommendations can be made in order to achieve both objectives of maintaining the farmer's seed system capacity for crops for home consumption and developing the capacity of of national research institutions to breed and release a greater number for crop varieties that better suit the needs of farmers.

Next to improving capacity for the development of local germplasm and seed production, national agricultural research institutions should be involved in screening varieties or participatory variety selection with farmers to determine the best varieties. This would contribute to strengthening the national variety release system and the issuing of seed import permits. The national variety release system can be further strengthened by developing standards for labeling seeds (in the local language for example).

There several approaches to improve the capacity of farmers to improve the market and making the most income for their efforts, and promote production of local varieties and species. Community diversity fairs have proven to be an effective way to both promote local vegetable and seed projects/exchange of planting materials, and provide a quick overview of the seeds and plant genetic resources used by the communities (FAO, 2006). At the same time farmers can be trained in how to produce and harvest and post harvest handling of vegetables so that they meet the quality standards of the market.

7. EVALUATION OF THE TOOLS USED

7.1. Examples of added value using the SLA tools

The added value of the Sustainable Livelihood Approach to the conventional participatory methods of assessing seed systems are the following:

1. Ranging from farmers' perception of preferred agro-morphological traits of seeds and seed lots to farmers' perception and understanding of their livelihood systems and strategies.

Participatory studies on PGRFA ensure that the assessment of the agronomic and morphological traits and seed qualities will be based on farmers' own perception and interests. However, this is often limited to the function of these traits within agricultural production systems. The sustainable livelihood approach used in this study assisted farmers to understand their livelihood assets and strategies and the role of seeds and their corresponding traits. The findings showed that farmers in the two districts employed different livelihood strategies, some of which were livelihood activities outside of direct agricultural production. These complex livelihood strategies largely define farmers' agricultural systems and their appropriate type of seeds. Seeds and their management cannot be completely understood outside these complex livelihood systems. Seed management through the livelihood approach therefore helps ensure its link to poverty alleviation.

2. The link of the livelihood approach to poverty alleviation

The livelihood approach also allowed the farmers and researchers to initially understand the complex causes of poverty, and the opportunities utilized by farmers as they respond to macro-economic trends. These trends and farmers' responses are creating new pressures on the different livelihood assets that farmers manage, from the allocation of family labour, financial capital, land, social, cultural and political institutions.

Discussion:

Under a conventional participatory approach, farmers may raise the importance of access to higher quality seeds of rice, with better germination percentage and uniformity. This is demanded by farmers involved in this research even of traditional rice varieties planted in marginal areas that are prone to flooding or drought. Under the livelihood approach, this greater demand for newer qualities of seeds is explained by the increasing importance of off-farm incomes over that of agriculture. Farmers lack the labour for replanting seedlings and prefer the crop to mature and be harvested at the same time. The shift to off-farm livelihood activities was possibly more economically rewarding than investing their labour into the replanting of low germination seeds, or to using labour for longer periods due to the uneven harvesting time of the crop.

The newer qualities demanded of seeds put both the traditional system of seed lot preparation, and the traditional system of access and exchange, under stress. The traditional participatory approach will assist farmers to highlight and analyze these problems, as well as and identifying technological bottlenecks (e.g. seed lot selection and preparation need to be

upgraded). The livelihood approach also links these new seed lot qualities with farmers' livelihood priorities and risk management.

Furthermore, different dominant roles are played in the different livelihood strategies within the community and within families. Understanding the value of the different types of seeds and the different terms of access to these seeds are better understood under the livelihood approach. The best example provided by research is the different appreciation and traits of seeds that men and women preferred.

7.2. Major lessons learned

Livelihood perspectives demonstrate how seeds and PGRFA are key assets that are linked to other livelihood resources and strategies in complex ways. Briefly, a livelihoods perspective offers insight into:

- The contribution of seeds and PGRFA to people's livelihood strategies and systems.
- The different routes through which access to seed and PGRFA may be secured.
- The opportunities and constraints people face in gaining access to seeds and PGRFA.
- The way access depend on wealth or socio-economic group, but also on other factors such as gender and age.
- The entry points that may enhance people's livelihood resilience.

The value-added of a livelihood approach lies in its attention to the importance of access to resources and to the institutions, both formal and informal, that shape and mediate such access. Issues around access to seeds and PGRFA are usually neglected by interventions that tend to concentrate on availability, supply and distribution of seeds. An analysis of institutions draws attention to how these affect people's access to and command of a range of assets, including seeds and PGRFA.

A more holistic approach to seeds and PGRFA work is needed to strengthen livelihoods – this approach would encompass more than just technical/genetic approaches, but also the social, political, economic, institutional perspectives.

The SLA analysis is multi-level and it looks at the way in which local, national and global policies and institutions are linked. It is dynamic, focused on the assets and strategies people use to negotiate within and among different institutional arrangements and in changing, and often uncertain, environments.

