Food Security and Sustainable Agriculture Development in the Uplands: Challenges and Opportunities

Proceedings of the

1st IDRC-SEARCA Annual Fellowship Plus Conference-Workshop

24-26 September 2013
SEARCA, Laguna, Philippines

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SEAMEO SEARCA

The Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) is one of the regional research and training centers of the Southeast Asian Ministers of Education Organization (SEAMEO), an intergovernment body founded in 1965 to promote cooperation among Southeast Asian nations through activities in education, science, and culture. SEARCA's programs are designed to accelerate sustainable agriculture and rural development through human resource development, research, technology transfer, and information dissemination. It is hosted by the Philippine Government on the campus of the University of the Philippines Los Baños, Laguna, Philippines. It is supported by donations from SEAMEO member and associate member states, other governments, and various international agencies.

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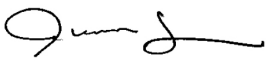
FOREWORD

It is a pleasure to share with you this publication that captures salient information and knowledge presented during the 1st IDRC-SEARCA Annual Fellowship plus Conference-Workshop held at SEARCA Headquarters, Los Baños, Laguna, Philippines on 24-26 September 2013.

The conference-workshop is the first of the three roving fellowship events under the Southeast Asian Upland Agriculture Fellowship project which the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) is implementing through the support of the International Development Research Center (IDRC) of Canada. Through this project, we hope to develop a new breed of high quality human resources who will champion natural resource management and respond to the two-pronged goal of food security and sustainable agriculture in the uplands of Southeast Asia particularly in Cambodia, Lao People's Democratic Republic, and Vietnam.

The conference-workshop was a fitting opportunity for scholars to learn from high calibre resource persons and apply these new knowledge in their own research work. Such gathering also provides a venue for scholars and experts to build networks which we hope will bear fruit in terms of collaborative research projects.

We acknowledge with appreciation the participation of the 27 scholars, as well as the Project Advisory Committee members who contributed in no small measure to the success of the conference-workshop. Our deepest gratitude also goes to the IDRC of Canada for their continued support to SEARCA. We hope that our partnership will reach greater heights as we look forward to more collaborative activities of common interest in the future.



Dr. Gil C. Saguiguit, Jr.
Director

EXECUTIVE SUMMARY

The 1st IDRC-SEARCA Annual Fellowship Plus Conference-Workshop on the theme, "Food Security and Sustainable Agriculture Development in the Uplands: Challenges and Opportunities" was the first of a series of three annual fellowship plus conference-workshops funded under the 3-year project of the International Development Research Centre (IDRC) of Canada and the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) titled, Upland Agriculture Fellowships for Southeast Asia Project which is being implemented by SEARCA from 2012 to 2015. The annual fellowship conference/workshops hope to build the fellows' knowledge through lectures and paper presentations by experts, encourage informal networking to develop a sense of community among IDRC fellowship recipients, share experiences among themselves as fellows, give them the opportunity to meet experts, and provide first-hand experience of the real situation in the uplands through site visits.

The 1st IDRC-SEARCA fellowship conference-workshop aimed to highlight the current issues/challenges facing upland agricultural areas in SE Asia; illustrate the role played by research and extension in addressing concerns of food insecurity in the uplands; discuss methodologies in assessing food and nutritional security across countries in the region that may be used by the scholars in their respective researches; and provide the opportunity for the scholars to present their research proposals/projects; and visit an upland project site in the Philippines.

To set the tone of the fellowship conference-workshop, three invited papers by recognized experts were presented during the plenary session. Participants were 27 fellowship grantees studying in UPLB, CMU, KU, and KKU, who also presented their research proposals. Guests were also invited to the event. Members of the Project Advisory Committee provided comments and feedback on the grantees' research proposals/projects.

In his welcome remarks, SEARCA Director Gil C. Saguiguit, Jr., expressed SEARCA's appreciation to play the role of implementing agency of this special program of IDRC that aligns well with SEARCA's mandate of building capacities of individuals and institutions working for agricultural and rural development in Southeast Asia. He emphasized that it is important to develop a new breed of development practitioners who will work for upland development and will champion natural resource management in the adjacent ecosystems.

Senior Program Specialist Rita Bowry of the Fellowships and Awards Program at the Special Initiatives Division of IDRC welcomed the guests and participants to the conference and expressed IDRC's appreciation to the advisers and mentors for guiding the scholars in their study programs. She said that the Centre supports research in four broad areas, namely: Agriculture and Environment; Global Health Policy; Science and Innovation; and Social and Economic Policy. The Centre supports academic research to help developing countries gain a critical mass of trained and experienced researchers to promote development in their regions; and give opportunity to a new generation of Canadians and citizens of developing countries to participate actively in international development issues. The Corporate Awards cover master's, PhD, and post-doctoral levels, research awards, research internships at IDRC, awards to junior and mid-career journalists, and endowments. The International Fellowships Program provides support to researchers in Africa, Asia, Latin America, and the Caribbean who are working towards graduate degrees or seeking research related work experiences. IDRC also provides supervisor support and mentorship; publications; conferences and networking; visits or semesters abroad at a Canadian university; project evaluations and tracer studies; and training workshops on proposal development; research methodology and ethics; data collection and analysis; communicating research; scientific writing and publications; monitoring and evaluation; thematic-focused workshops.

In his presentation on Contemporary Issues and Challenges in Sustainable Upland Agriculture in Southeast Asia, Percy E. Sajise, Honorary Research Fellow of Bioversity International, and Adjunct Professor of UPLB School of Environmental Science and Management, highlighted the urgent and compelling need for sustainable agricultural development of the uplands as these are closely linked to the lowland and aquatic ecosystems. He stressed that the uplands serve as foundation for livelihoods and food and nutrition security, and as repository of high agrobiodiversity and indigenous knowledge. He emphasized that with the pressure of increasing population, the deepening impacts of climate change, enabling factors

and processes are needed to bring about sustainable upland livelihoods and to implement appropriate interventions for sustainable upland agriculture sustainability while conscious of the fact that nobody should be left behind. He said that there is now a portfolio of paradigms, approaches and methodologies for conducting assessments for integrating climate change impacts, gender analysis to improve equity, and comparative analysis across various areas within the country and the region where payment for environmental services can be applied, and that in bringing about sustainable upland agriculture in the landscape of Southeast Asia, the following are needed: a) opportunity to break disciplinary and sectoral barriers to apply these paradigms, approaches and methodologies; b)a platform to promote exchanges of lessons and good practices for promoting and upscaling sustainable upland agriculture and rural development across time and space in the region while at the same time sharpening the tools and methods being used; and c) not only the science-based knowledge to support this important Post-2015 MDGs in Southeast Asia but also the necessary political will and holistic-altruistic drive to push the needed positive change.

UPLB Chancellor Rex Victor O. Cruz in his paper on "The Role of Research and Extension in Addressing Food Security Concerns in the Uplands of Southeast Asia" highlighted that doing research is finding practical solutions to real-world problems beyond laboratories and experimental farms, addressing the technological divide and bridging theory and practice through research and development. On the other hand, he expressed that current issues and challenges have changed the extension service landscape in facilitating and transferring technology as well as in engaging participation and empowerment of farmers in addressing health issues, promoting hygienic practices in food processing, and promoting diversified agriculture. He shared that in the Philippines, the Farmer-Scientists Research, Development and Extension Training Program spearheaded by the Agricultural Training Institute in collaboration with government agencies, state universities, and NGOs, provided for the skills enhancement of farmers particularly those in upland communities, and facilitated transfer of conservation farming technologies and practices. He emphasized that success in research and extension efforts in addressing food security concerns can be achieved through collaboration, knowledge sharing, research capacity building, and increased government funding, and that convergence in financial mechanisms, government policy on food and nutrition security, declaration of food and nutrition security zones, and collaboration in research, development and extension services, are essential.

Maria Victoria O. Espaldon, UPLB Vice-Chancellor for Research and Extension, in her paper on "Assessing Sustainable Upland Agriculture and Food and Nutritional Security: Some Indicators and Methodologies," discussed the indicators of food and nutrition security and highlighted that indicators system for assessing sustainable upland agriculture can be based on system properties of agroecosystems such as productivity, stability, sustainability and equity; or on the characteristics of sustainable agriculture such as provision of food and nutrition security, environmental stewardship, and enhanced socio-economic needs of households and communities. As regards the methodology of assessment, she said that quantitative methods can be employed such as analysis of economic returns to inspect viability; or the use of sustainable livelihood framework which employs both descriptive and quantitative approach to estimating sustainability with improving assets of household and community; or the use of highly qualitative approach.

The participants visited two upland project sites, namely: the Riaño's Farm in San Pablo, Laguna that demonstrates a public-private partnership model farm; and the UPLB Agroforestry Laboratory Training Center that demonstrates sloping agricultural land technologies. The debriefing workshop facilitated by Percy E. Sajise elicited from the participants their significant impressions on the sustainability of upland farms visited, the framework used to make the analysis of farm sustainability; and three research questions that the students want to pursue if they were to assess the sustainability of the upland farms.

The Project Advisory Committee expressed that the debriefing workshop was a very effective exercise to test the students' level of understanding on the framework, principles and processes of sustainable agriculture; however, they must assess the accuracy of the situation and data presented and must remember that the exercise of critical thinking is very important in analyzing and synthesizing data, and evaluating different situations. They stressed that in order for a system to be sustainable, it has to rely more on what is there rather than on what is being introduced, must consider the role of men and women in sustainable upland agriculture, research ethics, and must always connect their researches with what it can do to address issues in the uplands.

PAPER PRESENTATIONS

IDRC Fellowships and Awards and the International Fellowships Program

Mrs. Rita Bowry
Senior Program Specialist and Head, Fellowships and Awards
International Development Research Centre (IDRC) of Canada

IDRC and its Mandates

The International Research and Development Centre (IDRC) of Canada is a Crown corporation created in 1970 by an Act of Parliament. As a key part of Canada's aid program, IDRC supports research in developing countries to promote growth and development, and researchers as they find new ways to improve health, protect the environment, overcome poverty, and promote democracy. The Centre works with researchers to find solutions to problems they identify by supporting research, boosting research skills, and sharing knowledge. In the past 40 years, the Centre has funded 13,000 research activities involving more than 4,200 institutions.

IDRC has regional offices in Latin America, based on Montevideo; in Eastern and Western Africa, based in Nairobi; in the Middle East, based in Cairo; and in Asia, based in New Delhi.

Specifically, IDRC supports applied research; access to results and resources; awards and fellowships; networks of researchers; and partnerships among donors. The Centre's mandates are translated into the following program areas: Agriculture and Environment; Global Health Policy; Science and Innovation; Social and Economic Policy, and Special Initiatives.

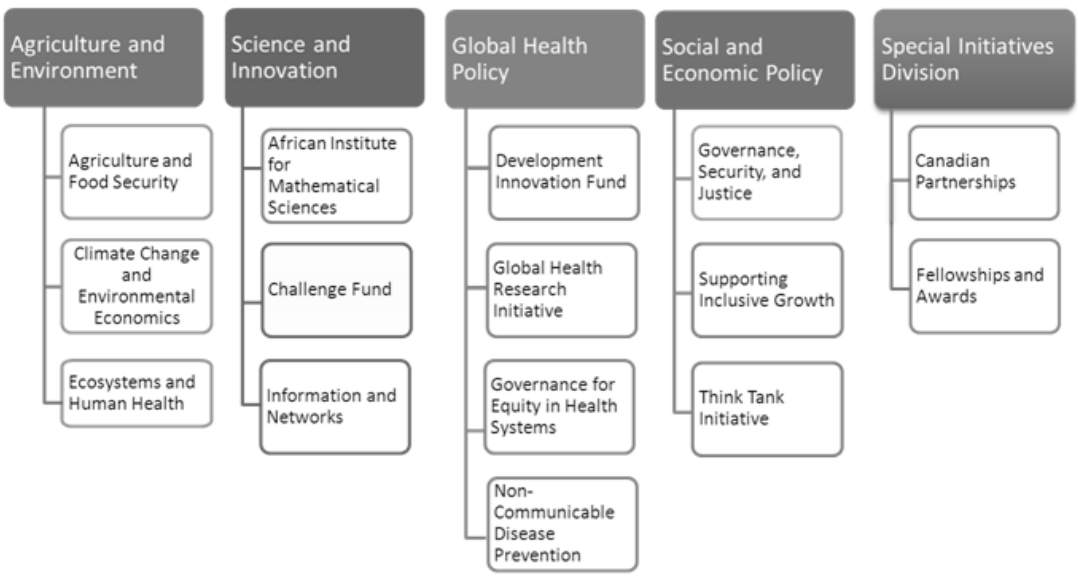


Figure 1. IDRC's program chart

The Fellowships and Awards Program

The Canadian Partnerships and the Fellowships and Awards are two programs under the Special Initiatives Division. The Fellowships and Awards Program is the focal point for training at IDRC. The Program supports academic research to help developing countries gain a critical mass of trained and experienced researchers to promote development in their regions; and to give opportunity to a new generation of Canadians and citizens of developing countries to participate actively in international development issues.

There are two program areas under the Fellowships and Awards Program, namely: Corporate Awards, and International Fellowships.

The Corporate Awards are internally-managed calls for Canadians and citizens of developing countries across all regions. A variety of corporate awards are granted at the master's and doctorate levels for research in international development issues corresponding to any of IDRC's four program areas; for research internships at IDRC; for junior and mid-career journalists; and endowments. Two examples of awards in the Agriculture and Environment are the Bentley Cropping Systems Fellowship; and the John G. Bene Fellowship. The awards range from CAD 15,000 to CAD 60,000.

The International Fellowships, launched in 2006, are externally-managed calls for citizens of developing countries in Africa, Asia, Latin America, and the Caribbean. It provides support to researchers in these regions who are working towards a graduate research degree or seeking a research-related work experience in their home country/region. It aims to help build homegrown experts that are able to address pressing environmental, health, social and economic problems in their countries, by facilitating timely completion of degrees and building strong research skills. The program also builds institutional capacity in grant management. Projects under this program are developed in coordination with IDRC staff in Ottawa and in regional offices and must be aligned with IDRC program areas. Types of awards under this fellowship program are full master's and PhD scholarships, doctoral field research awards, post-doctoral research awards, research internships, expert residencies and sabbaticals, and visiting fellowships.

IDRC also provides support for training workshops on topics such as: proposal development, research methodology and ethics, data collection and analysis, communicating research, scientific writing and publications, monitoring and evaluation; and thematic-focused workshops; supervisor support and mentorship; support for publications; conferences and networking; visits or semesters abroad at a Canadian university; project evaluations; and tracer studies.

Since 2007, 14 fellowships projects have been developed with institutions in Sub-Saharan Africa; 6 in Asia and 2 in Latin America and the Caribbean.

Over 300 awards have been granted to date, with researchers originating from 29 countries in Sub-Saharan Africa, 10 countries in Asia, and 2 countries in Latin America. The awards seek to maintain gender, linguistic and regional balance, and ensure more balanced support to more disadvantaged groups or regions with fewer resources or research capacities.

IDRC Partner Institutions

IDRC works with partner institutions in carrying out its mandates. The following are specific research focus with partner institutions in Sub-Saharan Africa since 2007:

- **Economics**
  - o African Economic Research Consortium (AERC)
  - o Le Nouveau programme de troisieme cycle interuniversitaire (NPTCI) en economie
- **Health Systems**
  - o African Population Health Center (APHRC)
  - o L'Institut superieur des sciences de la population (ISSP)
- **Ecohealth**
  - o University of KwaZulu Natal School of Environmental Sciences
- **Health Policy and Systems Research**
  - o University of the Western Cape and University of Capetown
- **Agricultural Economics**
  - o Collaborative Masters Program in Agricultural and Applied Economics (CMAAE)
- **Natural Resource Management**
  - o Regional Universities Forum for Capacity Building in Agriculture (RUFORUM)
- **Governance, Security, and Justice**
  - o Institute for Security Studies
  - o University for Peace (UPEACE) Africa Programme

- **Business, Economic Development and Management**
  - University of Pretoria Gordon Institute of Business Science (GIBS)
- **Social Protection Financing**
  - University of Mauritius
- **Science, Technology and Innovation**
  - Tshwane University of Technology Institute for Economic Research on Innovation (TUT-IERI)
- **ICT for Development (ICT4D)**
  - University of Nairobi School of Computing and Informatics

Researches focus with partner institutions in South and Southeast Asia since 2012 include the following:

- **Uplands Agriculture and Food Security**
  - Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)
- **Development Studies**
  - Chiang Mai University
- **Governance, Security and Justice**
  - Sustainable Development Policy Institute (SDPI)
- **Labour Markets and Industrial Policy**
  - Indira Gandhi Institute of Development Research (IGRDI) based in Pakistan
- **Health Equity**
  - Society for Community Health Awareness, Research and Action (SOCHARA)
- **Water Resources Management**
  - South Asia Consortium for Interdisciplinary Water Resources Studies (SACIWATERS)

Research focus with partner institutions for new projects in Latin America and the Caribbean include the following:

- **Nutrition, Prevention and Control of Non-Communicable Diseases**
  - Instituto de Nutricion de Centro America y Panama (INCAP)
- **Ecohealth**
  - Communities of Practice in Ecosystem Approaches to Health (CoPEH)

For more information about IDRC and its fellowships and awards, visit www.idrc.ca/awards, or send email to rbowry@idrc.ca.

Mrs. Rita Bowry is the Senior Program Specialist for Fellowships and Awards Program of the International Development Research Centre (IDRC) of Canada based in Ottawa, Canada which supports the professional development of graduate students and researchers — both in Canada and in the developing world. She also has extensive experience as an educator and researcher in her own right. Before joining IDRC, she was field manager of environmental training and management programs in Africa. She has studied science, education, and environmental management at universities in Kenya, Canada, India, Germany, and France. Mrs. Bowry's expertise are on training policy, fellowships, competitive scholarships and awards, grants, international education, environmental management and Africa. She has worked in the field of international development for more than 20 years.

She holds a master's degree in education from the University of Ottawa and a UNEP-UNESCO post-graduate diploma in environmental management and protection from the Technical University of Dresden. *Email: rbowry@idrc.ca*
Source: http://www.idrc.ca/EN/AboutUs/WhoWeAre/Pages/DetailedIDRCExpert.aspx?ProfileID=78

Sustainable Upland Agriculture in Southeast Asia: Issues, Challenges and Opportunities

Percy E. Sajise
Honorary Research Fellow, Bioversity International; Senior Fellow, SEARCA; Adjunct Professor, UPLB School of Environmental Science and Management (SESAM)

I. Upland and its importance in Southeast Asia

Upland, in the context of Southeast Asia, is hard to define in a common way because it has several dimensions, which are emphasized differently in various countries in the region. For example, in some cases, the legal dimension prevails while in others, it is the social and physiographic characteristics which are given more emphasis. However, in general, one can define the uplands as "hilly to mountainous landscapes including the tableland and plateau lying at higher elevations which are not normally suited to wet rice cultivation unless some form of terracing and groundwater supply exists" (Sajise and Ganapin, 1991). It then follows that any form of modification of the natural ecosystems in the upland landscape by humans for the purpose of producing the requirements of food, clothing, shelter and other basic needs of human society can be considered as an upland agricultural system or agroecosystem.

Upland agroecosystems dominate the landscape of Southeast Asia. It is a very heterogeneous and fragile resource base that exists in a continuum with the lowland and aquatic ecosystems. For example, Lao PDR, which is a landlocked country in the region has 80 percent of its land area classified as uplands while the Philippines, which is archipelagic has 54 percent and Indonesia has 87 percent (Sajise and Ganapin, 1991; Pratap, 2004; Alexander et al., 2012). The landscape of Southeast Asia can also be divided into two categories: core and hinterlands. Core areas are where large-scale monoculture rice production dominates and the hinterlands or the uplands are areas which are generally sloping and where small-scale mixed farming, grazing and forestry are practiced. Core areas in the region constitute only 2.30 percent to 4.20 percent of the total area of the various countries and the rest are hinterlands.

The upland is where small-scale and marginal farmer groups predominate and upland agriculture provides the foundation for their livelihoods and food and nutrition security (Sajise and Ganapin, 1991). A survey in Lao PDR, for example, indicated that only 10 percent of upland farmers had sufficient rice each year, 71 percent of villagers claimed they had insufficient rice for 2–4 months prior to harvest each year, while 3 percent were without sufficient rice for up to 9 months of the year (Alexander et al., 2009). There are regional disparities as well as differences of vulnerabilities to food security. The upland is also important as repository of high agricultural and natural biodiversity and the indigenous knowledge (IK) system associated with these materials (Bajracharya et al., 2002).

The beneficial ecological services as well as the instability provided by the uplands to the adjoining lowland and aquatic ecosystems are also reasons for concern as well as an important consideration in promoting sustainable development. The extent and importance of the upland for food and nutrition security, ecosystem services, biodiversity conservation and sustainable use, IK, social refuge especially of ethnic groups, and the increasing demand for other uses from various sectors makes it a critical concern in the region. There is also the prevailing apprehension that upland farms, in general, are increasingly being fragmented and the demand for converting these areas into monoculture plantations for commercial crops and biofuels is increasing and could be major drivers for further creating food insecurity, environmental problems such as declining biodiversity and social problems such as increasing inequity (Hilmi, 2012).

Having defined the upland and describing why it is important, another basic premise of this paper is that sustainable upland agriculture is at the heart of sustainable agricultural and rural development in many countries of the region. Sustainable upland agriculture is primarily undertaken with the purpose of satisfying basic human needs and can be viewed as a continuing dynamic and evolving process between people and ecosystems that can foster adaptive capabilities and enhance opportunities (Holden and Linnerud, 2007). Pearce et al. (1990) further characterized this type of development as conserving or enhancing natural capital. Pratap (2004) also emphasized that sustainable upland farming will be

sustainable if it is designed to mimic the control mechanisms that occur in the upland ecosystems which recognize diversity of land use opportunities, identify and harness location specific niches and ensure a balanced relationship between people and sloping lands. These basic concepts are not new and can be traced back to the earlier concepts of human ecology and the agroecosystem analysis for sustainable management of natural resources (Rambo, 1983; Conway and Sajise, 1985).

II. Sustainable upland agriculture and the global goal of sustainable agricultural development

Conway (2012) presented facts which argue for the urgent need to embark on a pathway of sustainable agricultural development at the global, national and local levels. These facts are as follows:

- Over one billion (or 1 in 5) people live in poverty, 1.4 billion or 14 percent (or 1 in 7) are undernourished, 195 million or 1/3 of children in the developing world under age of 5 years is stunted and 868 million people experience chronic hunger. The irony of this situation is that while there is hunger and malnutrition, 1/3 of the food produced go to waste which represents a missed opportunity not only in alleviating food insecurity but also in mitigating environmental impacts. This food wastage is coming more from food being consumed in developed countries while the source is mainly lack of or an inefficient post-harvest processing in developing countries (FAO, 2013);
- World population is expected to rise to 9.3 billion by 2050 and yet there is lack of available new land for crop production, 20 percent of the world's population (more than 1.2 billion) live in areas of water scarcity, global consumption of grains and oilseeds exceeded production in 7 of the years between 2000 and 2008 and there is a rising cost of fertilizer, i.e. price of diammonium phosphate has increased by six-fold since 2008;
- Per capita incomes since 1960 have doubled in the Middle East and North Africa and have increased six-fold in East Asia and the Pacific, which is accompanied by changing dietary patterns in favor of more demand for meat and meat products, i.e. in China, meat consumption has risen from 20 kg per person per year in 1985 to 55 kg today. This change in dietary patterns will not only further put a strain on resources for crop production but animals can directly compete for grain supply that can be used for food by human society. This is inefficient because animals are located at higher trophic level in the food chain relative to the primary producers;
- Increasing demand for biomass energy production, i.e. global ethanol production increased from under 20 billion litres in 2000 to around 85 billion litres in 2010, will further compete with resources needed for crop production in the coming years; and
- The labor force for agriculture is 43 pecent women farmers worldwide which are not often given importance and yet ensuring access to resources for them would reduce malnutrition by 100-150 million. On the other hand, while employment opportunities for the youth in developed countries are markedly decreased, 38% of working youth in Africa are in agriculture but which is declining in Southeast Asia.

These facts and observations have brought about the current paradigm of sustainable agricultural intensification (SAI). SAI is a strategy of utilizing existing land to produce greater yields, better nutrition and higher net income while reducing reliance on pesticides, fertilizers and lowering emissions of harmful greenhouse gases. SAI has to be implemented in a way that is efficient and resilient and contribute to the stock of natural environmental capital (The Montpellier Panel, 2013). Sustainable upland agriculture will necessarily require that it is circumscribed by the SAI paradigm. SAI, on the other hand, is a component of the "Green Economy" agenda which came out of Rio+20 (Barbier, 2012).

At the global level, the report of the eminent persons tasked to work on the post-2015 millennium development goals (MDGs) highlighted that the goals of reducing poverty and reducing child mortality have been achieved. There are now 0.5 billion fewer people living in poverty and 30 percent less child mortality. However, inequity gap has widened. A glaring fact is that 1.2 billion poorest people account for only 1 percent of total world consumption while 1 billion richest people account for 72 percent of world consumption (Report of the High Level Eminent Persons, 2013).

Thus, the post-2015 MDGs and approaches for supporting and sustaining efforts in sustainable development at all levels are urgent and compelling. It must be a development process which is sustained and characterized by inclusive and equitable economic growth, involves integrated and sustainable management of natural resources and facilitates ecosystem conservation, regeneration, restoration and resilience. Necessarily, it should be people-centered, supportive of freedom, peace and security. It should be human rights-based, i.e. right to food, the rule of law, gender equality, commitment to just and democratic society and empowerment of women. There is a need for democracy, good governance and the rule of law at all levels. Institutions at all levels that are effective, transparent, accountable and democratic strengthened by cooperation are necessary components. As a strong foundation for this approach, people should be provided with opportunities to influence their lives and future, participate in decision-making and voice their concerns. These requirements argue for the adoption of the three pillars of sustainable development: environmental, economic and social (Hilmi, 2012; UNEP, 2012). The economic pillar is characterized as sustained, inclusive and equitable economic growth. Environmental pillar will primarily refer to natural resource management which is integrated, sustainable, ecosystem conserving, resilient and promotes regeneration. The social pillar is characterized as giving emphasis to the principles of being people-centered, gender-sensitive, human rights-based, and promote good governance and effective institutions.

The Report of the High Level Eminent Persons (2013) identified five transformation shifts which will be required to drive the attainment of the goals of sustainable development, as follows:

- Leave no one behind
- Put sustainable development at the core
- Transform economies for jobs and inclusive growth
- Build peace and effective open and accountable institutions for all
- Forge a new global partnership

The paradigm of sustainable upland agriculture will have to align to these drivers of transformations or shifts so that it will be anchored on the sustainable development paradigm especially at the national and global levels. Sustainable development can be achieved only if this paradigm is used as basis at all hierarchical levels and supported by other paradigms which are aligned to this desired overall state or condition of human and natural ecosystems.

III. Evolution of the concept of sustainable upland development

This section of the paper will briefly trace the evolution of some key concepts and methodologies related to sustainable upland agriculture development. This is a necessary step in developing the conceptual framework to identify the possible approaches towards research and development in support of promoting sustainable upland agriculture in Southeast Asia. It will be categorized into two general periods: 1980's to late 1990's and 2000 and beyond.

A. 1980's – late 1990's

During the early 1980's uplands are seen mainly as being in the domain of forestry and its use is by various ethnic groups basically practicing shifting cultivation. This period also marked the beginning of upland occupation of land-hungry migrant population from the lowlands in some countries of the region. The dominant land use of this landscape is forestry, grazing and shifting cultivation. Ownership is generally with the government and legal rights are granted mainly in the form of leasehold for a varied length of time. Shifting cultivation is practiced by upland occupants, mainly ethnic groups, which have long occupied and used this land but are considered as illegal users of the land in many cases.

In the late 1980's and early 1990's, the increasing use of uplands for various uses brought the consciousness for the following concerns: off-site impacts which were considered into cost and benefit analysis, the necessity for increasing productivity in marginal soils, and technology and technology transfer for increasing upland productivity. The uplands were also viewed as frontier areas for agriculture

extensification but its fragile nature also brought the concern for sustainability. It is also during this period when the Bruntland Report of 1986 influenced the thinking of the global community on the importance of sustainable development.

Existing literature also indicated that the main pre-occupation during this period was upland agriculture technology and technology transfer. This was the basic rationale for the development of the Farming Systems Research and Extension (FSRE) approach applied during this period designed mainly for the lowlands but which included the uplands. However, sustainable upland agriculture is more complex than just technology and technology transfer and that technology for upland development is interwoven with the cultural, economic, ecological and political dimensions (Sajise, 2012). This period also saw the birth of participatory approaches and methods with the identification and involvement of stakeholders especially the resource users in promoting upland agriculture interventions (Chambers et al., 1982; Rhoades and Booth, 1982). This approach and method became the main characteristic of the community-based resource management (CBRM) strategy across the region and around the world. Agroecosystems analysis (AE) as a method for natural resource management which applies a methodology for integrating bio-physical and socio-economic and cultural data in time and space including decision flows using the participatory method were also applied in the region in the identification of issues and research problems in a landscape consisting of interacting ecosystems (Conway and Sajise, 1985).

B. 2000 onwards

In 2000 the ecosystem approach (EA) was adopted by the Convention on Biological Diversity (CBD). It is an approach of integrated management of land, water and living resources to promote sustainable and equitable benefits. This approach is based on the following 12 principles: decentralized management; linkages of ecosystems in a landscape; conservation of ecosystem structure and function; long-term objectives; adaptive management; management in an economic context; use of all forms of information; objectives depend on societal choice; within limits of ecosystem functions; appropriate spatial and temporal scales; balance and integration of conservation and use of biodiversity; and inter-sectoral and integrated (Perez, 2008). It is a confluence of the science of ecology, economics and sociology similar to the human ecology concept much earlier advanced by Rambo (1983). More recently, this approach has been made the guiding principle of the Globally Important Agricultural Heritage System (GIAHS) implemented by the UN Food and Agriculture Organization (FAO). Payment for environmental services (PES) as an economic-ecological-institutional tool for quantifying ecosystems interactions was recognized as a tool for the application of the EA.

In 2003, multifunctionality of the agricultural systems as having production, regulation, ecosystem and cultural services functions was recognized and incorporated into agricultural systems analysis (Batie, 2003). This was followed by the sustainable livelihoods approach (SLA) in 2004 which recognized five livelihood assets of households and subject to vulnerability from external forces and affected by policies, institutions and processes (DFID, 2004). These sustainable livelihood assets as affected by p o l i c i e s , institutions and vulnerability factors will determine livelihoods strategies resulting in outcomes such as increased income, productivity and building up of natural resource capital.

The above elaborations identified some important concepts, approaches and methods for promoting sustainable development in general, which has relevance and can be applied to the goal of attaining sustainable upland agriculture and livelihoods in particular.

IV. Proposed framework for sustainable upland agriculture

Taking into account the evolution of the various paradigms, concepts, approaches and methods for sustainable development, this paper proposes that the paradigm of sustainable upland agriculture be embedded in various paradigms at various hierarchical levels: sustainable livelihoods approach and sustainable agricultural intensification at the local level, ecosystems approach at the landscape level, sustainable agricultural and rural development and sustainable development in general at the higher levels (Figure 1).

At the core and as a starting point of the proposed framework is upland agriculture intensification and sustainable livelihoods. This basic consideration will necessarily require the analysis of the status and influence of the five sustainable livelihoods assets such as the natural, physical, economic, financial and human assets. It will also bring into the picture how the combined use of these assets and their strengths and limitations will affect activities and livelihoods options for upland farmers with its corresponding outcomes. These assets and activities will be influenced by institutions, policies and vulnerability elements external to the system.

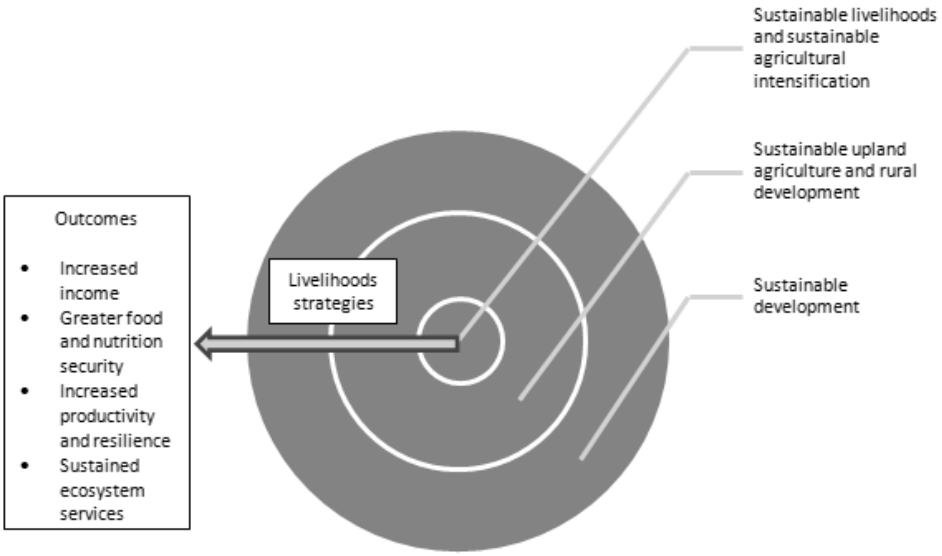


Figure 1. Basic conceptual framework for sustainable upland agriculture in the context of sustainable livelihoods, sustainable agricultural intensification and sustainable development

Forsyth (2007) strongly argued that the sustainable livelihoods approach should be seen in the context of local conditions and the adaptive behavior of upland farmers. Hilmi (2012) suggested that there should be two key considerations to bring this about: enabling factors and the application of the necessary processes at various hierarchical levels (Figure 2). These enabling factors and processes should take into consideration the necessity of being multi-stakeholder, multidisciplinary, multi-sectoral and anchored on the basic human values of human rights-based, people-centered and building up on natural capital or the ecological foundation of the natural resource base.

