รายงานการศึกษา ฝึกอบรม ดูงาน ประชุม/สัมมนา ปฏิบัติการวิจัยและการปฏิบัติงาน ในองค์การระหว่างประเทศ

ส่วนที่ 1 ข้อมูลทั่วไป

1.1 ชื่อ/นามสกุล (~~นาย/นาง~~/นางสาว) มลธุดา สุทธิพงศ์

อายุ 37 ปี การศึกษา ปริญญาโท

ความเชี่ยวชาญเฉพาะด้าน การจัดการด้านป่าไม้

1.2 ตำแหน่ง นักจัดการงานทั่วไปชำนาญการ

หน้าที่ความรับผิดชอบ (โดยย่อ) การประสานความร่วมมือ การดำเนินงานด้านการป่าไม้ระหว่างประเทศ และจัดฝึกอบรม สัมมนา ศึกษาดูงานให้แก่เจ้าหน้าที่ป่าไม้จาก ประเทศต่าง ๆ ตลอดจนบริหารจัดการเกี่ยวกับแผนงานและงบประมาณสำหรับการปฏิบัติงานตามโครงการระหว่างประเทศ

1.3 ชื่อเรื่อง/หลักสูตร Economics and Management

สาขา Forestry Economics and Management

เพื่อ ☑ ศึกษา ☐ ฝึกอบรม ☐ ดูงาน ☐ ประชุม/สัมมนา

☐ ปฏิบัติงานวิจัย ☐ ไปปฏิบัติงานในองค์การระหว่างประเทศ

ประเทศที่ไป สาธารณรัฐประชาชนจีน

แหล่งผู้ให้ทุน APFNet และทุนส่วนตัว

งบประมาณ -

ระหว่างวันที่ 4 พฤศจิกายน 2563 – 31 มกราคม 2566

รวมระยะเวลาการรับทุน 2 ปี 4 เดือน 27 วัน

ภายใต้โครงการ APFNet 2020 Scholarship Program

ของหน่วยงาน APFNet

คุณวุฒิ/วุฒิบัตรที่ได้รับ Master of Forestry Economics and Management

ส่วนที่ 2 ข้อมูลที่ได้รับจากการศึกษา ฝึกอบรม ดูงาน ประชุม/สัมมนา ปฏิบัติงานวิจัย และไปปฏิบัติงาน ในองค์การระหว่างประเทศ (โปรดให้ข้อมูลในเชิงวิชาการที่สามารถนำไปใช้ประโยชน์ได้ หากมีรายงานแยกต่างหาก กรุณาแนบ File ซึ่งมีขนาดไม่เกิน 2 Mb ส่งไปด้วย)

2.1 วัตถุประสงค์

1. เพื่อศึกษาผลกระทบของการจัดการป่าไม้ชุมชนต่อรายได้ครัวเรือนในประเทศไทย

2. เพื่อศึกษาผลกระทบของการจัดการป่าชุมชนต่อรายได้ป่าไม้

3. เพื่อศึกษาผลกระทบของการจัดการป่าไม้ชุมชนต่อรายได้เกษตรกร และศึกษาบทบาทของป่าชุมชนในการบรรเทาความยากจนในเขตลุ่มแม่น้ำโขงใหญ่

2.2 เนื้อหา (สรุปโดยย่อประมาณ 2-5 หน้ากระดาษ A4) การศึกษานี้ใช้ข้อมูลครัวเรือนตัวอย่างทั้งหมด 253 ครัวเรือนที่ได้จากการสำรวจภาคสนาม โดยใช้วิธีการวิเคราะห์ข้อมูล ผสมผสานสถิติบรรยายและแบบจำลองถดถอยพหุคูณ OLS เพื่อสำรวจผลกระทบและสาเหตุของการปลูกป่าชุมชนต่อรายได้ของเกษตรกร รวมถึงผลกระทบ ทั้งรายได้รวม รายได้ป่าไม้ รายได้ไร่นา และรายได้นอกไร่นา ผลการวิจัยพบว่า (1) รายได้จากป่ามีสัดส่วนมากที่สุดในรายได้รวม เผยให้เห็นความสำคัญของป่าชุมชน (2) ครัวเรือนเกษตรที่มีส่วนร่วมในป่าชุมชนอาจมีรายได้รวม รายได้จากป่า รายได้ในไร่นา และรายได้นอกไร่นามากกว่า เมื่อแยกผลกระทบของปัจจัยด้านนโยบายและสถาบันในแบบจำลองการถดถอย (3) ขนาดครัวเรือนมีผลกระทบอย่างมีนัยสำคัญต่อรายได้รวมและรายได้จากป่า และเพศของหัวหน้าครัวเรือนไม่มีผลกระทบอย่างมีนัยสำคัญต่อรายได้ทั้งหมด อายุและระดับการศึกษาของหัวหน้า และการบริจาคที่ดินมีผลกระทบบางส่วนในบางรูปแบบ (4) การฝึกอบรมและเงินช่วยเหลือมีผลกระทบเชิงบวกอย่างมากต่อรายได้รวมและรายได้จากป่า ข้อเสนอแนะจากการศึกษานี้ (1) เพื่อเสริมสร้างการสนับสนุนการพัฒนาป่าชุมชน (2) ให้ความสนใจกับการบริจาคที่ดินของครอบครัวเกษตรกรเมื่อออกแบบและดำเนินโครงการวนศาสตร์ชุมชน (3) รับรองการฝึกอบรมและอุดหนุนบทบาทที่ใหญ่ขึ้นและเป็นบวก

2.3 ประโยชน์ที่ได้รับ

☑ ต่อตนเอง ได้รับความรู้ในด้านการป่าไม้และการจัดการสิ่งแวดล้อม เพิ่มพูนทักษะด้านภาษาการต่างประเทศ ได้แก่ภาษาอังกฤษและภาษาจีน

☑ ต่อหน่วยงาน สามารถนำผลการศึกษามาต่อยอดในการวิเคราะห์นโยบายด้านการจัดการป่าชุมชน เพิ่มศักยภาพด้านการจัดการป่าไม้

☐ อื่น ๆ (ระบุ)

ส่วนที่ 3 ปัญหา/อุปสรรค เนื่องจากสถานการณ์การแพร่ระบาดของโคโรน่าไวรัส 19 ทำให้การเรียนการสอนเป็นไปในรูปแบบออนไลน์ ซึ่งบางครั้งเกิดปัญหาขัดข้องทางเครือข่ายอินเตอร์เน็ท ปัญหาการถามตอบกับอาจารย์ผู้สอน ปัญหาการฟัง ฯลฯ เป็นต้น

ส่วนที่ 4 ข้อคิดเห็นและข้อเสนอแนะ

ควรจัดหาทุนพร้อมให้การสนับสนุนบุคลากรในการศึกษา/ฝึกอบรมในระดับนานาชาติในโอกาสต่อ ๆ ไป เพื่อพัฒนาทักษะของบุคลากรกรมป่าไม้

(ลงชื่อ)