Strengths of the framework developed by Seshia & Scoones (2003):

- The livelihood approach encompasses more than just technical/genetic approaches – it also encompasses social, political, economic and institutional perspectives. Using the livelihood approach for this study, the linkages between the macro-economic trends and the role of seeds/ PGRFA in livelihood strategies responding to these trends was highlighted.

- Different routes through which access to seed and PGRFA may be secured and the opportunities and constraints people face in gaining access to seeds and PGRFA were also highlighted.
- The Framework (Seshia & Scoones, 2003) provides important information that can be used by national agricultural research and breeding institutions to better adjust their activities to diverse needs of different livelihood strategies (for example more rice varieties adapted to Laotian conditions that are of short duration, to save labour for other livelihood activities).

Words of caution in applying the framework developed by Seshia & Scoones (2003):

- The Sustainable Livelihoods Approach documentation often creates the impression that SLA implies a supra-household scale analysis. The entry point of the study was to collect information at household level in selected communities. After collecting data that was disaggregated according to household income, it soon became clear that use and access to seeds / PGRFA is much more differentiated within households than between households. Collection of gender disaggregated information in a few villages confirmed that there are big differences in the management of PGR between men and women farmers and that different households (rich, medium and poor) were not so different in the use and management of seeds/PGR. It is important to collect enough information on the linkages between various scales such as: gender, age groups, household, village level, district level, national level and international level.
- Assets such as family labour, and how it is divided between different livelihood activities, turned out to be a key issue determining the role of seeds / PGRFA in livelihood strategies. Even though men and women were interviewed separately, the data were not collected and analyzed in a disaggregated way. In this way a lot of information was lost. Men and women have different knowledge, are responsible for different crops, take care of different seeds, mainly women farmers are responsible for seed production, etc.. When applying the framework it is important to include the allocation of labour between livelihood activities and how it is divided between household members. If applied thoroughly the sustainable livelihoods analysis could provide a lot of valuable data on the importance to local seed management, home gardens, wild and weedy species and household food security.
- In order to develop a comprehensive picture of the linkages between assets, institutions and policies in different contexts that shape access to seeds and PGRFA considerable time and resources needs to be invested.

Lessons learned from this case-study:

- **Scale of analysis:**
In order to develop a clear picture of the linkages between assets, institutions and policies in different contexts that shape access to seeds and PGRFA, information needs to be gathered at various scales, especially within households.
 - **Division of labour between household members:**
In order to gain a better understanding of the role of seeds / PGRFA, the trends in the division of labour between household members need to be studied in more detail.
 - **Time constraints:**
To overcome reported constraints in time the case study could:
-

- Focus more on a specific group within the community that is most vulnerable or probably faces more constraints to access seeds / PGRFA;
- Focus on a specific group of plant genetic resources such as staple crops, cash crops, minor crops or collected wild and weedy resources;
- Focus more on the allocation of livelihood assets (labour, land etc.) between livelihood activities and strategies and less on mapping livelihood assets. This will result in better conclusions on the role of seeds and PGRFA in livelihood strategies;
- Organize community diversity fairs which have proven to be an effective way to both to promote local vegetables and seed projects/exchange of planting materials and provide a quick overview of the seeds and plant genetic resources used by the communities (FAO, 2006); and
- Awareness of the Sustainable Livelihoods Approach. It will be important to communicate the advantages of a SLA to policymakers, demonstrating how it can help them in addressing needs of the rural poor and to demonstrate how the SLA is a tool for decision makers to better address needs of the rural poor.

REFERENCES

Food and Agriculture Organization of the United Nations. (1996) *The Global Plan of Action: The Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture: The State of the World Report*. Rome: FAO.

Food and Agriculture Organization of the United Nations. (1998) *The State of the World's Plant Genetic Resources for Food and Agriculture*. Rome: FAO.

Food and Agriculture Organization of the United Nations. (2001) *FAO/WFP Crop and Food Supply Assessment Mission to Lao People's Democratic Republic*.
http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/004/X9978E/X9978E00.HTM,
Rome: FAO

Food and Agriculture Organization of the United Nations. (2006) *Community Diversity Seed Fairs in Tanzania: Guidelines for seed fairs*. LinKS project gender, biodiversity and local knowledge systems for food security. Report no 51, June 2006. <ftp://ftp.fao.org/docrep/fao/009/ag387e/ag387e00.pdf>
Rome: FAO.

Messer N. & Townsley, P. (2003). *Local Institutions and Livelihoods: Guidelines for Analysis*.
<http://www.fao.org/docrep/006/y5084e/y5084e00.HTM> Rome: FAO.

Seshia, S. and I. Scoones. (2003) *Understanding Access to Seeds and Plant Genetic Resources: What Can a Livelihoods Perspective Offer?* LSP Working Paper 6. Rome: FAO.