Figure 2. Framework for sustainable livelihoods for upland communities

The enabling factors are policy and legal tools, financial, knowledge and shared values. They should be synergistic and interactive and anchored on the three pillars of sustainable development. The following are brief descriptions of these various enabling factors:

- **Policy and legal tools** – promote basic human rights, promote free trade, eliminates subsidy, reduce greenhouse gasses;
- **Financial** – promote public-private partnership, fair input and output markets, micro- insurance, micro-finance, climate change investments;
- **Knowledge** – appropriate technology (environmentally, socially and economically viable), risk assessment for climate change, economic and environmental risk, organizational formation and institutional strengthening; and
- **Shared values** – people-centered, empowerment, human rights promotion, gender equality, inclusiveness, experimentation and innovation.

The processes and tools or methods identified in earlier research and development work which were effective in promoting sustainable development are the following:

- **For creating new linkages** – dialogues and negotiations, financial and for scaling up;
- **For exploration of new practices and capacity development** – farmer-scientist research to combine IK and formal knowledge systems, capacity development such as farmer field school (FFS); and participatory methods, i.e. participatory rapid appraisal (PRA), rapid rural appraisal (RRA), agroecosystem analysis (AE), participatory learning and action (PLA), participatory planning (PP), and participatory analysis and learning methods (PALM).

This portfolio of methodologies and approaches provide greater opportunity for promoting sustainable agriculture development in the uplands in the coming years.

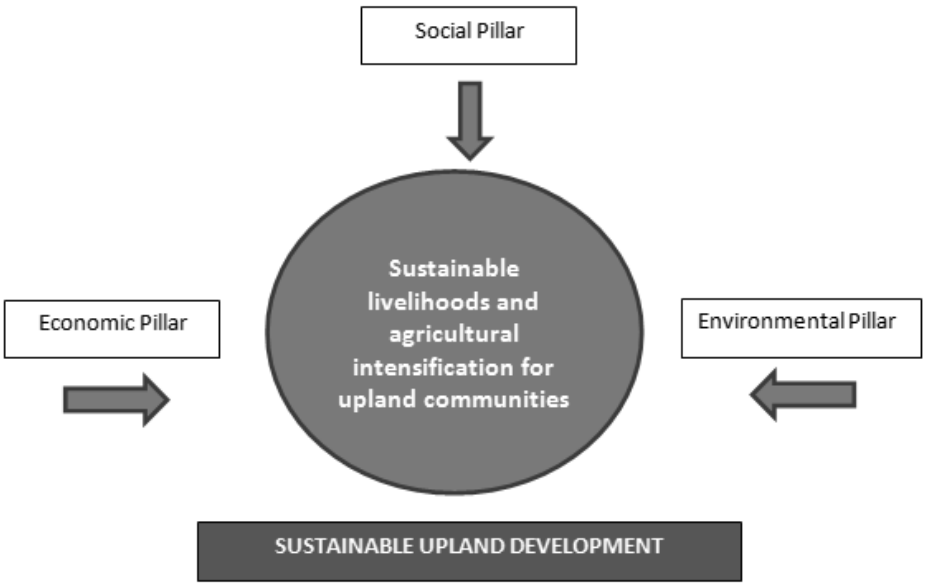
The appropriate and synergistic interactions of these enabling factors and processes are expected to generate desired outputs of sustainable upland livelihoods such as: a). greater food and nutrition security; b). ecological processes and ecosystems functions are maintained or improved; c). productive and resilient agricultural systems are developed; and d). increased income. These outputs of sustainable upland livelihoods can be assessed and appropriate indicators developed and used for baseline and in determining impacts of interventions.

This framework of sustainable upland livelihoods must be complemented by the sustainable agricultural intensification described as agro-ecological, genetic and social intensifications. It must also be anchored and embedded in the three pillars of sustainable upland and rural development as described earlier (Figure 3). This second hierarchical level assumes a different scale of analysis, i.e. landscape, river basin or watershed. At this level, the use of the 12 principles of the ecosystem approach (EA) is necessary including the use of tools such as AE and PES. It will also require a new configuration of institutional arrangements which will enhance the congruence of administrative and interacting ecosystem boundaries. Tools for communication and linking institutions and multi-stakeholders assume greater importance at this level especially in decision-making.

Figure 3. Relationship between sustainable livelihoods and sustainable upland development

V. Issues and challenges answered and unanswered

The uplands offer both opportunities and risks in the quest for sustainable development at the local, national, regional and global levels. Sustainable agricultural development is at the core of this quest. At the local and national levels, uplands offer opportunities for enhancing food and nutrition security, securing ecosystem services for other linked ecosystems, promoting biodiversity conservation, indigenous knowledge systems and promoting equity. These opportunities can be transformed into risks and constraints to sustainable development, especially if considered against the backdrop of climate change.



This could be the consequence if its management is viewed in the short term and not anchored on the principles and pillars of sustainable development. This is true for upland agriculture, forestry or any other land use for the uplands. At this point, it is useful to revisit the issues in sustainable upland agriculture development more than two decades ago (Blair and LeFoy, 1991).

Sajise and Ganapin (1991) identified some long-term issues that will determine the sustainability, productivity and equitability of agriculture in the uplands. These issues and a general assessment of their current status are the following:

1. **'Shrinking land-increasing population'.** A country, in the long run, cannot rely solely on its agricultural base. Land-based resources will not be sufficient to support projected population increases. This scenario will require increasing alternatives for off-farm or off-the-Iand sources of income. This was the thinking more than two decades ago and is a continuing issue faced by several countries in Southeast Asia. For example, the number of farmers having less than two hectares of land increased by 240 percent between 1970 to 2000 in the Philippines and 79 percent in Thailand; whereas the percent of farmers having less than two hectares as percent total of cultivated land is 94 percent in Vietnam, 88 percent in Indonesia and 45 percent in Thailand (Hilmi, 2012). The prevailing inheritance patterns also tend to promote land fragmentation and expansion of cultivation into forest land. This is a continuing issue and the Montpelier Panel (2013) has discussed this reality and came up with a list of options for food and nutrition insecure households which include the following: a) intensification and diversification of existing production patterns, b) increase farm size through consolidation and other means if possible, c) diversify livelihood and off-farm income, d) improve coverage and targeting assistance and social protection and safety nets, e) upgrading household living conditions, f) improving child nutrition and g) possible complete exit from the agricultural sector.
2. **Tenurial Forms** – in the early 1990's insecure land tenure of farmers in the upland has been identified as a major constraint for promoting sustainable upland agriculture. Governments in the region tried and implemented various policies which promoted various forms of tenurial security which are appropriate for specific cases and situations. From the time this issue was identified, there had been innovative tenurial forms which provided more security to tillers of the land in the uplands of Southeast Asia. There is still room for enhancing this strategy in some countries in the region to ensure that those marginal groups characterized as experiencing extreme poverty and food and nutrition insecurity are not left behind in the development process.
3. **Appropriate education and technology for promoting sustainable upland agriculture** – during the early 1990's, indigenous knowledge (IK) and culture are being rapidly 'eroded' by the so-called

'modern' agriculture and educational system. This was projected to have long-term consequences in the development of the uplands. This is still a current issue especially in the face of government policies for promoting large-scale monoculture agricultural and industrial crop production in the uplands in some countries in the region. There is much wisdom in looking back to the characteristics of traditional integrated agricultural systems in the uplands such as the VAC, a type of integrated production system of Vietnam, homegarden and agroforestry systems in many countries of the region in the context of sustainable upland agricultural intensification (Cuc et al., 1990; Sajise, 2012). In addition, the pattern in many countries of the region that the youth is less attracted to agriculture in general is also a concern which must be considered in terms of policies both in the education sector and in providing economic incentives to reverse the trend.

4. **Empowerment** – the highly varied and inaccessible conditions of most upland areas will require highly flexible and localized decision-making in the implementation of upland programs. It will also require the maximum use of indigenous knowledge in planning and empowerment of local communities. The challenge is how to respond to the organizational set-up of government line agencies which are highly centralized and sectoral. In the 1990's this was raised as an issue which to some extent still exists until today in some countries in the region.

5. **Equity** – in the early 1990's it was the thinking that land consolidation in the upland will again place the control of upland resources into the hands of those who have money and power. This is still a prevailing issue which is manifested in the conversion of upland areas into monoculture plantation crops and other industrial uses. This will further create a yawning gap between the rich and the poor in the landscape of Southeast Asia. The success stories in some countries in the region in bringing this about without sacrificing equity is worth looking at such as the land consolidation schemes in Malaysia.

6. **Upland-lowland interactions** – In the early 1990's there were attempts to highlight this with cost and benefit analysis of upland agriculture projects with high negative offsite impacts. Since then there were significant efforts to develop methodologies which will quantify these interactions through the integrated landscape and ecosystems approach. A methodology which had been used recently to emphasize these linkages provided by upland agriculture as ecosystem services is exemplified by Payment for Environmental Services (PES) where the big challenge is the process of identifying who will pay for what, how much and in what manner.

Additional issues after 1990 were also brought into the fore such as the following:

- **Impacts of climate change in the uplands** – the vulnerability of upland agriculture will become important in the face of increasing impacts of climate change. The losers and gainers concept in climate change will assume more importance if one looks at the landscape and interactions of ecosystems such as the upland-lowland-aquatic ecosystem continuum. The small farm holdings in the uplands plus the marginal conditions of the small upland farmers makes them more vulnerable to the impacts of climate change. The predicted extreme weather conditions will extremely affect the upland in terms of water availability, soil erosion, landslides and increasing frequency of fire. The resurgence of pests and diseases are also more likely to happen. Moreover, the upland landscape may become more attractive for property development to get away from flooding in the lowland. Safety nets for the most vulnerable groups in the uplands will have to be developed and implemented as a government policy.

- **Rapid changes in upland land use and lack of impact analysis** – the period after the early 1980's marked rapid changes in land use across upland landscapes in Southeast Asia (Meitz et al, 2009; Schmidt-Vogt et al, 2009). These changes were driven by several internal as well as external factors: a) central government policy on forest-agriculture land allocation as well as shifting policies on shifting cultivators; b) market influence at the local, national and international levels; and c) demographic policy (Mertz et al, 2009). However, there are no conscious efforts to assess the short and long term impacts of these land use changes and its general implications on sustainable development: Will it enhance food and nutrition security of the upland households? What are its impacts on ecosystem services? Will it reduce biodiversity? Who will benefit from the livelihoods generated in the long run? Will it create more inequality? Rudiarto and Doppler (2012), for

example, have shown that the opening up of more upland areas in the Dieng Plateau, Central Java, Indonesia for the cultivation of potato in response to the market have increased soil erosion.

- **Competing land use in the uplands** – the uplands have always been an arena for competing land uses which has become more intense with increasing needs for energy (biofuel plantations), industrial products such as oil palm against the need for ensuring food security for the poor and marginal groups which are using the same land resource.
- **Gender consideration** – it is reported that 45 percent of farmers worldwide are women and yet their role is often neglected. For example, they are known as keepers of agrobiodiversity and their production systems directly related to food and nutrition security of the households. Improving their access to resources would consequently improve food and nutrition security.

VI. Opportunities for research and development to promote sustainable agriculture in the uplands

There are opportunities for research and development to promote sustainable upland agriculture in Southeast Asia and elsewhere as a result of the increasing awareness for food and nutrition security, alleviation of poverty, maintaining environmental integrity and to support the attainment of sustainable development at all hierarchical levels. Such opportunities are highlighted by the output document of the Rio+20 on "The Future We Want". These opportunities are complemented by the availability of current portfolio of relevant and applicable paradigms, methodologies and approaches.

These are in the following areas:

- Assessment for identifying critical elements of sustainable upland livelihoods which need to be strengthened as well as developing indicators and measurements of the outcomes of sustainable upland livelihoods;
- Methodology (ies) for conducting these assessments and the opportunity for undertaking comparative analysis among communities and regions in the country and across countries in the region thereby sharing lessons on good and effective intervention practices;
- Identifying critical enabling factors of policy, financial and market, knowledge and shared values. The current suite of identified processes and tools/methodology which has to be conducted at different hierarchical levels of the social and ecological systems is also available and can be used for enhancing sustainable upland agriculture;
- Risk assessment methodologies for integrating climate change impacts on upland agriculture are currently in place for integration into a development planning exercises;
- Gender analysis methodologies are also available to enhance the role of women in promoting food and nutrition security and increasing income of upland households. This can be enhanced through policy support which can be provided for this purpose.

An assessment of the level of sustainability of the existing upland farming system can be developed and applied by the combined parameters and indicators for social acceptability, economic viability and environmental appropriateness (Tiwari et al 2008; Barghi et al, 2013). Critical interventions in the area of policy, technology and markets can then be formulated to enhance and bring to a higher level the sustainability of the existing upland farming system. This can be standardized and possibly used for a certification process to enhance overall sustainability of the uplands. In consideration of the ecological services provided by the upland agroecosystem to the adjoining lowland and aquatic ecosystems, the conduct of PES analysis could pave the way for support in enhancing soil and biological conservation in the uplands to solve the tradeoff between environmental and economic considerations.

In summary, our current state of knowledge on how to bring about sustainable upland agriculture in the context of sustainable upland development is much more improved compared to the situation 2-3 decades ago. This can be done through the identification and strengthening of factors, which constitute the enabling environment and the application of the necessary processes at all hierarchical levels of the socio-ecological system. The recognition of these opportunities has to be fully put in place in the area of applied research and actual upland development work across the region as time is running out in the race

between population expansion and the drive for food and nutrition security especially in the context of the currently felt and impending greater impact of climate change. A platform of exchanging lessons and best practices to promote sustainable upland agriculture in the context of sustainable development in Southeast Asia is timely and very much needed.

VII. Conclusions

Sustainable upland livelihoods are necessary for sustainable upland development which is interwoven into the fabric of sustainable development. From what we know since more than two decades ago, there are still persistent issues and challenges for sustainable upland agriculture that exist today: how it can be attained, how do you measure it, its interactions in a landscape as a continuum of interacting ecosystems and the continuing pressure exerted on this resource base in the face of burgeoning population in countries of Southeast Asia. However, at present, there are more paradigms and methodologies which one can use to improve understanding of the conditions in the upland in order to identify appropriate interventions for bringing about sustainable upland agriculture in particular and sustainable upland development in general. This improved understanding opens a wide window of opportunity to make upland agriculture and upland development provide a significant contribution to the goals of sustainable development in the post-2015 MDGs in Southeast Asia in particular and the world in general. This can happen if there will be a shift in the mindsets of researchers and development workers in the way we conduct our work by being more holistic, interdisciplinary and multi-sectoral. This in itself has been and still is a big challenge for the academe and development workers in highly sector-based and strongly disciplinary organizational set-ups. This can be done if there is political will and holistic-altruistic drive behind this noble goal for humanity.

References

Alexander, K.S., J.Millar and N. Lipscombe. 2009. Sustainable development in the uplands of Lao PDR. Sustainable Development. www.interscience.wiley.com

Bajracharya, D., P. Tiwari, R.K. Tiwari, Y. Panday, D. Panday, R.Yadav, D.K. Rijal, B.Baniya, M.P. Upadyay, B.R.Sthapit and D.I.Jarvis. 2002. Assessment of local crop genetic diversity in Nepal. In: D. Gauchan, B.R. Sthapit and D.I. Jarvis (eds). Nepal's contribution to agrobiodiversity conservation in situ: A scientific basis for policy recommendation. IPGRI/NARC/LIBIRD, Kathmandu, Nepal.

Barbier, E. 2012. The green economy post Rio+20. Science 338: 887-888. www.sciencemag.org

Barghi, H., D.Jamini, A. Jamshidi, M. Najafi and A. Alahdinivandi. 2013. Investigating determiners of sustainability in agriculture in rural areas of central district of Marivan town. International Journal of AgriScience 3(7): 543-549.

Batie, S.S. 2003. The multifunctional attributes of northeastern agriculture: A research agenda. Agricultural and Resource Economics Review 32(1): 1-8

Blair. G. and Lefroy, R. (eds). 1991. Technologies for sustainable agriculture in marginal uplands of Southeast Asia: proceedings of a workshop. Ternate, Cavite, Philippines. 10-14 December 1990. ACIAR Proceedings No. 33. 128p.

Chambers, R., A.P. Pacey and L.A. Thrupp. Farmer first innovations and agricultural research. Intermediate Technology Publications, London. 219p.

Conway, G. 2012. One billion hungry. Can we feed the World? Cornell University Press, Ithaca, New York. 439p.

Conway, G.R and P.E. Sajise. 1985. The agroecosystems of Buhi: Problems and opportunities. Bicol River Basin Program, San Jose, Pili, Camarines Sur. 277p.

Cuc, L.T., K. Gillogly and A.Terry Rambo. 1990. Agroecosystems of the midlands of Northern Vietnam. East-West Center, Hawaii, U.S.A.

DFID. 2004. Livelihoods connect, sustainable livelihood guidance sheet. Downloaded from http://www.livelihoods.org/infoguidancesheets.html

FAO. 2013. Food wastage footprint: Impacts on natural resources. Summary Report. www.fao.org/nr/sustainability

Forsyth, T. 2007. Sustainable livelihood approaches and soil erosion risks: Who is to judge? International Journal of Social Economics 34 (1/2): 88-102.

Hilmi, A.2012. Agricultural Transition. A Different Logic. The More and Better Network. Oslo, Norway. 113p.

Holden E, Linnerud K. 2007. The sustainable development area: satisfying basic needs and safeguarding ecological sustainability. Sustainable Development 15: 174–187. DOI: 10.1002/sd.313

Leisz, S.J., K. Yasuki, J. Fox, Y. Masayuki and A. T. Rambo. 2009. Land use changes in the uplands of Southeast Asia: Proximate and distant causes. Southeast Asian Studies 47(3): 237-243.

Mertz, O., C. Padoch, J. Fox, R.A. Cramb, S.J. Leisz, N.T. Lam and T.D. Vien. 2009. Swidden change in Southeast Asia: Understanding causes and consequences. Human Ecology 37: 259-264.

Montpelier Panel. 2013. Sustainable intensification: A new paradigm for African agriculture. London, Agriculture for Impact. www.Ag4Impact.org

Pearce, D., E. Barbier and A. Markandya. 1990. Sustainable development: Economics and environment in the Third World, Edward Elgar, Aldershot.

Perez, A.A. (ed). 2008. Applying the ecosystem approach in Latin America. Translated by Maria Eugenia Medina. Gland, Switzerland: IUCN vi+106p.

Pratap, T. 2004. Sustainable farming systems in upland areas. Asian Productivity Organization (APO), 1-2-10 Hirakawacho, Chiroda-Ku, Tokyo 102-0093, Japan.

Rambo, A.T. 1983. Conceptual approaches to human ecology research. Research Report No. 14, Environment and Policy Institute, East-West Center, Honolulu, Hawaii, USA.

Report of High Level Panel of Eminent Persons on the Post 2015 Development Agenda. 2013. A new global partnership: Eradicate poverty and transform economies through sustainable development. 69p.

Rhoades, R.D. and R.H. Booth. 1982. Farmer back to farmer: A model for generating acceptable agricultural technology. Agricultural Administration 11: 127-137.

Rudiarto, I. and W. Doppler. 2013. Impact of land use change in accelerating soil erosion in Indonesian upland area: A case of Dieng Plateau, Central Java, Indonesia. International Journal of AgriScience 3(7): 558-576.

Sajise, P.E and Ganapin D.J. Jr. 1991. An overview of upland development in the Philippines. In: Graeme, Blair and LeFoy Rod (eds). Technologies for sustainable agriculture in marginal uplands of Southeast Asia: Proceedings of a workshop, pp 31-44. Ternate, Cavite, Philippines, 10-14 December 1990. ACIAR Proceedings No. 33. 128p.

Sajise, P.E. 2012. Ecology, environment and sustainable development. Reflections spanning five decades. SEAMEO SEARCA and University of the Philippines at Los Banos. 151 pp.

Schmidt-Vogt, D., S.J. Leisz, O. Mertz, A. Heinimann, M.Thiha, M.Epprecht, P.V.Cu, V.K.Chi, M. Hardiono and T.M.Dao. 2009. An assessment of trends in the extent of swidden in Southeast Asia. Human Ecology 37: 269-280.

Tiwari, K.R., I.L.P. Nyborg, B.K. Sitaula and G.S.Paudel. 2008. An analysis of the sustainability of upland farming systems in Middle Mountains Region of Nepal. International Journal of Agricultural Sustainability 6 (4): 289-306.

UNEP. 2012. Avoiding future famines: Strengthening the ecological foundation of food security through sustainable food systems. United Nations Environment Programme (UNEP), Nairobi, Kenya. 63p.

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The Role of Research and Extension in Addressing Food Security Concerns in the Uplands of Southeast Asia

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I. Overview: Food Security

Decades ago, we thought of food security essentially in terms of production. It was assumed that adequate food production would ensure food in every table. Later, "hidden hunger" caused by micronutrient deficiency was observed and this led to the realization that food security is not limited to availability and access.

Now, the definition of food security is much broader. According to the Food and Agriculture Office of the United Nations, food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

Given this definition, food security has three major elements: food availability, food access, and food utilization. Food availability is a function of local production and importation. Food access, on the other hand, is determined by the purchasing power of a person. Therefore, households that have inadequate livelihood opportunities, especially those living in rural areas are deprived from access to food even though food is available.

It was reported that at present there is global surplus of food grains. However, this is just the result of inadequate consumption on the part of the poor and should not be mistaken as a sign of over-production.

The third element of food security is food utilization. According to the World Food Programme, food utilization refers to: a) households' use of the food to which they have access, and b) individuals' ability to absorb nutrients – the conversion efficiency of food by the body. Food utilization by households varies according to: (i) the facilities they have for food storage and processing; (ii) their knowledge and practices in relation to food preparation, the feeding of young children and other dependent individuals including sick and elderly people which may be impaired by low education of mothers and care givers, cultural beliefs and taboos; (iii) how food is shared within the household; and (iv) the state of health of each individual which may be impaired by disease, poor hygiene, water, sanitation, lack of access to health facilities and health care.

II. Threats to Food Security

According to the projection of the International Food Policy Research Institute, world population is expected to grow at an average rate of 1.4 percent to 2020. Population will rise by 2.7 billion in the next 30 years to reach 8 billion in 2020. In 2050, the number will rise to 9.2 billion, according to the United Nations Population Division.

More people mean more food to produce. In Southeast Asia, where major population growth rate is said to take place, per capita cereal demand for 2020 is projected to increase by 16 percent while per capita demand for meat will double.

An increase in the overall food production of some 70 percent between 2005 and 2050 has been predicted by FAO. With the livestock subsector as one of the fastest-growing in agriculture due to increased demand for meat products, it is expected that animal feed production will compete with human food production.

Studies conducted by different international organizations present that the prospect of feeding 9.2 billion

people in 2050 is uncertain. Intensified agriculture production may cope with the demand but with current farming practices, our natural resources may be compromised and still, we will not have enough food. Agriculture biotechnology has great promise in dramatically reducing dependence on pesticides, enhance the health of our agricultural systems, and increase the nutritional content of food. However, this alone may not guarantee global food and nutrition security.

Climate change risks will also have adverse impacts on food production, compounding the challenge of meeting global food demand. With the increased risk of droughts and floods due to rising temperatures, crop-yield losses are imminent (IPCC, 2007). Average annual agricultural losses in the Philippines are more than 12 billion pesos.

Looking ahead, soil erosion and the loss of farmland will also add to the challenge of boosting food production. Water scarcity is a growing concern too - lakes are going dry and underground water aquifers are being depleted at a rapid rate. Of course, we cannot discount the impacts of biodiversity loss. Although there are very site specific drivers that vary, it is more complex than it looks.

International trade and market access can also have a major impact on food security and safety. This can be of special importance for developing countries, particularly for smaller ones where the limited size of domestic markets discourages full use of production potential (FAO, 2011). With great regard to small farmers, how do we become competitive? International negotiations must be calibrated against reality to better accommodate small farm production systems.

These are the threats that we are confronted with today and compelled to overcome. Rich countries are not spared from these issues but they are most likely to hurdle them with relative ease. There is no problem too big for a great country. But how would developing countries respond? Can you imagine the gravity of these problems in the uplands of the Southeast Asian Region?

III. Food security in the uplands: Issues and Concerns

A. Nature of Uplands

In the Philippine context, uplands are areas with slopes steeper than 18%. It covers around half of the country's total land area and serve as vital support system for the downstream lowlands and aquatic areas. In particular, it provides water to rivers and lakes for irrigation; water carries decomposing organic matter to provide nutrients through surface run-off and leaching (Vergara, 1997).

Most of Philippine uplands have been deforested through illegal logging, slash-and-burn practices of upland communities, encroachment of landless lowland farmers who migrated to the uplands due to stiff competition for access to lowland arable lands.

B. Food production issues in the uplands

Perhaps, one of the major issues in food production in the uplands is low productivity/crop yield due to competition for limited sunlight and water and nutrient. Low production is further aggravated by non-adoption of soil and water conservation techniques and erosive farming techniques.

Farmers, though not all, also takes into consideration the impacts of their farming activities to biodiversity and environmental health. For this reason, we can say that damage to the ecological foundations necessary for sustainable agriculture is a grave internal threat to food security.

C. Some of the key food access issues in the uplands include:

- Resource flow to the agriculture sector is declining and indebtedness of small and marginal farm families is rising
- Input costs are increasing, while productivity is declining
- There is a need for cash crop production

- There is a need to adopt diversified farming
- Constraints to production caused by cash crops are increasing.

D. Food utilization and nutrition issues in the uplands

It is unfortunate that electrification in some upland areas is still a dream. Food storage therefore is a big constraint.

Marine products are limited and source of protein is a major problem – this will further be threatened by upland degradation. Food is one of the many footholds of culture and tradition in the uplands. We need to understand how culture and tradition are linked with or are part of production and consumption and vice-versa. Sometimes taboos impact on nutrition especially for the young and the elderly.

IV. The Role of Research

We, in the academe and in the research field, know very well that research is about finding practical solutions to real-world problems, empowering the local economy with new technology, and collaborating across disciplines on new areas of knowledge. *It is therefore imperative that we go beyond our laboratories and experimental farms. We should inform these people what we are doing, if not work directly with them. For research to have a greater impact, everyone should understand and appreciate the role of research and extension in solving problems faced by the human race.*

In the area of food security, research aims to discover the interrelationship of many variables as identified in our definition of food security: **physical, social and economic access to sufficient, safe, and nutritious food** which meets their **dietary needs and food preferences** for an **active and healthy life.** Through the many studies conducted by researchers around the world, we now understand these variables better, thus we can now respond more appropriately than before. An example is the development of knowledge into innovative technology and processes to address problems.

We are now in an era where technology advancement widens the gap between developed and underdeveloped regions or countries. Research and development is the key to address this so-called technological divide.

Research also bridges theory and practice. The information that we gather from the field serves as evidence necessary in identifying current needs and predicting future needs. These are important inputs to research and development agenda as well as policy development.

On food availability, research can bridge the gap between potential and actual yields. Since land and water will be shrinking resources for agriculture, the option left is to produce more food and other agricultural commodities from less per capita arable land and irrigation water.

Science therefore is required to raise production levels per unit of land, water, energy and time, without associated ecological harm.

Further, research connects us to the community. The practice of sound science brings us closer to the people thereby converging ideas, knowledge, and other resources.

V. The Changing Landscape of Extension Service

Working with the communities is a very important aspect of the food security agenda. Our research output should cascade down to the public, particularly to the farm communities, thus the need for truly relevant extension programs.

Literature points out that we should expand the concept of agricultural extension beyond technological training on production. It should encompass broader goals such as poverty alleviation and social equity. Even Climate Change Adaptation and Disaster Risk Reduction, biodiversity conservation, conservation of soil and water, are in line with this view of **extension as facilitation and technology transfer, extension as participation and empowerment, and extension as transformation of mindset and values**. To fully

feel its presence, we must find a means of expressing our diverse efforts to reach out to the public by getting engaged in food and nutrition security programs.

The South Korean model, as cited in the policy paper of a group of scientists, showcases a very comprehensive practice of agricultural extension. Their interventions range from health issues like organizing *tai chi* lessons, promoting hygienic practices in food processing including modernizing the kitchens and comfort rooms of women involved in food processing, and promoting diversified agriculture-based tourism such as landscape gardening.

Extension programs are meant to strengthen the capacity of the communities as well as promote knowledge management. We are now in a modern era but there are things that we still need to know from the communities. Participatory learning is now a hit, that is, scientists learn from the traditional practices of the farmers just as farmers learn from technicians and extension officers. In research, we need to provide enough spaces for the merging of minds and experiences of local and science communities, the merging of traditional with conventional science.

Modern information communication technologies (ICT) provide an opportunity for launching knowledge revolution in many parts of the globe. Our Department of Agriculture has taken advantage of the advancement in information and communication technology for its e-extension program titled "e-Learning for Agriculture and Fisheries". This program serves as a learning hub for farmers as well as agri-entrepreneurs. The Agricultural Training Institute of the Philippine Department of Agriculture led this initiative, in collaboration with other government agencies, state universities and colleges, and nongovernment organizations.

The International Rice Research Institute (IRRI) is also implementing a similar program using android applications like the Nutrient Manager for Rice Philippines.

In UPLB, we have a number of successful extension programs that is now implemented in a national scale.

Foremost is the Farmer-Scientists Research, Development and Extension Training Program or the FSTP. This program was designed to enhance the scientific skills of farmers, particularly those from upland communities, to grow crops and raise animals utilizing appropriate farming techniques. The program began in 1994 in Argao, Cebu with Dr. Romulo Davide spearheading its implementation. Dr. Davide believes in the importance and need for transferring technology to, or developing the same with, farmers making them farmer-scientists that discovers new farming technologies and producing through experimentation, high-yielding varieties of corn, vegetables, sweet potato and other crops that increased their production and income by more than 100%. Beginning 2008, the Department of Agriculture scaled up FSTP into a national program, producing farmer-scientists among Mangyans in Oriental Mindoro and the B'laan tribe in Sarangani FFS (Tupaz, 2012).

For upland communities, we have the Conservation Farming Village (CFV). This is a modality for enhancing the transfer of conservation farming technologies and practices anchored on participatory planning, monitoring, and evaluation processes at the community level. It is an *in situ* showcasing of model S&T based farms within a model village where practitioners, farmers and other stakeholders could observe and have hands-on experience in technology application.

International organizations like the World Agroforestry Centre (ICRAF) have pioneered Landcare in the Philippines.

Landcare refers to groups of people who are concerned about land degradation problems and are working together to safeguard the long-term health of the land. It evolved as a community-based approach designed to effect change in complex and diverse situations. In the Philippines, the Landcare movement initially arose for rapid and inexpensive dissemination of new conservation farming technologies and agroforestry practices to upland farmers. It was based on the innate interest of farmers to learn and share knowledge about new technologies that generate higher incomes and conserve natural resources (Garrity and Mercado, 1998, Mercado et al., 2000)

VI. Food security in the uplands: The way to go

While we can and should rejoice on the modest achievements of farmers, scientists/researchers, extension workers, and policy makers, there is yet no reason to believe that we have finally arrived at our final destination. The journey is not done and I do not know when and how we will get there. We should be unceasingly active in research and extension efforts and make sure that our work is not an isolated intellectual exercise, in time and space.

Since food security is a nexus of many factors, convergence of stakeholders and efforts is of prime importance. This can be achieved through regional collaboration, sharing of lessons learned, research capacity building, and increased government funding.

Let me share with you the convergence strategies outlined by a group of UPLB scientists to achieve food and nutrition security in the Philippines.

1. **Policy convergence** - enactment of a comprehensive National Food and Nutrition Security Act harmonized with international regulations and standards. This is the first necessary pre-condition for a unified program on food security to flourish: one policy, one program, one institutional framework.
2. **Convergence in policy delivery system** - This can be done by formulation of a single national food and nutrition security action plan, framework, budget and results-based monitoring and evaluation system. This is to assure immediate, optimum, and sustained impacts in addressing the hindrances to food security.
3. **Convergence in financial mechanisms** - funding support should promote the convergence strategy such that local enterprises will generate income for food and nutrition security. The end in view is to improve the local and household economies so that all families will have the minimum necessary ability to buy enough, safe and nutritious foods.

- **Spatial convergence** - declare food and nutrition security zones like areas with high food production capacity/potential; areas that are food and nutrition insecure. Equally essential is to identify these zones in areas where the food supply sufficiency can be realized with minimum, if not totally without, serious impacts on ecology and the environment. In sum, spatial convergence should be pursued in the context of converging goals of food production sufficiency and environmental protection.

4. **Convergence of competencies** - Organize collaborative research, development and extension services (CRDES) in all provinces. CRDES is a forum for LGU-academe-regional offices of DA and NNC-civil society-private sector to promote the convergence of resources in managing food and nutrition security program and delivery of services. This was piloted by the UPLB- College of Public Affairs and Development. A perfect illustration of our efforts to develop comprehensive, integrative, and systematic solutions to the problems that threaten our society and our environment. Problems that require solutions that are possible only when discipline, expertise, minds and hearts join together defying the imperfections of human laws and institutions.

VII. Concluding Statement

Indeed, we, like all of you, will definitely be not without these political and institutional weaknesses to contend with, particularly as we do research to promote food security and environmental security in upland areas. But we need to persevere. The challenge before us is daunting but this should not be a cause for resignation and inaction but rather, this should be a driver of optimism and greater resolve. As researchers and experts in our own fields, there is much that we can contribute. Add up to the body of knowledge; reach out to our farmers and to the public; and together, we can make our bid for a food secure Southeast Asia successful.

References

Cruz, R.V.O., et. al. (n.d.). Climate Change and Sustainable Upland Farming: The Case of the Baroro Watershed, Project Proposal: Project 1: Establishment of "Barangay Sagip Saka" (Conservation Farming Villages - CFVs). UPLB, College, Laguna: College of Forestry and Natural Resources.