(นางสาวมลธุดา สุทธิพงศ์)

ส่วนที่ 5 ความคิดเห็นของผู้บังคับบัญชา (ระดับผู้อำนวยการกอง/คณบดี ขึ้นไป)

เห็นสมควร [illegible]

[illegible]

[illegible] ต่อไป

(ลงชื่อ) [signature]

(นายจำลอง อุทัยวัฒนเดช)

นักวิชาการป่าไม้ชำนาญการพิเศษ

ตำแหน่ง รักษาราชการแทนผู้อำนวยการสำนักการป่าไม้ต่างประเทศ

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北京林业大学

学术型硕士学位论文

泰国社区林业对农户收入的影响研究

（中文题名）

Impact of Community Forestry on Household Income in Thailand

（英文题名）

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研　究　方　向　Forestry Economics and Management

二〇 2022 年　12　月　30　日

DECLARATION AND COPYRIGHT

Declaration

The author hereby declares that the work presented in this thesis paper has been carried out and composed by himself as part of a program of two-year studies at the School of Economics and Management of the Beijing Forestry University, People's Republic of China. All views and opinions expressed remain the author's sole responsibility and have not been presented in any previous application for a degree.

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摘要

本研究通过实地调研共获取有效数据 253 份，运用描述统计和 OLS 多元回归模型相结合的数据分析方法，探析泰国社区林业对农户收入的影响及成因，包括社区林业对农户林业收入、农业收入与非农收入的影响。研究表明：（1）林业收入在农户家庭收入占比最大，凸显社区林业的重要性；（2）在不考虑政策和制度因素的影响下，农户参与社区林业可以实现更高的总收入、林业收入、农业收入和非农收入；（3）农户家庭规模对于总收入及林业收入具有显著的正向影响，户主性别对于各项收入都没有影响，户主年龄和受教育程度、家庭土地禀赋在特定条件下具有部分影响；（4）接受培训和得到补助对于农户的总收入与林业收入具有显著的正向影响。本研究建议：（1）加大对社区林业发展的支持力度；（2）在设计和实施社区林业时，关注农户的土地禀赋；（3）发挥好培训与补助的积极作用。

关键词：社区林业；农户；林业收入；非农业收入；泰国

Impact of Community Forestry on Household Income in Thailand

ABSTRACT

This study, based on a total of 253 sample household data obtained through field survey, applied the data analytical methods, combining descriptive statistics and OLS multiple regression model, to explore the impacts and theirs causes of community forestry on farmers' income, including the impacts on total income, forest income, farm income and off-farm income. The results indicates that: (1) Forest income accounts for the largest proportion to the total income, revealing the importance of community forestry. (2) Those farm households participating in community forestry could have greater total income, forest income, farm income, and off-farm income when isolating the impacts of policy and institutional factors in the regression model. (3) Household size has significant impacts on total income and forest income, and gender of head of household has no significant impacts on all incomes, age and education level of head, and land endowment have partial impacts in some models. (4) Training and subsidy have significant and positive impacts on total income and forest income. It is recommended by this study: (1) To strengthen support to community forestry development. (2) Pay attention to land endowment of the farm household when designing and implementing community forestry programs. (3) Ensure the training and subsidy a larger and positive roles.

Keywords: Community Forestry, Farm Household Income, Forest Income, Off-farm Income, Thailand

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LIST OF ABBREVIATION

CFM	Community Forest Management
PFM	Participatory Forest Management
BDT	Bangladesh Taka
UNCED	United Nations Conference on the Environment and Development
SLF	Sustainable Livelihood Framework
NTFP	Non-Timber Forest Products
ADB	Asia Development Bank
FAO	Food and Agricultural Organization
FGD	Focus Group Discussion
FSR	Forest Sector Review
TFF	Tree Farming Fund
PBSA	Participatory Benefit Sharing Agreements
CP	Community Participation
HS	Household
FP	Forestry Policy
HC	Human Capital
FLO	Farmland Owned
FLA	Forestland Own
HS	Household Savings
INFP	Income from Non-Forest Products
RLH	Rural Livelihood
FOA	Forest Area (hectare)
FS	Farm Size (hectare)
WE	Working Experience
OI	Other source of Income

1. INTRODUCTION

1.1 Background

The community forestry development model has a long history worldwide and been regarded as one of the most essential forest resource management models until recent years. The community forestry are operated by joint property right arrangement, and participation of local people, which can satisfy local own economic, environmental, and social demands by forest resource utilization and protection. Community forestry development is crucial in sustaining rural livelihood and facilitating poverty reduction in Thailand. As pointed out by the FAO, community forestry is an umbrella term embracing 'most of how forestry and the goods and services of forestry directly affect the lives of rural people' (FAO, 1978). In this context, Hood et al. (1998) pointed out that community forestry should be understood as a process rather than a program. There are diverse community forestry programs and activities gloably, which are varied in contect of the governmental regime, developmental strategies and underlying forest resource conditions. It is widely accepted that the concept of community forestry is dominated by three key elements: community and its members' participation, local economic development, and sustainable forest management for ecological significance (Brendler and Carey, 1998).

The community should have the relaltively independent right to make decision when conducting forest management activities in the community forestry. This implies that communities member could plan, cultivate, manage, extract and harvest forest resources by themselves with support and approvment of government and so receive a significant proportion of the socio-economic and ecological benefits from the forest. McDermott (2009) argued that poverty reduction could be achieved only when the community forestry deveompment model was set to benefit the community well. Compared to the impact of benefit of timber forest profucts, the income of non-timber forest products (NTFPs) has a more significant impact on the poor people, who can collect and sell the NFTPs in the market (Paumgarter et al., 2009).

Nevertheless, community forestry is a recent policy initiative and is still in its formative stage in the nation (Gilmour et al., 2004). The concept of community forestry was introduced into Thailand from outside (Colchester, 2002). Community forestry is perceived in contemporary Thailand as a social organization mode and a way of forest resource management involving extensive participation by villagers in forestry production and management activities to promote rural economic development and sustainable rural society (Li, 2003). This perception is conceptually not far from the definition presented by FAO. Community forestry is also entitled as and replaced by collective forestry (Li, 2003; Anders, 2004), family forest farms or household forestry, or doorstep forestry (Bruce et al.,1995; Mayers and Vermeulen, 2002) or joint-stock forest farms (Rechlin et al., 2002) in the studies conducted in Thailand. Indeed, these various forestry models have been

implemented in rural areas across Thailand.

Collective forestry is characterized by village collectives' ownership and management of forests (Liu, 2001). Communal forest lands in Thailand account for 61.4% of the total forestland (Li, 2003). It is generally admitted that collective forestry has failed to achieve its targets due to a lack of a sense of real security of tenure, an overly top-down approach, and the logging ban implemented in 1998. Colchester (2002) pointed out that the farm householders and their collectives are not interested in investment of their labour force, physicial mateiral, and funds in forest plantations establisment or natural forest management for absence of sound economic return. A 'family forest farm' is operated by individual households who sign contracts with the collective and obtain the useright of on a piece of barren forested land for forest establishement and forest products production for a certain term (Li and Zhao, 2004). Rural households are then inspired to make investment in this mode for they are ensure a sercure forest land property right in the contracted term.