ANNEX 1: HOME GARDEN CROPS

Table 11: Hinheup District, Vientiane Province

	Crop's name (Lao)	Crop's name (English)	Scientific Name	Consumption (Rank in importance)	Selling (Rank in importance)	% Consumption	% Sold
1	Pak-i-kuu			3	3	80	20
2	Phak-ka	-	<i>ACACIA PENNATA WELL. SSP</i>	3	3	20	80
3	Phak-peo	-	<i>POLYGONUM ODORATUM LOUR</i>	3	3	20	80
4	Mak-tua-hei	Angola pea	<i>AGANAC CAGAN (L.) Mill SP</i>	3	3	20	80
5	Mon-sa-ku	Arrow roots		3	3	40	60
6	Nor-mai	Bamboo shoot	<i>BAMBUS. SP</i>	3	1	30	70
7	Kui	Banana	<i>MUSA SP</i>	2	3	80	20
8	Phak-sai	Bitter gourd	<i>MOMORDICA CHARANTIA .L.</i>	3	3	20	80
9	Bai-ki-hud	Bitter orange leaf		2	2	70	30
10	Tua-pum	Black eyed pea	<i>VIGNA UNIGUICULATA. L</i>	3	3	20	80
11	Mak-peap	Bonavista Bean	<i>LABLAB PURPUREUS (L) sweet</i>	3	3	80	20
12	Man-nam	Bottle gourd	<i>MOMORDICA CHARANTIA .L.</i>	2	3	80	20
13	Phak-ka-lam-pi	Cabbage	<i>BRASSICA OLERACEA LINN</i>	2	2	40	60
14	Man-tone	Cassava	<i>MANIHOT ESCULENTA CRANTZ</i>	3	3	80	20
15	Phak-ka-lam-dok	Cauliflower		2	2	20	80
16	Phak-se-nan-ly	Celery	<i>APIUM GRAVIOLENS VAR</i>	3	3	30	70
17	Mak-pet	Chili*	<i>CAPSICUM ANNUM CV. GROUP LONGUM</i>	1	1	50	50
18	Phak-kat-yo	Chinese cabbage	<i>BRASSICA PEKINENSIS VAR CYLINDRICA</i>	2	2	50	50
19	Phak-kat-na	Chinese kale	<i>BRASSICA ALBOGLABRA</i>	2	2	30	70
20	Phak-kat-ki	Chopped mustard	<i>BRASSICA JUNCEA</i>	2	2	40	60
21	Phak-haw-paw	Coriander	<i>CONANDRUM SATIVUM LING</i>	3	1	10	90
22	Mak-sa-li	Corn	<i>ZEA MAYS. L</i>	2	2	30	70
23	Phak-tang-o	Crow daisy	<i>CHRYSANTHEMUM CORONARIUM</i>	3	3	20	80
24	Mak-teng	Cucumber	<i>CUCUMIS SATIVUS LINN</i>	2	1	50	50
25	Phak-si	Dill	<i>ANETHUM GRAVEOLENS LINN</i>	1	2	50	50
26	Mak-kea	Eggplant	<i>SOLANUM TRILOBATUM LINN</i>	1	2	30	70
27	Phak-hom-pe	Eryngo	<i>ERYNGIUM FOETIDUM Linn.</i>	3	2	30	70
28	Phak-kad-som	Flowering cabbage	<i>BRASSICA CHINENSIS VAR PARACHINENSIS</i>	2	2	90	10
29	Hua-ka	Galanga	<i>ALPINIA GALANGA (L) WILLD</i>	2	2	80	20
30	Phak-tiam	Garlic*	<i>A. SATIVUM LINN</i>	1	3	90	10