D.P. and Mercado, A. Jr. 1998. The Landcare approach: A two-pronged method to rapidly disseminate agroforestry practices in the upland watersheds. International Center for Research in Agroforestry, Southeast Asian Regional Research Programme, Bogor, Indonesia. 6 pp.

E-learning for Agriculture and Fisheries homepage. Department of Agriculture Extension Program. Retrieved on 18 September 2013 from http://e- extension.gov.ph/elearning/.

Food and Agriculture Organization. (2009). How To Feed The World in 2050, Economic and Social Development Department, Rome, Italy, retrieved on 28 June 2013 from http://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf.

Food and Agriculture Organization. (2011). Major Challenges to Food Security in the 21st Century. Rome, Italy. retrieved on 28 June 2013 from http://www.fao.org/docrep/015/i2307e/i2307e01.pdf

Mercado, A. Jr ., A., Patindol, M. and Garrity, D.P. 2000. The Landcare experience in the Philippines: Technical and institutional innovations for conservation farming. In: Changing Landscapes — Shaping the Future. Proceedings of the International Landcare Conference and Exhibition, Melbourne, Australia, March 2 to 3. Pp. 236-244

Mercado, A. R. Jr. and D. P. Garrity. The Landscape Approach: Enhancing Community Participation in Sustainable Agriculture and Natural Resource Management in the Uplands, retrieved on 18 September 2013 from http://www.worldagroforestry.org/sea/Publications/files/paper/PP0081-04.PDF.

Rosegrant, M.W., et. al. (October 1995) Global Food Projections to 2020: Implications for Investment, International Food Policy Research Institute. Washington, D.C., retrieved on 28 June 2013 from http://pdf.usaid.gov/pdf_docs/PCAAA662.pdf.

Serrano, RC, AM Daño and JM Pulhin. Landscape-wide Analysis of the Environmental and Socioeconomic Impacts of Upland Farming in Manupali Watershed, Philippines. In www.asb.cgiar.org/.../02-5a%20Philippines%20site.doc (retrieved on 18 September 2013)

The First Ten K R Narayanan Orations: Essays by Eminent Persons on the Rapidly Transforming Indian Economy, retrieved on 18 September 2013 from http://epress.anu.edu.au/narayanan/mobile_devices/index.html.

Tupaz, V. 2012. RM awardee: Science in the hands of Pinoy farmers. Retrieved on 18 September 2013 from http://www.rappler.com/move-ph/11465-scientist-farmer- magsaysay-laureate-honor-our-farmers-with-dignity.

United Nations Department of Public Information. World population will increase by 2.5. billion by 2050; people over 60 to increase by more than 1 billion. News and Media Division, New York, retrieved on 18 September 2013 from http://www.un.org/News/Press/docs/2007/pop952.doc.htm.

Vergara, NT. 1997. Current Upland Issues. In: Integrated Pest Management for Agroforest Farms: A Training Manual. Plan International Philippines and UPLB Agroforestry Program. ISBN 971-547-124-2. Pp 21-41

Velasco, Luis Rey, et. al. Agenda for Food & Nutrition Security in the Philippines. UP Policy Paper Award 2011.

WFP Indonesia: Working Together to Solve Hunger. Retrieved on 18 September 2013 from http://www.foodsecurityatlas.org/idn/country/fsva-2009/chapter-4- food-utilization.

Dr. Rex Victor O. Cruz is currently the Chancellor of the University of the Philippines Los Baños (UPLB). He was the former Dean, College of Forestry and Natural Resources, UPLB in 2008-2012 before he became Chancellor. He attained his Ph.D in Watershed Management (Major in Watershed Hydrology, Minor in Soil and Water Conservation), School of Renewable Natural Resource at the University of Arizona, Tucson, Arizona, USA, in May 1990. He finished M.S in Forestry (Major in Watershed Management, Minor in Soil Science), and B.S in Forestry, major in Forest Resources Management, Minor in Forest Biological Science, College of Forestry both in UPLB. Prior to joining UPLB, he served as Senior Agribusiness Professor at the Graduate School of Business De La Salle University, Makati City, Philippines September 2004-2006 as Assistant Professor and Agribusiness Cluster Head of the School of Management, University of the Philippines in Mindanao (UPM), Davao City, Philippines June 1998-June 2004 and University Extension Specialist of UPM, Davao City, Philippines from June 1997 toJune 1998.

Dr. Cruz has received numerous awards for his achievements. Among the most recent awards include being a member of a panel of experts of the Intergovernmental Panel on Climate Change (IPCC) that won the 2007 Nobel Peace Prize with the former US Vice President Al Gore. His paper entitled "Yield and Oil Content Ideotypes Specification in Jatropha curcas L." won Best Scientific Poster Award for Agricultural Sciences by the National Academy of Science and Technology on 15 July 2010.

In 2009, he received the 2009 Distinguished Scientist Award (Basic Science Achievement Award) from the National Research Council of the Philippines for his outstanding accomplishments in research on climate change and watershed management. He was named as one of the Ten Outstanding UPLB Alumni Awardees of the University of the Philippines Los Baños Alumni Association in 2009 and one of the Most Illustrious Sons of the Province of Laguna in 2008, by the Members of Sangguniang Panglalawigan of Laguna. *Email: rexcruz@yahoo.com*

Comparative Use and Application of Indicators and Methodologies in Assessing Sustainable Upland Agriculture and Food and Nutritional security

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Importance of sustainable upland agriculture in Southeast Asia

The upland is the "life support of the lowland and aquatic areas" which is a fragile ecosystem. It contains the tropical forest ecosystem which is the oldest and most productive and protective ecosystem on earth. It is the place where an increasing population of the "poorest of the poor" live and is expected to absorb more of the expanding population. The uplands can be a destabilizing force in the peace and security of the country if environmental and socioeconomic conditions do not improve.

Sustainable development has been defined as that "development that meets the needs of the present without compromising the ability of the future generations to meet their own needs." (WCED, 1987). The Agenda 21 as adopted in the Rio Summit of 1992 defined sustainable development as the harmonious integration of economic activity and responsible governance vis-a-vis social and human development and the maintenance of cultural, intergenerational and ecological integrity.

Sustainable upland agriculture is the management of agricultural systems in the uplands to satisfy changing human needs in the context of various stresses, including climate, while maintaining or enhancing the quality of the environment and conserving natural resources. Sustainable upland agriculture is expected to increase productivity and the income of local farming households, enhance stability and sustainability of the system through soil, water and nutrient conservation, and increase equity. Productivity is determined by the amount of biomass produced per unit area per unit time; e.g. yield per hectare per cropping; and income per household derived from the products. Enhanced stability and sustainability is the ability of the system to maintain a certain level of productivity needed to meet the needs of the households. Increased equity reflects the evenness of distribution of productivity among beneficiaries. Factors affecting equity include land tenure and differential access to modes of production. As a property of the system, sustainability must consider the biophysical (nutrient cycling, soil quality maintenance, biotic diversity, water conservation, biomass production) and socio-cultural (participation, social structure and organization, economic viability, gender concerns, information flows, linkages and networks) dimensions.

Sustainable upland agriculture improves food and nutrition security of the farming households, promotes environmental stewardship which involves the maintenance of environmental quality and eventually the preservation of the productive capacity of the land, and supports economic and social development goals among households.

Food Security as a function of sustainable upland agriculture

The Food and Agriculture Organization (FAO) of the United Nations defines food security as a condition that "exists when all people, at all times, have physical, social, and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life." Food and nutrition security may be measured using the following indicators of the National Economic Development Authority (NEDA) of the Philippines (2010): decreased food subsistence incidence, and food calorie intake vis-a-vis the national health standards.

According to Paul Teng (2012), food security is beyond just production, and Asia should be concerned because it has been predicted that by 2050, Asia will have a population of 5.1 billion, with 3.7 billion living in urban areas; thus the need to increase food supply by more than 70%. Since food supply needs to be increased, agricultural productivity also needs to be increased by 200% in small farms and by 20% in commercial farms (IFPRI, 2007). The increasing demand for animal protein food and high value imported food results to increased production of protein food which puts pressure on grain and water, as well as continued reliance on grain imports from outside Asia.

Integrative approach to assessing sustainable upland agriculture

There are different approaches and methodologies in assessing sustainable upland agriculture. The sustainable livelihoods approach in assessing livelihood sustainability of the households is better illustrated by the sustainable livelihood framework (Carney et.al, 1999) in Figure 1.

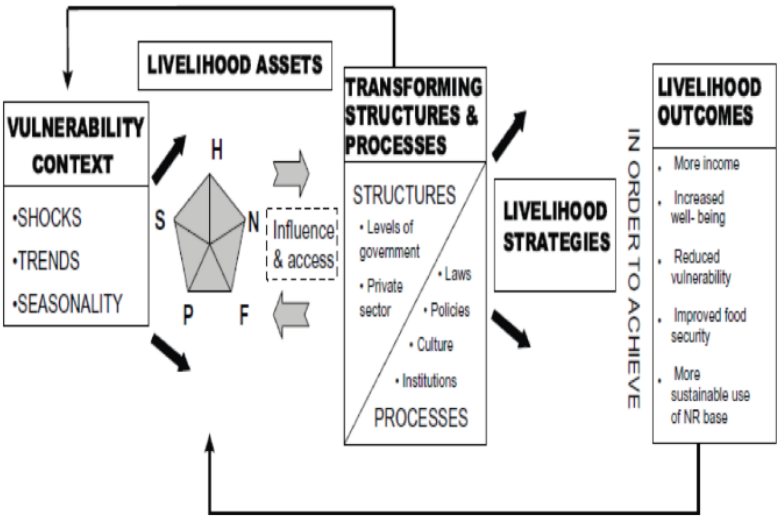

Figure 1. Sustainable livelihood framework

The livelihoods approach puts together the principal components of the livelihoods definition and the interaction among these components (Espaldon in FAO, 2009).

Since capital assets are at the center of the livelihoods framework, the asset-based assessment by Espaldon et.al. (2008) is presented in Table 1.

Table 1. Asset-based assessment

Asset-based assessment (Espaldon et al, 2008)	
Natural capital natural resources used in the livelihood activities such as crops cultivated, animals raised, areas of pasture leased or accessed by license, and farm by-products. **Physical capital**-- is the physical properties or assets of the household and community that are used in the livelihood activities, e.g. farms, house, farm implements, or at the community or citizen level will also include infrastructures such as water systems, road networks, energy distribution system and communication system.	• **Financial capital**- resources available to people such ad household income, expenses, savings and credit. • **Social capital**- refers to social resources upon which people draw in pursuit of livelihoods, e.g. social relationships, such as kinship networks, associations, membership organizations and peer-group networks. • **Human capital**- capacity of the people in terms of their health, knowledge, skills and education to pursue different livelihood strategies.

Meanwhile, the indicator system of assessment by Nha Trang (2008), considers the natural, physical, human, financial, and social capitals as indicators of sustainability (Table 2).

Table 2. Indicator system by Nha Trang

Indicator system (Nha Trang, 2008)	
• Natural Capital – Efficient use of materials and energy saving – Efficient use of water • Physical capital – Addition to physical structure for integrated farming – Build up of rural physical assets – More efficient use of built physical assets in rural area • Human Capital – Food and nutrition security – Seasonal food security	• Financial Capital – Household saved expenditure in protein food items. – SSA serves as a source of household economic security • Social Capital – Social participation – Women empowerment – Fostering social harmony – Part of a long-term livelihood strategy

Conclusion

The indicators system for assessing sustainable upland agriculture can be based on system properties of agroecosystems such as productivity, stability, sustainability and equity. It can also be based on the characteristics of sustainable agriculture such as provision of food and nutrition security, environmental stewardship, and enhanced socio-economic needs of households and communities. As regards the methodology of assessment, the following can be employed: a) quantitative method such as analysis of economic returns to inspect viability; b) sustainable livelihood (SL) framework, which employs both descriptive and quantitative approach to estimating sustainability with improving assets of household and community; and c) the highly qualitative approach.

References:

Farrington, J., Carney, D., Ashley, C. and Turton, C. 1999. Sustainable livelihoods in practice: early applications of concepts in rural areas. ODI Natural Resource Perspectives No. 42.

Espaldon, M.V.O. 2009. Theory and practice of sustainable livelihood development, pp. 135-144. In M.G. Bondad-Reantaso and M. Prein (eds). Measuring the contribution of small-scale aquaculture: an assessment. FAO Fisheries and Aquaculture Technical Paper. No. 534. Rome, FAO. 2009. 180p.

Espaldon, M.V.O. and Espaldon, C.F. 2008. Mainstreaming Climate Change among Farming Communities in the Philippines: Heeding the Cries of the Skies. A video documentation. UPLB and World Agroforestry Center.

FAO (Food and Agriculture Organization). Population Institute. FAO says Food Production must Rise by 70%. Available at http://www.populationinstitute.org/resources/populationonline/issue/1/8/.

FAO Food Security Statistics. 2003. Available at http://www.fao.org/economic/ess/food-security-statistics/food-security-statistics-by-country/en/. Accessed on 22 November2010

IFPRI (2007), "The Future of Small Farms for Poverty Reduction and Growth. 2020", Discussion Paper 42, prepared by Peter Hazell, Colin Poulton, Steve Wiggins, and Andrew Dorward, page 1.

Nha Trang, 2008. FAO Expert Workshop on Methods and Indicators for Evaluating the Contribution of Small-Scale Aquaculture to Sustainable Rural Development". Nha Trang, Vietnam. 24 to 28 November 2008

NEDA, 2010. Philippine Development Plan 2011-2016. Available at http://www.neda.gov.ph/wp-content/uploads/2013/10/pdprm2011-2016.pdf

Teng, P. (2012). Food Security and Climate Change Impact on Urban-Rural Linkages. Available at icciafes.searcabackup.org/downloads/presentation/Food-Security-and-Climate-Change-Impacts-on-Urban-Rural-Linkages - Paul S. Teng.pdf

University of the Philippines Los Baños. 2001. UPLB Land Grant Master Plan. WCED. 1987. Our Common Future. Oxford University Press. pp 1-27.

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Dr. Espaldon has held the UPLB Centennial Professorial Chair in 2010 and SEARCA Professorial Chair for Geography in 2003. She had been a Visiting Professor at the Department of Geography, European Institute for Marine Ecosystem Studies, University of Brest, France; and a Visiting Scientist at the Department of Soils and Geology in Wageningen Agricultural University (WAU), the Netherlands.

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THESIS PROPOSALS

THESIS PROPOSALS

Rationale and mechanics of proposal presentation

Dr. Maria Cristeta N. Cuaresma, Consultant of the Graduate Scholarship Department, presented the mechanics and rationale of the session and facilitated the presentation of the scholars' thesis proposals. The presentation of the thesis research proposals provided training to IDRC-SEARCA scholars in communicating their research problems. It also allowed them to benefit from the comments of the advisory committee members and other resource persons present during the conference in order to further improve theirs research plans.The presentation was also a venue to get to know what other scholars are working on, as well as a way for them to learn from each other's presentations. Each scholar was given 15 minutes to present his/her proposal. After the presentation, the project advisory committee members, Dr. Mom Seng, Dr. Prasit Wangpakapattanawong, Dr. Oscar B. Zamora, and Dr. Gil C. Saguiguit, as well as Dr. Percy E. Sajise, Dr. Julian Gonzalves and Ms. Rita Bowry, made comments and gave suggestions to their proposals. Dr. Vo Tong Xuan, who was not able to attend the conference, sent his comments to the proposals via email.

CHIANG MAI UNIVERSITY

Utilization of Earthworm (Perionyx excavatus) and Locally Available Materials as Supplemental Diet for Common Carp (Cyprinus carpio L.) Cultured in Yen Chau District, Son La Province, Northwest of Vietnam

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I. Introduction

Son La province is located in the mountainous region of Northwest Vietnam. It has a population of 1,092,700 comprising of six (6) different ethnic groups, namely Thai, H'mong, Muong, La Ha, Khang, and XinhMun. With a total area of 14,055 sq km, Son La is the third biggest province and is holding 4.27% of the total area of Vietnam (People's committee Yen Chau, data referring to 2010).

Yen Chau is a district of Son La with a population of 69, 800. Approximately 54% of this number belongs to the Black Thai ethnic minority (People's committee Yen Chau, data referring to 2010). The Black Thai farmers usually live in the valleys, where they are able to produce paddy rice, maize, cassava and occasionally cotton. The production of fish in a small pond system is also a typical activity that provides an important source of nutrition for humans and contributes to food security in the region (Edwards, 2000, Steinbronn, 2009). In addition, products from aquaculture systems can be sold at local markets and lead to increased household income (Steinbronn, 2009). This aquaculture system is characterized by poly-culture of Grass carp (Ctenopharyngodonidella) and other species including Common carp (Cyprinuscarpio), Mud carp (Cirrhinusmolitorella), Bighead carp (Aristichthysnobilis), Silver carp (Hypophthalmichthysmolitrix), and tilapia (Oreochromisniloticus) in a semi-intensive system (Steinbronn S, 2009). Weeds from the paddy fields, leaves from the upland fields, crop residues such as cassava peelings and rice bran, as well as manure from large ruminants and pigs serve as inputs for ponds; such feed is mainly consumed by the macro-herbivorous grass carp. As the production of natural feed is restricted in this system, the other species usually show much lower growth rates than grass carp (Steinbronn, 2009). The annual fish yields are relatively low, at only 1.5 tons per ha per year (Dongmeza E et al., 2009) as compared to other integrated carp poly-culture systems in northern Vietnam which have reported yields of up to 6.7 tons per ha (Red River delta) (Luu et al., 2002). To avoid the risk of losing grass carp, farmers tended to change the composition of the fish species stocked in favor of species such as common carp and mud carp, without having an appropriate feed base for these species (Tuan et al., 2010, Steinbronnet al., 2009).

On the other hand, Yen Chau's farmers often produced redundant surpluses of agricultural products such as cassava and maize. GSO reported that Son La produced approximately 506,100 tons, 351,500 tons and 102,000 tons of maize, cassava and soybean respectively in 2011. Most of these products were sold to traders from the lowlands at relatively low prices. These products were then used as ingredients to formulate feed for animals, as well as for fish species, in the lowlands. Therefore, if farmers in Yen Chau could process those crops by themselves for use in fish culture, they could turn crop surpluses, which currently bring very little value, into 'value added' products. Moreover, Müller et al., 2012 revealed that earthworm has, recently, been produced locally using leaf litter, cattle and buffalo manure, etc. Earthworm culture could also increase household fish production without conflict with other production activities.

II. Rationale

Improvement of the feed base for the non-grass carp fish species by developing cost-effective diets is expected to significantly enhance the fish production and therefore farmers' income. However, an evaluation of the effect of using earthworm meal (Perionyxexcavatus) and other available materials as supplemental feed for common carp is necessary prior to recommending its use to farmers. Thus, this study will evaluate the influence of diets using earthworm meal and the available crop surpluses in Yen Chau district on the growth of the common carp.

Note: Adviser-Mintra Seel-Audom (Mint)

III. Objective/Research Hyphothesis

Objective

To evaluate the effects of diets using earthworm, soybean meal, corn meal, cassava meal and rice bran on growth function of common carp.

Hypothesis

Supplemental feeds using earthworm and other locally available materials improve common carp production and economic return to farmers in Yen Chau district, Son La province.

IV. Importance of the Study

From the developed cost-effective diets and the resulting analysis, one diet will be selected based on the fish growth and economic benefits and this diet will be introduced to farmers in Yen Chau district, Son La province through Yen Chau Extension Station (Yen ChauDepartment of Agriculture and Rural Development)

V. Location of research

This research will be done in Vietnam and at the Department of Animal and Aquatic Science, Chiang Mai University, Thailand.

VI. Methodology

Experimental diets

Four diets will be formulated to contain various percentages of earthworm powder, heated soybean, rice bran, cassava and corn. All diets should contain 30% protein and 11% lipid.

Experimental procedure

Common carp will be stocked in a tank for one week prior to experimental regimen, in order to condition them to the laboratory system and handling procedures.

At the start of the growth trial, the fishes of 20-gram body weight will be randomly distributed into 12 tanks, with three replicates per diet. Each tank will contain 10 common carp.

Sampling Procedure

The feeds offered will be recorded daily and samples will be collected twice a week for chemical analysis. Before and at the end of the experiment, all fish will be measured according to length and weight.

Prior to final weighing and sampling for chemical analysis, fish will be starved for 24 hours. At the termination of the experiment, fish from each tank will then be collected for proximate analysis. The fish will be killed by immersing in ice water. Fish carcass samples will be analyzed for crude protein, crude fat and moisture content according to the methods described by the Association of Official Analytical Chemists AOAC, 1995.

Feed samples will be analyzed for DM, nitrogen (N), ether extract, and organic matter (OM) according to the procedures of AOAC (1995).

Calculation of fish performance and statistical analysis

$$\text{Feed conversion ratio (FCR)} = \frac{\text{Dry feed consumed (g)}}{\text{Wet weight gain(g)}}$$

$$\text{Protein efficiency ratio(PER)} = \frac{\text{Wet weight gain(g)}}{\text{Protein consumed (g)}}$$

$$\text{Specific growth rate (SGR)} = \frac{[\ln \text{finalweight (g)} - \ln \text{initial weight (g)}]}{\text{Time (days)}} \text{x } 100$$

Data Analysis

Data will be analyzed by ANOVA with GLM procedures using SAS (1996). The least squares mean (LSM) will be compared for significance of the difference using Duncan's New Multiple Range Test.

VII. Research Schedule

Months Tasks	Feb. 2014	Mar. 2014	Apr. 2014	May. 2014	Jun. 2014	Jul. 2014	Aug.2 014
Defend proposal							
Pick up ingredients and feeds from Vietnam and set up experiments in Thailand							
Start experiment							
Data Analysis and statictics							

REFERENCES

Association of Official Analytical Chemists (AOAC) (1995). Official Methods of Analysis, 16th ed. AOAC, Arlington, VA.

Dongmeza E, Steinbronn S, Francis G, Focken U, Becker K (2009) Investigations on the nutrient and anti-nutrient content of typical plants used as fish feed in small scale aquaculture in the mountainous regions of Northern Vietnam. Animal Feed Science and Technology 149(1-2): 162-178.

Dongmeza E, Steinbronn S, Francis G, Focken U, Becker K (2010). Investigations on the digestibility and metabolisability of the major nutrients and energy of maize leaves and barnyard grass in grass carp (Ctenopharyngodonidella). Aquaculture Nutrition 16(3): 313-326.

Luu LT, Trang PV, Cuong NX, Demaine H, Edwards P, Pant J (2002). Promotion of small-scale pond aquaculture in the Red River Delta, Vietnam. In: Edwards P, Little DC, Demaine H (eds) Rural aquaculture. CABI Publishing, Oxon/New York, pp 55–75.

Mayrhofer R, Soliman H, Saleh M, Pucher J, Focken U, Trang T, Van KV, El-Matbouli M (2010). Preliminary results on the cause of grass-carp disease outbreak in Yen Chau, Son La Province, Vietnam.International Symposium "Sustainable Land Use and Rural Development in Mountainous Regions of Southeast Asia". Hanoi, Vietnam. July 21-23, 2010.

Müller J, Pucher J, Thu TNT, Focken U, Kreuzer M (2012). The potential of vermiculture to produce on-farm feed resources for aquaculture in mountainous areas of North Vietnam. International Scientific Conference "Sustainable Land Use and Rural Development in Mountain Areas". Stuttgart, Germany. April 16-18, 2012.

Nguyen SH, Bui AT, Le LT, Nguyen TTT, De Silva SS (2001). The culture-based fisheries in small, farmer-managed reservoirs in two Provinces of northern Vietnam: an evaluation based on three production cycles. Aquaculture Research 32, 975–990.

Steinbronn S (2009). A case study: fish production in the integrated farming system of the Black Thai in Yen Chau district (Son La province) in mountainous North-Western Vietnam – current state and potential. Dissertation, University of Hohenheim, Stuttgart.

Tuan NN, Focken U(2010). Development of local, low cost fish feed in mountainous regions in Vietnam. Paper presented at the International Symposium "Sustainable Land Use and Rural Development in Mountainous Regions of Southeast Asia". Hanoi, Vietnam, 21-23 July 2010.

Tuan NN, Focken U(2009).Earthworm powder as potential protein source in diets for common carp (Cyprinuscarpio L.). Paper presented at the Tropentag 2009 "Biophysical and Socio-economic Frame Conditions for the Sustainable Management of Natural Resources". Hamburg, Germany, 6-8 October 2009.

Assessing Rice Farmers' Use of Seasonal Weather Forecasts Data to Cope with Climate Variability in Central Highland of Vietnam

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I. Introduction

Climatic factors are key determinants to crop production processes. Solar radiation, rainfall and temperature fluctuations lead to water deficit, flood, change in soil moisture content, and pest and diseases outbreak. These constrain crop growth and account for 15-80% of the variation of inter-annual yield (Oerke et al., 2009; World Meteorological Organization, 1981; Yoshida and Parao, 1979; Lansigan et al., 2000).

Climate prediction or forecast is one among many sources of information that can be used by decision makers to adapt to climate variability and optimize gains in agriculture, where outcomes are often closely linked to climate patterns and factors (Hammer et al., 2001). In many cases, the indigenous forecast systems based on indigenous knowledge and past experience of farmers become less credible (Baigorria, 2007). The provision of seasonal weather forecasts (SWFs) enables farmers to organize and carry out appropriate activities to cope with climate risks. Thus, it is essential that farmers take advantage of the SWFs (World Meteorological Organization, 1981).

The current situation is that too few farmers consider forecasts in relevant farming decisions. Given the amount of effort and investment currently dedicated to developing and improving the forecasts, it is important to investigate and understand why the extent of farmer's use and influence has not changed (Hu et al., 2006).

II. Rationale

In the face of increasing climate variability, rice farmers could no longer rely on the traditional farming calendar and the existing indigenous knowledge and experience on predicting weather. As a result, the risk of failure in rice production has increased, particularly those on rainfed farming lands. The use of appropriate SWFs has the potential to help vulnerable farmers to adapt to climate change. Thus, it is necessary that farmers are able to access and use more efficient climatic forecasts/information for preparedness and adaption to climate variability in rice production. However, the use of SWFs is a big leap for the farmer. Hence, understanding farmers' use of SWFs, as well as exploring internal and external motivational factors that enhance or motivate farmers to consider using SWFs in their rice faming management play a significant role for scientists working on rural development. This study can assist to inform and improve the farmers' use of SWFs to help them adapt to climate variability.

III. Objectives

This study aims to answer the following key questions under the context of rice farming systems in the central highland of Vietnam:

1. What are the impacts of climate variability on rice production in the study area?
2. How are rice farmers using SWFs to adapt to climate variability in the highland area?
3. What are the factors influencing the use of SWFs in the rice famers' decision making?

To answer the questions above, this study aims to achieve the following objectives:

- Investigate the impact of climate variability on rice yield in the highland area;
- Explore the use of SWFs by rice famers in coping with climate variability in the highland area; and
- Assess the factors influencing the use of SWFs by rice farmers in making decisions.

Note: Adviser- Assoc. Prof. AttachaiJintrawet

IV. Importance of the Study

The results of this research will provide local governments with information that can be used to improve their rural socio-economic development plan and assist farmers in reducing climate risks. This will also help meteorological centers and agricultural extension units to make proper adjustments in terms of communicating climate information to farmers. Subsequently, the accessibility of SWFs to farmers will be enhanced and thereby reduce livelihood failure due to climate risks and take advantage of favorable climate conditions.

V. Methodology

Conceptual Framework

This framework illustrates the factors that influence how farmers use SWFs in decision making to cope with climate variability.

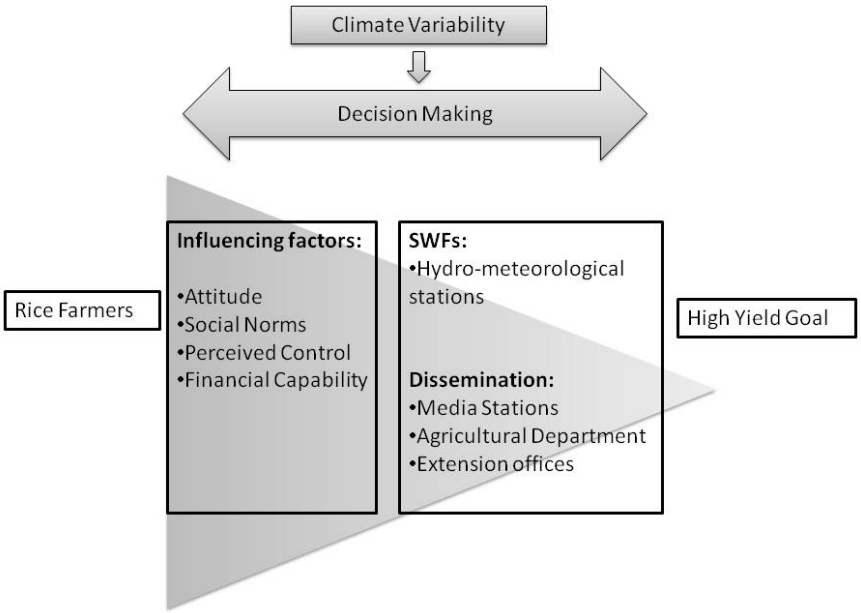


Figure 1: Research conceptual framework, adapted from Reyes et al., 2009

Farmers consider climate variability that relates to biophysical elements and other related resources to make decision on their rice farms (Reyes et al., 2009). The attitude, social norm, perceived control, and the financial capacity of the farmer complete the mix. The challenge for change agents is to diligently consider this complex mix in addressing needs and identifying appropriate entry points for institutional support like SWFs and development interventions. This study attempts to characterize the rice farmer, by focusing on attributes that influence his decision making in relation to rice farming and use of SWFs. This would allow better understanding of the subject and permit a more workable fit between needs and proposed interventions.

Study area

The research will be conducted in Nam Dong district which lies in the south-west of Thua Thien Hue province in central Vietnam. Nam Dong is one of the poorest districts of the country. Five percent of the total district area (5,272 hectares) are agricultural land, of which 2,497.2 hectares (47.03%) are planted with rice, while the remaining area are planted with vegetables, perennials and other annual crops (Nam Dong Statistic Data, 2009).

The district's agricultural produce focuses on rice, maize, cassava, sweet potato and vegetables such as

melon, bitter gourd and chili. Food production reaches 3.850 tons. The district's communes are mobilizing local residents to leave traditional cultivation (slash, burn, sowing) for intensive rice and vegetable growing (District Socio-economic Report, 2012).

According to the District Socio-economic Report (2012), rubber trees are considered as a backbone of economy in the commune. The total area for rubber trees has grown to 3,538 hectares with 900 hectares under exploitation. The average income per hectare at USD150 is an important contribution to the economic development of the local people.

Due to the geographical characteristics of location, topography, climate and hydrology mentioned earlier, Thua Thien Hue is one of the provinces most heavily affected by climate variability. It is one of the provinces with the largest amount of rainfall in the country with annual average rainfall of 800 – 1500mm. There is less rainfall in the first seven months of each year, then rains increase strongly until the end of the year. The most significant change in rainfall pattern is the increase of rainfall during the rainy seasons (especially December to October and to a lesser extent February to July) and the decrease in rainfall during the drier June-July period. This means that the rainy seasons are becoming wetter and the dry season drier.

Data Collection and Analysis

Sampling

Both primary and secondary data will be collected. Sample for the study will be divided in two types, the first will include farmers growing rice only and the other will involve farmers planting rice and rubber tree as mixed crop.

The number of samples to be used for the questionnaire survey is 180 households out of the total 1,853 households. Of this number, 90 will be rice-growing households only and the other 90 will be households planting rice and rubber trees. The sample size was calculated using Yamane's formula which determines the sample size for a given level of significance. The Yamane formula is given by , where n is the Sample size, N is the Population size and e is the Error of sampling.

Secondary data on rice yields in two seasons from the year 1972-2012 will be collected from statistics offices (province and district office). In addition, climate data on monthly maximum temperature, minimum temperature and total rainfall for the period 1972-2012 will be taken from the Thua Thien Hue Hydro-meteorological Station and National Hydro-meteorological Center. Multiple regression using Ordinary Least Squares or Quartile Regression will then be applied to the data collected to identify the impact of climate variability on rice yield.

The Ordinary Least Squares (OLS) or Quartile Regression (QR) equation is given by

$$Ys_t = \beta_1 maxT_t + \beta_2 minT_t + \beta_3 rain_t + \varepsilon_t$$

where,

Ys_t	-	The Rice yield – from Jan to May for the 1st rice season and May to Sep for the 2nd rice season (ton/ha/season)
$\beta_1, \beta_2, \beta_3$	-	Coefficient for independent variables
$maxT_t$	-	The average maximum temperature (0C) for the 1st season and 2nd season
$minT_t$	-	The average minimum temperature (0C) for the 1st season and 2nd season.
$rain_t$	-	The total rainfall (mm) for the 1st season and 2nd season
ε_t	-	The error term
t	-	The time (year)

All variables under each model are log transformed before estimation. Median regression (at the 0.5 quartile) is employed for the estimation of the QR model.

Two focus group discussions in the commune will be held to help understand the farming situation and the rice production contribution of highland farmers. This will also identify the common rice production decisions and the climate predictions/information accessed by farmers.

The various farmers' decisions that make use of different typical forecasts will be extracted into components through Factor Analysis. The variables to be used in factor analysis are capital preparation, choice of crop type, planting date, soil preparation, seed variety, planting density, brewed rice, sowing, weeding, applications of pesticides, herbicide application, fertilizer application, irrigation application, planting harvest date, post harvest and marketing choices, made throughout the year that made use of SWFs.

The Theory of Planned Behavior (TPB) (Ajzen, 1985, 1991) will be integrated with main ideas from the Theory of Planted Demand (TPD) model to provide a useful framework for understanding farmer motivation to use or not to use the forecasts in farming decisions (Hu et al., 2006; Artikov et al., 2006). The equation to be used is:

A = f(attitude, socialnorms, perceived control, financial capability)

where A is action, and f is a function of the causal factors given.