Household forestry is a form of small-scale forestry that suits rural areas of Thailand, where infrastructure and skilled human resources are lacking. The desirable features of household forestry are that it allows long-term rotation forestry production and encourages local people to protect forests against outside encroachment. (www.nrsm.uq.edu.au) It is compatible with traditional Thai cultivating styles and is likely to be accepted by peasants. However, due to the lack of knowledge of most households about the market economy, technical extension and training by the local government are necessary. (www.nrsm.uq.edu.au) In addition, householder forestry is dependent on subsidies from the local government (Shenqi and Harrison, 2000). In Thailand, joint-stock forest farms arose amidst economic reforms in the 1990s and have developed rapidly in recent years, converting forest lands, labour, and capital into an economic commodity in the form of shares. Shares and dividends are allocated among the villagers once a year or when dividends are available (Shenqi and Harrison 2000). In this forest management system, there is no physical redistribution of land and forests to households.

Thus, rural livelihood has become an essential argument in advocacy for adopting community-based forestry resource management approaches (FAO, 2004). In Thailand, community forestry has been developed rapidly in recent years, which is indeedly drived by rural livelihood (Sunderlin, 2006). Many studies have revealed that how much and why the community forestry can facilitate development of rural communities. The community forestry is highly expected by some insitutions working for the country to have significant contribution to poverty alleviation and reduction nationwide (Sunderlin, 2006). However, the achievement of poverty alleviation and reduction by developing community forestry has not reached the expectation (Fisher, 2003). Therefore, the significant roles of community forest in supporting rural livelihood and proverty alleviation and reduction need to be reinforced in the practices (Sunderlin, 2006). In that case, the potential of community forestry gets to be re-examined, and course corrections get to be made to fix the existing

weaknesses (Sunderlin, 2006).

Rural livelihood has been one of the key concerns and largest challenges in worldwide. Specificly, the rural livelihods in those communities with large populations like in Thailand should be more challenging. Government and non-governmental organizations have a large amount of compaign with huge efforts to improve rural livelihood and alleviate and reduce poverty in each area in this country. Several relevant empirical studies have been reported (Liu et al. 2000, Rozelle 2000, FAO and DFID, 2001; Zachernuk and Yong, 2001; Xu and Yu, 2002; Xu and Zachernuk, 2003; Gilmour et al., 2004; Li and Zhao, 2004). Community forests work as a safety net for those rural people, especially in poverty, by providing subsistence and cash income. Though the rural people have different dependence on community forest resource, all of they can benefit from the community forestry for a better and more solid livelihood.

This paper is to look into the details of the community forestry development model in Tailand, how the community forestry affects the rural livelihood, and then put forward countermeasures of development of the community forestry for a better and more stable livelihood in Thailand.

1.2 Problem Statement

How to make the community forestry plan a more significant impact on improving rural livelihood is a key concern of this study. This study have concluded three major problems which hamper the development of community forestry and its positive role in rurual devleompent. These problems are to be answered in this study.

Firstly, a clarification of rural livlihod and rural devlepment is needed. The rural livelihood is widely defined to be both physical and mental requirements to maintain local normal life (Toman and Ashton, 1996; Knight, 1996; Thomas and Huke, 1996). This includes food, water clothes, housing, healthy care and recreation. Meanwhile, the ecologcial service is also needed for secure and sound living environment (Atkinson et al. 1997). In recent years, the climate change has attractec much attection for its negative inpacts on every aspect of rural livelihood (UNCED 1992). To this sense, a well definition of the rural livelihood and rural development is necessary for understanding the roral of the community forestry.

Secondly, a well definition of community forestry and its model are needed. Ever since the Earth Summit, ecological servce of forest ecosystem has become a key concern globally, which has been highlighted in forest policies of many countries (Choudhury 2005). In another sentence, the global community is seeking to balance forest protection and utilization. A comprehensive utilization and protection of all type of forest resources is needed. (Dupuy et al. 1999). This indeedly set an obstacle in the practice for the different activities are subsistutive in some cases. To this sense, a major role of community forestry is needed to be well defined.

Thirdly, absence of systematical study of a community-forestry based rural livelihood

development model in Thainland weakens the potentially significant role of community forestry. The community forestry is a complex system, consistuted by the natural and social and economic sub-systems (Biswas 2001). This makes a sound understaning of the community forestry is full of challenges (Dupuy et al. 1999), especially the sustainability of the system being hard to be well understood (McCool and Stankey, 2001; Sheil et al., 2004). Specificly, Thailand is featured by tropical forest, which is somewhat impoverished and degraded (Dupuy et al. 1999). However, the Royal Forest Department of Thailand has started to make change and ensure a stable and healthy community forestry system.

1.3 Objectives of the Study

This study is aimed to reveal impact of community forestry on rural livelihood in the Thailand, which used as one case in understanding the community forestry in Great Mekong Region. The specific objectives of this study are as follows.

(1) To examine the impact of community forestry on rural farmers' income, respectively including of total income, forest income, farm income, and off-farm income, in Thailand;

(2) To investigate what factors related to community forestry have significant impacts;

(3) To put forwards countermeasures to promote the significantly positive impact of community forestry on improving rural livelihood.

1.4 Research Questions

This study is trying to answer the following three questions by joint application of statiscial description and regressional methods.

(1) What is the impact of community forestry on rural farmers' income in Thailand?

(2) What determines the impact of community forestry on rural farmers' income in Thailand?

1.5 Significance of the Study

This study is significant both from the theorectical and practical perspectives.

(1) Theorectically, this study sets up regresional model based on the exsiting empirical study models together with the practice in Thailand. This will provide references for future model specification.

(2) Practically, the countermeasures of this study could be used as reference for the community forestry and rural development authorities in Thailand. In case the importance of community forestry in Thailand, these countermeasures are full of significance.

1.6 Organization of the Thesis

This thesis consists of five chapters. The first chapter of introduction, as a start of this thesis, states research background, problems, objective, research questions, significance, and organization of the thesis.

The second chapter states the concept of community forestry, and rural livelihood, and

then provides literature reviews concerning these two key concepts.

The third chapter of methodology states study area, source and method of data collection, sampling technique and sample size, and method of data analyasis.

The fourth chapter states statiscial description and regressional results, and makes discussion of the results by comparing the existing research findings.

The fifth chapter, as the final chapter, concludes whole study, discusses policy implication and recommendation, and limitation and recommendation for future studies.