Their Role in Improving Rural Livelihoods in Lao PDR

Crop's name (Lao)	Crop's name (English)	Scientific Name	Consumption (Rank in importance)	Selling (Rank in importance)	% Consumption	% Sold
31 Hue-king	Ginger	ZINGIBER OFFICINALE ROSCOE	2	2	70	30
32 Phak-i-tu	Holy basil	OCIMUM AMERICANUM L.	2	2	60	40
33 Dok-kar-kao	Humming-bird	SESBANIA GRADIFLORA (L.) POIR	3	3	40	60
34 Mak-tua-paep	Hyacinth dolichos	DOLICHOSS LABLAB. LINN	3	3	40	60
35 Mak-len-mai	Indian Trumpet flower	ONEXYLUM INDICUM L. KURZ	2	2	20	80
36 Phak-tam-nin	Ivy gourd	COCCINIA GRANDIS (L.) Voigt	3	2	20	80
37 Het-hu-nu	Jew's ear	HIRNEOLA AURICULA JUDAE BERK	3	2	20	80
38 Mak-deau	Jobs tears	COIX LACHRYMA JOBI LINN	2	3	60	40
39 Phak-home	Chinese spinach	AMARANTHUS GANGETICUS A. TRICOLOR	2	2	90	10
40 Phak-kad-tin-mi	Leaf mustard	BRASSICA JUNCEA VAR RUGOSA	1	2	40	60
41 Hua-si-kai	Lemon grass*	CYMOPOGON CITRATUS (DC) STAPF	2	2	10	90
42 Phak-sa-lat	Lettuce	LACTUCA SATIVA VAR CRISPA	2	2	30	70
43 Tua-phak-yao	Longbean	VIGNA SESQUIPEDALIS	3	1	30	70
44 Mak-noy	Luffa	LUFFA ACUTAUGULA. LINN	3	3	30	70
45 Haw-lap	Mint	MENTHA CORDIFOLIA OPIZ	3	3	40	60
46 Phak-bong	Morning glory	IPOMOEA AQUATICA	2	2	80	20
47 Kom-ka-dao	Neem Tree	AZADIRACHTA INDICA JUSS. VAR. SIAMENSIS VALETON	3	2	20	80
48 Mak-hung	Papaya	CARICA PAPAYA	3	2	50	50
49 Tua-din	Peanut	ARACHIS HYPOGAEA LINN	3	2	20	80
50 Mak-eu	Pumpkin	CUCURBITA MOSCHATA	3	3	50	50
51 Kao	Rice	ORYZA SATIVA	1	2	100	-
52 Mak-nga	Sesame	SESAMMUM OREUTAL. L	3	3	40	60
53 Mak-buab	Smooth Loofah	CYLINDRICA. L	2	2	30	70
54 Mak-tua-leang	Soybean	GLYCINE MAX	2	2	20	80
55 Man-on-nam	Spiny yam	Lesser yam	3	3	60	40
56 Phak-bua	Spring onion/Shallot*	ALLIUMCEPA VAR AGGREGATUM	1	2	100	-
57 Oi	Sugar cane	SACCHARUM OFFICINARUM LINN	3	2	60	40
58 Mak-tua-lan-tao	Sugar pea	PISUM SATIVUM VAR SACCARATUM	3	3	70	30
59 Phak-bua-la-pa	Sweet basil	O. BASILICUM. L	3	3	100	-
60 Man-dang	Sweet potato	IPOMOEA BATATAS	3	3	80	20
61 Mak-tua-lag-tek	Sword bean	CANVALIA GLADIATE (JAEP) DC	3	3	100	-
62 Bone-van	Taro	COLCASEA ESCULENTA SCHOTT	3	3	90	10
63 Hua-peau	Taro	COLCASEA SP	3	3	70	30

Access to Seeds and Plant Genetic Resources for Food and Agriculture

	Crop's name (Lao)	Crop's name (English)	Scientific Name	Consumption (Rank in importance)	Selling (Rank in importance)	% Consumption	% Sold
64	Kan-toon	Taro stem	<i>COLCASEA SP</i>	3	3	90	10
65	Mak-len	Tomato	<i>LYCOPERSICON ESCULENTUM MILL</i>	2	2	80	20
66	Mak-tone	Wax gourd	<i>BENINCASA CERIFERA SAVI</i>	2	3	80	20
67	Phak-kad-kao	White cabbage	<i>BRASSICA RAPA SUBSP. CHINENSIS</i>	3	2	80	20
68	Phak-i-luad	Wild betel leaf	<i>PIPER SARMENTOSUM ROXB</i>	3	2	60	40
69	Mak-tua-poo	Winged bean	<i>PSOPHOCARPUS TETRAGONOLOBUS</i>	3	3	90	10
70	Mon-pao	Yam bean	<i>PACHYRHIZUS EROSUS URBAR</i>	2	1	80	20

Table 12: Viengkham, Vientiane Province

	Crop's name (Lao)	Crop's name (English)	Scientific name	Consumption (Rank in importance)	Selling (Rank in importance)	% Consumption	% Sold
1	Phak-peo		<i>POLYGONUM ODORATUM LOUR</i>	3	3	70	30
2	Phak-kao-tong		<i>HOUTTUYNIA CORDATA THUMB</i>	3	3	60	40
3	Man-saa-koo	Arrow roots		2	3	50	50
4	Mak-kuai	Banana	<i>MUSA SP</i>	2	3	40	60
5	Phak-sai	Bitter gourd	<i>MOMORDICA CHARANTIA .L.</i>	2	3	20	80
6	Mak-peb	Bonavista Bean	<i>LABLAB PURPUREUS (L.) Sweet</i>	3	3	40	60
7	Mak-nam	Bottle gourd	<i>LAGENARIA SICERARIA (MOLINA) STANDL</i>	3	3	20	80
8	Phak-ka-lam-pi	Cabbage	<i>BRASSICA OLERACEA LINN</i>	3	1	5	95
9	Man-ton	Cassava	<i>MANIHOT ESCULENTA CRANTZ</i>	3	2	40	60
10	Phak-ka-lam-dok	Cauliflower		3	2	20	80
11	Phak-se-na-ly	Celery	<i>APIUM GRAVIOLENS VAR</i>	3	3	40	60
12	Mak-pet	Chili*	<i>CAPSICUM ANNUM CV. GROUP LONGUM</i>	1	2	50	50
13	Phak-kad-kao-hor	Chinese cabbage	<i>BRASSICA PEKINENSIS VAR CYLINDRICA</i>	2	2	30	70
14	Phak-kat-na	Chinese Kale	<i>BRASSICA ALBOGLABRA</i>	2	2	20	80
15	Phak-home	Chinese Spinach	<i>AMARANTHUS GANGETICUS A. TRICOLOR</i>	2	3	60	40
16	Phak-kad-kild	Chopped Mustard	<i>BRASSICA JUNCEA</i>	2	3	80	20
17	Phak-hom-pom	Coriander	<i>CONANDRUM SATIVUM LING</i>	1	3	20	80
18	Mak-sa-ly	Corn	<i>ZEA MAYS. L</i>	2	2	40	60
19	Mak-teng	Cucumber	<i>CUCUMIS SATIVUS LINN</i>	2	1	30	70
20	Phak-si	Dill	<i>ANETHUM GRAVEOLENS LINN</i>	2	3	30	70
21	Mak-kua	Eggplant	<i>SOLANUM TRILOBATUM LINN</i>	2	3	30	70
22	Phak-hom-pe	Eryngo/Stink weed	<i>ERYNGIUM FOETIDUM Linn.</i>	3	3	30	70