To give empirical meaning to the model in the equation above and define the extent and degree of the influence of the causal factors in probability terms, we have:

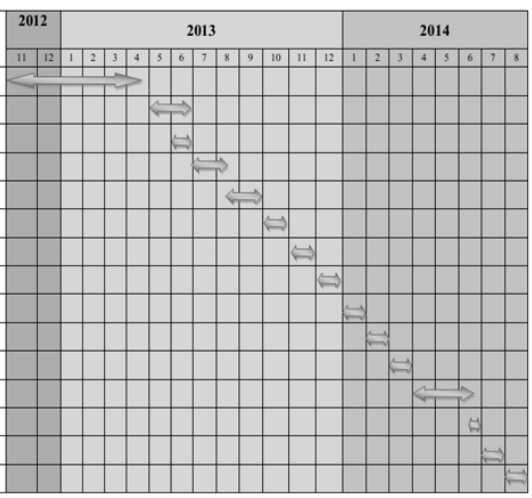
$$\text{Prob}\,(0,X) = \beta_1 \sum_{j=1}^{J} b_j e_j + \beta_2 \sum_{k=1}^{K} n_k m_k + \beta_3 \sum_{l=1}^{L} c_l p_l + \beta_4 R + \beta_0$$

where,

β_0 : constant term
$\beta_1, \beta_2, \beta_3, \beta_4$: coefficients for the independent variables
b_j, e_j : Attitude outcome and value
n_k, m_k : Social norm outcome and value
c_l, p_l : Perceived control outcome and value
R : Financial variable

VI. Research Timetable

ID	Activities	Start	End
1	Develop proposal	*1/11*	*30/04*
2	Defend proposal	*1/5*	*31/06*
3	Revise & submit proposal	*1/6*	*31/06*
4	Field work 1	*1/07*	*09/08*
5	Data processing 1	*10/08*	*30/09*
6	Data analysis 1	*01/10*	*30/10*
7	Proposal revision	*01/11*	*30/11*
8	Questionnaire design	*01/12*	*31/12*
9	Field work 2	*01/01*	*30/01*
10	Data processing 1	*01/2*	*28/02*
11	Data analysis 2	*01/03*	*30/03*
12	Report wring	*01/04*	*15/06*
13	Thesis defense	*16/06*	*31/06*
14	Thesis revision	*01/07*	*30/07*
15	Thesis submission	*01/08*	*30/08*



References

Ajzen, I. 1985. From Intentions to Actions: A Theory of Planned Behavior. Springer–Verlag, Heidelberg, New York.

Ajzen, I. 1991. "The Theory of Planned Behavior." Organizational Behavior and Human Decision Processes. 50: 179-211.

Ajzen, I. and M. Fishbein, 1980. Understanding Attitudes and Predicting Social Behavior. Prentice Hill, Englewood Cliffs, New Jersey.

Artikov, I., S. J. Hoffman, G.D. Lynne, L.M.P. Zilling and Q. Hu. 2006. Understanding the Influence of Climate Forecasts on Farmer Decisions as Planned Behavior." Journal of Applied Meteorology and Climatology. 45(9): 1202-1214.

Baigorria, G. A. 2007. "Assessing the Use of Seasonal Climate Forecasts to Support Farmers in the Andean Highlands."InMannava V. K. Sivakumar and James Hansen. Eds. 2007. Climate Prediction and Agriculture: Advances and Challenges. Springer Berlin Heidelberg, New York.

Cooper, P., J. Dimes, K. P. C. Rao, B. Shapiro, B. Shiferaw and S. Twomlow. 2008. "Coping Better with Current Climatic Variability in the Rain-fed Farming Systems of Sub-Saharan Africa: An Essential First Step in Adapting to Future Climate Change." Agriculture, Ecosystems and Environment. 126: 24–35.

FAO. 2004b. Rice is Life. International Rice Year Report, Philippines.

Fishbein, M. and I. Ajzen. 1975. Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research.New York: Addison-Wesley.

Garacia, L. 2002. Overview of Early Warning Systems for Hydro-Meteorological Hazards in Selected Countries in Southeast Asia. Thailand: Asian Disaster Preparedness Center.

Glantz, M. 1977. "The Value Of a Long-Term Weather Forecast for the Western African Sahel." American Meteorological Socio-economic. 58: 150-158.

Hammer, G., J. Hansen, J. Phillips, J. Mjelde, H. Hill, A. Love and A. Potgieter. 2001. "Advances in Application of Climate Prediction in Agriculture." Agricultural Systems. 70(2): 515-553.

Hansen, J. W. and J. W. Jones. 2000. "Scaling Up Crop Models for Climate Variability Applications." Agricultural Systems. 65(1): 43-72.

Hellmuth, M. E., S. Mason, C. Vaughan, M. Van Aalst and R. Choularton. 2011. A Better Climate for Disaster Risk Management. International Research Institute for Climate and Society (IRI), Columbia University, New York.

Hu Q. I., L. M. P. Zillig, G. D. Lynne, A. J. Tomkins, W. J. Waltman,M. J. Hayes, K. G. Hubbard, I. Artikov, S. J. Hoffman and D. A. Wilhite. "Understanding Farmers' Forecast Use from Their Beliefs, Values, Social Norms, and Perceived Obstacles." Journal of Applied Meteorology and Climatology.45(9): 1190-1201.

Koenker, R. and G. W. Bassett. 1978. "Regression quantiles."Econometric Society. 46: 33 – 50.

Maclean, J. L., D. C. Dawe, B. Hardy and G. P Hettel. 2002. "Rice Almanac." Annals of Botany.92(5): 739-739

Mavi, H. S. and G. T. Tupper. 2004. Agrometeorology: Principles and Applications of ClimateStudies in Agriculture. New York: The Haworth Press.

Mjelde, J. W., H. S. J. Hill and J. F. Griffiths. 1998. "A Review of Current Evidence on Climate Forecasts and Their Economic Effects in Agriculture." American Journal of Agricultural Economics.80: 1089-1095.

Nguyen Thi Hien Thuan, Luong Van Viet, Nguyen Thi Phuong, Le Thi Xuan Lan, Nguyen Dinh Phu. 2007. "Application of Climate Prediction for Rice Production in the Mekong River Delta (Vietnam)." Climate Prediction and Agriculture.181-187.

Nicholls,N. 1999. "Cognitive Illusions, Heuristics, and Climate Prediction."American Meteorological Society. 7: 1385-1397.

Oerke, E. C., H.W. Dehne, F. Schonbeckand A. Weber. 1994. "Crop Production and Crop Protection—Estimated Losses in Major Food and Cash Crops." Agricultural Science, Amsterdam. 127: 137 -141.

Orlove, B. S., K. Broad and A.M. Petty.2004. "Factors that Influence the Use of Climate Forecasts."American Meteorological Society.85: 1-9.

Reyes, C. M., S. N. Domingo, C. D. Mina and K. G. Gonzales. 2009. Climate Variability, Seasonal Climate Forecasts, and Corn Farming in Isabela, Philippines: A Farm and Household Level Analysis. Philippine Institute for Development Studies.

Rosenzweig, C. and M. Parry. 1994. "Potential Impact of Climate Change on World Food Supply." Nature. 367: 133– 138.

Sarker, M. A. R., K. Alam and J. Gow. 2012. "Exploring the Relationship between Climate Change and Rice Yield in Bangladesh: An Analysis of Time Series Data." Agricultural Systems.112: 11-16.

Tran Thuc, Nguyen Van Thang, Hoang DucCuong and Hoang Trong Thai. 2009. Development of Climate Change Scenarios for Vietnam, Proceedings of the Workshop Climate Change Adaptation Vietnam. Ha Long Bay, Vietnam.

Vu Thi Thanh Hang and Nguyen Thi Trang. 2010. "An Analysis of Drought Conditions in Central Vietnam during 1961-2007." Journal of Science, Earth Sciences. 26: 75-81.

World Meteorological Organization.1981. "Guide to Agricultural Meteorological Practices." In H.P. Das and KeesStigter. 2010. Weather and Climate Forecasts for Agriculture. Wisconsin Madison University.

Yoshida, S. and F. T. Parao. 1979. "Climatic Influence on Yield and Yield Components of Lowland Rice in the Tropics."Climate and Rice.471–494.

Young, K. B., E. J. Wailes and Nguyen Tri Khiem. 2002. Vietnam's Rice Economy: Developments and Prospects. Arkansas Agricultural Experiment Station, Arkansas University.

Ziervogel, G. and A. Opere. 2010. Integrating Meteorological and Indigenous Knowledge-Based Swfs for the Agricultural Sector: Lessons From Participatory Action Research in Sub-Saharan Africa. International Development Research Centre, Ottawa, Canada.

Ziervogel, G. and R. Calder. 2003. "Climate Variability and Rural Livelihoods: Assessing the Impact of SWFs in Lesotho" Area. 403-417.

Farmers' Perception and Adaptation to Climate Change Pressure on Highland Coffee Production, Dak Lak Province, Vietnam

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I. Introduction

Agriculture plays a dominant role in supporting rural livelihoods and economic growth in the central highland of Vietnam. Specifically, the upland areas are cultivated with tropical crops such as coffee, cocoa, and tea, which are considered as sustainable foundation for the elimination of poverty and attainment of food security in Vietnam. Despite impressive success in increasing food production in Vietnam to meet the demands of the rapidly increasing population, the ability to sustain this success is a major concern since agricultural systems are vulnerable to variability in climate variables. Vietnam is considered as one of the countries in the world that is most affected by climate change.

Dak Lak is the largest province of Vietnam located in the Central Highland with the total area of 1,312,537 hectares, including 480,000 hectares of agricultural land (Bui, 2012). Dak Lak is very suitable for cultivating high value industrial crops such as coffee, pepper and rubber.

Temperature and rainfall conditions are considered to be important factors in defining potential coffee yield. Both factors interfere in the crop phenology, and consequently in productivity and quality. The coffee plant responds sensitively to increasing temperatures, specifically during blossoming and fructification (Haggar, 2012). Since rainfall distribution is not balanced, it causes an obstacle for coffee pollination and extended drying time, thus coffee price decreases dramatically. Moreover, the high temperature results in increasing water demand for crops while water resource is becoming scarce. Besides the direct impacts of high temperatures on the coffee crop, the increasing number of pests and diseases is supposed to be a consequence of increasing temperatures. According to latest press releases, the coffee sector is already suffering from climate variability as the 2010–2011 harvest output is expected to decline by 20% compared with previous harvest due to extreme drought period and delayed rainfalls. (Haggar, 2012).

The farmers pursue a number of strategies in the face of climatic stressors, including changing to coffee varieties more resistant to drought or excess moisture; crop diversification; economic diversification; soil conservation methods utilizing shade trees, live barriers, composting, and terracing; and joining social-economic organizations such as farmer cooperatives. Adaptive capacity, or the factors that enable social systems to respond proactively to environmental change, has emerged as a core domain of global change research (Burton et al., 1996); (Smit, B and J. Wandel, 2006); (Nelson et al., 2007).

II. Rationale

Climate pressure is considered as a major concern for agricultural development and food security. Promoting sustainable development in the uplands of the Central Highland poses important challenges. Thus, there is a need for a careful and detailed analysis of the factors that affect the farm households' decision to adapt to climate pressure. It is crucial to understand how the social, economic, institutional and ecological contexts mitigate the impacts of climate change and influence adaptation response. Coffee farming will be the major subject of the study because coffee is a dominant crop in the highlands of Vietnam.

III. Objectives

This study aims to:

1. understand farmers' perception about climate pressure;
2. determine the factors influencing farmers' choices of adaptation options for dealing with climate pressure; and
3. estimate coffee yield and the profitability of farmers who practice adaptation categories.

Note: Adviser-Assoc. Prof. Dr. Yaovarate Chaovanapoonphol

IV. Importance of study

The study will particularly provide empirical insights on the assessment of farmer's perception on the climate pressure and the factors that influence farmers' decision to adapt strategies. The results of this study may also be used as a preliminary analysis to set up the foundation for possible future research.

V. Methodology

Theory of framework motivation in adaptation

Motivation is the final essential element leading to adaptation; therefore, gaining an understanding of the cognitive processes that affect motivation remains instrumental to developing climate change adaptation initiatives and policy. At the individual level, the socio-cognitive domain of the adaptation process, in which social identity interacts with perception and motivation, is affected by social, economic and demographic characteristics of individuals and their environments. Adaptations thus emerge in a decision process that takes into account not only who an individual is in terms of age, economic status, education, etc., but also how the individual perceives his or herself in relation to others and in relation to risk.

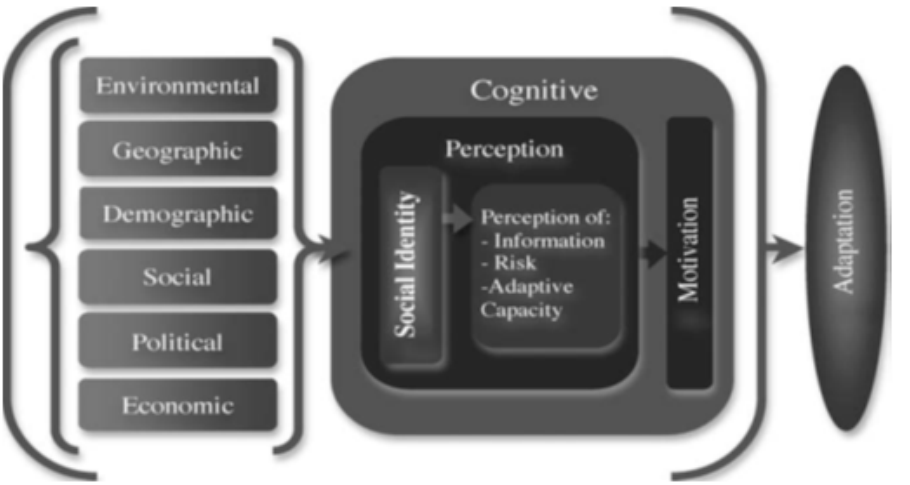

Fig.1. Conceptual model of the relationship between social identity and the perception of information. (Frank et al., 2011).

Data Collection and Analysis

A simple random sampling method is adopted to select households for questionnaire survey. The sample size for farmers is calculated based on Yamane's formula (Yamane, 1967)

$$n = \frac{N}{1 + N * e^2}$$

where n is the sample size, N is the population of the coffee farmers, and e is the allowable error, which is assumed in this study as 7.5%.

Data will be collected through face-to-face interview using a semi-structured survey questionnaire. Descriptive statistics will be applied to describe the socio-economic profile of farmers such as farmers' personal, economic and biophysical characteristics, present farming technology and existing farming practices for adapting to climate change.

Likert Rating Scale will also be used to examine the respondents' perception about climate pressure. The perception questions on climate pressure will be asked from respondents based on their level of agreement or decision making. The logit model is also employed to analyze the factors that impact on the farmers' choice of adaptation strategies to mitigate climate pressure effects in the study area. The logit model (from

(Green, 2000) as cited in Enete and Amusa, 2010) is given by:

$$Y_j = \alpha_1 + \beta_i X_i + \varepsilon$$

where:

Yj = 1 : If farmer adopted adaptation option j
Yj = 0 : If farmer did not adopt adaptation option j
α, β : Regression Coefficients
Xi : Independent variables which impact to Yj
ε : Regression error

The farm household will choose from the following adaptation options: Crop diversification, Building a water-harvesting scheme, Implementing soil conservation technologies, and Use of irrigation technology. The variable Xi represents a set of conditioning variables which are the household attributes, as follows:

X1: Education (years)
X2 : Coffee cultivation experience (years)
X3 : Gender (1: Female; 0: Male)
X4: Coffee Farming size (ha)
X5: Coffee Growing Income (VND/year)
X6: Off-farming Income(VND/year)
X7: Irrigation option (Yes: 1; No: 0)
X8: Land tenure (1: Having secure property rights; 0: No)
X9: Access to credit (1: yes; 0: no)
X10: Access to extension service (times)
X11: Access to climate information (1: yes; 0: no)
X12: Farmers' perception of change in temperature (in 0) during flowering since 2010
(Change: 1; No change: 0)
X13: Farmers' perception of change in Rainfall during flowering since 2010
(Change: 1; No change: 0)

Chi-square analysis will also be conducted to find the relationship between the number of farmers' adaptation options and the impact factors (education, farming experience, farm size and income).

Finally, gross margin analysis will be used to determine the profit of farmers in relation to the different levels of strategies adopted for climate pressure. The gross margin of farm households is calculated as follows:

$$GM = GR - TVC$$

$$GR = \sum_{i}^{n} Q_i P_i$$

$$TVC = \sum_{j}^{n} W_j X_j$$

where,

GM = Gross margin (VND/ha)
GR = Gross revenue (VND/ha)
TVC = Total variable cost (VND/ha)
Pi = The price of output variable i (VND/ton)
Qi = The quantity of output variable i (ton/ha)
Wj = The price of input variable j (VND)
Xj = The quantity of input variable j (kgs/package/bottle/litter)
i = output variables
j = input variables
n = size of sample

Data collection Procedure

Secondary data will be collected from relevant reports, statistical data and published information related to study issues, web-research, and local departments. Data on farmers' perception about climate pressure and factors that impact farmers on choosing adaptation strategies will be collected through an intensive household survey using a questionnaire survey instrument. The instrument will then be pre-tested via a pilot survey for the relevancy and correctness of the questions. The main survey will be done in targeted areas in Dak Lak with a sample size of about 176, using face to face interview technique. The questionnaire contains information on socio-economic characteristics of the households (eg. age, number of family members, education, climate change knowledge, income, etc), respondent's perception on climate pressure, and adaptation options.

Data analysis

The data gathered from the survey will be processed and analyzed with quantitative and qualitative analysis technique. The Excel and Limdep will be employed to analyze the data set in both standard descriptive statistic and econometric model.

The primary data and secondary data collected from household interview using questionnaire and institutional survey will be analyzed using Likert Rating Scale, descriptive statistics, frequency distributions, means and standard deviations, as well as Chi-Square analysis.

VI. Duration of the study

Activities	2013								2014						
	Jun	July	Aug	Sep - Dec		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Proposal defense															
Data collection (1)															
- Improving chapter literature review - Writing chapter 4: general characteristics of study area + Coffee production +Temperature and rainfall patern															
Data collection (2)															
Data analysis															
Writing chapter 4: analyze results about - Farmer's perception and adaptation to climate pressure. - Coffee profitability between adaptation groups															
Writing chapter 5: Conclusion and recommendation															
Revisions															
Thesis defense															

References

Burton, I., J. Smith, N. Bhatti and R. Benioff. 1996. "The Growth of Adaptation Capacity: Practice and Policy." Adapting to Climate Change: Assessment and Issues. Springer, New York.

Enete, A. A. and T. A. Amusa. 2010. Determinants of Women's Contribution of Farming Decisions in Cocoa Based Agroforestry Households Of Ekiti State, Nigeria. Field Action Science Reports.

Green. 2000. Econometric Analysis, 4th ed. Prentice Hall Upper Saddle River, New Jersey: Prentice-Hall.

Habiba, U., R. Shaw and Y. Takeuchi. 2012. "Farmer's Perception and Adaptation Practices to Cope with Drought: Perspectives from Northwestern Bangladesh." International Journal of Disaster Risk Reduction. 1: 72-84.

Haggar. 2012. "Coffee and Climate Change Impacts and Options for Adaptation In Brazil, Guatemala, Tanzania and Vietnam". Climate Change, Agriculture and Natural Resource.

Haggar, J. 2011. "Impacts of Climate Change in The Pilot Country Vietnam The Coffee and Climate Initiative." Coffee and Climate Change.

Hansen, Marx, J. and S. Weber. 2004. The Role of Climate Change Perceptions, Expectations and Forecasts in Farmer Decision Making: The Argentine Pampas and South Florida. The Earth Institution at Columbia University: International Research Institute for Climate Prediction (IRI).

Hu, Q., L. M. Pytlik Zillig, G. D. Lynne, K. G. Hubbard, W. J. Waltman, M. J. Hayes, A. J. Tomkins, S. J. Hoffman and D. A. Wilhite. 2006. "Understanding Farmers' Forecast Use From Their Beliefs, Values, Social Norms and Perceived Obstacles." Journal of Applied Meteorology and Climatology. 45: 1190–1201.

Luu, N. 2002. "Exploitation Capacity and Recurrent Groundwater Resources in Dak Lak Province." Institute of Meteorology and Hydrology, Boun Ma Thout, Dak Lak.

Nelson, D. R., W. N. Adger and K. Brown. 2007. " Adaptation to Environmental Change: Contributions of A Resilience Framework." Annual Review of Environment and Resources. 32: 395–419.

Smit, B., And O Pilfosova. 2001. Adaptation to Climate Change in the Context of Sustainable Development and Equity. In Climate Change 2001: Impacts, Adaptation, and Vulerability-Contribution of Working Group II to The Third Assessment Report of The Intergovernmental Panel on Climate Change. Cambridge University Press.

Smit, B. and J. Wandel. 2006. "Adaptation, Adaptive Capacity and Vulnerability." Global Environmental Change. 16.

Thai, N. V. 1997. Study on Robuste Coffee Root System and Methods for Improving It. Hanoi Agriculture University.

Tu, T. C. 1998. Incresing Nitrogen Fertilizer Use Efficiency for Coffee. In a Ten Year Research of Central Highlands Soils Research Center. Daklak: Central highlands Soilds Research Center Publishing.

UNDP. 2009. Climate Change and Agriculture: Guaatemala [Online]. Available: http://www.adaptationlearning.net/countryprofiles/GT [20 March 2013].

UNFCC. 2007. Climate Change- Impact, Vulnerabilities and Adaptation in Developing Countries [Online]. Available: http://maps.grida.no/go/graphic/climate_ change_processes_characteristics_and_treats [20 March 2013]

Yamane. 1967. Statistics An Introductory Analysis. 2nd Ed. New York: Harper and Row.

Yamauchi, F., H. Takeshima, S. Sumaryanto, R. Dewina, and A. Haruna, 2012. "Climate Change, Perception and Adaptation and Rice Productivity in Indonesia." International Association of Agricultural Economists.

Impacts of Agricultural Systems Transition on Rural Livelihood Security in Northern Uplands of Lao PDR: A case study of Phonsa-at Village cluster, Phieng district, Sayaboury Province

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I. Rationale

The Northern Uplands of Lao People's Democratic Republic (PDR), comprising the provinces of PhongSaly, LuangNamtha, Bokeo, HouaPhan, XiengKhouang, Oudomxay, Xayabury, LuangPrabang, and northern Vientiane, remains one of the lagging regions in mainland Southeast Asia. The Northern Uplands is nearly exclusively agriculture based with almost 90 percent of rural households involved for most of their time in crop and livestock production (World Bank, 2008).

In the Northern Uplands, fixed rotation cropping is emerging as the dominant non-traditional agricultural production system. This is characterized by subsistence production with numerous cash crops increasingly introduced on a small scale. Mono-cropping is also fast emerging in the North. Over the last decade, the area under maize production nearly tripled to more than 66,000 ha (in 2005). Provincial data by the World Bank shows that this expansion has further accelerated and some provinces have seen a doubling in maize production area since 2005, with Xayabury, Oudomxay, and Bokeo having seen the most dramatic increases in production area.

In the commercial transition, potentially over a million hectares are changing from subsistence to cash crops under different investment schemes. Eight major commodities such as rubber, sugar cane and maize, along with niche crops like cardamom, job's tear and sesame, are replacing rice production and natural forests. The result is that entire communities are changing their livelihood strategies and becoming integrated into the growing market economy.

Recently, there were studies on the outcomes of the transformation of agricultural systems, but those research largely focused on the impacts towards socio-economic conditions. Thus, this research will attempt to investigate the impacts of those transitions specifically on livelihood security in the rural upland of Northern Lao PDR.

II. Research Objectives

The specific objectives of this study are:

1. To explore and investigate the socio-economic and policy contexts contributing to land use and agricultural pattern changes during the last decade;
2. To investigate the impacts of agricultural systems changes on community livelihood security; and
3. To collectively construct community development strategies to cope with or reduce future risk.

III. Research Hypotheses

- Changes in Lao PDR socio-economic and policy contexts have been driving/influencing transition of rural agricultural systems which have been already susceptible and vulnerable to rapid changes and pressures;
- The transition of agricultural systems affects the livelihood security (human, natural, physical, financial, social, and political assets) of farmers residing in the study area; thus the related livelihood security risks are questioned.

Note: Adviser -Dr. Budsara Liminrakul

IV. Importance of the Study

Results of the thesis would give an understanding of the causes of changes in the rural agricultural system and its impact on the rural livelihood security. It would also lead to an identification of future risks.

The results of the participatory livelihood system analysis with the rural key and diverse stakeholders could strengthen the capacity of these stakeholders.

The thesis would also provide a set of scenarios and future vision altogether with a relevant strategic plan to reduce and/or adapt to the future risk and thereby lead to resilience.

V. Research Method

Conceptual Framework

The proposed research will be a participatory study and conducted within the Sustainable Livelihoods Framework (SLF) as follows:

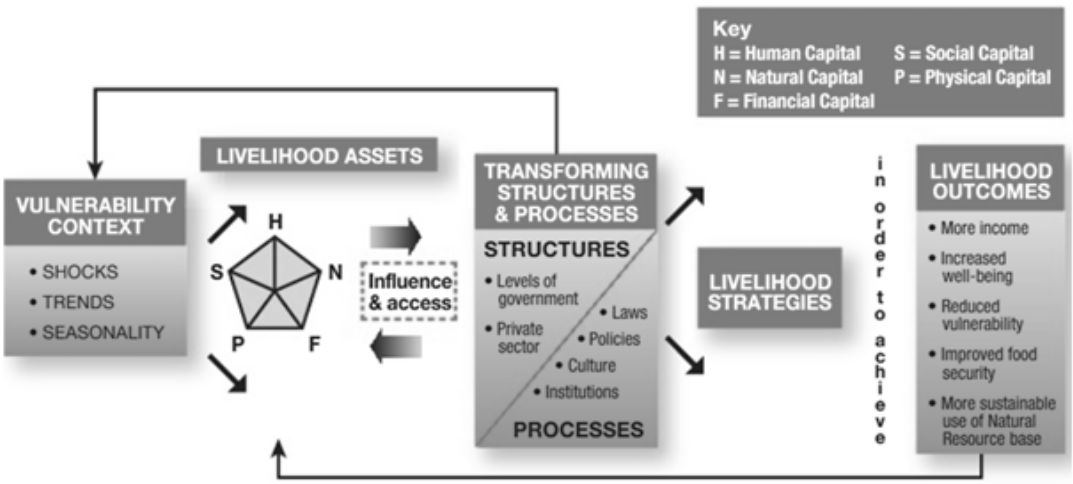

Figure 1: Sustainable Livelihoods Framework (DFID, 1999)

The sustainable livelihoods framework encompasses five sections, and is intended to be dynamic due to both external interventions and the activities of the rural residents. The sections are: (1) vulnerability context; (2) livelihood assets; (3) transforming structures and processes; (4) livelihood strategies; and (5) livelihood outcomes. (DFID, 1999).

Study area

The study will be conducted in the Phonsa-at Village Cluster, Phieng District, Sayaboury Province in the Lao PDR.

Data Collection

Primary and secondary data will be gathered through key informant interviews, household interviews, focus group discussions, and community mapping. The latter is a useful tool to visualize the spatial organization of the community to depict the following: natural physical features, social institutions and villagers' homes.

In addition, the observation through the transect walk approach will also be done. This is a tool in empirical research that permits the analysis of the change in variables without the manipulation of the researcher within the social context. This method will be used to obtain additional information as well

as to gain an insight into the village and its activities by living with a local family and coming into close contact with the villagers.

Sampling

Stratified sampling method will be applied to get the respondents for the interviews based on three technical variables:

- The wealth of the household (poor, average, and better-off) based on the classification of related local authority;
- The age of the household headman (below 30 years old, between 30-40 years old, and above 40 years old); and
- The gender of the household headman.

Stratifying the communities along these criteria can ensure that certain characteristics will be found in the sample. Communities will be randomly chosen within each category. The number of chosen respondents will depend upon the given time, logistical and labor constraints (Frankenberger et al., 2002).

Data analysis

Secondary and primary data will be analyzed by both quantitative and qualitative approaches. The data gathed through PRA methods from key informant interviews, group discussions, household surveys, and field observation will be processed and analyzed using Microsoft Excel and SPSS Program.

References

Chambers, R., Conway, G. 1992. Sustainable rural livelihoods: practical concepts for the 21st Century.

DFID.1999. Sustainable Livelihoods Guidance Sheet 2.1. Department for International Development. London, UK.

FAO/ILO. 2009. The Livelihood Assessment Tool-kit: Analysing and responding to the impact of disasters on the livelihoods of people; Food and Agriculture Organizationof the United Nations (FAO), Rome and International Labour Organization (ILO), Geneva.

Frankenberger, T. 1996 "Measuring Household Livelihood Security: An Approach for Reducing Absolute Poverty." Food Forum 24. Washington, D.C. Food Aid Management.

Timothy R. Frankenberger, Kristina Luther, James Becht, M. Katherine McCaston. 2002. Household Livelihood Security Assessments: A Toolkit for Practitioners; TANGO International Inc. CARE USA.

World Bank. 2008. Lao People's Democratic Republic: Policy, Market, and Agriculture Transition in the Northern Uplands.

Farmers' Perception and Adaptation to Drought in Maize Cultivation, Dakrong District, Quang Tri Province, Vietnam

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I. Introduction

Climate change is one of the most serious problems in Vietnam similar to other countries around the world. Small changes in environmental factors such as temperature or rainfall, acting together or in isolation, may lead to a natural hazard event (Wachinger, 2010). Different climatic hazards (flood, drought, thermal extremes and storm events) affect most regions of the globe and the prospect of changes in the extent, magnitude and distribution of climatic hazards compounds an already severe socio-environmental problem in many regions. This is more evident in developing countries where the state's capacity to provide widespread protection measures is often limited and where poverty and vulnerability to hazards may have a cyclical relationship (Few, 2008).

According to Easterling (2000), an important aspect of climate extremes is related to drought. Drought is considered by many to be the most complex but least understood of all natural hazards, affecting more people than any other hazard (Hagman 1984, cited by ACSAD et al.). Drought is affecting agricultural production globally, triggering significant food and health insecurity and habitat loss through land degradation and desertification (Smakhtin and Schipper, 2006). Crop yield losses due to drought stress are considerable.

Dakrong is one of the highland districts of Quang Tri province located in a hazard-prone area of Central Vietnam. The district lies in the tropical monsoon zone influenced by the convergent climate of the subtropical North and the tropical South. Therefore, the climate is divided into two seasons (rainy and dry season) and drought often occurs during the dry season, from March to August every year. According to the Dakrong Agriculture Department, drought is the main factor for low productivity of crops, especially for maize because it is grown on the mountainside where water sources are limited.

The people of Dakrong rely heavily on maize, which is considered as an economically and politically important crop in the area. Maize is a major ingredient for food and feed products and assumes a role second to rice. About 91% of the farmers here belong to an ethnic minority, with a low education level. Their farming experience is also limited and they face a lot of difficulties in maize cultivation.

Therefore, the following questions must be clarified: (1) Are farmers aware of the drought going on? (2) What is the level of the farmers' awareness of the drought and its impact? (3) What strategies are the farmers adapting to cope with drought? (4) What factors impact on farmers' adaptive ability?

II. Rationale

In the case of Dakrong district, most farmers belong to an ethnic minority with low level of education and poor living standards. Drought directly or indirectly impact on the lives of people in the district, where maize is considered an important crop. Farmers who grow maize face severe impacts from the drought. Thus, a study on farmers' perception and adaptation to drought in maize cultivation need to be paid more attention. This is an essential requirement for building sustainable adaptation strategies to drought in the future.

III. Objectives

This study aims to:

1. assess farmers' perception toward drought;
2. examine farmers' adaptation to drought in maize-cultivated area; and
3. analyze factors having impact on farmers' adaptation to drought in maize cultivation.

Note: Adviser -Dr. Budsara Liminrakul

IV. Importance of the study

The findings of the study will contribute to understanding farmer's perception about drought. This will provide information to assist maize farmers in coping with droughts and climate change. Further, examining the factors that impact on farmer's adaptation to drought will help find appropriate interventions for improving adaptation capacity of the maize farmers in the future.

V. Methodology

Sampling

Both primary and secondary data will be collected. The sample size will be calculated using Yamane's formula (1967).

$$n = N/ (1+N (e^2))$$

where n is the sample size, N is the total number of farm households, and e is the error of sampling (7.5%).

Data collection

Primary data will be collected through key informant interviews (informal survey) and household survey (formal survey). Both quantitative and qualitative type of information will be gathered. Field observations will also be helpful to understand the real situation. Secondary data will also be collected to achieve a better understanding of the drought phenomenon in the Dakrong district.

Data analysis

The data gathered from the survey will be processed and analyzed with quantitative and qualitative analysis technique. For the analysis, the Statistical Package for Social Sciences (SPSS) and Microsoft Excel will be used. Descriptive statistics will be also used to illustrate the farmers' awareness situation regarding related characteristics of drought.

The Multinomial Logit model will be used to analyze maize adaptation choices as methods to adapt to the negative impacts of drought.

The decision of whether or not to use any adaptation option could fall under the framework of utility and profit maximization. Although utility is not directly observed, the actions of economic agents are observed through the choices they make. (Deressa et al., 2008). Suppose that Yj and Yk represent a household's utility for two choices, which are denoted by Uj and Uk , respectively. The linear random utility model could then be specified as:

$$Uj = \beta j'Xj + \varepsilon j \quad \text{and} \quad Uk = \beta k'Xk + \varepsilon k$$

where:
- Uj and Uk - perceived utilities of adaptation methods j and k, respectively;
- Xj and Xk - the vector of explanatory variables that influence the perceived desirability of the method;
- βj and βk - parameters to be estimated; and
- εj and εk - error terms assumed to be independently and identically distributed

Study area

Dakrong is a highland district of Quang Tri province, including 1 town and 13 communes. The Dakrong territory covers over an area of 122,332.21 hectares, and has southern and western borders with Lao PDR. The district land areas are mainly mountains and forests, while agricultural land accounts for only 4.51% of the total area. Maize growing is important here as it is not only a food crop but also the economic crop for farm households. Dakrong has a population of nearly 40,000 people in 7,485 households (2012). Most of the residents belong to the ethnic minority (81%) with low education level, low farming experience, and low living standards that serves as barrier to socioeconomic development in this area.