2. CONCEPT DEFINITION AND LITERATURE REVIEW

2.1 Definition

2.1.1 Community Forestry

Community forestry can be defined as a cluster of forestry management strategies or activities, centering on local commuities' and their members' participation in forest management, and timber and non-timber forest harvest for the memembers' livelihoods (Sharma, 2003; Agbor, 2002). There are multiple stakeholders, such as policymakers, forest and forestland plnaner, authorities officials, and local farmers, involved in any community forestry program (Udo, 2007). The community forestry is a complex approach, consisting of on-ground initiative, colletive action, and community admiminitration capacity building (King et al., 2013; Agbogidi and Okonta, 2003). The local interests are set in priority when the community forestry is designed and implemented, with the assistance of external experts and a higher level forestry authority (FAO, 1978).

Community forestry, theorecticlly, is independent to forestland property right types. It is observed that the community forestry is developed on private forestland, community forestland, public forestland, state-owned forestland in world wide (FAO, 2010), though most community forestry programs are designed and implemented on the pubic and state-owned forestlands in Asian nations (Tewari and Tiwari, 2013). This is determined by a primary motivation to develop community forestry as an effective instruments to end deforestation and forest degradation in these Asian nations, where the forest are lack of well management before involved in the community forestry programe (Ogar et al., 2003). No surprising, the program also providces incentives to the local community members for their active participation and meaningful contribution in the forest management.

Notely, the community forestry is rapidly developed in the most undeveloped area, where local poor people are lack of nature resources, such as forest, cropland, and fish ponds, to sustain their livelihoods (Udofia, 2015). Even though, these poor people have very high dependence on the primary use of nature resources, which makes them can not get rid of extreme proverty (Udo, 2013; Agbogidi and Okonta, 2013). In reality, this repeatedly took place and created a huge obstacle for poverty alleviation and reduction. To this sense, the local poor people is needed to participate in the community forestry program as practitioner, and they also need the community forestry as a better opportunity of extended resource utilization.

The farm household, as one whole unit, parcitipates in the community forestry, which is lead jointly by the community and forestry authority under a forest management plan. Their forest management activities are well organized, and their relevant benefits are well guaranteed. They might be involved in forest plantation establishment, forest quality improvement, non-timber forest products collections. However, no matter what they are working on, they are paid. This makes sense for them a better livelihood.

2.1.2 Rural Livelihood

Rural livelihood is generally defined as the daily needs for food, colths, fueldood, housing, healthy care, education, transportion, and recreation of rural people (Bhandari, 2012). There are many other concepts to be used as substiutions of the livelihood, of which poverty, and wealth are most well known. The most frequently used indicator, for measurement of livelihood, should be income, or income per capita. The latter one also used to reflect as one of the key indcators for measuring proverty degress in one certain region or nation. In the developing countries, income could be further classified into cash income and non-cash income, such as fuelwood collected for family consumption.

Since late 1990s, the sustainable livhood become a increasingly popular concept for the global community obtaining a better understanding of the weakness of livelihood in the most undeveloped regions (Carney, 1998; DFID, 1999; Ellis, 2000a). As indicated in Figure 2-1, the sustainable livelihood could be analyzed in a specifc framework, so called the sustainable livelihood framework (the SLF; DFID, 1999). Regarding the framework, the households' livelihood is decomposed into livelihood assets, livehood strategies, and livelihood outcomes. The livelihood outcomes could be varied according to different opions of livelihood strategies, which are determined by different setting of livelihood assets(Wang et al., 2019). For those most poorest people, their extreme poverty is an indication of livelihood outcome, and they usually have very small amount of and low quality assets.

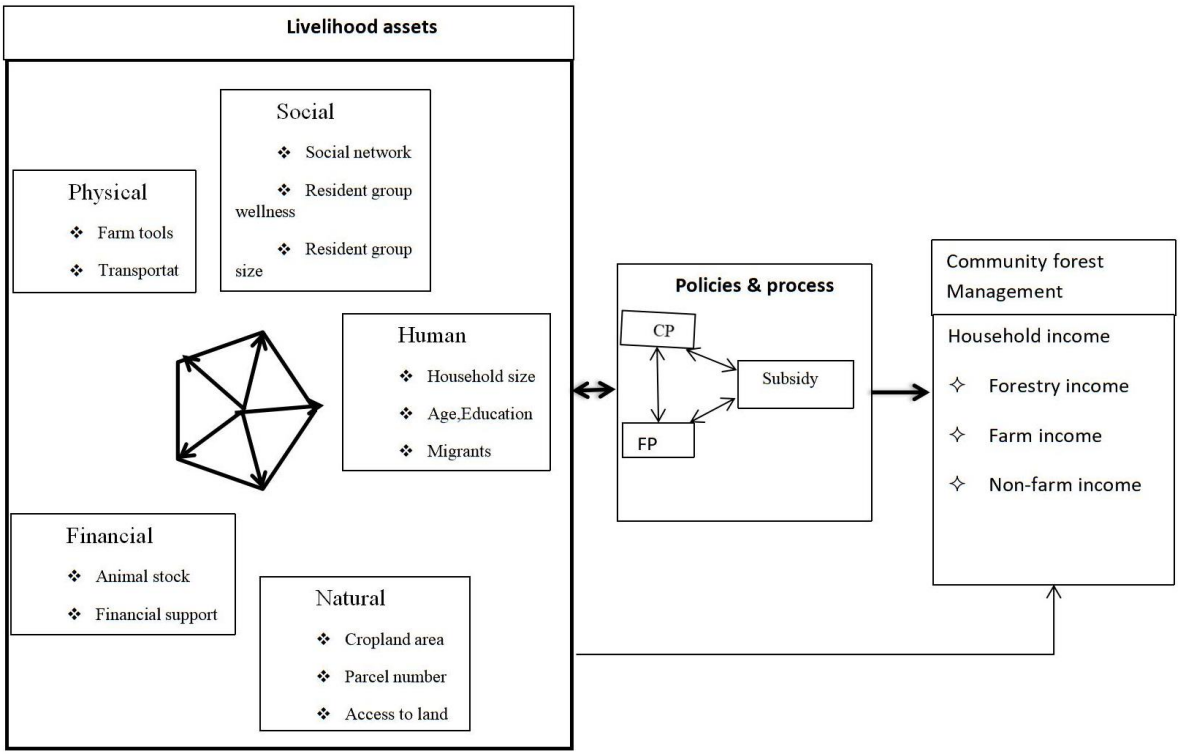

Figure 2-1. Sustainable Livelihood Framework (SLF)
Adapted from DFID (1999)

The SLF is updated based on the traditional livelihood theory, and can be used for a better understanding on the livelihood in the developing nations. It can also be used for analysis of how the community forestry could benefit the poor community and people. Intuitively, those community and people without sound livelihood assets get to be trapped in the poverty. The community forestry plays its function by improving their assets.

2.2 Community Forestry in the Mekong Region

2.2.1 Forest Conditions

The Mekong region's forests have played a dominating role in the region's sustainable development, by producing timber and non-timber products, conserving biodiversity, combating climate change, and protecting land and water resources. Consequently, the forests sustain local peoples' livelihood by offering employment, food, firber, fuelwood, fruit, medicine, protein, and so on.