Their Role in Improving Rural Livelihoods in Lao PDR

23	Phak-ka-lam-dok	Flowering cabbage	<i>BRASSICA CHINENSIS VAR PARACHINENSIS</i>	3	2	20	80
24	Hua-ka	Galanga	<i>ALPINIA GALANGA (L) WILLD</i>	3	3	70	30
25	Phak-tiam	Garlic*	<i>A. SATIVUM LINN</i>	2	2	70	30
26	King	Ginger*	<i>ZINGIBER OFFICINALE ROSCOE</i>	3	3	50	50
27	Phak-i-tuu	Holy basil	<i>OCIMUM AMERICANUM .L</i>	2	3	80	20
28	Mak-tua-peab	Hyacinth dolichos	<i>DOLICHOSS LABLAB. LINN</i>	3	3	70	30
29	Phak-sa-lad-hor	Iceberg Lettuce	<i>LACTUCA SATIVA VAR CAPITATA</i>	3	1	10	90
30	Phak-tam-nin	Ivy Gourd	<i>COCCINIA GRANDIS (L.) Voigt</i>	3	2	50	50
31	Man-on	Yam	<i>MENTHA CORDIFOLIA OPIZ</i>	3	3	80	20
32	Phak-kad-tin-my	Leaf Mustard	<i>BRASSICA JUNCEA VAR RUGOSA</i>	3	1	10	90
33	Hua-si-kai	Lemon grass	<i>CYMOPOGON CITRATUS (DC) STAPF</i>	1	2	80	20
34	Phak-sa-lad-kai	Lettuce	<i>LACTUCA SATIVA VAR CRISPA</i>	2	2	20	80
35	Mak-tua-phak-yao	Long Bean	<i>VIGNA SESQUIPEDALIS</i>	3	1	10	90
36	Mak-kua-ham-mar	Long eggplant	<i>SOLANUM MELONGENA</i>	3	3	20	80
37	Mak-noy	Luffa	<i>L. ACUTAUGULA. LINN</i>	3	1	10	90
38	Mak-teng	Melon	<i>CUCUMNIS MELO Linn</i>	3	2	80	20
39	Phak-hom-lab	Mint	<i>MENTHA CORDIFOLIA OPIZ</i>	3	2	20	80
40	Phak-bong	Morning Glory	<i>IPOMOEA AQUATICA</i>	2	2	50	50
41	Het-nang-lam	Oyster mushroom	<i>PEURATUS SP.</i>	3	2	30	70
42	Mak-hung	Papaya	<i>CARICA PAPAYA</i>	2	2	30	70
43	Mak-ui	Pumpkin	<i>CUCURBITA MOSCHATA</i>	2	3	50	50
44	Kao	Rice	<i>O. SATAVA</i>	1	1	70	30
45	Mak-buab	Smooth Luffa	<i>CYLINDRICA. L</i>	2	3	20	80
46	Phak-bua-hua	Spring Onion /Shallot*	<i>ALLIUMCEPA VAR AGGREGATUM</i>	1	2	80	20
47	Hed-fuang	Straw mushroom	<i>VELVARRELLA VOLVACEA FR.</i>	2	1	20	80
48	Mak-tua-lan-tao	Sugar Pea	<i>PISUM SATIVUM VAR SACCHARATUM</i>	3	2	20	80
49	Oil	Sugarcane	<i>SACCHARUM OFFICINARUM LINN</i>	3	2	30	70
50	Phak-bua-la-pa	Sweet basil	<i>O. BASILICUM. L</i>	2	3	10	90
51	Man-dang	Sweet potato	<i>IPOMOEA BATATAS</i>	3	3	30	70
52	Hua-peak	Taro (root)	<i>COLCASEA ESCULENTA (L) SCHOTT</i>	3	3	20	80
53	Toon	Taro (stem)	<i>COLCASEA SP</i>	3	3	50	50
54	Mak-len	Tomato	<i>LYCOPERSICON ESCULENTUM MILL</i>	2	2	40	60
55	Mak-mo	Water melon	<i>CITRULLUS LANATUS (THUMB) MANST</i>	3	1	5	95
56	Mak-ton	Wax gourd	<i>BENINCASA CERIFERA SAVI</i>	3	3	20	80
57	Phak-i-luad	Wild betel leaf	<i>PIPER SARMENTOSUM ROXB</i>	3	3	20	80
58	Mak-tua-puu	Wing bean	<i>PSOPHOCARPUS TERAGONOLOBUS DC</i>	3	3	60	40
59	Man-pao	Yam bean	<i>PACHYRHIZUS EROSUS URBAR</i>	3	2	20	80