Regarding the climate, Dakrong has the same climatic characteristics as that in Quang Tri province as well as central region – one of hottest areas in Vietnam. There are two distinct seasons in Dakrong, the rainy season, with storms and tropical cyclones characterized by heavy rainfall and strong winds, from

September to January; and the dry season, with little rain, from March to August.

The monthly average temperate is relatively high at around 25 °C, occurring from May to August. Rainfall is unevenly distributed throughout the year, but mainly on September to December. From the distribution of rainfall and monthly temperature, there seems to be a drought lasting from March to August. Finally, hot dry wind blows from the southwest for about 40 to 60 days a year (IDPC, 2003) making the drought in Dakrong more severe.

Scope of study

Although the study area is the Dakrong district, the research will choose two communes having a high proportion of farmers cultivating maize where the impact of drought is strong. This choice will be made after reviewing the collected data (secondary data).

VI. Study schedule

ID	Projects	Start	End	2012		2013												2014							
				11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8
1	Writing proposal	*1/11*	*30/04*																						
2	Defend proposal	*1/5*	*31/06*																						
3	Revise & submit proposal	*1/6*	*31/06*																						
4	Field work 1	*1/07*	*09/08*																						
5	Data processing 1	*10/08*	*30/09*																						
6	Data analysis 1	*01/10*	*30/10*																						
7	Proposal revision	*01/11*	*30/11*																						
8	Questionnaire design	*01/12*	*31/12*																						
9	Field work 2	*01/01*	*30/01*																						
10	Data processing 1	*01/2*	*28/02*																						
11	Data analysis 2	*01/03*	*30/03*																						
12	Writing report	*01/04*	*15/06*																						
13	Thesis defense	*16/06*	*31/06*																						
14	Thesis revision	*01/07*	*30/07*																						
15	Thesis submission	*01/08*	*30/08*																						

References

Arab Center for the Studies of Arid Zones and Dry Lands (ACSAD). 2011. Drought Vulnerability in the Arab Region - Case Study-Drought in Syria Ten Years of Scarce Water (2000 – 2010). Damascus: Arab Center for the Studies of Arid Zones and Dry Lands.

Asian Disaster Preparedness Center (ADPC). 2003. The Role of Local Institutions in Reducing Vulnerability to Recurrent Natural Disasters and in Sustainable Livelihoods Development - Case study: Vietnam.

Barron, J., J. Rockström, F Gichuki and N. Hatibu. 2003. "Dry Spell Analysis and Maize Yields for Two Semi-Arid Locations in East Africa." Agricultural and Forest Meteorology. 117: 23–37

Bui Dung The and Bui DucTinh. 2012. "Households' Vulnerability to Climate Change in Thua Thien Hue Province". Journal of Science, Hue University. 70 (2012): 227-236.

Campos, H., M. Cooper, J.E. Habben, G.O. Edmeades and J.R. Schussler. 2004. Improving Drought Tolerance in Maize: A View from Industry. Field Crops Research.90: 19–34.

"Drought Tolerance Improvement in Crop Plants: An Integrated View from Breeding to Genomics." Field Crops Research. 105: 1–14.

Chaudhry, P. and G. Ruysschaert. 2007. Climate Change and Human Development in Viet Nam. Human Development Report 2007/2008, UNDP.

Deressa, T. T., R. M. Hassan, C. Ringler, T. Alemu, and M. Yesuf. 2008. "Analysis of the Determinants of Farmers' Choice of Adaptation Methods and Perceptions of Climate Change in the Nile Basin of Ethiopia". IFPRI Discussion Paper. (15 September): 2.

Eakin, H. 2000. "Smallholder Maize Production and Climate Risk: A Case Study from Mexico." Climate Change. 45: 19-36.

Easterling, D. R., J. L. Evans, P. YaGroisman, T. R. Karl, K. E. Kunkel and P. Ambenje. 2000. "Observed Variability and Trends in Extreme Climate Events: A Brief Review." Bulletin of the American Meteorological Society. 2(25 October): 417-425.

Frank, E., H. Eakin and D. López-Carr. 2010. Risk Perception and Adaptation to Climate Risk in the Coffee Sector of Chiapas, Mexico. Conference on International Research on Food Security, Natural Resource Management and Rural Development.

Gbetibouo, G. A. 2009. "Understanding Farmers' Perceptions and Adaptations to Climate Change and Variability - The Case of the Limpopo Basin, South Africa."IFPRI Discussion Paper 00849.(February): 52.

Gene, C.W. 1982. Natural Hazard Research: "Agro-climatic Hazards Perception, Prediction and Risk Avoidance Strategies in Lesotho." Working Paper.44 (July): 81.

Gobin, A. 2012."Impact of Heat and Drought Stress on Arable Crop Production in Belgium."Natural Hazards and Earth System Sciences. 12: 1911–1922.

Gregory, J. M., J. F. B. Mitchell and A. J. Brady. 1997. "Summer Drought in Northern Midlatitudes in a Time-Dependent CO2 Climate Experiment." Journal of Climate. 10 (18 Jun): 662-686.

Habiba, U., R. Shaw and Y. Takeuchi. 2012. "Farmer's Perception and Adaptation Practices to Cope with Drought: Perspectives from Northwestern Bangladesh." International Journal of Disaster Risk Reduction. 1 (31 May): 72–84.

Haddad, B. 2005."Ranking the Adaptive Capacity of Nations to Climate Change when Socio-Political Goals are Explicit."Global Environmental Change. 15: 165-176

Hansen, J., S. Marx and E. Weber. 2004. The Role of Climate Perceptions, Expectations, and Forecasts in Farmer Decision Making. IRI Technical Report 04-01, International Research Institute for Climate Prediction, The Earth Institute at Columbia University, Palisades, New York.

Kemper, N. A. Flanders, B. Watkins and M. Popp. 2012. Impact of the 2012 Drought on Field Crops and Cattle Production in Arkansas - Preliminary Report. University of Arkansas System.

Le Thi Hong Phuong. 2011. Climate Change and Farmers' Adaptation: A Case Study of Mixed - Farming Systems in the Coastal Area in Trieu Van Commune, Trieu Phong District, Quang Tri Province, Vietnam. Master Thesis in Rural Development with Specialization in Livelihood and Natural Resource Management.Department of Urban and Rural Development Faculty of Natural Resources and Agriculture Sciences Swedish University of Agricultural Sciences.

Maddison, D. 2007. "The Perception of and Adaptation to Climate Change in Africa."Policy Research Working Paper 4308. (August 2007): 53.

MyintMyint Aye. 2008. Farmers' Attitudes towards Monsoon Groundnut Production in Pakokku District, Dry Zone Area, Myanmar. M.S. Thesis in Tropical Agriculture.Graduate School, Kasetsart University.

Nguyen Dang Tinh. 2006. Coping with Drought in the Central Highlands – Vietnam. Doctoral Thesis Institute of Environment & Resources Technical University of Denmark.

Ogalleh, S.A., C. R. Vogl, J. "Eitzinger and M. Hauser. 2012. Local Perceptions and Responses to Climate Change and Variability: The Case of Laikipia District, Kenya." Sustainability. 4: 3302-3325.

Ogunlade, M. O., S. O. Agbeniyi and K. A. Oluyole. 2010. "An Assessment of the Perception of Farmers on Cocoa Pod Husk Fertilizer in Cross River State, Nigeria." ARPN Journal of Agricultural and Biological Science. 5: 1-4.

Simelton, E., C. H. Quinn, P. AntwiAgyei, N. Batisani, A. J. Dougill, J. Dyer, E. D.G. Fraser, D. Mkwambisi, S. Rosell, S. Sallu and L. C. Stringer. 2011. African Farmers' Perceptions of Erratic Rainfall. Sustainability Research Institute Paper.(November): 41.

Sivakumar,. M. V. K. 1991. "Empirical Analysis of Dry Spell for Agricultural Application in West Africa."Journal of Climate. 5 (17 October): 532-539.

Slegers, M.F.W. 1991. Exploring Farmers' Perceptions of Drought in Tanzania and Ethiopia.Doctoral Thesis Wageningen University, Netherlands.

Smakhtin, V.U. and E. L. F. Schipper. 2008. "Droughts: The Impact of Semantics and Perceptions." Water Policy. 10: 131–143.

Smit, B. and J. Wandel. 2006. "Adaptation, Adaptive Capacity and Vulnerability." Global Environmental Change. 16: 282 – 292.

Sun, Y. and S. Solomon. 2005. "How Often Does It Rain?." Journal of Climate. 19 (1 September): 916-934.

Taylor, J., T. R. Stewart and M. Downton. 1988. "Perceptions of Drought in the Ogallala Aquifer Region." Environment and Behavior.20(2): 150-175.

Wachinger, G. and O. Renn. 2010. Risk Perception and Natural Hazards. CapHaz-Net WP3 Report, DIALOGIK Non-Profit Institute for Communication and Cooperative Research, Stuttgart.

Wilhite, D.A. and M.H. Glantz. 1985. "Understanding the Drought Phenomenon: The Role of Definitions." Water International. 10(3):111–120.

Wolfsegger, C. 2005. Perception and Adaptation to Climate Change in Low Altitude Ski Resorts in Austria.Master's Thesis in International Environmental Science.Master's Programme in International Environmental Science, Lund University.

Woudenberg, D.L.,D. A. Wilhite and M. Hayes. 2008. "Perception of Drought Hazard and Its Sociological Impacts in South-Central Nebraska." Great Plains Research. 18: 93-102.

Zhang, J. 2004. "Risk Assessment of Drought Disaster in the Maize-Growing Region of Songliao Plain, China."Agriculture, Ecosystems and Environment. 102: 133–153

Farmers' Attitudes Towards Vulnerability to Food Availability and Coping Strategies at Farm Levels in the Different Upland Farming Practices in Oudomxay Province, Lao PDR

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I. Introduction

The Lao People's Democratic Republic (Lao PDR) is a landlocked country with generally rugged terrain, limited infrastructure, a narrow human capital base and emerging social and economic institutions. Lao PDR is located in Southeast Asia, bordered with Vietnam, Cambodia, Thailand, Myanmar and China. Agriculture sector plays an important role in social, economic, and food security of Lao people. Rice occupies about 80 percent of the agriculture cultivated land areas. Rice is the most significant staple food. Rice cultivation in Lao PDR has two types: lowland rice cultivation covering 422,000 hectares; and upland rice cultivation covering 223,000 hectares. Farmers grow rice using the mono-cropping farming system throughout the country. Most of the farmers cultivate traditional rainfed rice during the wet season in the lowland rice and upland areas. Rice production has influences to many farmers' household welfare and their available foods. Rice production has decreased due to many factors such as limited rainfall, soil erosion and soil fertility, and to upland agriculture practices such as shifting cultivation. These factors cause self-insufficiency in food for many farmers (http://en.wikipedia.org/wiki/Agriculture_in_Laos).

Lao PDR's major farming systems are identified as (1) lowland rainfed and lowland irrigated; (2) upland and mountain; and (3) plateau. The cultivated land is for lowland rice production in the wet-season and for livestock grazing in the dry season. The upland and mountain farming systems are dominated by single wet season crop production, and paddy rice is the most important crop in shifting cultivation. In the plateau farming system, commercial cropping is practiced and there is a declining trend of shifting cultivation. The major commercial crops are coffee, tea, cardamom, fruits and vegetables. Rice is the most important crop, occupying 82-84% of the total crop area under rainfed condition, and is the staple food for the Lao people (Roder, 2001).

Stabilization/reduction of slash-and-burn cultivation has been promoted by the government. The target is to stabilize about 100,000 families, who will be encouraged to take up alternative on-farm and off-farm economic activities such as improved agro-forestry, animal husbandry, food and cash crop production in the plateau and, wage labour in agro-processing and trading. Credit and other forms of government assistance in land development and management have supported the eradication of slash-and-burn cultivation, protected the environment and ensured sustainable use of natural resources (Roder, 2001).

II. Rationale

Upland farming systems in Lao PDR are complex and diverse. Farmers have different farming systems practices from lowland paddy fields to upland fields. The government promotes the technologies so as to increase productivity and improve production systems for upland farmers. This approach is to reduce the shifting cultivation in the upland areas (Connell et al., 2006). Farmers have limited knowledge of sustainable upland technologies. The problems depend on the biophysical diversity as seen in differences of climatic condition, soil fertility, socio-economic diversity, and market variety. The government agencies encourage the application of on-farm cropping systems (upland rice with pigeon pea, rice with mulberry, and rice with rattan). Rotation with other crops is necessary for sustainable agriculture systems. Upland rice is cultivated only in wet season, in areas that are concentrated on slopes with altitude ranging from 300-800 meters above sea level. Maize is cultivated as second crop after rice by farmers in upland areas. Many farmers grow maize as the main source of food and income for their families. The introduction of new cropping patterns is expected to solve problems of food insecurity for the farmer's household in the upland.

Note: Adviser -Dr. Budsara Liminrakul

Growing fruit trees in uplands is one alternative for sustainable agriculture systems. The farmers are highly successful in developing their orchards. However, the marketing is a challenge. The inhibiting factors are lack or uncertain market and slow returns. (Dubbeldam, 2006). Growing vegetable is another option for upland farming systems, where many farmers intercrop vegetables with upland rice in home-gardens and near river banks. Farmers have a good opportunity to sell vegetables with good price for their cash income because of farm-input in vegetable production (Gansberghe, 2005). Rubber tree plantation is also widely promoted and established under land use policy by the government. Smallholder rubber production has expanded in northern Lao PDR and played a significant role in rural development to reduce shifting cultivation. In the long term, sustainable agriculture practice can be promoted as a best alternative to reduce poverty in many rural farms and increase the farmer's income. However, in rubber and fruit tree farming as practiced in the uplands of the Lao PDR, food security may not be sustainable in these types of farming systems.

For these reasons, the study is important to understand the vulnerability and attitude of farmers towards introduced farming practices for food availability and to explore the coping strategies for smallholder farmers of Lao PDR.

III. Objectives of the study

The following are the objectives of the study:

1. To explore the vulnerability of the different upland farming practices in the study site;
2. To assess the farmer's attitude towards vulnerability of household's food availability and livelihood security in the upland farming practices; and
3. To identify the farmer's coping strategies towards vulnerability of food availability in different upland farming practices.

IV. Hypothesis of this Study

Determination of the weight frequency reflecting levels of vulnerability towards food insecurity and severity will be useful for household's coping strategies. The farmer can better adapt to food insecurity and present food stock. The farmers are able to make their strategies for increasing their productivity and improving the cultivation techniques for the future.

V. Proposed Research Methodology

Sampling

The sample size of this study will be randomized in two districts with different farming practices. The number of sample size is approximately 100 persons per district. The survey will be conducted for both upland farming and off-farm practice.

Data collection

The data will be collected using group discussion method to gather the qualitative and quantitative data of the socio-economic and demographic characteristics of the farmer's households.

Data to be gathered will focus on the farmer' behaviors for adapting to climate severity condition in their farms. The yearly weather data (temperature and rainfall) will be collected from the provincial meteorological department. Risk management will be used to explore vulnerability. The Likert scale will be used for scoring of respondent's statements on adaptation to food availability.

VI. Duration and Time Table of the Study

Activities	2012		2013												2014				
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
Literature review																			
Seminar I (AGS 791)																			
Data collection																			
Data analysis																			
Writing the thesis																			
Seminar II (AGS 792)																			
Thesis defense																			
Revision and preparation of manuscript																			
Graduation																			

References

Babatunde, R.O., O.A. Omotesho, E.O. Olorunsanya and G.M. Owotoki. 2008. Determinant of vulnerability to food insecurity: A gender based analysis of farming household in Nigeria. Journal of Agriculture and Economic, 63(1): 116-125

Bard, S.K., and P.J. Barry, 2000. Developing a scale for assessing risk attitudes of agriculture decision makers. Internation Food and Agribusiness Management Review (3): 9-25

Connell, J. G., J. Millar, V. Photakoun and O. Pathammavong. 2006. Strategies for scaling up: Technology innovation and agro-enterprise development. In: NAFRI, NAFES and NUOL,. Improving livelihood in upland of the Lao PDR. National Agriculture and Forestry Research Institute (NAFRI), Vientiane, Lao PDR, Available by February 2006. p. 361-373

Department for International Development (DFID).1999. Sustainable livelihoods guidance sheets. DFID, London. http://www.livelihoods.org/info/info_guidancesheets.html. Accessed May 2013.

DeVellis, R.F. 2003. Scale dedelopment theory and applications Second edition. Applied Social Research Methods Series (26), London, UK., 171p.

Douangsavanh, L., B. Bouahom and K. Pouyavong. 2005. Enhancing Sustainable Development of Diverse Agriculture in Lao People's Democratic Republic. UNESCAP-CAPSA: Centre for Alleviation of Poverty through Secondary Crops' Development in Asia and the Pacific. 54p.

Gansberghe, D. V. 2005. Key Concept of Food Security. In: NAFRI, NAFES and NUOL,. Improving livelihood in upland of the Lao PDR. National Agriculture and Forestry Research Institute (NAFRI), Vientiane, Lao PDR, Available by February 2005. p. 47-52

Harvey D., 1997. A Livelihood Systems Approach to the Sustainable Development of Upland Farming Systems. In Proceedings of an International Workshop held in Vientiane, Laos, p. 27-33.

Khemmarath, S. 2005. Cultivated vegetable options for the uplands. In: NAFRI, NAFES and NUOL,. Improving livelihood in upland of the Lao PDR. National Agriculture and Forestry Research Institute (NAFRI), Vientiane, Lao PDR, Available by February 2005. p. 47-52.

Lao People's Democratic Republic (Lao PDR). Country Background. source from http://en.wikipedia.org/wiki/Agriculture_in_Laos, Accessed June 2013.

Linquist, B., K. Saito, B. Keoboualapha, S. Phengchan, K. Songyikhangsutho, K. Phanthaboon, B. Vongphoutone, V. Navongsai and T. Horie. 2006. Improving rice base upland cropping systems for the Lao PDR. In: NAFRI, NAFES and NUOL,. Improving livelihood in upland of the Lao PDR. National Agriculture and Forestry Research Institute (NAFRI), Vientiane, Lao PDR, Available by February 2006. p. 299-313.

Manivong, V. and Cramb, R. A. 2007. Economics of Smallholder Rubber Production in Northern Laos. 51st Annual Conference Australian Agricultural & Resource Economics Society, Queenstown, New Zealand , February 2007 Publication. 15p.

Maxwell, D., B. Watkins, R. Wheeler and G. Colling. 2003. The Coping Strategies Index: A tool for rapid measurement of household food security and impact of food aid programs in humanitarian emergencies. CARE and World Food Programme.

PLewa, M. 2007. The Biodiversity of Local Vegetable Varieties- a Treasure for Income Generation and Food Diversification in the Uplands of the Lao PDR. Sustainable Sloping Land and Watershed Management Conference, Vientiane. pp. 262-269.

Roder, W. 2001. Slash and burn rice systems in the hill of northern Lao PDR, challenges and opportunities. IRRI. Vientiane, Lao PDR. 201p.

World Food Programme. 2008. Food market study and preliminary household level survey on the impact of higher food prices on household food security. World Food Programme, Vientiane Lao PDR. 45p.

Effect of Supplementation with Guinea Grass Silage Fed Rice Straw based Diet on Growth Performance of Native Cattle

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I. Introduction

Lao People's Democratic Republic (PDR) is a country located in Southeast Asia covering an area of 236,800 km^2 and having a population 6.5 million people (Statistic, 2012). Lao PDR is "a landlocked country", bordered by five countries: Thailand, Cambodia, China, Myanmar and Vietnam and divided into three parts: the southern (four provinces), the central (six provinces), and the northern (eight provinces) parts.

The agriculture technology development has not covered all farming areas. Around 73 percent of the population of Lao PDR lives in the rural areas. LuangPrabang is one of the provinces in the Northern part of the country. Approximately 80 percent of farmers raise animals in upland areas using traditional techniques. The farmers lack knowledge on farming systems management and environmental and land use management. As a result, the farmers experience food insecurity the whole year round.

II. Rationale

Cattle and buffalo are grazed in fallow upland fields and forests. Management inputs are minimal and animals are left on their own much of the year. There are differences among ethnic groups and villages in the way cattle and buffalo are managed. The Hmong are well known for their skills and build extensive fences using local materials to keep animals from cropping areas. Many villages herd cattle and buffalo communally in dedicated grazing areas. In other villages, families manage animals individually. For part of the year, animals graze in remote areas where ample feed is available. At other times, animals are brought back to an enclosure every night. Farmers in some villages provide supplementary feed to cows with newborn calves and keep sick animals in special pens where they are given cut-and-carry feed. Most farmers provide salt to animals, often as an incentive to return to the enclosure by themselves (Annad frits and Aeksel suasach, 2005).

During the rainy season, the tropic guinea grass species grow very fast, with the yields often exceeding animal requirements. It cannot be cut and fed to animals, and it will continue to grow, producing very long and fibrous material but low in energy and protein.

If this guinea grass were harvested and successfully stored as silage, it could be fed to the cattle during the dry season. Although the quality of the guinea grass silage will be slightly lower than its fresh state (10 – 15% lower in good ensiling condition), it will still be better quality than many of the forage only available for dry season feeding. (John Moran, 2005)

III. Objectives

1. To study the effect of supplementation with guinea grass silage fed rice straw based diet on the growth performance of native cattle.
2. To find out the appropriate methodologies (nutrition) to improve cattle production system in the uplands.

IV. Importance of the study

This study is important to determine the potential of guinea grass as local feed to improve cattle production in Lao PDR.

Note: CMU Research Mentors- Advisor: Dr. Saowaluck Yammuen-art, Co-adviser: Dr. Chirawath Phatsara

V. Methodology

Twelve (12) native cattle aged two (2) years old and with initial weight 210 ± 29.6 kg will be used in the experiment. The feed composed of guinea grass as silage will be used for the experimental diets of cattle and will be compared with diet not supplemented with guinea grass silage.

Experimental design

Treatment will be divided into four (4) groups by following the supplement sources: T1 (control: non supplement), T2 (guinea grass silage supplemented 1kg/DM), T3 (guinea grass silage supplement 1.5kg/DM) and T4 (guinea grass silage supplement 2kg/DM).

Data collection

Data on silage quality, volatile fatty acid, chemical composition, and growth performance will be collected

Data analysis

The data will be analyzed using the analysis of variance (ANOVA) in Complete Randomized Design (CRD). The Duncan's Multiple Range Test (Steel and Torrie, 1980) will be used to determine the significant difference between treatments using the model CRD below:

$$Yij = \mu + \tau i + \varepsilon ij$$

where:

- Y : Observations
- μ : Means
- τ : Treatment effect
- ε : Experimental error

VI. Study schedule, Location and Work plan

The research will be carried out for six (6) months from February 2014 until July 2014 at the Northern Agriculture and Forestry College (NAFC), Luangprabang province, Lao PDR. Analysis of research data will be completed at the Animal Science Department, Faculty of Agriculture, Chiang Mai University, Thailand. The following is the work plan of the study:

Activities	Year 2014 - 2015									
	1	2	3	4	5	6	7	8	9	10
Housing Preparation										
Silage production										
Data collection										
Writing report										
Report and presentation										
Graduation										

References

Annad frits and Aeksel suasach. 2005. Smallholder Livestock Systems and Upland Development. Improving Livelihoods in the Uplands of the Lao PDR (lao version). Was produced in 2005 by NAFRI, NAFES and NUOL. 4.

Department of Animal Science, Prince of Songkla University. 2013. Feed and Ration Formulations [Online]. Available: http://www.natres.psu.ac.th/Department/AnimalScience/515-353/powerpoint/Roughage/silage.pps. [2013, September 16]

Dirk Van Gansberghe. 2005. Smallholder Livestock Systems and Upland Development. dirkvangansberghe@yahoo.com . Improving Livelihoods in the Uplands of the Lao PDR was produced in 2005 by NAFRI, NAFES and NUOL, page 72.

FATSTAT. 2010. Country report of Lao PDR [Online]. Available: http://www.foastat/search/lao. [2013, September 16].

Lao statistics bureau. 2012. Population LAO PDR 2011-2012 [Online]. Available: http://www.nsc.gov.la. [2013, August 28].

KHON KAEN UNIVERSITY

Effect of Jatropha Cultivation on Food Security and Socio-Economic Condition in Rural Upland of Northern Lao PDR

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I. Introduction

Lao People's Democratic Republic (PDR) is a small landlocked country in Southeast Asia with a population of over 5.8 million, a population density of 23.3 percent, an annual growth rate of 1.9 percent and with 68% of the people living in rural areas (ADB, 2011). Lao PDR is rich in natural resources and most of the people derive their livelihood from agriculture. The Lao government has set up the goal to reduce poverty among Lao ethnic communities by 2015 and to take out the country from the list of least developing countries in 2020. The main challenge of the government is to improve food security and quality of life. In 1986, the Lao government adopted a new economic mechanism and partnership with the private sector to reduce rural poverty.

Modern agriculture and forestry may be used to support the government to improve food security and economic development (Government of Laos, 2004). In rural areas, the challenge is in the production of crops including rubber, stone Jatropha, Cassava, Sugarcane and Corn, and also in facing the rapid increase of foreign investment in land (Land Concession) for Agriculture, Mining, and Electrical Hydropower sectors.
Stone Jatropha has become a dominant crop in the northern part of Lao PDR especially in Phongsaly, Xiengkhouang, Huaphan and Luangphrabang provinces. The promotion of planting Stone Jatropha for biodiesel for the industries began in 2010. Stone Jatropha plantation covered over 12,000 hectares of land in Northern provinces such as Phongsaly, Xiengkhouang, Huaphan, and Luangphrabang.

II. Rationale

The government's policy for allocating land to farmers to accelerate economic development through job creation for poverty reduction must follow regulations under "Land Act", allowing farmers to plant cash crops or energy crops for profit. (Government, 2010). The Jatropha Production Project has positive impacts on small householders in the production areas, especially in terms of job opportunities and income for local small householders; capacity building for the small holders involved (Souklaty et al.,2009), and the opportunity for small householders to inter-crop upland rice with the jatropha cultivation. However, there were also some adverse effects on the small holders including conflicts arising between the small holders and the Jatropha production companies (Markandya et al.,2008).

The study will investigate the effect of Stone Jatropha cultivation on upland rural areas and aims to understand the economic approaches, renewable energy towards food security from production and utilization of Stone Jatropha in rural areas of Lao PDR.

III. Research Objectives

The research aims to:

1. Understand how the households generate income from Jatropha production in upland Northern Lao PDR.
2. Determine how investments on the energy crop contribute to food security in upland rural areas.
3. Evaluate the impact of Jathropa production on the smallholder farmers in terms of changes in

Note: Adviser Dr. Naruemol Kaewjampa

food access, utilization, stability and the role of gender participation in this development strategy.

Research hypothesis:

- The most potential source for household income generation is derived from Jatropha production.
- Sustainability of livelihood from Jathropa largely depends on the socio-economic status of the household farmer and the extent of gender participation in developing the status of the agriculture practices in the uplands.

IV. Importance of the study

The results of this research will determine the economic contribution of cash crop production of Jathropa to the upland small holder community and its impact to food security in the uplands of Northern Lao PDR; as well as provide insights to Lao PDR Government to enhance investment strategies for the benefit of the upland community.

V. Methodology

Study area

The study area is located in Northern Lao, Xiengnguen District, Luangprabang Province, 1,626 km^2, 445 m above sea level and with 91% as upland area.

Data Collection

Primary data will be collected using survey questionnaires and interviews. Secondary data will be gathered from relevant documents and reports. Stratified random sampling will be used to determine the sample size for each stratum.

Data Analysis

The data will be analyzed using Analysis of Variance (ANOVA) and SPSS for Windows Program to find frequencies, percentage, mean (X), minimum, maximum, and standard deviation (S.D).

VI. Research Time Table

The following is the timetable for this research study:

Activity	Month in 2013- 2015																			
	2013				2014												2015			
	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
Preparation of the proposed research																					
Proposed study																					
Preparations for the survey plantation research																					
Field research																					
Data collection																					
Interview																					
Information																					
Interview analysis																					
Reporting process study																					
Data final analysis																					
Report thesis																					

References

ADB. (2011). Asian Development Bank & Lao People Democratic Republic: Fact Sheet. Retrieved July 25, 2011

Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (Revised 2000). Guide to Measure Household Food Security. Retrieved September 29, 2011,

FAO. (2006). Food Security. Policy Brief , p.1.

FAO. (2003). Trade Reform and Food Security. Rome.

Foppes, J., & Ketphanh, S. (2004). NTFPs Use and Food Security in Lao PDR.

Laos, G. o. (2007). Resolution of First National Land Management Meeting. First National Land Management Meeting. from http://en.wikipedia.org/wiki/Agriculture_in_Laos 23.October2013.

Peter Kurt Hansen .(2013) Shifting Cultivation Development in Northern Laos from http://www.fao.org/sd/wpdirect/WPre0109.htm 23.October2013

FAO.(2011) The Role of Women in Agriculture 1.ESA working paper No.11-12

FAO.(2009). Sustainable Agriculture and food security in Asia and the Pacific.

Network, T. S. (2009). Rubber Investments and Market Linkages in Lao PDR: Approaches for Sustainability

Anil Markandya, and Setboonsarng, Sununtar.(2008) Organic crops or energy crops? Options for rural development in Cambodia and the Lao People's Democratic Republic, ADB Institute Discussion Papers 101

Grimsby.L. K,, Aune J. B, and Fred H. J.(2012) Human energy requirements in Jatropha oil production for rural electrification in Tanzania. Energy for Sustainable Development.16, 279-302

Dereje Kifle.(2013) Gender role in agricultural production in some parts of Ethiopia International Journal of Research in Applied, Natural and Social Sciences (IJRANSS)2,49-52

C. Suhas P. Girish, K.L. Sahrawat, Ch. Srinivasa Rao, G. Raghvendra, and P. Susanna, M. Pavani.(2012) Carbon sequestration and land rehabilitation through Jatropha curcas (L.) plantation in degraded lands Agriculture, Ecosystems and Environment 161, 112– 120

ManuelRuíz-Valdiviezo. V, M-Guidoa, Aurélie.G, and Federico AntonioGutiérrez-Miceli, LucDendoovena,.(2010)Greenhouse gas emissions and C and N mineralization in soils of Chiapas (México) amendedwithleavesof Jatropha curcas L. Applied SoilEcology 46, 17–25

L.C. Stringer , A.J. Dougill , A.D. Thomas , and D.V. Spracklen , S. Chesterman,C. Ifejika Speranza , H. Rueff , M. Riddell , M. Williams , T. Beedy , D.J. Abson ,P. Klintenberg , S. Syampungani , P. Powell , A.R. Palmer , M.K. Seely , D.D. Mkwambisi ,M. Falcao , A. Sitoe, S. Ross , G. Kopolo .(2012) Challenges and opportunities in linking carbon sequestration, livelihoods and ecosystem service provision in dry lands environmental & policy ., 19 – 20 , 121 – 135

Schut M,, A.Paassen , C.Leeuwis , S.Bos , W. Leonardo , and A.Lerner (2011). Space for innovation for sustainable community-based biofuel production and use: Lessons learned for policy from Nhambita community, Mozambique. Energy Policy 39 , 5116–5128

Fartaj A, David S.-K. Ting, and Wendy W. Yang.(2004) Second law analysis of the transcritical CO2 refrigeration cycle. Energy Conversion and Management. 45, 2269–2281

in Botswana: A contribution to energy policy. Energy.policy 43.70-79

Mintz-Habib.N.(2013) Malaysian biofuels industry experience:A socio-political analysis of the commercial environment. Energy policy 56.88-100

Sysaneth Souklaty and Dr L. Duangsavanh.(2009) Impacts of Jatropha plantation on smallholders.(NAFRI). Ministry of Agriculture and Forestry, Lao PDR

Laos Government.(2010) the study on Laos Jatropha Bio-diesel fuel Development Project. Engineering and consulting Firm Association, Japan Oriental Consultants Co.,Ltd.

Marcus.V.A.F and W.Doppler.(2010) Bioenergy and sustainable development: the dilemma of food security and climate cange in the Brazilian Savannah.Ennergy for sustainable Development 14.194-199

Wang Zanxin and M. M. Calderon,Y.Lu. (2011) Lifecycle assessment of the economic, environment and energy performance of Jatropha curcas L. biodiesel in China. Biomass and Bioenergy 35.2893-2902

Zhou Adrian and Elspeth Thomson.(2009) the development of biofuel in Asia. Applies Energy.86, 511-520

Sustainability of the Source of Food from Upland Slash and Burn Farming in Northern of Lao PDR

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I. Introduction And Rationale

Poverty in the uplands of Lao PDR is largely due to lack of sustainable livelihoods. Households are vulnerable to food shortages and hardly able to meet family subsistence requirements. They have few capital goods and farm implements, low levels of education, and poor health. Increased scarcity of land resources and a decline in rice productivity resulted to food shortages. These trends are the result of a growing population pressure, government-sanctioned policies, as well as the growing presence of foreign commercial agriculture. Despite these challenges, rice is and will likely continue to be the major staple crop, which upland farmers rely on for food security. Overall, improvement of the agriculture production systems in the northern uplands of Lao PDR is regarded as an entry point for freeing up more land and labor for other commodities and activities. Once sustainable food security has been established, further improvement of the agricultural production systems and sustainable resource management will be possible (Swiss Agency for Development and Cooperation, 2008).