The forests of the region are qualified as one of the most biodiversity richness pots in the world. It is indentified as one of the world's 25 global biodiversity hotspots where a significant proportion of the treathened and endangered species are needed more effective conservation (Myers et al., 2000). Forest clearance and degradation in the region has been continuously happening during the past decades. During 2000 and 2010, the forest area declined by 0.4 percent per annum, compared to 0.5 percent per annum between 1990 and 2000, when the forest area were contracted by 8.0 million hectares (FAO, 2010).

Table 2-1. Area of forest in the GMS countries in 2015 and rate of change in forest area

Country	**Forest Area 2015 (1000 ha)**	**Forest Cover (%)**	**Annual Change in Forest Area (%)**		
			1990-2000	**2000-2010**	**2010-2015**
Cambodia	9457	54	-1.1	-1.3	-1.3
Lao PDR	18761	81	-0.7	0.8	1.0
Myanmar	29041	44	-1.2	-0.9	-1.8
Thailand	16399	32	2.0	-0.5	0.2
Vietnam	14773	48	2.3	1.9	0.9

Source: FAO (2015a).

The forests (excluding China) cover 88.4 million hectares in 2015, with national forest cover ranging from 32 percent in Thailand to 81 percent in Lao PDR., as shown in Table 2-1.

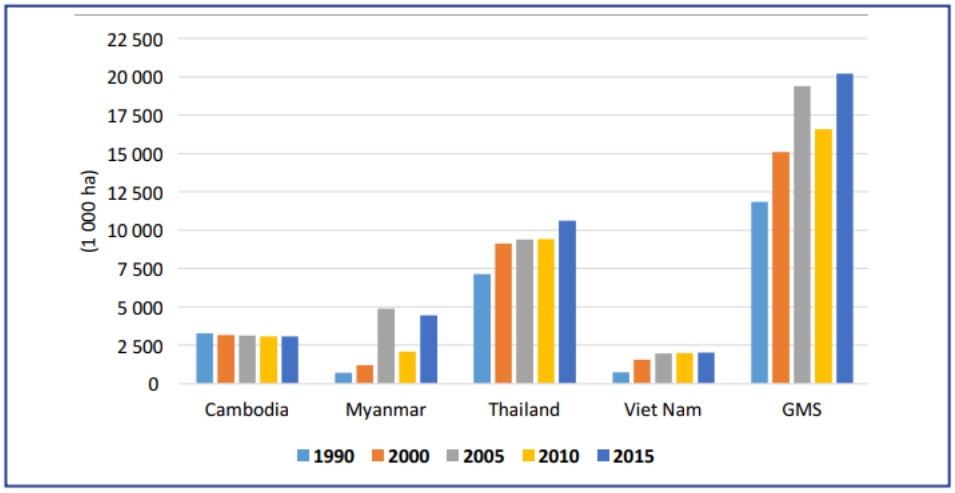

Figure 2-2. Protected area in GMS countries (1990-2015) Source: (FAO, 2015a).

As indicated in Figure 2-2, the distribution of protected areas between countries and the predominance of Myanmar, both in terms of total forest area and reduction in area. Except for Viet Nam, all regions and countries show the same decline in the protected area.

2.2.2 Community Forestry

In the region, communities play an increasingly important role in forest management. (RRI, 2018). For all nations in the region, the community forestry programs have beem implemented for promoting forest resources recovery, local livelihood improvement and regional development.

In 2006, the NGOs began working with villagers in the Khamkeut District of Bolikhamxay Province, Laos, providing them technical support on forest and natural resource management according to the sustainable forest management standards, and helping strengthen forest-based livelihoods through rattan handicrafts making, so that villagers could improve their standard of living without depleting their forest resources. After nearly 20 years of implementation, an evaluation of the project's effects on forest cover change shows that the project areas had a 13.2% lower forest loss rate than other areas. Interviews with local stakeholders reveal that with the right incentives, community members are willing to forego the conversion of forests for other land uses that offer higher short-term benefits. However, these positive findings are not universal.

The community forestry progames implemented in different nations do have verified impact on local livelihood. In Myanmar, there are very few successful community forestry program, which can benefit the local peoples' livelihood and local ecological restoration at the same time. Even though, it is observed that the local peoples' livelihood strategy is diversified and their high dependence on primary resouces are alleviated. Meanwhile, the local people were not actively enough to participate in the program duing to non-transparent information and inadeqaunt participation opporutnities. It is argued that more supports, such governmental subsidy, and the NGOs' assistance are needed for further development of the community forestry in this region (Humphries et., 2020).

2.3 Community Forestry in Thailand

Thailand National Forest Policy sets a target for 40% forest cover, with 25% for conservation and 15% for the economic forest. From the current record, the total forest cover of Thailand is 31.68% (RFD, 2018) or about 16.4 million ha, which means there is a need to increase forest area to around 4.3 million hectares to reach the target. Since the country's logging ban in 1989, the government has implemented measures to protect the remaining natural forests and promote more plantations. Forest plantation has grown through smallholders, state enterprises, and some corporations; however, the Forest Act B.E.2484 (1941) and the Forest Plantation Act B.E.2535 (1992) had put restrictions on several valuable trees difficult especially for smallholders to increase forest plantations during the past decades. Under the 20-Year National Strategic Plan, the government recognized increasing demands for timber and wood products in the domestic and international markets.

Consequently, one of the forest management strategies has been geared towards promoting economic forests, especially on privately owned lands. The government promotes the plantation of fast-growing trees and slow-growing high-value tree species. Recently, article 7 under Forest Act B.E.2484 (1941) has been amended to allow tree growers on private lands with secured land titles to grow and harvest trees for commercial purposes without getting officers' authorizations. The law amendment aimed to facilitate forest plantations and timber production to serve the growing demand, estimated to be 48 million tons in 2005 and projected to be up to 100 million tons in 2026.

On the other hand, Community Forest has been in the debates and policy dialogues for several decades between government, civil society, and community-based organizations. As a responsible agency, the Royal Forest Department (RFD) has piloted community forests and envisioned long-term planning and support through Community Forest Management Bureau. The approach is recognized as a tool to achieve sustainable forest management and encourage community cooperation and participation of local communities. Rural populations in various parts of the country have benefited from community forest management by collecting non-timber forest products for their consumption and additional income. Different models of community forests emerged in Thailand and are seen as a solid process to strengthen community capacity in sustainable natural resource management, maintaining cultural relationships and traditional knowledge between people and nature, food security, and improving local livelihoods.

Currently, around 14,000 community forests have been established in Thailand, covering an area of 1.4 million ha. (NLA, 2018). The Community Forest Act was passed and published in the Royal Gazette in late May 2019. It is expected to contribute to the expansion of CF areas and strengthen CF management organizations. The government plans to establish up to 21,000 forest communities covering 3 million hectares of forestes in 2020.