ANNEX 2: FARM GATE PRICES OF CASH CROPS

Table 13: Farm gate prices gathered in Viengkham District

Crop name	High K/ 12 kilos	Low K/ 12 kilos	Farmer's floor price K/ 12 kilos	Vientiane Market Price*	
				high	low
Sticky rice	20,000	8,000	12,000		
Long bean	60,000	15,000	12,000	69,300	36,000
Cucumber	20,000	6,000	10,000	22,500	12,000
Leaf mustard	26,000	5,000	8,000	42,000	24,000
Flowering cabbage	50,000	30,000	20,000		
Chinese cabbage	50,000	15,000	10,000	82,500	24,000
Cabbage	30,000	12,000	8,000	38,064	15,996
Chili*	100,000	60,000	40,000	128,000	46,500
Lettuce	60,000	12,000	30,000	73,500	24,000
Sugar pea	120,000	40,000	35,000		
Cauliflower	84,000	32,000	20,000	168,000	40,000
Coriander	60,000	45,000	48,000	184,500	27,996
Luffa	30,000	15,000	12,000		
Watermelon	1,333 k/kg	667 k/kg	1,000 k/kg		

* A column on the price in Vientiane Market was added for comparison collected by the Vegetable Seed Section of (Haddokkeo) Horticulture Research Center currently assisted by DED.

Table 14: Farm gate prices gathered in Hinheup District

Crop name	High K/ 12 kilos	Low K/ 12 kilos	Farmer's floor price K/ 12 kilos	Vientiane Market Price	
				high	low
Long bean	72,000	24,000	36,000	69,300	36,000
Cucumber	24,000	12,000	12,000	22,500	12,000
Leaf mustard	30,000	5,000	15,000	42,000	24,000
Chinese cabbage	48,000	25,000	30,000	82,500	24,000
Chili*	84,000	36,000	60,000	128,000	46,500
Lettuce	40,000	15,000	20,000	73,500	24,000
Coriander	72,000	24,000	35,000	184,500	27,996

LSP WORKING PAPERS to November 2007

Baumann P., (July 2002) **Improving Access to Natural Resources for the Rural Poor: A critical analysis of central concepts and emerging trends from a sustainable livelihoods perspective.** FAO, LSP WP 1, Access to Natural Resources Sub-Programme.

Cotula L., (August 2002) **Improving Access to Natural Resources for the Rural Poor: The experience of FAO and of other key organisations from a sustainable livelihoods perspective.** FAO, LSP WP 2, Access to Natural Resources Sub-Programme.

Karl M., (August 2002) **Participatory Policy Reform from a Sustainable Livelihoods Perspective: Review of concepts and practical experiences.** FAO, LSP WP 3, Participation, Policy and Local Governance Sub-Programme. Also available in Spanish and French.

Warren P., (December 2002) **Livelihoods Diversification and Enterprise Development: An initial exploration of Concepts and Issues.** FAO, LSP WP 4, Livelihoods Diversification and Enterprise Development Sub-Programme.

Cleary D., with contributions from Pari Baumann, Marta Bruno, Ximena Flores and Patrizio Warren (September 2003) **People-Centred Approaches: A brief literature review and comparison of types.** FAO, LSP WP 5, People-Centered Approaches in Different Cultural Contexts Sub-Programme. Also available in Spanish and French.

Seshia S. with Scoones I., Environment Group, Institute of Development Studies, University of Sussex, UK (November 2003) **Understanding Access to Seeds and Plant Genetic Resources. What Can a Livelihoods Perspective Offer?** FAO, LSP WP 6, Access to Natural Resources Sub-Programme.

Biggs S. D., and Messerschmidt D., (December 2003) **The Culture of Access to Mountain Natural Resources: Policy, Processes and Practices.** FAO, LSP WP 7, Access to Natural Resources Sub-Programme.

Evrard O., (Janvier 2004) **La mise en oeuvre de la réforme foncière au Laos : Impacts sociaux et effets sur les conditions de vie en milieu rural** (with summary in English). FAO, LSP WP 8, Access to Natural Resources Sub-Programme.