Slash and burn agriculture is the process of cutting down the vegetation in a particular plot of land, setting fire to the remaining foliage, and using the ashes to provide nutrients to the soil for use of planting food crops (Hirst, 2013). It is also known as swidden, is used for a relatively short period of time and is a part of forest rotation. There are positive aspects of slash and burn system of farming. The positive aspects include: provision of food from crops (mainly rice, sugar cane, maize, cassava, etc.), provision of non-crop food (such as wild vegetables, tubers, insects, rodents, amphibians, birds, etc.) collected in the upland rice plot as well as in the fallow plots from precedent years. The negative effects of this type of farming systems are: erosion (when fields are slashed), nutrient loss, biodiversity loss (when plots of land area are cleared), and damaged environment, etc.

Rice is the most important crop in Laos and about 70% of the total calorie supply in diets comes from rice (Maclean et al. 2002). In the mountainous region of northern Laos, the upland rice ecosystem accounts for about half of the total rice area (National Statistical Center 2004). Upland rice is typically grown under slash-and-burn systems and farmers have relied on extended fallows to restore soil fertility and to reduce problems from insects and weeds as is typical of slash-and burn systems elsewhere (Nye and Greenland 1960). In Laos, the traditional cropping cycle has been a single rice crop followed by fallow periods of 10 or more years (Roder et al. 1997a; Roder 2001). It is generally agreed that slash-and burn systems are sustainable when population densities are low enough to allow for long fallow periods. Long fallows allow for vegetation to build up, providing large quantities of biomass for burning and the ash deposits and nutrients from mineralized organic matter are considered sufficient for reasonable crop yields in the initial year after clearing vegetation (Kyuma and Pairintra 1983; Roder et al. 1995a; Roder et al. 1996).

The challenges of agricultural development in the uplands include unclear land tenure system, lack of political support to expand farm size, poor support services (health, education), and labor intensive production systems that reduce options for change.

The information that can be obtained from this study will serve as an eye opener for the government of Laos to give importance to the rural communities who highly contribute to the country's food security and agricultural development. The results of the study will be useful in identifying bottlenecks in the community's food security and agricultural development at the grassroots level and to other social scientists in other regions who may conduct similar research studies.

Note: Adviser- Dr. Jirawat Sanitchon

II. Objectives

1. To analyze the source of food from slash and burn agriculture as a whole including the crop itself (upland rice and other associated crops) and the wild vegetables, cultivated vegetables and animals collected in the forest regrowth and fallows from precedent years that are an integral part of the rotation
2. To draw lessons on food security approaches and development directions by taking into account the importance of non-agricultural sources of food as opposed to a typical agricultural development view of farming systems and agricultural productivity.
3. To evaluate soil productivities in superimposed zones (transect approach)

III. Importance Of The Study

The results of this study hopes to address the need for better understanding of the various sources of food and the benefits to farmers of maintaining sustainable biodiversity agro-ecosystems. This study will support strategies to seek new approaches and innovations in food security interventions and rural development in upland areas by recognizing farmers' practices to get sources of food from both agriculture and other by-products from the farming system areas.

IV. Location Of The Study

The study will be conducted in Khoun District at the south of the Xieng Khouang Province, 320 km from Vientiane. It will cover two villages in the selected village cluster of Keoset Kumban.

V. Methodology

The research design will adopt the social survey design including the basic steps such as selection of sites, respondents, methods, unit of analysis, data collection, data analysis and report writing. The following data collection methods will be used:

- Interview schedule using a structured questionnaire
- Key informant survey using guide questions
- Focus group discussions (FGDs)
- Desk review of relevant secondary documents such as INGO, NGOs, local authorities, reports, official records, research papers, unpublished papers, maps, journals, internet, and others.

Sampling technique

The sampling technique will follow stratified sampling and simple random sampling. Selected sites will cover 3 levels such as low terraces as well as upland slash and burn ecosystems. Those three types of ecosystems will be studied to assess the balance of sources of food between the crop per se and the collected food (wild edible plants and animal species).

Data analysis

In this study, results of the survey will be analyzed with the use of descriptive and inferential statistics. Descriptive analysis will include presentation and discussion of the frequency, percentage, mean, and range of data gathered using SPSS program.

VI. Expected Results

The study hopes to achieve the following results:

- Better understanding of the various sources of food and the benefits for the farmers from maintaining sustainable diversified agro-ecosystems.
- Provide innovations for soil-plant conservations in upland areas and new approaches in food

security interventions in agriculture development by recognizing farmers' practices for food sources from upland farming systems.

- Develop a plan to sustain ecosystem of Khoun District in Xiengkhaung province

VII. Study Schedule

The research will be implemented from November 2013 and will be completed in December 2014. This time-frame will allow for the intervention to cover two harvesting seasons (2013 and 2014). Details of activities are as follows:

ITEM	ACTIVITY	2013		2014							
		Nov	Dec	April	May	June	Jul	Aug	Sept	Oct	Nov
1	Area survey and select area										
2	Data collection (rice harvest)										
3	Monitoring new plantation rice, wild vegetable and insect area										
4	Group discussion with focus village										
5	Data sampling										
6	Data collection (rice, wild vegetable and insect in area)										
7	Summarize data and data entry										
8	Make report										

References

Pasual, U. 2005. Analysis, Land use intensification potential in slash-and-burn farming through improvements in technical efficiency. Ecological Economics 52, 497-511.

Schuck, E. C., W. Nganje and D. Yantio. Analysis, The role of land tenure and extension education in the adoption of slash and burn agriculture. Ecological Economics 43, 61-70.

Smith, J., P. V. D. Kop, K. Reategui, I. Lombardi, C. Sabogal and A. Diaz. 1999. Dynamics of secondary forests in slash-and-burn farming: interactions among land use types in Peruvian Amason. Agricul, Ecosyst and Environ 76, 85-98.

Pandey, S. and D. V. Minh. 1998. A socio-economic analysis of rice production systems in the uplands of northern Vietnam. Agriculture, Ecosystems and Environment 70, 249-258.

Styger, E., H. M. Rakotondramasy, M. J. Pfeffer, E. C. M. Fernandes and D. M. Bates. 2007. Influence of slash-and-burn farming practices on fallow succession and land degradation in the rainforest region of Madagascar. Agriculture, Ecosystems and Environment 119, 257-269.

Kris Hirst, K. 2013. Slash and burn (web: http://archaeology.about.com/od/skthroughsp /qt/slash_burn.htm , cited on August 13, 2013).

Roder, W. 2000. Slash and burn rice systems in the hills of Northern LAO PDR: Description, challenge and opportunities. IRRI, Vol. 50.

Colin Stief - Geography Intern at Geography at About.com Colin is the Fall 2008 Geography at About.com Intern (web: http://geography.about.com/od/geographyintern/a/colinbio.htm, cited on September 01, 2013).J. Nutr. 133: 3879S–3885S, 2003.

A non-Profit Organization (web: http://en.wikipedia.org/wiki/Laotian_society,WikimediaFoundation, Inc., 10,2013)

Study on Livelihood of Households after Land Use Conversion at Song Khe Commune, Bac Giang City, Bac Giang Province, Vietnam

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I. Introduction

There is no doubt that land is a highly precious resource of every nation which provides not only indispensable means of production contributing to the economic development of the country, but also the basis for establishment of social, cultural and military infrastructures (Land Law 2003). In a fast changing economy, land has been altered in order to increase efficiencies; however this objective is not always achieved as it takes time to value results. Obviously, land use must carefully consider the total effects on the whole society.

To change economic structure appropriately is the first important duty of the nation towards industrialization and modernization. The nation's policy is to change economy structure for increasing weight of industry and services, reducing weight of agriculture. The purpose of agricultural land conversion into non-agricultural land use purposes plays a tremendous role in stimulating the process of industrialization, modernization and urbanization.

The conversion of agricultural land for expanding urban areas and for other non-agricultural use has the most severe impact on low and middle-income countries. In Vietnam, approximately 200 000 ha of agricultural land is transformed for non-agricultural uses annually (Hanoimoi, 2006). The transformation has occurred in many provinces as a natural process of development, especially in big cities and industrialized provinces. For agrarian households, land is the most valuable asset for farm production and income generation. Land represents a fundamental asset because of its role as primary source of income, security, and status (RDI, 2002-2004).

II. Rationale

The cultivated land is being replaced by the construction of infrastructure and industrial zone in many rural areas. This change has a significant impact on the food security and livelihood resources of upland households. For agrarian households, cultivated land is a key livelihood asset. Therefore, without cultivated land the households are forced to look for new forms and means of livelihood.

Moreover, it is clear that after land use conversion through Government revocation, the peasants lost not only the land, which is a key livelihood asset in terms of natural capital, but also their traditional on-farm skills. As compensation, the peasants received a lump sum of money for land revocation. In other words, this vulnerability context had an impact on household's livelihood status in terms of natural capital, human capital, and financial capital.

These changes in land use have affected Song Khe, an upland rural commune. This study will look at the livelihood of households after land use conversion at Song Khe commune, Bac Giang City, Bac Giang Province, Vietnam.

III. Objectives

The research study aims to:

- Describe the status of land use and cultivated land use conversion in Song Khe.
- Determine the main livelihood activities of households after land use conversion.
- Analyze the change of household livelihood after land use conversion.
- Recommend strategies to ensure sustainable livelihood for local households.

IV. Importance of the Study

In Vietnam, cultivated land is a key livelihood asset of agrarian households. Therefore, the transformation of agricultural land into non-agricultural use clearly urges households to find new forms of livelihood.

This study will provide information on the process of transformation into new forms of livelihoods for the households and an analysis about farmer household's adaptation to change after the land use conversion. This information may be useful for them in resolving jobs and encouraging the process of transforming employment opportunities, investing in improving capacity for households in the village especially for the next generation.

There is an urgent need for interventions to enable the upland communities to conserve and manage the natural resources while sustaining livelihood to contribute to food security.

V. Location of the study

This study will be conducted in Song Khe Commune, Bac Giang City, Bac Giang Province, Vietnam.

VI. Methodology

Secondary data will be gathered from officials reports and articles. Primary data will be collected using Participatory Research Appraisal (PRA) tools which include group discussion, key informant interview, semi-structured interviews, and interview with local government officials and field observation.

Data analysis

Collected data will be analyzed by using Statistical Package for Social Sciences program (SPSS). The research will use both descriptive statistics and comparative statistics in analyzing the data.

VII. Research Time Table

The Independent study will be conducted from April 2014 to August 2014, with the following details:

Order	Description of research Items	Month				
		April	May	June	July	August
1	Development of theoretical framework					
2	Data collection					
	Collecting secondary data and related documentations at level of commune and district					
	Survey, collecting primary data at the level of commune and households					
3	Data analysis					
4	Writing of dissertation					
Total		5 months				

References

The UK Department for International Development. (1999). Sustainable Livelihoods Guidance. Sheet: Introduction. http://www.livelihoods.org/info/info_guidancesheets.html#1.

Murray, Janet and Mary Ferguson. (2001). Women in Transition Out of Poverty. Toronto: Women and Economic Development Consortium. January.

Tran Thi Thu Hang, (2011). Assessing the performance of altering agricultural land into industrial land in the period between 2000 and 2010 in Dong Anh district, Ha Noi province.

Department of Planning and Investment of Bac Giang province, 2008, Report of the whole economic and social development in Bac Giang province from 2011 to 2020.

Nguyen Van Song, 1996. Human capital and economic efficiency of rice farmers in the province of Hanoi.

Prime mister, 2007. Enhancing performance control over uses and planning and investment on land.

Nguyen Thi Huong, 2006. Evaluating economic efficiency of using cultivable land at Tu Dan commune, Khoai Chau district, Hung Yen province.

Nguyen Dinh Bong, 2002. National land budget – Status and forecasting of land use. real status of environment of Misnistry of Science and Technology in 2000.

Le Thai Bat, 2002, Land environment in Vietnam 2000. Report on Vietnamese.

Tran Thi Hai, (2011). Evaluating status and giving some suitable types of land use towards efficient and sustainable in Thanh Chuong district, Nghe An province.

Coping Strategies for Food Security: Case Study on Promotion of Organic Rice Production in the Upland Area of Northern Lao PDR

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I. Introduction

Lao PDR is a least developed country and its government actively tries to free the country from its current status as least developed to a developed country by 2020 emphasizing on utilization of natural resources such as forest, mining, water, and others in order to support socio-economic development of the country.

The government's vision to develop agriculture, and forestry, natural resources and rural development is based on a holistic concept of long-term, sustainable development, including economic, social and ecological dimensions. The long-term development goals of the Lao government are aimed at the conservation of upland ecosystem, ensuring food security and improving the livelihoods of rural communities. The improvement of livelihoods (through agriculture and livestock activities) towards food security is a priority concern of the Lao government.

The present agriculture development strategy of the Lao government from 2011 to 2020 is a long term framework for the development of the sector which will serve as a reference for orienting the Ministry of Agriculture and Forestry decision makers and officers, as well as development partners, to provide their support to the agriculture natural resource and rural development sectors.

The agricultural and forestry sectors continue to be the key sectors contributing to the reduction of rural poverty. Accelerating poverty reduction depends largely on delivering an adequate combination of public investment, foreign direct investment, and trade liberalization to the sector. The agricultural and natural resource sector's overall contribution to national poverty reduction and aggregate economic growth has so far remained relatively modest and below its potential. Moreover, the contribution of the agriculture sector to overall national economic development has the potential to be very effective.

The Lao agriculture and forestry sectors play an important role as contributor to food security within the ASEAN Region as well as to the maintenance of a sound environmental base in the region.

Organic agriculture in Lao PDR has been promoted both by rural development NGOs and by private sector enterprises interested to gain access to premium markets. The government of Lao PDR has also been involved in the sector development since the early stage. Almost all NGOs in the country are foreign NGOs having offices and development projects in the country.

II. Statement of the problem

The government and private sectors have been supportive in raising yield and income and in implementing other support services to improve rural farming productivity. One problem is that these farming practices have not been fully examined. There is a need to understand adoption or possibility of adopting agriculture practices. The existing situation of adoption of agriculture technology by the farmer must be understood by government and private extension agents to enable them to customize interventions to the needs of the farmers. Improving agricultural production is particularly difficult in the North because of the hilly topography, the often steep slopes, the small potential for paddy cultivation, and the limited infrastructure and market access.

III. Objectives of the study

The research study aims to answer the following questions:

1. How does organic rice production contribute to farmers' income?
2. In what way do organic agricultural practices contribute to the conservation of the environment?
3. What are the available new technologies to improve the agricultural production system?
4. What are the extension service strategies for organic rice production in upland northern Xiengkhouang province?

IV. Importance of the study

The research study is important in light of the need to:

- Determine basic socio-economic background of the target organic rice farmers.
- Find out the best ways to further develop suitable agricultural extension techniques in organic rice production in these areas.
- Provide a good reference material for students, and organizations and government agencies who are interested to promote organic rice production in upland areas.

V. Data Collection and Method of Analysis

Primary data will be collected using survey questionnaire and interview guide, focused group discussion and informal meetings with farmers and villagers during immersion period in the community. Secondary data will be collected from the national and local statistics offices, reports and other printed materials. Data sets to be collected and method analysis will have to be discussed yet with the adviser.

VI. Location of the study

The research study will be conducted in Phoukout District, Xiengkhouang northern province, Lao PDR.

KASETSART UNIVERSITY

Profit Efficiency of Hybrid Rice in Central Vietnam

Mr. Ho Trong Phuc
MSc Agricultural and Resource Economics, Kasetsart University

I. Introduction and Rationale

Vietnam is an agricultural country with approximately 70% of the population living in the rural areas and more than 56% deriving their livelihood from the agriculture sector (Hoai, 2012). Rice production plays an important role in the nation's economy. With the government's support policies and the application of advanced science and technology, the production yield of rice increased annually. In 2011, the total area planted to rice was 7.6 million hectares with an average yield of 5.5 tons/ha and a total production of 42.4 million tons (Ministry of Agriculture and Rural Development, 2011). Vietnam has become the world's second largest rice exporting country in recent years with the total amount of rice export reaching 7.1 million tons and worth (Free on Board) 3.5 billion USD (Vietnam Food Assocation, 2011).

Despite these achievements, rice farmers face challenges such as soil erosion, water pollution, and the decline of land area for rice and deteriorating quality of rice as well. These challenges are due to the negative impacts of the environment and urbanization associated with bad-practice treatments relying only on exploiting the fertility of the soil. This is especially true for the central and northern mountainous provinces of Vietnam where almost all of the natural areas are forest land and rivers and the land area for rice is limited, sloping, infertile, has bad water storage capacity, and are usually heavily affected by natural disasters such as typhoon, floods, landslides, drought, and salinity.

With this situation, the Vietnamese government experimented and introduced hybrid rice varieties in Northern Vietnam initially planted on 100 ha of land in 1991. The MARD statistics showed that the yield of hybrid rice was higher than that of inbred rice varieties. Consequently, hybrid rice was adopted widely and the planted area increased rapidly from 100 ha in 1991 to 709,820 ha in 2009 (General Statistics Office, 2010) under the government's subsidy policies (for example, the subsidy policy on hybrid rice seed).

The yield advantage of hybrid rice was also found in other major rice production countries, which have high rate of hybrid rice adoption. For example, in China hybrid rice has been adopted since 1979 and brought an average yield of more than 20% compared with inbred varieties (Yuan, 2004). In the Philippines from 2001 to 2007 the recorded yield advantage of hybrid rice is 33% more than that of inbred varieties; in Bangladesh 14%; and in Myanmar from 12 to 48% (Vien and Nga, 2009). In India, studies showed that the yield advantage of hybrid rice compared with inbred rice is from 24% to 36.4% (Fangming, 2011).

The central zone is one of the largest areas in Vietnam. It is divided based on terrain and climate conditions for agricultural production. The Northern and Southern areas have the advantageous conditions for agricultural development, especially rice production with the Mekong River Delta in the South and Red River Delta in the North. These are the main zones for rice production for export in 2011. The rice plantation areas of these two deltas account for 68% of Vietnam's total land areas planted to rice. (GSO, 2011). In contrast, the central zone has a disadvantageous condition in terms of rice production. The rice production in this zone only meets the zone's domestic and the Northern Province's demand. The large proportion of land area is mountains and rivers, rice land only makes up 4.8% of the total land area and accounts for 19% (1.45 million ha) of the whole country's total area planted to rice. (GSO, 2011). Moreover, this zone is usually affected heavily by natural disasters such as typhoon, floods, erosion, drought, and landslides. These result in negative direct effects on the zone's rice production profit.

Until now, there is no research yet on analysis of profit efficiency of hybrid rice in Vietnam, particularly in the central zone. There were some initial studies about hybrid rice but were only focused on analyzing the economic impact. The use of profit efficiency approach is minimal in Vietnam, especially at farm level. Previous studies either analyzed technical efficiency or cost efficiency. Therefore, the application of profit efficiency analysis for hybrid rice is a new approach. Ogundari Kolawole (2006) and Maudos

Note: Advisers- Dr. Orachos Napasintuwong Artachinda, Thesis Advisor, Dr. Santi Sanglestsawai, Thesis Co-Advisor and Dr. Nguyen Tri Khiem, Thesis Co-Advisor

(2003) indicated that the technical efficiency considerations are important improvements in production efficiency, but computing profit efficiency will lead to greater benefits to the farmers and will provide information that is more important to policy makers. Kumbhakar and Lovell (2003) also illustrated that a cost minimization objective is undoubtedly appropriate in some environments, but it can be argued that in other environments, it is not sufficiently stringent because the ultimate objective of many producers is to maximize profit.

II. Objectives and Research Hyphothesis

This study aims to:

1. Analyze the profit efficiency of farmer's hybrid rice production; and
2. to investigate the determinants of profit inefficiency.

III. Location of the study

The study site is located in the North Central Coast area of Cental Vietnam.

IV. Usefulness/Importance of the study

The results of this study will enhance the profit of rice households through efficient use of input sources and will formulate recommendations to the government to support and stimulate the development of hybrid rice in the central region in particular, and the whole country in general.

The research may provide the theories and methodologies related to economic efficiency, profit efficiency, stochastic frontier analysis with profit function, and hybrid rice production to readers, scholars, and students who are interested in pursuing agricultural economics as a field of specialization.

V. Methodology

Hypothesis

The hypotheses of this research will be tested as follows:

1. Farmers growing hybrid rice in the central zone have different profits.
2. Profit efficiency of farmer's hybrid rice production in the Central Vietnam is affected by farmer characteristics, farm characteristics, and other related variables.

Analytical Framework

The stochastic frontier analysis method with profit function approach will be employed in this study. This is a new approach to measure the efficiency of rice production of households. Moreover, stochastic frontier analysis method is a parameter approach, which will give us the research results more accurately and reliably than non-parameter approaches. Besides, the descriptive statistics method is also applied to describe natural conditions, socio-economic conditions, farmer characteristics, farm characteristics, and the situations of rice and hybrid rice production of surveyed households. To be sure that the study results have high significance to science and practice, the review of literature and expert method are proposed to be used in this research to verify and reduce random errors during the period of conducting research.

The data for this study will come from two sources: primary data and secondary data. The primary data is collected through household interviews by random sample selection method to seek information about farmer characteristics, farm characteristics, input and output quantities as well as their prices, and other variables relevant to the profit inefficiency of hybrid rice production of households. The secondary data is collected from statistics offices of provinces in the study site for descriptive statistics analysis of the status of rice and hybrid rice production in past the five years. The analytical framework is presented in Figure 1.

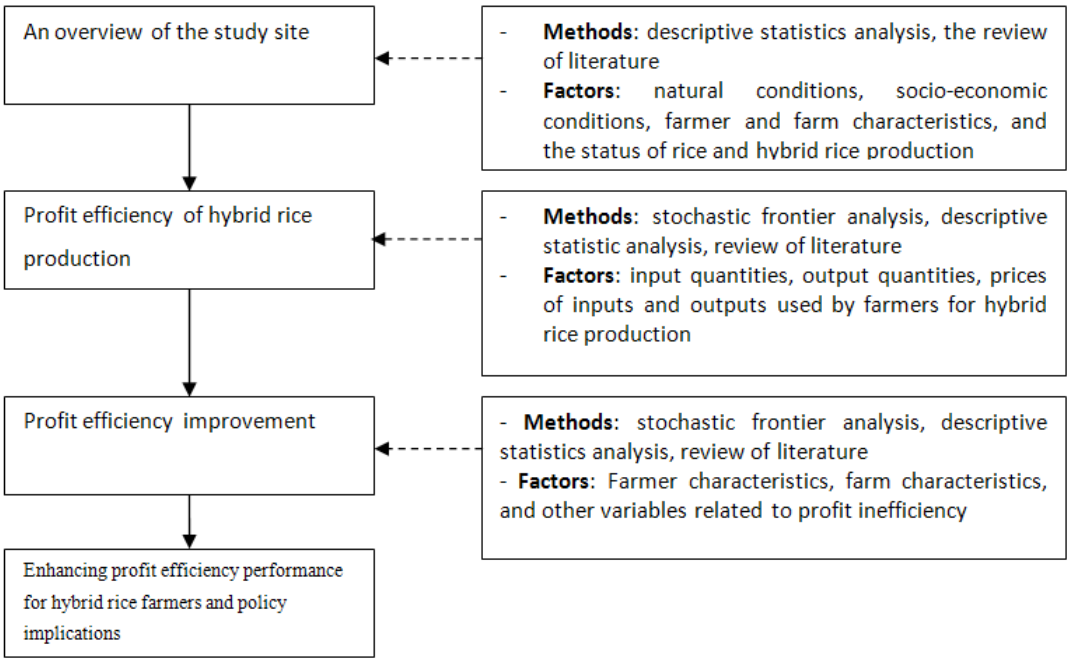


Figure 1: Analytical Framework

Sampling Procedure

Sampling procedure is one of the most import parts of each study and the significant level of each study will depend on the accuracy of the collected data (the representation ability of sample). The precision of the collected data is decided by the sampling method. In order to ensure the confident and significant levels of the study, the following stages of sampling procedure is presented in figure 2.

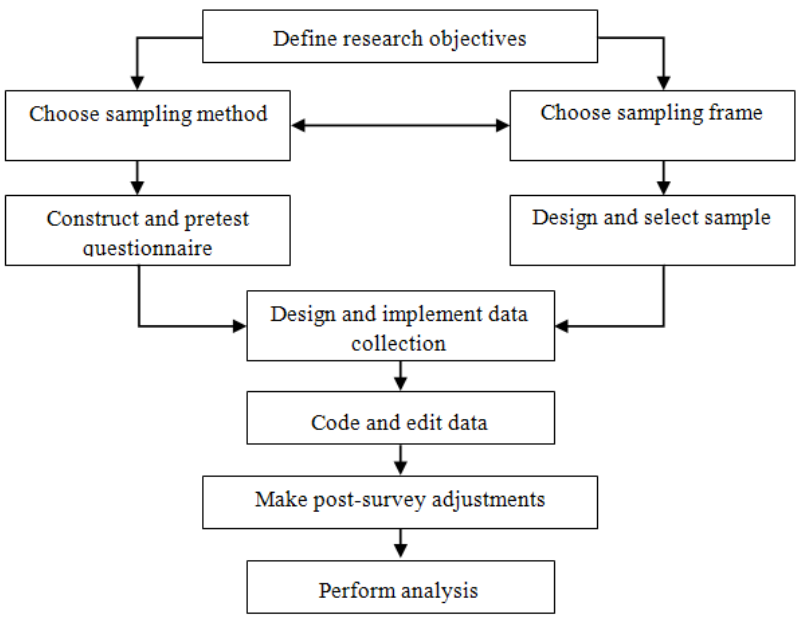


Figure 2 The stages of survey (Robert at al, 2004)

VI. Research Timetable

The following is the research timetable:

Activity	2013				2014									
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Thesis Proposal defense														
Editing and submission of proposal														
Pretesting and data collection (1)														
Data collection (2)														
Organization of data														
Data analysis														
- Improving the chapter introduction, literature review, and methodology - Writing chapter 4 and chapter 5 - Writing Paper														
Final Editing														
Thesis defense														
Publication/Presentation														

References

Abdulail, A. and W. E. Huffman. 1998. An Examination of Profit Inefficiency of Rice farmers in Northern Ghana. Working paper in Dept. of Economics, Iowa State University, Ames, U.S.A.

Adesina, A. A. and K. K. Djato .1996. Farm Size, Relative Efficiency and Agrarian Policy in Cote d'Ivoire: Profit Function Analysis of Rice Farmers. Agricultural Economics. 14: 101-119.

Coelli, T.J. 1996. A guide to DEAP Version 2.1: A Data Evelopment Analysis (Computer) Program. University of New England, Armidale, NSW, 2351 Australia.

Coelli, T.J. 1996. A guide to FRONTIER VERSION 4.1c. A computer program for stochastic frontier production and cost function Estimation. Mimeo, Department of Econometrics, University of New England, Armidale, Australia.

Cochran, William Gemmell. 1977. Sampling Techniques (third edition). New York: John Wiley & Sons.

Fangming, Xie. 2011. Hybrid Rice R&D Program at IRRI. Sanya, China.

Hoai, N.M. 2012. The basic theory and reality of building new rural area in Vietnam.

Kumbhakar, Subal C. and Lovell C. A. Knox. 2003. Stochastic Frontier Analysis. Cambridge University Press.

Linh, V. H. 2012. Efficiency of rice farming households in Vietnam. International Journal of Development Issues, Vol. 11 Iss: 1 pp. 60 – 73.

Ogundari, Kolawole. 2006. Determinants of profit efficiency among small scale rice farmers in Nigeria: A profit function approach. Presented at the International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18, 2006.

Robert M. Groves, Floyd J. Fowler, Jr., Mick P.Couper, James M. Lepknowski, Eleanor Singer, and Roger Tourangeau. 2004. Survey Methodology. The United States of America: John Wiley & Sons.

Sanzidur, Rahman. 2003. Profit efficiency among Bangladeshi rice farmers. Food Policy. 28: 487–503.

Seyyed and Mohmmad. 2012. Logistic Regression Analysis on Factors Affecting Adoption of Rice-Fish Farming in North Iran. Rice Science, Vol. (19), No.2, 2012.

Vien, T. D., Nga N. T. D. 2009. Economic impact of hybrid rice in Vietnam: an initial assessment, J. Sci. Dev. 2009, 7 (Eng.Iss. 2): 258 – 272 Hanoi University of Agriculture.

Yuan, Longping. 2004. Hybrid rice for food security in the world. FAO rice conference, Rome, Italy.

MARD: Ministry of Agriculture and Rural Development www.agroviet.gov.vn/en/

VFA: Vietnam Food Association www.vietfood.org.vn/en/

GSO: General Statistic Office of Vietnam www.gso.gov.vn

VNA: Viet Nam Agriculture http://nongnghiep.vn

The Banana Production and Consumption in Nam Dong District in Vietnam: Situation and Solutions

Nguyen Van Thanh
MSc Sustainable Agriculture, Kasetsart University

I. Introduction

Fruit production plays an important role in agriculture for many countries in the world. Fruit sector is also an important production sector of Vietnamese agriculture. In recent years, expenditure demands of fruits in Vietnam is increasing, in particular, fresh fruits like bananas, mangosteens and blue dragons (Marissa, 2009). On average, a Vietnamese person consumes around 55kgs of fresh fruit annually (Marissa, 2009). Vietnamese banana has high nutritional value. Bananas offer various mineral substances and energy. Bananas are not only delicious when ripe, but green bananas are also part of some dishes.

Vietnam bananas are considered as an important economic component of households and are popularly grown in gardens and small fields. According to Cultivate Bureau (2012) Vietnam banana plantations occupy 109 000 ha, accounting for 14.7 percent of the total fruit tree areas. The bananas particularly the ripe ones, are consumed in the local market year round. Vietnamese banana is also exported to other countries such as China, the United States and the European Union (Hung, Cham and Truc, 2013).

Although, Vietnam bananas are staple crops, the mean banana yield is only 16.34 tons/ha that is lower than many Asian countries like India (35.9 tons/ha) and the Philippines (20.2 tones/ha) (NCAER, 2012). In fact, Vietnam bananas have been not invested appropriately (MARD, 2007). Farmers' knowledge and techniques about banana growing is quite limited, and some farmers cannot afford to invest for production.

II. Rationale

Nam Dong is one mountainous district in Thua Thien Hue province, Vietnam with population of 24,815 people, including ethnic minority people which account for 44.5 percent. The main livelihood of the local people is agricultural production (Hang and Long, 2012).

In Nam Dong, bananas are very suitable to the land and weather condition as well as the economic circumstance of households (Chau and Tuyen, 2010). Banana is one of the major fruit crops and banana production activities contribute considerably to the income of banana farmers in Nam Dong. At present, the total land area for agriculture in Nam Dong is 584 hectares which include 48 percent of banana plantations. Although, the banana production provide high income compared to other crop production in the district, the income of the banana production is lower than those in other regions in Vietnam, (about USD 2,380 per ha in 2011). The low banana is caused by the following: First, there is a limited application of production techniques and the growers often follow their usual practices and experience. Second, investment costs for banana production are quite low. Third, the banana growers' capacity to access the market is very limited. Finally, there is a very low consumption of banana in the market due to the availability of other varieties of fruits bought in the market.

Therefore, the aim of this research is to gather information about the banana production and consumption in Nam Dong and find solutions to improve the banana production and its sustainability for households in Nam Dong upland district.

III. Objectives

The overall objective of the study is to gather information on the situation of banana production and consumption in Nam Dong district and find solutions to improve banana production for farmers in Nam Dong upland district. Specifically the study aims to:

- Assess the real situation of banana production and consumption.
- Determine production and marketing constraints.
- Analyze participation in the process of the banana production and consumption.

Note: Adviser -Dr. Chinawat Yapwattanaphun

- Propose solutions to improve the banana production effect for local farmers in Nam Dong upland district.

IV. Importance of the study

The findings of this research would benefit the local government and farmers in Nam Dong, specifically on:

- The real situation of banana production and consumption;
- The problems in banana production and marketing;
- Advantages and disadvantages in banana production and consumption; and
- Feasible solutions for banana sustainable production and consumption in Nam Dong.

V. Methodology

Both quantitative and qualitative research methods will be used in this research to achieve the objectives. Secondary data will be obtained from the local reports gathered in Nam Dong District, particularly on socio-economic situation, climate condition, land types, population and situation of banana production and consumption, planning and management. Primary data will be gathered from farmers, traders, businesses, and other relevant participants through participatory rural appraisal (PRA) using structured and unstructured questionnaires, group discussion, in-depth interview and observation.

VI. Study schedule

This study will be conducted within 22 months. The plan of study is described as follows:

No	Activities	2013 - 2014												2014 - 2015										
		8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7
1	Building research proposal and contents																								
2	Design research tools																								
3	Submit and defend thesis proposal																								
4	Collect secondary data																								
5	Collect primary data																								
6	Write the results and discussion																								
7	Thesis writing																								
8	Defend results of the master thesis																								
9	Submit final thesis																								

References

Chau, N. N. and M. C. Tuyen. 2010. The banana production and consumption situations in Huong Phu commune, Nam Dong district, Thua Thien Hue province. The Journal of Science of Hue University. 26: 23-34.

Duy Lam, N. 2007. Current Difficulties and Solutions for Enhancing Production and Export of Vietnamese fruits (Research).

Hai, N. V. 2013. Quang Tri: Difficulties in find the outputs for Huong Hoa banana fruits Available Source: http://www.nhandan.com.vn/kinhte/tin-tuc/item/348002-.html, 11/9/2013.

Hung, P. V., N. T. M. Cham and P. T. T. Truc. 2013. Characterization of Vietnamese banana starch and its resistant starch improvement. International Food Research Journal. 20 (1): 205-211.

Huu Nhi, H. 2004. Current banana R&D in Vietnam. pp. 135-148. In A. B. Molina, L. B. Xu, V. N. Roa, I. V. d. Bergh and K. H. Borromeo, eds. Advancing banana and plantain R&D in Asia and the Pacific, Guangzhou, China.