2.4 Comments on the Existing Literatures

Based on the above mentioned literatures reviews, this study found that the community forestry is a popular research topic in the field of forest management and utilization, rural development, poverty alleviation and reduction in the developing countries. The existing studies were implemented by multiple types of quanlitative and quantitative analytical methods. The qualitative analytical results ensure this study have solid base of clear definition of key concepts of community forestry and rural livliehood. The quantitative analytical results inspire this study a lot in model specification and estimation. The study also benefits from the quantitative study from their successful experiences in sampling and data collection.

The gap in the literature reviewed is significant, which ensure this study to be implemented with innovations. One of the most signifant gap is the inadequate study conducted in Thailand with the first hand data and conducted a the local community member level. This makes the readersto be failure in obtaining a sound understanding of the impact of community forestry from rural livelihood perspecrive in Thailand. Therefore, this study is aimed to conducted based on first-hand data collection at the farm household level, and to reveal a complete picture of the impact of community forestry on the rural livelihood. Notedly, the study area used as sample in this study need to represent general situation. The study makes a synthesis review of all community forestry areas in Thailand and then finish sampling work before a round of consultation to the experts and officials in Thailand.

It also noted that income is useds an overall indicator in the exsiting literatures related to community forestry in Thailand which can not reveal the detailed impacts of community forestry on different types of income sources. Conversely, forest income, farm income, off-farm income, decomposed from the income, have been widely used to assess farmers' livelihood strategies. Therefor, this study adopts the treatment of income in the existing literature when specifying regressional models. This treatement enables the readers to know both the direct impact of community forestry on rural livelihood, and the indirect impact at the same time. The latter impact is not observed obviously.

This study non-doubtly can cover only a portion of the exsiting knowledge gaps, but the majority of the gaps get to be filled by future studies. This is duing to the limited research resources and capacity owned by this study.

3. METHODOLOGY

3.1 Study Area

The Lancang-Mekong River is one of the largest river systems in the world, having a length of about 4800 km and a drainage basin of about 800,000 km2. The river basin includes parts of China (in the Yunnan Province and Guanxi Zhuang Autonomous Region), Myanmar, Vietnam, nearly one-third of Thailand, and almost the whole of Cambodia and Lao PDR. The Lancang-Mekong River has played a vital role in the social, economic, and cultural history of the regional economies through which it passes and still plays a dominant role in the essential livelihood of millions of people.

Thailand is located in the lower area of the Lancang-Mekong River. As mentioned in Chapte 2, Thailand hightlights the significance of community forestry in rural development and forest management, and has developed more than 20 thousands forest communities based on legilastion and implementation of community forestry programs. This study is conducted in Buengkan province where is located in the upper northeast of Thailand. The administrative area is divided into 8 districts, such as, Bueng Kan District, Seka District, and So Phisai District. Bung Khla District Bueng Khong Long District, Pak Khat District, Phon Charoen District and Si Wilai District. The map of Bueng Kan Province is indicated as figure 3-1. In general, it is a plateau that can be divided into 3 characteristic sub-regeions: the first sub-region is undulating and sloping, scattered in patches in every district, the second sub-region is undulating and hilly, and the third sub-region with natural forests such as deciduous dipterocarp forest and mixed deciduous forest.

There are 6 community forestry programs implemented in the study ares, consisting of, Ban Na Sawan Community Forest, Na Charoen Community Forest, Ban Sai Thong Community Forest, Ban Sai Thong Community Forest, Ban Mai Chomphu Community Forest, and Ban Tha Chiang Community Forest. It has a total area of more than 2,185 rai, spread out in 6 sub-districts and 3 districts, namely Na Sawan, Kham Na Di and Khok Kong. Mueang Bueng Kan District, Na Sing Subdistrict and Na Sabaeng Subdistrict, Si Wilai District and Pong Hai Subdistrict, Seka District, Bueng Kan Province. The groups can be divided according to the status of community forest registration into two groups as follows. The firest community forests that are registered as community forests according to the Forest Act of 1941 in the amount of 5 places. Secondly, one community forest is to be registered for the establishment of a community forest. Most of the population are farmers, rubber plantations and rice fields. In addition, people in the community depend on forest resources and ecosystems in the community forest floor and public forests located in community areas and nearby communities. to be a source of food and a source of extra income for the family as well.

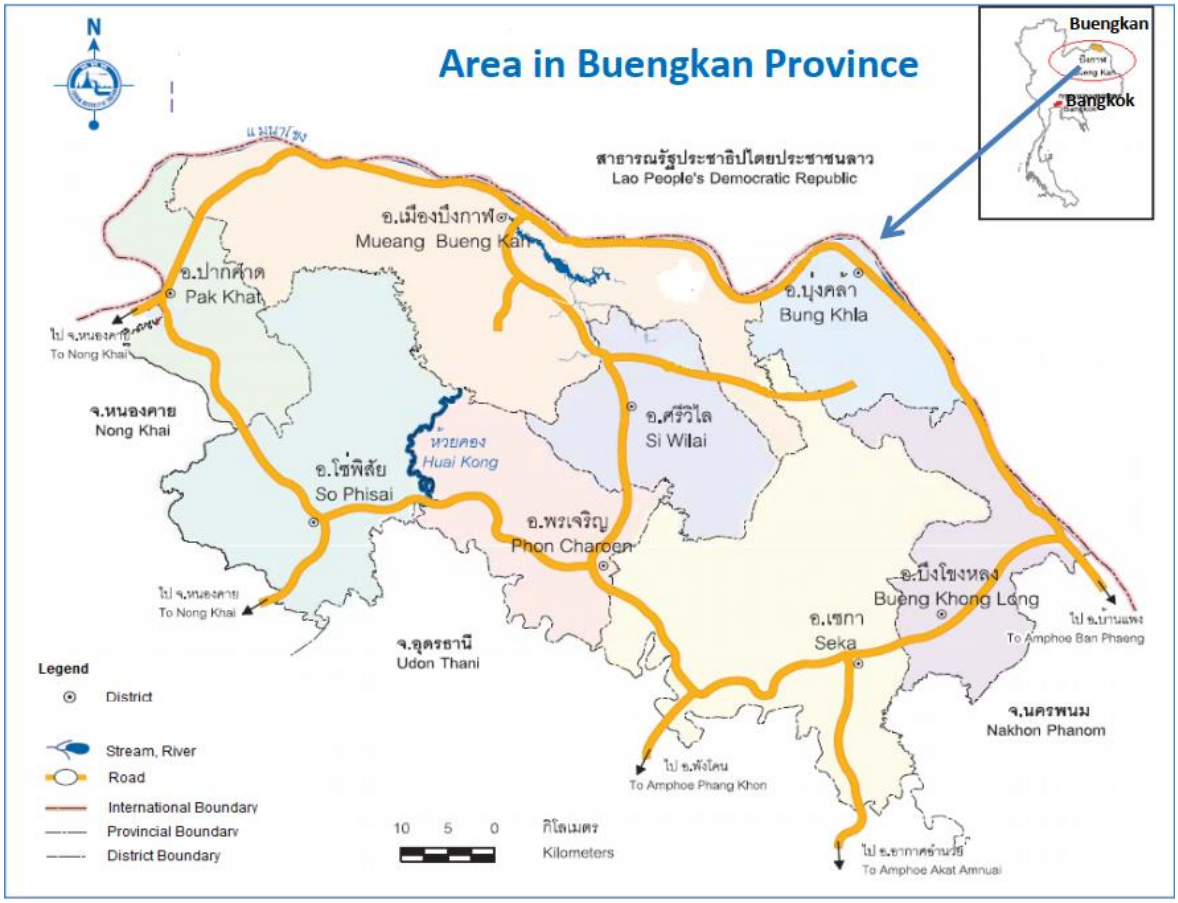

Figure 3-1. Map of the study areas

3.2 Data Collection

This study collected both the first hand and second hand data. The first hand data was collected from the sampling farm households by using structural questionnaire. The second hand data was collected from the published articles, reports, and yearbooks of the Royal Forest Department in Thailand.