Ellis F., Allison E., Overseas Development Group, University of Anglia, UK (January 2004) **Livelihood Diversification and Natural Resource Access.** FAO, LSP WP 9, Access to Natural Resources Sub-Programme, Livelihood Diversification and Enterprise Development Sub-Programme.

Hodgson S., (March 2004) **Land and Water – the rights interface.** FAO, LSP WP 10, Access to Natural Resources Sub-Programme.

Mitchell R. and Hanstad T., Rural Development Institute (RDI), USA, (March 2004) **Small homegarden plots and sustainable livelihoods for the poor.** FAO LSP WP 11, Access to Natural Resources Sub-Programme. Also available in Bahasa.

Hanstad T., Nielsen R., Brown J., Rural Development Institute (RDI), USA, (May 2004) **Land and Livelihoods: Making land rights real for India's rural poor.** FAO LSP WP 12, Access to Natural Resources Sub-Programme.

Fisher R.J., Schmidt K., Steenhof B. and Akenshaev N., (May 2004) **Poverty and forestry : A case study of Kyrgyzstan with reference to other countries in West and Central Asia.** FAO LSP WP 13, Access to Natural Resources Sub-Programme.

Cotula L. and Toulmin C. with Vlaenderen H.V., Tall S.M., Gaye G, Saunders J., Ahiadeke C. and Anarfi J.K. (IIED) (July 2004). **Till to tiller: Linkages between international remittances and access to land in West Africa.** FAO LSP WP 14, Access to Natural Resources Sub-Programme.

Baumann P., Bruno M., Cleary D., Dubois O. and Flores X., with contributions from Warren P., Maffei T. and Johnson J. (March 2004) **Applying people centred development approaches within FAO: some practical lessons.** FAO LSP WP 15, People Centred Approaches in Different Development Contexts Sub-Programme. Also available in Spanish and French.

Neely C., Sutherland K., and Johnson J. (October 2004) **Do sustainable livelihoods approaches have a positive impact on the rural poor? – A look at twelve case studies.** FAO LSP WP 16, Institutional Learning Sub-Programme. Also available in Spanish and French

Norfolk S. (2004) **Examining access to natural resources and linkages to sustainable livelihoods: A case study of Mozambique.** FAO LSP WP 17, Access to Natural Resources Sub-Programme.

Unruh J., (2004) **Post-conflict land tenure: using a sustainable livelihoods approach.** FAO LSP WP 18, Access to Natural Resources Sub-Programme

Eckman, C. (2005) **Lessons Learned by the WIN Project on Livelihoods Diversification and Enterprise Development: An Overview of WIN LDED-related Activities in Cambodia, Nepal and Zambia.** FAO LSP WP 19. Livelihoods Diversification and Enterprise Development Sub-Programme.

Warren, P. (2005) **Between the Household and the Market: A livelihoods analysis of SPFS seed multiplication in Southern Guatemala.** FAO LSP WP 20. Livelihoods Diversification and Enterprise Development Sub-Programme

Strele M., Holtge K., Fiebiger M., Were J, Schulmeister A, with contributions from Weingartner L, (2006) **Participatory Livelihoods Monitoring : Linking Programmes and Poor People's Interests to Policies. Experiences from Cambodia.** FAO LSP. WP 21, Participation, Policy and Local Governance Sub-Programme

Unruh J. and Turray H. (2006). **Land tenure, food security and investment in postwar Sierra Leone.** FAO LSP WP 22. Access to Natural Resources Sub-Programme.

Nielsen R., Hanstad T., and Rolfes L. **Rural Development Institute (RDI). (2006). Implementing homestead plot programmes: Experience from India.** FAO LSP WP 23. Access to Natural Resources Sub-Programme.

Quan, J. Natural Resources Institute University of Greenwich. (2006). **Land access in the 21st century: Issues, trends, linkages and policy options.** FAO LSP WP 24. Access to Natural Resources Sub-Programme.

Cotula L., Hesse C., Sylla O., Thébaud B., Vogt G., and Vogt K. International Institute for Environment and Development (IIED). (2006.) **Land and water rights in the Sahel: Tenure challenges of improving access to water for agriculture.** FAO LSP WP 25. Access to Natural Resources Sub-Programme.

Gomes N. (2006). **Access to water, pastoral resource management and pastoralists' livelihoods: Lessons learned from water development in selected areas of Eastern Africa (Kenya, Ethiopia, Somalia).** FAO LSP WP 26. Access to Natural Resources Sub-Programme.

Tanner C., Baleira S., Norfolk S., Cau B. and Assulai J. (2006). **Making rights a reality: Participation in practice and lessons learned in Mozambique.** FAO LSP WP 27. Access to Natural Resources Sub-Programme.

Tanner C. and Baleira S. with Afonso Â, Azevedo J. P., Bila J., Chichava C., Moisés A., Pedro C. and Santos J. (2006). **Mozambique's legal framework for access to natural resources: The impact of new legal rights and community consultations on local livelihoods.** FAO LSP WP 28. Access to Natural Resources Sub-Programme.