Mard. (2007). The plan to develop vegetable, fruits and ornamental trees by 2020. Retrieved. from http://thuvienphapluat.vn/archive/Quyet-dinh/Quyet-dinh-52-2007-QD-BNN-phe-duyet-quy-hoach-phat-trien-rau-qua-hoa-cay-canh-den-nam-2010-tam-nhin-2020-vb21005t17.aspx.

Mard. 2013. Cultivation Data. Available Source: http://fsiu.mard.gov.vn/data/trongtrot.htm, 12/8/ 2013.

Ncaer. (2012). Agricultural Outlook and Situation Analysis Reports. Retrieved 15.10. from http://nfsm.gov.in/Circulars_Notifications/AgriOutlook.pdf.

Sampath, K. K. P., D. Bhowmik, S. Duraivel and M. Umadevi. 2012. Traditional and Medicinal Uses of Banana. Pharmacognosy and Phytochemistry. 1 (3): 51-63.

UNIVERSITY OF THE PHILIPPINES

Quality Evaluation of Maltose Syrup from Cassava Starch using Germinated Rice Amylase and *Rhizopus Oryzae*

Theavy Srey
MSc In Food Science, University of the Philippines Los Baños

I. Introduction and Rationale

Cassava (Manihot esculenta Crantz) is an upland crop, grown in Northeast and Eastern Regions of Cambodia (MAFF, 2003). Cassava KU50 has been grown in Cambodia with optimum yield (55 t/ha fresh root, 27.8 % starch content, and 15.3 t/ha starch yield) (Lefroy et al, 2013). The plantation area of cassava increased from 19,600 ha in 2002 to 28,122 ha in 2007, with crop yields increasing from an average of 6.24 tons/ha in 2002 to 20.49 tons/ha in 2007 (MAFF, 2008). Cassava is accepted as an excellent source of pure suitable starch for wide range of applications since it contains higher starch content and low quantity of impurities (protein and lipid) (Tonukari, 2004; Sanguanpong et al., 2003).

Maltose (C12H22O11) is a type of sugar used in food products (Igoe, 1989 and Bello-Perez et al, 2002). Maltose or malt sugar is the least common disaccharide in nature. It is present in germinating grain, in a small proportion in corn syrup, and forms on the partial hydrolysis of starch called reducing sugar (Charles, 2003). It can be obtained by technology of enzyme hydrolysis and acid hydrolysis (Yankov et al., 1986).

Rice can be a source of enzyme, with different rice varieties having different germination days (Nguyen and John, 2004). Mold Rhizopus oryzae can be isolated from starter culture "Mesra" from Cambodia (Chay Chim, ongoing research, 2013) Amylase, an enzyme that breaks down starch into several smaller molecules, including maltose, a disaccharide, and dextrins. In Similase GFCF, it is active in a pH range of 4-6 (NaturoDoc, 2013).

This study proposes to examine and evaluate the quality of maltose syrup from cassava starch using germinated rice amylase and rhizopus oryzae.

II. Objectives of the study

This study generally aims to evaluate the physicochemical and sensory properties of maltose syrup using germinated rice amylase and Rhizopus spp isolated from mesra, an instant starter culture for rice wine processing in Cambodia. Specifically it aims to:

1. identify the optimum germination time of rice seeds to obtain the highest productivity of amylase;
2. determine the optimum pH, temperature, length of boiling, and enzyme combination for both rice amylase and Rhizopus spp for saccharification of cassava starch;
3. measure the proximate composition of fresh and processed cassava;
4. evaluate the physicochemical (color, pH, moisture content, total soluble solids (TSS), viscosity, heat stability, % total sugar, % reducing sugar, dextrose equivalent, protein content) and sensory properties of maltose syrup; and
5. determine the acceptability and sensory properties of the maltose syrup.

III. Importance of the study

From this study, different ways of producing maltose syrup will be documented. It will be helpful for both students that are interested on this sort of research work,and cassava farmers that are producing maltose syrup besides farming. Results of this study will also benefit the local people that are growing and processing maltose syrup, through any support from any NGOs. Moreover, farmers can process their

Note: Adviser- Prof. Erlinda I. Dizon

produce, especially during peak season when the price of the commodity is always relatively low. Hence, processing is the best way to add value to the product and reduce loss; hence, food security will also be addressed.

IV. Location of the study

This study will be conducted at the Laboratory of the Food Science Cluster, College of Agriculture, and University of the Philippines Los Baños.

V. Methodology

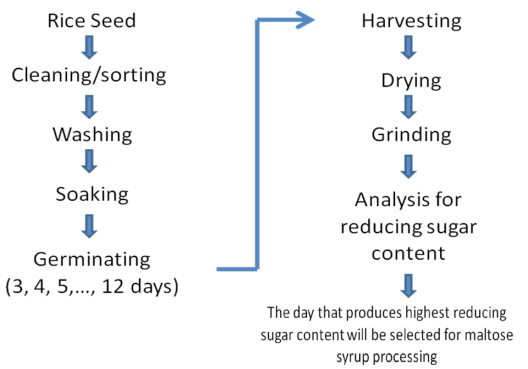
Experimental Materials

Rice seeds "Sen Pido" variety and cassava "KU50" starch will be obtained from Cambodia and transported to the Philippines for this study. The pure culture of Rhizopus oryzae isolated from the dried instant starter culture (mesra) used for rice wine processing in Cambodia will be obtained from the Food Microbiology Laboratory, Food Science Cluster, College of Agriculture, University of the Philippines Los Banos.

Preparation of Germinated Rice

Fresh Cassava will be analyzed for moisture content, crude protein, crude fiber, crude ash, crude fat and carbohydrates. After processing the cassava starch, it will be analyzed again for the above physico-chemical properties.

The following is the procedure for preparing germinated rice amylase:



Experimental Set-up

The following tables (Table 1 and 2) explain the experimental set-up for two treatments designed for Maltose syrup from Cassava starch and rice amylase; and for maltose syrup from cassava starch and Rhyzopus.

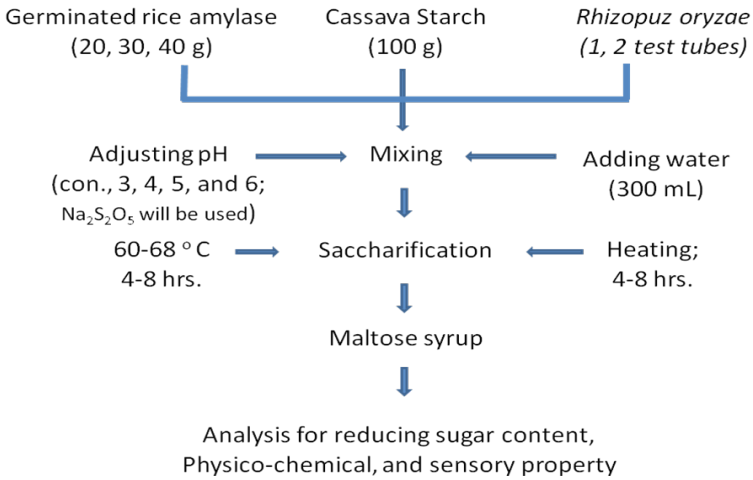
Table 1. Treatment designed for maltose syrup from cassava starch and rice amylase

Treatments	Cassava starch (g)	Water (ml)	Rice amylase (g)		pH	Replications
Control	100	300	20	30	-	3
T1					4	
T2					5	
T3					6	

Table 2. Treatment designed for maltose syrup from cassava starch and Rhyzopus

Treatments	Cassava starch (g)	Water (ml)	*Rhyzopus* (test tubes)	pH	Replications
Control	100	300	2	-	3
T1				4	
T2				5	
T3				6	

The following processing Diagram will be followed in the experiment:



VI. Research Timetable

Activity	2013		2014									
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Defense of thesis proposal												
Revision and submission of proposal												
Gathering of raw materials, chemical substances and equipment												
Conduct of pre-study												
Review of literature												
Start of experiment												
Checking, encoding and analysis of data												
Thesis writing												
Revision and submission of drafts												
Thesis defense												
Revision and submission of final thesis												
Publication of thesis and journal												

References

Charles E. (2003). Maltose. Virtual Chembook. El nhurst College. At: http://www.elmhurst.edu/~chm/ -vchembook/546maltose.html; October 2013.

Chay C. (on going research, 2013). Quality Evaluation of Rice Wine using Isolated Microorganisms from Me Dambae, a Starter Culture from Cambodia. University of the Philippine Los Banos.

Egbe Agbor T., Brauman A., Griffon D., Treche S. (1995). The use of cassava starch in the artisanal production of maltose.

Igoe, R. S. (1989). Dictionary of Food Ingredients. 2nd edition. Van Norstrand Reinhold Book, New York. Pp 39 -39,131. In: Zainab A., Modu S, Falmata A.S, and Maisaratu (2011). Laboratory scale production of glucose syrup by the enzymatic hydrolysis of starch made from maize, millet and sorghum. Biokemistri; Nigerrian Society for Experimental Biology; ISSN: 0795-8080; vol. 23, num. 1, 2011, pp.1-8; At: http://www.bioline.org.br/request?bk11001; October 2013.

Lefroy R. D. B., Aye T. M., Fahrney K. S., Sok S., and Laothao (2013). Improving the sustainability, productivity, and livelihood impacts of smallholder cassava production. At: www.satnetasia.org/public/2-Sustainable%20Cassava-CIAT.pdf; September, 2013.

MAFF (Ministry of Agriculture Fisheries and Forestry), 2003. Book of Agricultural Statistics and Research Planning. Department of Planning and International Cooperation, MAFF, Cambodia, (Khmer language).). In: Sopheap U, Patanothai A, and Aye T.M. (2012). Nutrient balances for cassava cultivation in Kampong Cham province in Northeast Cambodia; Int. J. Plant Production 6 (1), January 2012; ISSN: 1735-6814 (Print), 1735-8043 (Online); www.ijpp.info

MAFF (Ministry of Agriculture, Forestry and Fisheries), 2008. Report on Activities of Agriculture, Forestry and Fisheries. Proceedings of a Workshop on National Achievement in 2007-2008 and Planning for 2008-2009. 2-3 April 2008, MAFF, Phnom Penh, Cambodia, (Khmer language). In: Sopheap U, Patanothai A, and Aye T.M. (2012). Nutrient balances for cassava cultivation in Kampong Cham province in Northeast Cambodia; Int. J. Plant Production 6 (1), January 2012; ISSN: 1735-6814 (Print), 1735-8043 (Online); www.ijpp.info

NaturoDoc (2013). Similase-GFCF, 120 caps Plant enzymes to assist with digestion of gluten and casein. At: http://www.naturodoc.com/T-73952.htm; October 2013.

Nguyen Khac Quynh and John Cecil (1996). Sweetness from Starch. In: FAO (1996) A manual for making maltose from starch.

Nout, M. J. R.; Beernink, G.; Bonants-va-Laarhoven, T. M. G. (1987). Int. J. Food Microbiol. 4; 293-301.

Steinkraus, K. H.; Yap B. H.; Buren van J. P. Provvi denti, M. I.; and Hand, B. (1960). J. Food Sci. 25; 777-788.

TONUKARI, J. N. Cassava and the future of starch. Electronic Journal of Biotechnology, v. 7, n. 1, p. 1-8, 2004. In: Roberto do Nascimento SILVA, Fábio Pereira QUINTINO, Valdirene Neves MONTEIRO, Eduardo Ramirez ASQUIERI (2009). Production of glucose and fructose syrups from cassava (Manihot esculenta Crantz) starch using enzymes produced by microorganisms isolated from Brazilian Cerrado soil. Ciência e Tecnologia de Alimentos; ISSN 0101-2061; At: www.scielo.br/pdf/cta/v30n1/aop_ 3383.pdf; October 2013.

Yankov, D., Dob'reva, E. Beschkov, U and Emanuilova, E. (1986). Study of optimum conditions and Kinetics of Starch Hydrolysis by means of Thermostable - amylase. Enzyme Microb. Technol 8:9665-667). In: Zainab A., Modu S., Falmata A.S., Maisaratu (2011). Laboratory scale production of glucose syrup by the enzymatic hydrolysis of starch made form maize, millet and sorgum. Biokemistri. Vol. 23, No. 1, March 31, 2011, pages 1-8. Nigeria.

Yankov, D., Dob'reva, E. Beschkov, U and Emanuilova, E. (1986). Study of optimum conditions and Kinetics of starch Hydrolysis by means of Thermostable - amylase. Enzyme Microb. Technol 8:9665-667). In: Zainab A., Modu S, Falmata A.S, and Maisaratu (2011). Laboratory scale production of glucose syrup by the enzymatic hydrolysis of starch made from maize, millet and sorghum. Biokemistri; Nigerrian Society for Experimental Biology; ISSN: 0795-8080; vol. 23, num. 1, 2011, pp.1-8; At: http://www.bioline.org.br/request?bk11001; October 2013.

Zainab A., Modu A., Falmata A. S., Maisaratu (2011). Laboratory Scale Production of Glucose Syrup by the enzymatic hydrolysis of starch made from maize, millet and sorghum. Biokemistri. Vol. 23, No. 1, March 31, 2011, pages 1-8, Nigeria.

Assessment of the Contribution of the Commune Council in Promoting Household Food and Nutrition Security in Four Upland Communes in Kratie Province, Cambodia

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I. Introduction

Cambodia is located in Southeast Asia and has a total area of 181,035 km^2. Cambodia has a coastline of 435 km, and its land border of 2,438 km runs along Thailand to the west and north, Vietnam to the east, and Laos to the north. Cambodia is composed of 23 provinces and one capital, 194 districts, 1,633 communes and 14,138 villages (NCDD, 2010a).

The population of Cambodia is 13.4 million in 2008 (NIS, 2009). The proportion of the population living in rural areas is 80.5 percent; only 19.5 percent of the country's residents live in urban areas. The population density in the country as a whole is 75 per square kilometer, with approximately 1.3 million inhabitants living in Phnom Penh. The average size of the Cambodian household is 4.7. The literacy rate among adults aged 15 and older is 78 percent, with the male adult literacy rate (85 percent) being considerably higher than the rate among females (71 percent). Currently, it is estimated that 28 percent of the total population lives below the poverty line (CDHS, 2010).

Kratie is one of the upland provinces which is located along the Mekong River in the Northeast of Cambodia. It borders Stung Treng to the North, Mondulkiri to the East, Vietnam and Kampong Cham to the South and Kampong Thom to the West. The province is bisected North-South by the Mekong River and its narrow floodplains. Most of the province consists of undulating uplands, including lowland/upland mosaic and upland forested areas, and it is classified as a rural province (WFP, 2013). Surrounded by highlands, Cambodia's geography is dominated by the Mekong River. The natural resources provide a foundation for food security, income and employment for most of Cambodian's population (MAFF, 2004). The people of Kratie Province lives in 5 districts and 1 municipality composed of 46 communes/sangkats and 250 villages. The estimated total population was 331,592 persons in 2010. The population of children aged under 5 years was 49,510 persons which was 14.9% percent of the total province population. The total number of families is 68,171. Eighty-one (81) percent of the total families are primarily engaged in agriculture such as rice farming (62.78 percent), cultivating short-term crops (10.13 percent), cultivating long-term crops (4.28 percent), and cultivating vegetable, fishing ,and livestock farming (1.23 percent, 1.73 percent, 0.62 percent and 0.64 percent) (NCDD, 2010b).

The Ministry of Planning (MoP, 2012) identified that Kratie has the second highest percentage of poor population. "Poverty is both a cause and a consequence of poor health. Poor health in turn traps communities in poverty. Infectious and neglected tropical diseases kill and weaken millions of the poorest and most vulnerable people each year" (Health Poverty Action, n.d.).

A lack of food can be an important cause of malnutrition and can contribute to premature mortality. Poor nutrition in the first 1,000 days of life-from the womb to two years of age can lead to irreversible damage to children's minds and bodies (WFP, 2012). Food availability is the ability of the people to directly produce the foods they need through their own activities in agriculture and livestock production, and through harvesting available food sources in common agricultural areas, forests and fishing grounds.

Information on food availability is limited in some areas, particularly in relation to wild foods from common property such as the forest, agricultural and fishery areas. This study examines evidence of food unavailability that may have contributed to child malnutrition and mortality levels among the people of Kratie province.

Note: Adviser- Ma. Theresa M. Talavera

II. Rationale

- Cambodia is primarily an agriculture country; more than 80% of its population are living in the rural area, with farming as major source of livelihood.
- Food insecurity and malnutrition among the poor families are the main causes of public health problems; the prevalence of under nutrition is still high at 28.8%.
- Upland communities are the most vulnerable areas in terms of food security and nutrition, and it is mostly overlooked by development partners and practitioners.
- The government of Cambodia is implementing administrative reform to achieve effectiveness and efficiency in development efforts with a good governance perspective. Sub-national administrative units were established and are empowered to decide and were provided with resources to address and respond to the citizens' needs related to food and nutrition security.

III. Objectives

In general, the study aims to assess the contribution made by the Commune Council in promoting household food and nutrition security in upland communities. The specific objectives of the study are:

1. To review the role of the Commune Council in promoting household food and nutrition security in the study area;
2. To identify the factors that facilitate or inhibit the Commune Council in contributing to the promotion of household food and nutrition security including mechanism of food availability, accessibility and utility;
3. To analyze the challenges and issues encountered in the implementation and/or intervention of Commune Council in promoting household food and nutrition security;
4. To recommend strategies to improve the contribution of the Commune Council in promoting household food and nutrition security.

IV. Importance of the study

- The research is going to address the problem of malnutrition in the upland areas, which is often overlooked by development partners and practitioners;
- The study is in line with the Royal Government of Cambodia's efforts in reforming its administration by bringing the services closer to the citizens (decentralization and de-concentration) in which functions, resources, and institutional developments are being transferred to the sub-national level;
- The research will describe the issue of nutrition in local governance by assessing the level of intervention made by Commune Councils, which are the decentralized sub-national administration in improving food and nutrition security that directly responds to the problem of malnutrition (underweight, stunted, and wasted);
- The findings from this research would help inform policy makers in defining more appropriate or/and better ways that Commune Councils could bring more effective and efficient programs through the planning or/and responding to the best interests of citizens related to food and nutrition, which is the core area of sustainable development and absolutely contributes to poverty reduction in Cambodia; and
- This research would become the first literature review for students, researchers, academia, practitioners and development partners to learn from these practices and experiences for their consideration, adjustment and strategic plan development of their projects and/or activities that would bring much more impact to the target groups.

V. Location of the study

The study will be conducted in Cambodia specifically in Kratie, which is one of the upland provinces in the said county. Four upland communes located in the rural areas of the province will be selected with priority to be given to minority communities.

VI. Proposed Methodology

Basically, the study will start with a review of the laws, regulations, guidelines and other legal documents to analyze the role/s of the Commune Council in rural development, specifically on the promotion of household food and nutrition security. Then, a structured interview and focus group discussion will be conducted with Commune Councilors and community people, especially the mothers to be able to define the level of contribution made by the Commune Council in promoting household food and nutrition security by comparing to other relevant actor/s such as the Provincial Department of Health, Rural Development, Agriculture and civil society. Furthermore, semi-structured interviews will be conducted with relevant institutions to investigate on what and how the activities related to household food and nutrition security were performed by the Commune Council as well as to validate the argument provided by the above informants. Finally, a data base system of province, district, and commune profiles will be generated to compare the food security and nutritional status in the study for a given period of time after consultation with relevant people in charge of the following: Demographic and Health Survey, Commune Development Plan, Commune Investment Program.

VII. Study Schedule

The study will be conducted during the summer of academic year 2013-2014 (Jun-Aug 2013).

References

Calveton, Maryland (2011). Cambodia Demographic and Health Survey (CDHS) 2010. National Institute Statistic (NIS). Ministry of Planning (MoP), Cambodia.

Health Poverty Action (n.d.). Poverty and Poor health. Retrieved from: http://www.healthpovertyaction.org/policy-and-resources/the-cycle-of-poverty-and-poor-health/the-cycle-of-poverty-and-poor-health1/ website

MoP (2012). Identification of Poor in Cambodia. The finding in round fourth (2010) and fifth (2011). Ministry of Planning. Supported by World Food Program.

NIS/FAO/EU (2007), Summary report on the Food Insecurity Assessment in Cambodia. National institute of Statistic Cambodia (NIS). Ministry of Planning (MoP).

NCDD (2010a). Gazetteer Databases Online. National Committee for Sub-National Democratic Development (Ministry of Interior (MoI), Cambodia. Retrieved from: http://db.ncdd.gov.kh/gazetteer/view/index.castle website

NCDD (2010b). Commune Databases Online. Ministry of Interior (MoI), Cambodia. Retrieved from: http://db.ncdd.gov.kh/cdbonline/home/index.castle website

WFP (2013). Provincial Profile-Kratie Province. World Food Program. Retrieved from: http://www.foodsecurityatlas.org/khm/country/provincial-Profile/Kratie website

Participation of the Poor in the Litchi Value Chain in Bac Giang Province, Vietnam

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I. Introduction

In recent years, the living standard of Vietnamese has improved. However, the poverty rate in Vietnam is still high, accounting for 14.2% of the total Vietnamese population in 2010 (Vietnam general statistics office, 2010).

In Vietnam, most of the poor live in rural and mountainous areas where they have very difficult conditions to improve their income. Bac Giang province is one of such regions located in the North of Vietnam. In this province, litchi crop is the traditional food and still plays an important role to ensure food security and bring economic benefits especially to local farmers. However, in the whole litchi market, the farmers are still receiving the lowest gain while they have been contributing the most. Under the domestic economic recession and litchi market price fluctuation, the poor farmers happen to be the most vulnerable actor. They have questioned their participation with hope for government concern and support. Besides, it is worth to note that there have been many previous researches regarding the situation but none has insightfully identified the feasible solutions. Therefore, the litchi value chain research will help draw the overall picture of the problem to justify the participation of the poor farmers in the whole litchi value chain.

II. Rationale

Bac Giang is an upland province with 19.61% poor household and 8.85% near poor household in 2010 (Statistics on poor and near-poor households in Bac Giang province, 2011). Litchi is the main plant and is grown by ethnic minorities.

Litchi crop plays an important role to ensure food security and bring economic benefits especially to local poor farmers.

The value chain research of litchi will have significant implications for social improvement and poverty reduction.

III. Objectives of the study

This study aims to:

1. To analyze the structure of litchi value chain in Bac Giang province;
2. To determine the extent of participation of various stakeholders in the litchi value chain in Bac Giang province;
3. To assess the distribution of profits and costs among the actors of the chain; and
4. To identify the main constraints and relevant solutions to improve the poor's income along with the development of the litchi chain in Bac Giang province.

Specifically the study aims to find answers to the following research questions:

- Who and how many participants are there in the value chain? What are their functions and characteristics in litchi value chain?
- What are the relationships among the value chain actors?
- How much are the profit margins and costs of different actors in the litchi value chain?

Note: Adviser- Isabelita M. Pabuayon, PhD

- What are the effects of participation on the well-being of various stakeholders in the litchi value chain?
- What are the problems/constraints and what should be done to improve the poor's income along with the development of litchi value chain in Bac Giang province?

IV. Importance of the study

- The study will provide better understanding of the participation of the poor into litchi value chain concept.
- The study will provide some solutions to improve the value chain and the benefits of participation by the poor in the chain.
- The study will also act as a base of further market study of litchi in the upland areas.
- This study can help the relevant policy makers in the government to take initiative for the improvements of the poor litchi farmers.
- We can apply this research to other commodities in Bac Giang or other mountainous areas in Vietnam.

V. Proposed Methodology

Research methodology

(1) Selection of the study area

- Bac Giang is a mountainous province (with 72% mountainous area) and has the biggest litchi production and largest production area in Vietnam

(2) Sampling procedure and sample Size

- The following are the 6 districts in the Bac Giang province (with the respective volume of litchi production): Luc Ngan (72.000 tons), Luc Nam (25.000 tons), Tan Yen (8.000 tons), Lang Giang (7.500 tons), Yen The (15.000 tons), and Son Dong (4.000 tons) (Department of industry and trade Bac Giang, 2013)
- The survey will focus on the research area in Luc Ngan district since its litchi production contributed up to 67.24% of the total provincial litchi production in year 2013 (Department of industry and trade Bac Giang, 2013)
- The sample size will be 150 respondents distributed among the different value chain actors (Farmers =95, Collectors =20, Wholesalers = 15, Retailers = 20).
- Sampling technique will be a combination of purposive and random.

(3) Data collection

Secondary Data

The secondary-data will be collected from statistical materials, research papers, newspapers, and government documents which are related to value chain analysis. This will provide the overview of litchi value chain in Bac Giang province of Vietnam.

Primary Data

Primary data will be obtained through extended fieldwork with combination of interviews of the farmers and traders (such as collectors, wholesalers, retailers) in Bac Giang province.

VI. Study Schedule

Activity	2013				2014									
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Thesis proposal defense														
Edit and submit proposal														
Data collection (1)														
Improving the chapter of introduction, literature, and methodology *														
Data collection (2)														
Data analysis														
Writing the chapter result and conclusion														
Thesis defense														
Publication/ presentation														

* During this time, I will improve 3 chapters of my thesis and study 10 units in the class

References

Luigi Cuna, Dominic Smith, 2008. Marketing value chains work better for the poor: A toolbook for practitioners of Value Chain Analysis.

Nguyen Do Anh Tuan, Luigi Cuna, 2005. Marketing value chains work better for the poor: The participation of the poor in agricultural value chain: A case study of cassava.

Tran Con Thang, Emma Samman, Karl Rich, Pham Quang Dieu, Nguyen Do Tuan Anh, Nguyen Van Thanh, Dang van Thu, 2004. Marketing value chains work better for the poor: The participation of the poor in agricultural value chain: A case study of tea.

Nguyen Thi Phuong Lan, 2010. Fresh Thieu lychee quality improvement for the upper segment of the markets base on chain analysis approaches.

Result of the Viet Nam household living standards survey 2010, General statistics office

Statistics on poor and near-poor households in Bac Giang province in 2011. Department of labor invalids and social Bac Giang.

Litchi production and consumption in 2013. Department of industry and trade Bac Giang.

Integration of Biochar on Nutrient Management of Varying Upland Rice Varieties and Soils in Northeast Cambodia

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I. Introduction

Rice (Oryza sativa L.) is the most important grain with regard to human nutrition and caloric intake, providing more than one-fifth of the calories consumed worldwide by the human species. Rice is an annual crop which can grow from 1 to 1.8 m tall, depending on the variety, soil fertility, and environmental elements. It has long, slender leaves 50 to 100 cm long and broad. The small wind-pollinated flowers are produced in a branched arching to pendulous inflorescence 30 to 50 cm long. The edible seed is a grain (caryopsis) 5 to 12 mm long and 2 to 3 mm thick (Saikai and Deka, 2011).

Upland rice areas are unbounded fields that depend entirely on rainfall, which are small in proportion to the total rice land (Nesbitt, 1997).

Agriculture production is mainly shifting cultivation with rainfed rice production. According to IRRI statistics, there is about 50 000 ha of upland rice in Cambodia (2 to 4% of total rice area). Swidden agriculture has been the main source of livelihood in the highlands for centuries. In fact, this type of dual system of having both paddy rice and upland swidden cultivation, is quite common among the ethnic groups that have been in contact with the Khmer or lowland Lao. The present government policies supporting sedentary paddy production have also strengthened this mode of production (Elja 2000).

In Cambodia there are large proportions of soils in the upland farming systems, which are well known as the Labansiek soil group. The texture of Labansiek soil is mainly clayey throughout and the pH is acidic. Good responses to N, P, and K application would be expected in areas used for intensive crop production (Nesbitt, 1997). The soil surface remains soft to firm, is easy to till and does not impede seed emergence. But the capability of Labansiek soil for field crops is fair because it is extremely acidic of pH from 4.0 to 5.0 followed by N 0.17g/kg, P 11mg/kg, and K 0.05cmol/kg (ACIAR Project, 2001).

Average yield of upland rice is generally low from 0.5 to 1.5 t/ha (IIR, 1975) and in Cambodia, the average yield is from 1.0 to 1.8 t/ha (PSSR, 2008). Upland soils face serious problems in nutrient deficiency. Infertility in upland soils is caused by higher rainfall and stronger soil acidity. The higher rainfall takes part in nutrient leaching of soil fertility and causes soil erosion.

Biochar has received a growing interest as a sustainable technology to improve highly weathered or degraded tropical soils (Lehmann and Rondon, 2006). Biochar has substantial potential for soil improvement because of its unique physical, chemical, and biological properties and their interactions with soil and plant communities. Biochar incorporation can alter soil physical properties such structure, pore size distribution and density, with implications for soil aeration, water holding capacity, plant growth, and soil workability (Downie et al. 2009). Evidence suggests that biochar application into soil may increase the overall net soil surface area and consequently, may improve soil water and nutrient retention (Downie et al. 2009) and soil aeration, particularly in fine-textured soils. Biochar has the potential to increase nutrient availability for plants (Lehmann et al. 2003). Nutrient availability can be affected by increasing caution exchange capacity, altering soil pH, or direct nutrient contributions from biochar. One potential mechanism for enhanced nutrient retention and supply following biochar amendment is increasing (CEC) by up to 50% as compared to unamended soils (Lehmann 2003; Liang 2006; Tryon 1948; Mbagwu and Piccolo 1997). Biochar has a greater ability to absorb and retain cautions in an exchangeable form than other forms of soil organic matter due to its greater surface area, and negative surface charge (Liang et al. 2006).

Biochar can serve as a liming agent resulting in increased pH and nutrient availability for a number of different soil types (Lehmann and Rondon 2006). The carbonate concentration of biochar facilitates

Note: Adviser-Dr. Pompe C. Sta. Cruz

liming in soils and can raise soil pH of neutral or acidic soil (Van Zweiten et al. 2007). Mbagwu and Piccolo (1997) report increases in pH of various soils and textures by up to 1.2 pH units from pH 5.4 to 6.6. Tryon (1948) reports a greater increase in pH in sandy and loamy soils than in clayey soils. The pH of various soils increases after applications of hardwood charcoals (pH 6.15) than of conifer charcoals (pH 5.15) likely due to their different ash contents of 6.38% and 1.48%, respectively (Glaser 2002).

II. Objectives of the Study

The general objective of the study is to evaluate the efficacy of Biochar application and soil types for upland rice production in Cambodia. Specifically, it aims to:

1. Determine the optimum combination of Biochar and soil-applied NPK fertilizers on upland rice;
2. Evaluate the effect of biochar and soil-applied fertilizer combinations on different upland rice varieties; and
3. Formulate recommendations of biochar application in nutrient management of upland rice in Cambodia.

III. Location and duration of the study

This study will be conducted at the Agronomy Screenhouse of the Crop Science Cluster, College of Agriculture, University of the Philippines Los Baños (UPLB) from November 2013 to March 2014 for the first two experiments; and in an upland area at Ban Pong village, Ban Pang commune, Venusai district, Ratanakiri province in the northeast Cambodia from April 2014 to September 2014 for the third experiment.

IV. Importance of the Study

The study is important to educate the farmers on the proper fertilizer application using biochar and soil-applied fertilizer combination and improve livelihood as well as food security in the remote upland areas through nutrient management strategy.

V. Methodology

Three experiments will be done for this study: the first two experiments aim to gather data on tillering, height, yield and yield components under greenhouse condition, while the third experiment will gather data on tillering, height, yield and yield components under field condition. This study will use analysis and SAS software, analysis of variance (ANOVA), pairwise mean comparison by using LSD to identify significant differences on treatment, and pairwise mean comparison by using DMRT and to identify significant difference in T and V treatment interaction.

References

Cambodia Soil Database, ACIAR Project LWR/2001/051)

Downie, A., A. Crosky and P. Munroe 2009. Physical properties of biochar. In Biochar for environmental management

Eija Pehu, 2000, Upland Agriculture, Cambodia

Glaser, B., Lehmann, J., Zech, W., 2002. Ameliorating physical and chemical properties of highly weathered soils in the tropics with bio-char – a review. Biology and Fertility of Soils 35, 219–230.

Graeme Blair and Nelly Blair, 2010, Soil fertility constraints and limitations to fertilizer recommendation in Cambodia.

H.J. Nesbitt, 1997, Rice Production in Cambodia.

Lehmann and Rondon, 2006. The Basics of Biochar : A Natural Soil Amendment.

Mbagwu JSC and Piccolo A. 1997. Effects of humic substances from oxidized coal on soil chemical properties and maize yield

Saikia, D. and Deka S.C, 2011, Cereals: from food to nutraceuticals

Tyron, E.H. 1948. Effect of charcoal on certain physical, chemical, and biological properties of forest soils.

Van Zwieten, L., Kimber, S., Downie, A., Chan, K.Y., Cowie, A., Wainberg, R. & Morris, S. 2007. 'Papermill char: Benefits to soil health and plant production' in Proceedings of the Conference of the International Agrichar Initiative, 30 April – 2 May 2007, Terrigal, NSW, Australia.

Spatial Linkages of Regional Rice Markets in the Philippines

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I. Rationale

Agricultural market in the uplands of Vietnam are characterized by geographical dispersion, where producing areas and consuming areas are separated, where farm products are bulky and perishable, and where poor infrastructure and inadequate marketing institutions have threatened governments in their attempt to reduce food insecurity. The costs associated with market intervention policies may be massive or modest, depending on how well the market situation is understood. For instance, if markets are not integrated but are assumed to be so, government intervention may create serious food deficits in some regions and unnecessary surplus in others. Therefore, this study will provide benefits for both policymakers as well as beneficiaries, increase the efficient use of available agricultural resources, balance agricultural supply and demand and help to avoid severe famine.

Due to the initiation of Vietnam's reform program (1986) and its entry into the international market (1995), including the Asian Free Trade Area (AFTA) and World Trade Organization (WTO), the farmers in its upland areas as well as the participants in agricultural value chains should have good market knowledge in order to strengthen its competitive capacities. This target may be reached by providing an overview of the co-integration analysis result among other regional rice markets. This study of regional markets in the Philippines hopes to contribute to the analysis.