3.2.1 First hand Data Collection

First-hand data was collected maily from face-to-face interview on the ground, which was conducted by a field investigation team composed by the author and her colleagues in the same department of the Royal Forest Department in Thailand during June to July, 2021. All team members had long-term working experiences in the field of community forestry development in Thailand, and were excelled in field survey.

The structural questionnaire was used in the face-to-face interview. The questionnaire consists of three major parts of contents. The first part concerns the social-demographic characteristics of the respondents, such as the age, gender, and academic level of the head of household, size of the household, number of adult labors, and forest land and cropland endowment of the household. The second part concerns the economic situations of the household, such as income level, and income sources. The third part concern the farm

household's participation in the community forestry, including of when they were involved in the community forestry and what they did in the community forestry.

The investigation team held field visting to observe practical difference of livelihood situation between those households within and without the community forestry program. Their housing conditions, food types, healthy condition, fuelwood amount and happiness were paid espcial attentions by the team. The team also made conversation with other household members besides the head of the household to collect more comprehensive information of their understanding and recognition of the advantages and disadvantages of the community forestry programs. The team walked within and nearby the community forest to observe the real sitation of the forest managed by the communities.

In order to tesify the quality of the first hand data collected from the farm household by face-to-face interview, the team organized a group talk in each sample community. The community leaders and key persons were invited to join the talk, which enabled the team know a general situation of the whole community and implementation of the community forestry program. The team also raised some same questions in the questionnaire to in the talk for verification. For example, according to the year when the household being engaged in the program, the team repeated the question in the talk.

3.2.2 Secondary Data Collection

The secondary data was collected mainly based on the author's working department, affiliated to the Royal Forest Department in Thailand, which is in charge of the community forestry development affairs in Thailand. Due to this convenience, along with the approval of the department, the author collected the yearbook and reports related to the community forestry development. For the specific contents to be cited in this study, the author also made discussions with the right officials for more details. For examples, the author held more than one times of workshop on how to ensure the community forestry play more significant on income enhancement in Thailand.

The author also made good use of the existing dataset, and literatures database. To the limitation caused by the COVID-19, the author can not come to the university and make use of the paid literatures database. This did narrow the author's reviewing work on the recent literatures in the field of community forestry and rural livelihood. However, the author made full use of other types of literature search platforms, such as Research-gate, and MDPI wetsite, for open-access literatures.

3.3 Sampling

The sampling techniques were applied by two stages. Firstly, this study conducted selection of sample communities from the area where the community forestry program was implemented. Notedly, the sampled communities had very few differences regarding their involvement in community forestry, and livelihood conditions.

Secondly, this study conducted selection of sample farm household. This selection was finished by following a random sampling techniques. The team requested a namelist of

each sample community, which was randomly recorded the name of each farmhousehold, and then selected one name from every three names. In case that the total households of the sample communities were 690, the study randomly selected 230 sample household. In order to meet the requirement of well representativeness, the study made second round of random selection from the remaining households on the namelist, and then had another 23 sample households. In total, the study obtained a sample of 253 households from the sample communities.

As stated earlier, the sample size to be selected for this research follows adopted in this study technique. The sample size for the study was drawn from the total household in the study area. Six hundred ninety total households live around the villages of the study area. A total of 253 respondents will be selected from the total households as the sample size of this study.

The representativeness was confirmaed by an application of calculation following Yamane's formula (Yamane, 1967). The formula ensures the study have a sound sample with a confidence level at 95%, and the sampling error at 5 % (0.05). This sampling size confirmation technique has been extensively used in the forest economics and policy studies. The formula is as eqation 3-1.

$$n = \frac{N}{[1+N(e)^2]^{(3-1)}} \qquad (3\text{-}1)$$

where, n = sample size, N = total population of household, e = the acceptable sampling error (0.05).

Regarding the poplation size N is 690, the n is 253.

3.4 Data Analysis

3.4.1 Statistical Description

The statistical description was used to state general situation of the social, demographic, economic characteristics of the sample household in the study areas. The study also describle general situation of the community forestry development in Thailand. To this sense, the statistical descriptions were also applied for analyzing the first hand and secondary hand data. The statistical description was conducted in Excel version 2010.

3.4.2 Regression Model Specification

The study adopted the OLS model for regression analysis for the income, forest income, farm income, and off-farm income used as independent variables in the model were all measured directly by their values. The decomposization of income was as following equation 3-2.

$$Income = Forest\ Income + Farm\ Income + Off - Farm\ INcome + other\ Incomes \qquad (3\text{-}2)$$

Where, off-farm income was denoted by wage income, and forest income was originated from the community forestry.

Farm households' income have been testified by multiple types of factors, which were including of their social and demographic characteristics, land resource endownment, and policy and institutional involvement (Xie et al., 2014).

On the other hand, the econometric analysis was conducted using simple linear regression to analyze the impact of community forestry on household income. Therefore, three models were suggested to help achieve the study's objectives. In this study, the participation in community forestry was a central focus, and involved in the regressional model as independent variable. This study then has an analytical framework as the following figure 3-2.

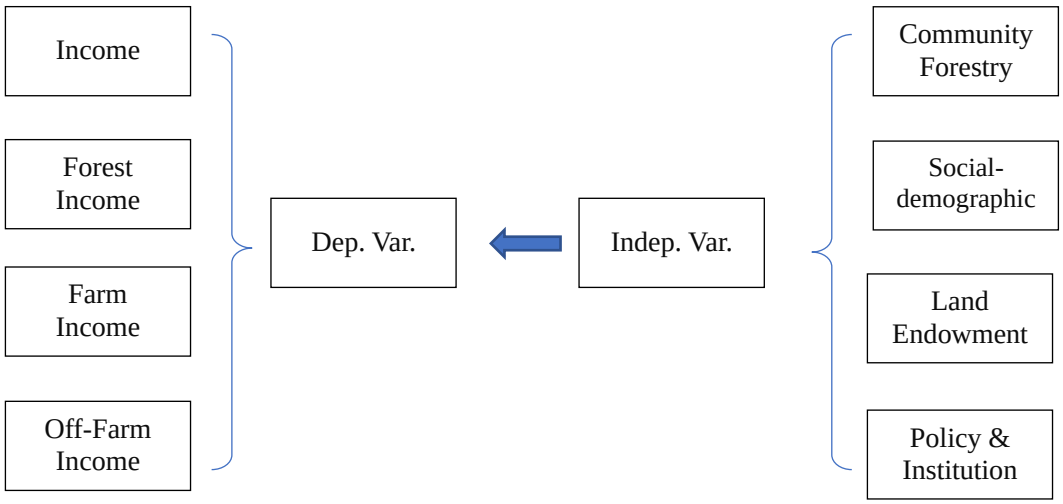

Figure 3-2. Modified RLH framework constructed by the author

Therefore, the linear model of this study is expressed as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \cdots\cdots + \beta_k X_k + u_t \quad (3\text{-}3)$$