Romano F. and Reeb D. (2006). **Understanding forest tenure: What rights and for whom? Secure forest tenure for sustainable forest management and poverty alleviation: the case of South and Southeast Asia, with case studies of Orissa and Meghalaya, India and Nepal.** FAO LSP WP 29. Access to Natural Resources Sub-Programme.

Lindsay J., Wingard J. and Manaljav Z. (2006). **Improving the legal framework for participatory forestry: Issues and options for Mongolia.** FAO LSP WP 30. Access to Natural Resources Sub-Programme.

Schmidt S. with Altanchimeg C., Tungalagtuya K., Narangerel Y., Ganchimeg D., Erdenechimeg B., Dambayuren S. and Battogoo D. New Zealand Nature Institute - Initiative for People Centered Conservation. (2006). **Depleting natural wealth – perpetuating poverty: Rural livelihoods and access to forest resources in Mongolia.** FAO LSP WP 31. Access to Natural Resources Sub-Programme.

Schmidt S. with Altanchimeg C., Tungalagtuya K., Narangerel Y., Ganchimeg D., Erdenechimeg B., Dambayuren S. and Battogoo D. New Zealand Nature Institute - Initiative for People Centered Conservation. (2006). **Rural livelihoods and access to forest resources in Mongolia: Methodology and case studies of Tsenkher Soum, Ulaan Uul Soum, Binder Soum, Teshig Soum and Baynlig Soum.** FAO LSP WP 32. Access to Natural Resources Sub-Programme.

Shimizu T. (2006) **Assessing the access to forest resources for improving livelihoods in West and Central Asia countries.** FAO LSP WP 33. Access to Natural Resources Sub-Programme.

Baumann P. (2006) **Forest - poverty linkages in West and Central Asia: The outlook from a sustainable livelihoods perspective.** FAO LSP WP 34. Access to Natural Resources Sub-Programme.

Shimizu T., and Trudel M., with case studies by Asanbaeva A., Kananian M., Naseri Gh. and Sülüşoğlu M. (2006). **Methodology and case studies on linkages between poverty and forestry: Afghanistan, Iran, Kyrgyzstan and Turkey.** FAO LSP WP 35. Access to Natural Resources Sub-Programme.

Åkerlund U., in collaboration with Knuth L., Randrup T. and Schipperijn J. (2006). **Urban and peri-urban forestry and greening in west and Central Asia: Experiences, constraints and prospects.** FAO LSP WP 36. Access to Natural Resources Sub-Programme.

Knuth L. (2006) **Greening cities for improving urban livelihoods: Legal, policy and institutional aspects of urban and peri-urban forestry in West and Central Asia (with a case study of Armenia).** FAO LSP WP 37. Access to Natural Resources Sub-Programme.

Cotula L., Chauveau J-P., Cissé S., Colin J-P., Lavigne Delville P., Neves N., Quan J., and Toulmin C., IIED (2006) **Changes in “customary” land tenure systems in Africa.** FAO LSP WP 38. Access to Natural Resources Sub-Programme.

Rose, L. (2006) **Children’s property and inheritance rights and their livelihoods: The context of HIV and AIDS in Southern and East Africa.** FAO LSP WP 39. Access to Natural Resources Sub-Programme.

Howard P. and Smith E. (2006) **Leaving two thirds out of development: Female headed households and common property resources in the highlands of Tigray, Ethiopia.** Wageningen University . FAO LSP WP 40. Access to Natural Resources Sub-Programme.

Okali C. (2006) **Linking livelihoods and gender analysis for achieving gender transformative change** . FAO LSP WP 41. Access to Natural Resources Sub-Programme.

Ramirez R. and Fernandez M. (2007), with contributions from DaPassano M., Bello T., Johnson J. and Callens K. **Getting a framework perspective on local participation in policy: Views through FAO experience**. FAO LSP WP42. Participation, Policy and Local Governance Sub-Programme

Avella N. et Younfa A., avec la collaboration de Lawali S. (2007) **L'accès à l'information foncière et aux institutions décentralisées pour sécuriser les droits fonciers des ruraux pauvres . L'expérience des Commissions Foncières au Niger** (with Summary in English). FAO LSP WP 43. Sous-Programme Accès aux Ressources Naturelles.

Goislard C. , avec la collaboration de Djiré M. (2007). **Accès à l'information juridique, aux institutions et procédures légales : Quelle sécurisation foncière pour les ruraux pauvres au Mali ? Etude de cas dans le sud malien**. FAO LSP WP 44. Sous-Programme Accès aux Ressources Naturelles.

Sescon J. and Salazar R., **Access to Seeds and Plant Genetic Resources for Food and Agriculture, Their Role in Improving Rural Livelihoods in Lao PDR**. FAO LSP WP 45. Access to Natural Resources Sub-Programme.