II. Objectives of the study

The following are the objectives of this study:

- Examine the degree of market integration and the pattern of independence among rice markets in the Philippines;
- Analyze the dynamic relationship of regional rice markets in Philippines; and
- Provide policy recommendations based on the results of the study.

III. Importance of the study

- By providing information on how rice markets work, this kind of data results in better formulation and implementation of food policy for two reasons:

    1. It guides policymakers by identifying which markets have dominant influences and where intervention should start;
    2. It saves time and cost of implementing policies.

- Participation in the global food market means that the Philippines also has to experience fluctuations in agricultural prices and trade flow and food security concerns. This global interdependence in the market, associated with the changing macroeconomic environment, makes analysis of food policy more difficult because of the feedback mechanism. Timmer (1983) gave the solution: it is better to understand this interdependence and utilize the positive effects and minimize the negative effects at the national level. The study is designed to provide this understanding to the policymakers.
- Farmers, traders and consumers benefit from policies triggered by earlier implications. The better integrated regional rice markets are, the faster the information. In a well-integrated market, the price signal will help farmers and traders to make better decisions. Consumers also gain because (1) an integrated market reduces the unbalanced supply and demand across regions; and (2) they are given better consumption choices, as they face more "correct" prices.

Note: Adviser- Prof. Jose M. Yorobe

IV. Methodology

Location of the study

The study will cover monthly data from 1990 – 2013 from 17 selected regional markets in the Philippines, including National Capital Region, Cordillera Administrative Region, Ilocos Region, Cagayan Valley, Central Luzon, Calabarzon, Mimaropa, Bicol Region, Western Visayas, Central Visayas, Eastern Visayas, Zamboanga Peninsula, Northern Mindanao, Davao Region, Soccsksargen, Caraga and Autonomous Region in Muslim Mindanao.

Data Collection

The study will examine both secondary and primary data from various sources. Secondary data for three levels of prices namely: wholesale price, retail price and farm gate price, will be collected mainly from the Bureau of Agricultural Statistics (BAS), relevant journals and publications. Primary data will be gathered through Participatory Rural Appraisal (PRA) method, i.e. pooled interviews with key informants, focus group discussion, etc.

Data analysis

The study will conduct co-integration analysis to deal with dynamic relationship between variables by using different stationary series method. The following diagnostic tests will be used:

- Dickey-Fuller test (DF) for 1st diff. Autocorrelation; Augmented Dickey-Fuller (ADF) test for higher order autocorrelation; Phillips Perron Test; Correlogram (graphical method).
- Vector error correction model (VECM): was proposed by Engel and Granger (1987) and developed by Johansen (1988).

V. Study Schedule

2nd Semester SY 2013-2014 (Nov. 2013 – April 2014)	Summer 2014 (May – June)	1st Semester SY 2014-2015 (July 2014 – Nov. 2014)
1. Studying coursework 2. Start and defend outline in qualifying exam 3. Preparing materials for gathering data	1. Gather data 2. Analyze data	1. Thesis writing (from 1st to 3rd draft before getting the final) 2. Defend thesis result 3. Submit to GS and publish in international journal

REFERENCES

James D. Hamilton. 1994. Time series analysis. Princeton University Press.

Kurt Niquidet, Bruce Manley. 2008. Regional log market integration in NewZealand. University of Victoria.

Valerien O. Pede, Andrew M. Mckenzie. 2008. Integration in Benin maize market: an application of Threshold co-integration analysis. Journal of International Agricultural Trade and Development.

Barry K. Goodwin, Nicholas E. Piggott. 1999. Spatial market integration in the presence of threshold effects. www.aaea.org

Anton Bekkerman, Barry K.Goodwin, Nicholas E. Piggott. 2009. Spatial analysis of market linkage in North Carolina using threshold autoregression models with variable transaction costs.

Robert F. Engle and C. W. J. Granger. Co-Integration and Error Correction: Representation, Estimation, and Testing. Econometrica, Vol. 55, No. 2, (Mar., 1987), pp. 251-276

FIELD TOUR

FIELD TOUR

The participants visited two upland agriculture sites in Laguna, namely: Riaños Farm in Baranggay Atisan, San Pablo City, and Agroforestry Learning Laboratory at the UPLB College of Forestry and Natural Resources. The Riaños Farm showcases a private-public partnership in sustainable livelihood for the uplands. The farm's main agriculture crops are fruit trees such as bignay (Antidesma bunius), guyabano (Anona muricata), and banana (Musa spp.), with fruits processed later as wine. Although the farm is privately owned, the farm owner involves the local community farmers by teaching them to grow fruit seedlings. The farm also provides fruit seedlings to the local farmers, then buys back the fruits from the farmers for wine processing. The farm also involves the community in the system called "Paiwi" where the farm owner provides young cattle for rearing. When these cattle are sold, the local farmers get half of the profit from the sale. The Riaños farm owners are also able to avail of the services of community farm volunteers. The farm also nurtures bee colonies since bees are natural pollinators. The farm owners expanded their business by selling bee colonies and honey. Aside from the farm facilities, the participants also visited the wine processing plant and the bee farm.

The next upland site was the Learning Laboratory for Agroforestry (LLA) of the Institute of Agroforestry at UPLB College of Forestry and Natural Resources (CFNR). Dr. Roselyn Paelmo, University Researcher, briefed the participants about the learning laboratory and agroforestry systems in the area.

Debriefing

Dr. Sajise facilitated the debriefing after the field tour by posing guide questions and engaging the scholars into a group exercise. The guide questions were: 1) What are the three (3) most significant impressions you have on the sustainability of upland farm we visited today; 2) What kind of framework did you use to make this analysis?; 3) List down three (3) research questions you want to pursue if you were to assess the sustainability of that upland farm.
The scholars were divided into three groups to tackle each of the questions. The three groups listed the following significant impressions of the upland farms visited:

1. Diversity of upland household models as well as livelihood activities.
2. Farm labor problem
3. In practicing organic agriculture production, the sustainability and impact on environment were considered.
4. Income of the farmers were derived from growing fruit trees in the orchard and fruit wine-making.
5. There are issues related to infrastructures (electricity and road access) and health care.
6. There are issues related to environment (soil erosions, landslides, soil fertilizer) that need to be addressed.
7. The importance of managing water resources
8. Farmers are aware of the availability of new farm technologies
9. Famer's ability to access the market.

In coming up with the analysis of the practices in upland farms visited, the three groups said that they used the following framework:

- Assessment for Sustainability Pillar
- Socio-Economic and environmental impact framework on human resources and education.
- Cost Benefit Analysis for the farm's economic returns
- Sustainable Livelihood framework (social, financial, physical)
- Framework of diverse agroforestry system to address soil erosion.

If the scholars were to assess the sustainability of the upland farm visited, they will pursue the following research areas:

- Improving upland farmers' accessibility to capital
- Policy options to support sustainability in the uplands
- Farmers' access to external support
- Contribution of fruit crop production to farmers' income
- Factors affecting farmers' adoption or non-adoption of the agricultural diversification
- The role of policy makers in addressing soil erosion
- Coping strategies towards farms' vulnerability to soil erosion
- Farmers' access to resources and land for farming
- Post harvest technology and market access

ANNEXES

ANNEX A. MESSAGES, PROJECT UPDATE, IMPRESSIONS

Welcome Messages

- *Dr. Gil C. Saguiguit, Jr., Director, SEARCA*

"Ladies and Gentlemen, Notwithstanding the rainy weather the past three days, a very good morning and a warm, sunny welcome to the Philippines, to SEARCA, and to this first Fellowship cum Conference-Workshop of the IDRC-SEARCA Upland Scholarship Program. My welcome extends to our fellows from Cambodia, Lao PDR, Thailand, Vietnam, and the Philippines and to our excellent pool of resource speakers and distinguished guests. Among these guests are no less than Mrs. Rita Bowry, Head of IDRC's Fellowship and Awards Program; Dr. Percy Sajise, SEARCA Senior Fellow; Dr. Julian Gonsalves, Senior Adviser of the International Institute for Rural Reconstruction; and Chancellor Rex Cruz of UPLB."

"SEARCA is pleased to play the role of implementing agency of this special program which aligns well with our mandate of building capacities of individuals and institutions working for agricultural and rural development in Southeast Asia. We have long recognized that activities affecting the fragile uplands trickle down and correspondingly create a set of problems in the adjacent lowlands and coastal areas. It is therefore important to develop a new breed of development practitioners who will champion natural resource management in these adjacent ecosystems. In this particular program, we are concentrating on developing a cadre of professionals who will work for upland development. With the formidable tasks and challenges facing them, it is important that they are fully equipped with the necessary knowledge and specialized skills."

"I was told that there will be a total of three roving workshops to be held annually, the first of which we are conducting today. Our goal is for our scholars to enhance their knowledge on contemporary issues as well as opportunities in the uplands through first hand experiences of experts in this field. The experts we have gathered in this conference are expected to guide our scholars in developing research proposals aligned and relevant to the prevailing situation and scenarios in the uplands. We also hope this first fellowship will lead to networking, information sharing, and lively communications between and among our scholars as well as with the resource persons."

"Finally, I would like to express my appreciation to IDRC for its support to this conference and to this whole program. We look forward to a fruitful collaboration with you. I also thank my fellow advisory committee members (Dr. Prasit Wangpakapattanawong of Chiang Mai University, Thailand; Dr. Mom Seng, of the Royal University of Agriculture, Cambodia; and Dr. Oscar Zamora, Vice Chancellor for Instruction, UPLB) who will be with us for the duration of the Conference-Workshop."

"So once again a warm welcome everybody and as we say in the Philippines, Mabuhay!"

- *Rita Bowry, IDRC*

"Thank you for this wonderful opportunity to be with you. I am happy to be here with all of our distinguished guests, resource speakers, our advisers, mentors and all our scholars from Cambodia, Lao PDR, and Vietnam who are studying in the Philippines and Thailand. On behalf of IDRC, it is my pleasure to welcome you to this fellowship conference."

"Since this particular IDRC International Fellowships Program started seven years ago, we are already seeing a lot of collaborations. The International Fellowships are externally-managed calls for citizens of developing countries in Africa, Asia, and Latin America. Basically, the program supports not just scholarships for masters and doctorate degrees but also training workshops. Since the establishment of the program, 14 awards projects have been developed in sub-Saharan Africa, 6 in Asia and 2 in Latin America and the Caribbean (LAC). The program was piloted in Africa, but was expanded to Asia in the past two years and in LAC in the past year. The Upland Fellowships with SEARCA is one of the first projects to be developed in Southeast Asia."

"Research projects must correspond to any of IDRC's four program areas, namely: Agriculture and Environment; Global Health Policy; Science and Innovation; and Social and Economic Policy. For Agriculture and Environment awards, we have two examples: the Bentley Cropping Systems Fellowship, and the John G. Bene Fellowship. I mention these two because we do not get too many applications from Asia, and I would like to encourage more applications from this region. This is a scholarship for cropping systems agriculture and soil fertility. The cost is about $30,000 for the graduate level. So I invite you to look this up in IDRC's website and if you know of people from different universities, who may be interested, please encourage them to apply for these scholarships. I will talk about the other grants under the Fellowships and Awards more in my paper."

"It is a real challenge to bring all students together in conferences and fellowships like this. And I am glad to note that this is the start of our working together, to collaborate with each other. That is why it is very important that all scholars fill out the personal information forms and send them to IDRC through the SEARCA Graduate Scholarship Department in order for you to have access to IDRC's research databases to help you when you write your theses. I also encourage you to start your network and become friends, know each other's culture and languages. Who knows, ten years from now you will be occupying high positions in your respective countries and you will eventually be working together in research projects and mentoring activities in the region."

"Finally, I wish to thank SEARCA for facilitating the conduct of this first fellowship conference under the Uplands Fellowship Project of IDRC."

"Once again, it is a pleasure to be with all of you on this occasion and I look forward to fruitful and lively discussions."

"Thank you."

Project Updates

- *Dr. Editha C. Cedicol*

"The IDRC of Canada and SEARCA believe that a capacity-building program is needed to develop the knowledge and skills of individuals to address food security and agriculture development in the uplands of Southeast Asia. Thus, on 12 March 2012, IDRC and SEARCA signed a Memorandum of Grant Conditions for a 3-year project titled, "Southeast Asian Upland Agriculture Fellowships" to support 33 scholars from Cambodia, Lao PDR, and Vietnam to pursue master's degrees in various programs with research focus on the sustainable upland agriculture development towards food security. The scholars (28 of them as of June 2013) are studying in the following universities: University of the Philippines Los Baños (UPLB), in the Philippines; Chiang Mai University (CMU), Kasetsart University (KU), and KhonKaen University (KKU), all in Thailand. In addition to the scholarships, the project has three annual fellowship/conferences, and this conference that we are holding today is the first of the three fellowship/conferences. The second is planned to be held in Chiang Mai University in Thailand towards the end of 2014, and the third will be held in Hue University, Vietnam but the schedule has yet to be discussed with the host university. The annual fellowship/conferences are intended to build the the scholars' knowledge through lectures and paper presentations by experts, encourage networking and provide first-hand experience of upland situations and interventions through site visits."

"So what have we accomplished so far since the beginning of this Project? We have organized meetings with key project officers from IDRC and SEARCA, as well as with the Project Advisory Committee Members composed of recognized experts from Vietnam, Cambodia, Lao PDR, Thailand, and the Philippines; conducted three batches of recruitment and interviews of applicants for scholarship between August 2012 and August 2013, and pretty soon, we will be conducting another Skype interview to recruit five more scholars who should commence their studies in November this year to complete the 33 scholarships under the Project. We have created the Project website and I encourage you to visit www.idrc@searca.org for news, updates, and the link to reference materials from IDRC office. We have developed the scholars' handbook which should serve as the scholars' guide on the policies, rules and regulations governing their scholarship programs; facilitated the participation of the scholars in Intensive English Courses to improve their proficiency in the English language; partnered with the Los Baños Toastmasters, Inc. in the conduct of the training on oral communication skills for the scholars; and involved the scholars in social activities of the Center. Lately, I have conducted coordination visits to CMU, KKU, and KU in Thailand to discuss project matters, find out possible difficulties encountered in administering the scholars program in these respective universities, and to discuss the fellowship conferences."

"This 1st IDRC-SEARCA Annual Fellowship Plus Conference-Workshop is aptly themed, "Food Security and Sustainable Agriculture Development in the Uplands: Challenges and Opportunities," to set the backdrop of this Project and aims to highlight the current issues/challenges facing upland agricultural areas in SE Asia; illustrate the role played by research and extension in addressing concerns of food insecurity in the uplands; discuss methodologies in assessing food and nutritional security across countries in the region that may be used by the scholars in their respective researches; and provide the opportunity for the scholars to present their research proposals/projects. Please take note that most of these thesis proposals have yet to be refined by the scholars in consultation with their respective advisers. "

Impressions/Remarks by Scholars

- *Ms. Nguyen Thi Chung, Chiang Mai University*

"On behalf of the IDRC scholars in CMU, I would like to express our thanks to IDRC and SEARCA for bringing all of us here in this conference and for giving us the opportunity to meet new friends and fellow scholars from other universities that allowed us to share new experiences and knowledge in different programs. Through this conference, we presented our proposed thesis research, and we thank the committee for the various comments to improve our thesis when we come back to CMU."

- *Ms. Nguyen Thi Ngoc Thuong, Khon Kaen University*

"On behalf of the scholars in KKU, we would like to express our thanks to IDRC-SEARCA scholarship program for this very lively and worthwhile conference. We met professors from the Philippines, Cambodia and Thailand who have deep experience and knowledge. We thank the committee for the recommendations and comments to our research proposals. Also, we met the scholars from UPLB, KU, and CMU. We met people from Laos, Cambodia, Vietnam and the Philippines and our fellowship was strengthened. It was also a nice experience travelling to another country. We expect to have more knowledge and experience to contribute to our country, particularly, in the upland areas."

- *Mr. Ho Trong Phuc, Kasetsart University*

"We at KU would like to thank IDRC-SEARCA for this scholarship to study abroad to improve our knowledge and for organizing this conference to present our research ideas. We also would like to thank the committee members for their useful comments and suggestions. Lastly, we would like to thank the IDRC-SEARCA scholars for their presentation because we learned from them. I hope in the future, we will continue this opportunity to attend this conference and to share what we have learned in the IDRC-SEARCA project."

- *Mr. Vu Xuan Truong, University of the Philippines Los Baños*

"All of us at UPLB would like to express our appreciation to IDRC-SEARCA and the advisory committees for giving us the chance to attend this conference, to present our thesis proposals and for giving us a lot of helpful comments. The conference gave us a better understanding of the concepts of sustainable agriculture and food security in upland regions. We also had first-hand experience in an upland farm during our field visit and learned from sustainable agroforesty model in UPLB College of Forestry. We had a very interesting group discussion, shared our ideas and learned from the knowledge of other scholars and lecture notes of Dr. Sajise. It

was very helpful for us. We got to know other scholars from Thailand. Hopefully in the future, we will have more chance to work and cooperate with each other. We also would like to express our thanks to Ms. Rita Bowry for giving us a chance to present our difficulties as students. We would like to thank SEARCA especially the Graduate Scholarship Department for a very good 3-day conference. SEARCA organized it very well. I strongly believe that all scholars here are studying seriously and we hope we will graduate on time. See you all next year in Thailand."

Statements from the Project Advisory Committee

- *Dr. Prasit Wangpakattanawong*

"From what I have seen, I stand by my comment yesterday that all of the IDRC-SEARCA scholars are working very hard and I would like you to continue this. Yesterday, we went out to the field for one whole day and we were all so tired. But we all know who are in the field all day, all the time- -the farmers. We should not forget that. The farmers are the ultimate reason why we are here. We want to improve their livelihood. We want to improve their food security. We want to improve their education; we want to improve everything for them. We are not here without them so we should work together for them at the end of the day. It has been a good learning experience for you and for me because I have heard many new things from you. For example, agricultural climate is new to me and many other topics that it is not my area at all. I am so glad to learn about these new things. One thing that I have learned is about research ethics. I think this is important because in my past experiences, every time researchers go to the field to collect data and information from the farmers, they disappear after obtaining the data. Farmers are happy to give information to researchers hoping that through researchers, their problems, issues and concerns will have some solutions. But researchers do not come back to them. This has been a cycle and I do not want you to do this kind of cycle. We should be reciprocating things; this is a very important ethic. We should give back to them, in whatever form we can in the future. Even if you work as lecturer, government worker, a staff of NGOs or private organizations, we should give back to the farmers as much as possible as they have a harder life than we have. This conference is a good learning experience for me, and next year we will be seeing each other in CMU, and you are all looking forward to visit me next year. I would like to advise the CMU scholars to study how the conference is done because the 2nd annual conference will be in Chiang Mai. I wish to thank IDRC for allowing me to be here and I am so honored to be part of this project. I promise I will be in this project until the end because in the past, I have been working for myself, to develop myself as good researcher. Now I think this is good time for me to give back something to the community. This is what I can do now and I hope I can do more in the future."

- *Dr. Mom Seng*

"I wish to express my appreciation to SEARCA for organizing this conference. It is a combination, IDRC-SEARCA Fellowship Conference cum workshop. I think lecture should be added because it is included in this conference and actually an intensive lecture. Like the students, I have learned a lot from the lecture, about the upland, the farm and livelihood. Through the speakers' presentations, now I understand more how important is the upland, how fragile it is, and how it is important to the lowland people. We want to bring this message to our policy makers, to the development agencies, and other stakeholders. But to bring a strong message, it needs to be written and I hope it is not too late until we got the research of scholars and to conduct another research conference or either policy round table about the livelihood sustainability of the upland. I agree with Dr. Prasit for those who are advanced in speaking English, you learned not only from the resource persons but also from your fellow scholars. And you will know next time, what level they will expect from you. This is a challenge but this is the way it is done. There is no difference between Bachelor's, Master's and PhD, that is why this is a learning process. I think at the end you will be proud of yourselves. In behalf of Royal University of Agriculture in Cambodia, we would like to thank IDRC and SEARCA for the scholarship to build the capacities of Cambodians, particularly for upland agriculture. I wish you success and please stay healthy, happy and keep working hard."

- *Dr. Percy E. Sajise*

"When I look at you, I see myself during the time I was beginning my career. And I am very thankful that I can still be around at this time. Why? Because I work in the uplands, so it means it is healthy to work in the uplands. It is healthy for your body, you get free exercise. It is also healthy for your mind because it makes you think all the time. When we started, the uplands were almost uncharted. It challenges you to think all the time of ways to do things. If you are looking for the most neglected group of people, those that have been left behind, you will find them in the uplands. Any country cannot develop fully if these groups cannot be helped and will be left behind. To work in the uplands is healthy for your soul because you feel that any small activity that you will do will be helping those who really need help. So that is why it is healthy for your body, healthy for your mind, and healthy for your soul. It is good that IDRC and SEARCA organized this conference to allow scholars from different countries, different cultures, and different disciplines, to come together. This is a platform for exchange of ideas early on in your career. You will become better and stronger professionals because you will have developed a network at the end of the day. I said, a platform, a place where you can be together to share knowledge, share experiences, and to share good practices. Make this as your platform, make sure that your friendship and your professional relationships would become stronger in the future, not only to develop your own careers but also to strengthen the ASEAN group of countries and group of people. So, thank you very much for this opportunity to be with you. I wish you good luck in your studies, I am sure you will all become successful and maybe years from now many of you will become ministers and who knows, the topmost leaders of your country. Make sure that you will develop yourself so that when that opportunity comes along you are ready. Participating in this conference is your preparation. Have a nice and safe trip tomorrow, if you will stay longer, make sure it will not be long enough to delay your studies. Thank you and good luck."

Statements of Partners

- *Mrs. Rita Bowry, IDRC*

"I wrote so many points here. I have been to a lot of projects and fellowships and every time I go there it is a learning experience for me. I come across people like Dr. Sajise, who has so much experience and knowledge. When I look at all the 27 scholars here, I learn about your cultures, your languages, everybody is so different. It has been a pleasure to come here, listening to presentations of three distinguished experts and presentations by 18 scholars from four universities facilitated by Dr. Cuaresma. Many thanks to our distinguished advisers, Dr. Gil Saguiguit, Dr. Sajise, Dr. Mom Seng and Dr. Prasit, for all their wisdom and knowledge. There has to be a delicate balance between incorporating comments from our distinguished advisers and major advisers. So handle that carefully and feel free to visit and practice together as a family with the help of the advisers. We were so exhausted after coming back from the field visits but you just went on working on your ideas, with Dr. Sajise facilitating discussion of your ideas up to the end. And that shows that all of you will go very far. The welcome dinner also confirmed that some of you can have some side careers like singing. Some of you may go on to do your doctorates and to specialize and reach the highest level of education in your countries. Others may not do this, which is just fine. Always think about the implications of your research and how it can affect policy and decision making. Be the one to initiate change in your country. Why did we choose scholars from Vietnam, Laos and Cambodia? Because we felt, together with SEARCA, that there is a great need of well-capacitated individuals in upland agriculture from these countries. So we brought you to UPLB and good universities in Thailand to make the best in your careers. Dr. Sajise mentioned that you are already grouped together according to your research topics and that is why you need to start learning from one another. I also heard of the difficulties that the scholars talked about which is the possibility of not finishing on time. We will look into it but we cannot promise that the funding can be sustained. So please do your best to finish on time. There is also a difficulty for some scholars in the English language so we will try our best to work on that. This conference has been a great success because of all of you and the efficiency of all staff including those in the food security business, the hospitality and the lunches and the dinners we had. Everything worked very well and I wish to thank SEARCA, wish everybody lots of success. Work hard and have fun. Make SEARCA, your university and IDRC proud of you. We will be following you up ten years from now."

Closing Remarks

- *Dr. Gil C. Saguiguit*

"I would like to commend my team, Dr. Cedicol and her staff, for their hard work in convening and organizing this conference-workshop. I have heard good things from you yourselves about how you appreciate their work. And such forums, conferences, workshops, have become a forte for the center. Of course, you have only seen our Graduate Scholarship Department in action. You have to see our Knowledge Management and our Research Department as they bring together workshops and learning events. Sometime in the future after you finish, I hope you can join us in such learning events and forums. Of course our Graduate Scholarship Department has been known for its strength in scholarship management. And we are so glad that IDRC gave us a chance to further strengthen our fast rising reputation as a manager of scholarships. We welcome that. I would like to thank Dr. Cedicol for a very thorough summary of what transpired in the 3-day workshop and even the summary of the presentations of our resource persons. I must thank, my former boss, Dr. Sajise. I grew up in the center with him as director. Actually, he was the one who introduced me to the uplands. We were in the uplands of Southern Philippines for a number of years and I learned a lot from him. He has become a guru of sorts in the upland development not only in the Philippines but also in Southeast Asia. And I thank him for going over and above his duty in this conference by facilitating some discussions apart from his presentation. I hope you will remember, when we started, just two days ago, I said I hope you will find your stay here at SEARCA during this workshop fellowship a fruitful and enjoyable event. For our scholars in this uplands project, I hope you have benefited from the comments and advice of the advisory committee members, including Dr. Vo Tong Xuan who, despite his inability to come to the conference, sent his comments on some of the proposals. The advisory committee members are there for a reason, they are experts in their field and they have a lot of inputs to your studies and research proposals. Over the past two days you benefited from them. The highlight of your studies will be your research. Finally, let me thank IDRC represented by Mrs. Rita Bowry for making such an event possible and for this wonderful and most worthwhile project. This fellowship, like what Dr. Sajise said, is a platform for continued communication and friendship and also for the benefit of your studies. In a bigger scale, we have continued contact with our former scholars and in fact we have organized them into alumni associations. We have also some major events in each of the countries where we have scholars' associations, and they are helping SEARCA not only in our projects but also in convening forums like this that allow us to take up different themes. It is still having a link beyond your studies. I wish everybody a safe trip home, and I am sure we will see each other again. Thank you very much."

ANNEX B . PROGRAM

DAY 1

Tuesday, 24 September 2013

Morning

8:30- 9:00 - Registration (SEARCA Auditorium)

9:00-10:00 - **Opening Program**

- **Welcome Messages**
  - ***Dr. Gil C. Saguiguit, Jr.***
    SEARCA Director
  - ***Mrs. Rita Bowry***
    Senior Program Specialist and Head, Fellowships and Awards Program
    International Development Research Centre (IDRC) of Canada

- **Presentation**: IDRC Fellowships and Awards and the International Fellowships Program
  - ***Mrs. Rita Bowry***

- Brief Project Update, Rationale and Background of the Fellowship Plus Conference, and Introduction of Resource Persons, Advisory Committee, and Participants
  - ***Dr. Editha C. Cedicol***
    Program Head, SEARCA Graduate Scholarship Program

- Group Photo (SEARCA Auditorium)
  - Facilitated by Graduate Scholarship Department Team

10:00- 10:30 - Refreshments (Auditorium Lobby)

10:30-12:00 - **Paper presentations**

10:30- 11:15 - *Contemporary Issues and Challenges in Sustainable Upland Agriculture in Southeast Asia*
  - ***Dr. Percy E. Sajise***
    Honorary Research Fellow, Bioversity International, and Adjunct Professor, School of Environmental Science and Management (SESAM), UPLB

11:15-12:00 - *The Role of Research and Extension in Addressing Food Security Concerns in the Uplands of Southeast Asia*
  - ***Dr. Rex Victor O. Cruz***
    Chancellor, University of the Philippines Los Baños (UPLB)

12:00-12:15 - Open Forum

12:15-1:30 - LUNCH (SEARCA Café Makiling Lounge)

Afternoon Session

Continuation of Paper Presentation

1:30- 2:15 - *Comparative Use and Application of Indicators and Methodologies in Assessing Sustainable Upland Agriculture and Food and Nutritional Security*
  - ***Dr. Maria Victoria O. Espaldon***
    Vice Chancellor for Research and Extension. UPLB

2:15-2:30 - Open Forum

Presentation of Scholars' Thesis Research Proposals

2:30-2:45 - Rationale and mechanics of the activity
  - ***Dr. Maria Cristeta N. Cuaresma,*** SEARCA GS consultant
    Moderator /Facilitator for thesis proposal presentation

2:45-3:15 - Presentation of Research Proposals (15 minutes each)

- **Scholars at Chiang Mai University**

"Utilization of earthworm (Perionyx excavatus) and locally available materials as supplemental diet for common carp (Cyprinus carpio L.) cultured in Yen Chau district, Son La province, Northwest of Vietnam"

- Mr. Tran Quang Hung, MS Animal Science

"*Assessing Rice Farmers' Use of Seasonal Weather Forecast Data to Cope with Climate Variability in Central Highland of Vietnam*"
- o Ms. Nguyen Thi Chung, MS Agricultural Systems Management

3:15-3:30 - Refreshments (SEARCA Auditorium Lobby)

3:30- 5:00 - Continuation of Presentation of Research Proposals by CMU scholars

"Farmers' Perception and Adaptation to Climate Change Pressure on Highland Coffee Production, Dak Lak Province, Vietnam"
- o Ms. Pham Thi Thuyen, MS Agricultural Systems Management

"Impacts of Agricultural Systems Transition on Rural Livelihood Security in Northern Uplands of Lao PDR; Case Study: Phongsa-at village cluster, Phieng district, Sayaboury Province"
- o Mr. Bouavonh Biachampah, MS Agricultural Systems Management

"Farmers' Perception and Adaptation to Drought in Maize Cultivation, Dakrong District, Quang Tri Province, Vietnam"
- o Mr. Tran Cao Uy, MS Agricultural Systems Management

"Farmers' Attitudes Towards Vulnerability to Food Availability and Coping Strategies at Farm Levels in the Different Upland Farming practices in Oudomxay Province, Lao PDR"
- o Mr. Xayansinh Sommany, MS Agricultural Systems Management

"Effect of supplementation with guinea grass silage fed rice straw based diet on growth performance of native cattle"
- o Mr. Lyfong Yalao, Ms Animal Science

5:00-5:30 - Comments from Advisory Committee

6:30 – 9:00 - COCKTAILS AND WELCOME DINNER (SRH Rooftop)

DAY 2

Wednesday, 25 September 2013

8: 00 – 12:00 - Visit Riaño Farm, San Pablo City, Laguna
- Briefing about the project and lessons on project implementation and management

12:00 – 1:30 - LUNCH (Sulyap Restaurant, San Pablo City, Laguna)

2:30 -4:30 - Visit upland project in UPLB College of Forestry
- Briefing

4:30- 5:30 - Return to SEARCA for debriefing

6:30-8:30 - Dinner (SRH Dalcielo's)

DAY 3

Thursday, 26 September 2013

8:00- 10:00 - Presentation of research proposals
- **Scholars from Khon Kaen University (KKU)**

"Effect of Jatropha cultivation on Food security and socio-economic condition in rural upland of northern Lao PDR "
- o Mr. Khambai Phunthavongsa, MS Agriculture

"Sustainability of the Sources of Food from upland Slash and Burn Farming in Northern Lao PDR"
- o Ms. Pathumpone Sonemany, MS Agronomy

"Study on livelihood of households after land use conversion at Song Khe commune, Yen Dung district Bac Giang provine, Vietnam"
- o Ms. Nguyen Thi Ngoc Thuong, MS Rural Development Management

"Coping Strategies for Food Security: "Case Study on Organic Rice Promotion in Upland Area, Northern Lao PDR"
- o Mr. Khamnien Phongtady, MS Rural Development Management

- **Scholars from Kasetsart University (KU)**

"Profit efficiency of hybrid rice in Central Vietnam"
o Mr. Ho Trong Phuc, MS Agricultural Economics

"The Banana production and consumption in Nam Dong district in Vietnam: situation and solutions"
o Mr. Nguyen Van Thanh, MS Agriculture

9:30-10:00 - Comments from Advisory Committee

10:00-10:30 - Refreshments (Auditorium Lobby)

10:30-12:00 - Continuation of Presentation of Research Proposals

- **Scholars from University of the Philippines Los Baños**

"Physico Chemical and Sensory Properties of Maltose Syrup form Cassava Starch Using Rice Amylase Hydrolysis and Dried Instant Starter Culture (Mesra) Used in Rice Wine Processing of Cambodia"
o Ms. Srey Theavy, MS Food Science

"Assessment of the Contribution of the Commune Council in Promoting Household Food and Nutrition Security in Four Upland Communes in Kratie Province, Cambodia"
o Mr. Eng Chheanghong, MS Applied Nutrition

"Participation of the poor in the litchi value chain in Bac Giang Province, Vietnam"
o Ms. Bui Hong Quy, MS Agricultural Economics

"Integration of Biochar in Nutrient Management of Varying Upland Rice Varieties and Soils in Northeast Cambodia"
o Mr. Thea Sive, MS Agronomy

"*Spatial linkages of regional rice markets in the Philippines"*
o Ms. Nguyen Thi Bich Thuy, MS Agricultural Economics

- Comments by Advisory Committee

12:00-1:30 - LUNCH

1:30- 3:00 - CLOSING PROGRAM

- Presentation of Highlights of the Conference
  - ***Dr. Editha C. Cedicol***
- Impressions/Remarks by Scholars
  - CMU
  - KKU
  - KU
  - UPLB
- Statements from Project Advisory Committee
- Distribution of Certificates
- Statements of Partners and Closing Remarks
  - ***Mrs. Rita Bowry, IDRC***
  - ***Dr. Virginia R. Cardenas***
    Deputy Director for Administration, SEARCA

3:00 – 3:30 - Refreshments

3:30- 5:00 - Tour of UPLB campus and IRRI
(led by Dr. Cuaresma and GSD staff)

6:30- 9:00 - FAREWELL DINNER (Kamayan sa Palaisdaan Restaurant, Bay Laguna)

Friday, 27 September 2013
-participants leave for respective countries

ANNEX C. DIRECTORY OF PARTICIPANTS

PARTICIPANTS

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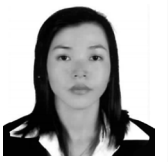

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