Where, Y=Household Income; X_1=Age; X_2= Education level; X_3=Gender; X_4= Family Size; X_5=Farm land area in hectares; X_6= Forest land area in hectares; X_7= Forest policy; X_8=Subsidy; X_9=Training; X_{10}= Community participation.

Furthermore, the factors should respetively affect Forest Income, Farm Income, and Off-farm Income, which will be determined as shown in equation 3-4, 3-5, and 3-6 as below:

$$Forest\ Income = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \cdots\cdots + \beta_k X_k + \eta_t \quad (3\text{-}4)$$

$$Farm\ Income = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \cdots\cdots + \beta_k X_k + \vartheta_t \quad (3\text{-}5)$$

$$Off - Farm\ Income = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \cdots\cdots + \beta_k X_k + \mathfrak{h}_t \quad (3\text{-}6)$$

The coeffecients of the above regressional models were estimated by application of STATA version 15.

Therefore, the study estimated 4 models in which model 1 just indicates the sole

impact of community forestry; model 2 incorporates the Impact of demographic Factors based on model 1 while model 3 involves the Impact of land endowment based on model 2. On the other hand, Model 4 is a complete model involving all the factors of the model.

4. RESULTS AND DISCUSSIONS

4.1 Statistical Description

4.1.1 Dependent Variables

This study reported the results of total income, forest income, farm income, off-farm income and other sources of income (as indicated in Table 4-1), of which the first four types of incomes were involved in the regression model as dependent variables. The transformation of income by using logarithm of natural number base was to avoid the skewness caused by huge differences between the value of income and independent variables in the regression calculation.

Table 4-1. Statistical Description of the dependant variables

Variables	Observation	Unit	Mean	Std. Dev.	Minimum	Maximum
Income Level						
Total Income	253	In USD	1864.03	1300.75	0	8000
Forest Income	253	In USD	859.03	775.34	0	3400
Farm Income	253	In USD	433.53	407.87	0	3500
Off-farm Income	253	In USD	525.26	587.31	0	4000
Other Income	253	In USD	46.20	66.48	0	300
Transformation of Income by Ln(income + 1)						
Ln Total Income	253		7.22	1.15	0	8.99
Ln Forest Income	253		6.13	1.53	0	8.13
Ln Farm Income	253		5.59	1.35	0	8.16
Ln Off-farm Income	253		5.63	1.49	0	8.29
Ln Other Income	253		2.32	2.13	0	5.71

The mean total income of farm household in the sample area was USD 1864.03, with the lowest farm household income being 0 and the highest farm household income being USD 8,000. This indicated that there was a significant economic disparity between affluent and poor farm households. A comparative study between those household being and not being in the community forestry revealed that the former group obtained mean total income of USD 2766.72, which was roughly 2.5 times of the later group with a value of USD 1024.59.

The mean forest income of farm household was USD 859.03, of which 8 farm housesholds did not have this type of income. The greatest forestry income reached USD 3400. A comparative study between those household being and not being in the community forestry revealed that the former group obtained mean forest income of USD 1380.67, which was a little higher than two times of the later group with a value of USD 639.24.

The mean farm income of farm households was USD 433.53, of which 9 farm housesholds did not have this type of income. The greatest farm income reached USD 3500. A comparative study between those household being and not being in the community forestry revealed that the former group obtains mean farm income of USD 602.40, which was 1.5 times greater than the later group with a value of USD 362.38. Farm households'

farm income was modestly lowner than their forest income, which indicated the importance of forest income in their total income.

The mean value of off-farm income was USD 525.26, of which 10 farm housesholds did not have this type of income. The greatest off-farm income reached USD 4000. A comparative study between those household being and not being in the community forestry revealed that the former group obtained mean off-farm income of USD 713.07, which was a little higher than 1.5 times of the later group with a value of USD 446.13.

The mean value of other sources of income was USD 46.20, with the lowest source of income being 0 and the highest being USD 300. This indicated that other sources of money were not very abundant.

In all, the highest income came from forestry, followed by income from off-farm work, income from agriculture, and finally income from other sources, according to the mean value of all income.

4.1.2 Independent Variables

This study had three types of factors as independent variables, respectively related to demographic characteristics, land endowment, and policy and institutional factors. The statistical descriptive results were indicated in Table 4-2.

Table 4-2. Statistical Description of the independent variables

Variables	Observation	Unit	Mean	Std. Dev.	Minimum	Maximum
CF Participation	253	Dummy	0.296	0.46	0	1
Demographic Factors						
Age of the Head	253	Numbers	51.26	10.34	26	87
Educational Level of the Head	253	Numbers	1.14	0.37	1	3
Gender of the Head	253	Dummy	0.75	0.44	0	1
Household size	253	Numbers	6.58	1.86	3	11
Land Endowment						
Farmland	253	In hectares	2.02	1.13	0	6
Forestland	253	In hectares	14.85	6.36	0	60
Policy and Institutional Factors						
Policy	253	Dummy	0.33	0.47	0	1
Subsidy	253	Dummy	0.47	0.499	0	1
Training	253	Dummy	0.28	0.45	0	1

According to the results of demographic factors, the youngest respondent, viz. the head of sample farm household, was 26 years old, and the oldest was 87. Most respodents did not receive formal eduction, of which 219 respondents did not participate in education, 32 respondents finished primary school eduction, and the remaining 12 respondents had secondary school certificates. There were 75% of the heads of the farm household being male, and the other 25% was female. The smallest and largest households, in terms of number of people, were 3 and 11, respectively.

With a mean value of 2.02 hectares, farm land obtained by the farm households

ranged from 0 to 6 hectares. With a mean value of 14.85 hectares, forest land obtained by the farm households ranged from 0 to 60 hectares. This implied that forest land plays more significant roles on farm households' livelihood than farm land.

According to the question of "is there any policy on the management of the community forestry in this area", there were 33% of farm households answering "yes", accounting for roughly 1/3 of total farm households. According to the question of "did you family receive any subsidy support from the government or any other agency in promoting community forestry management", there were 47% of farm households answering "yes", accounting for fewer than 1/2 of total farm households. According to the question of "have you participated in forestry knowledge/skills training that can help in sustainable or rural forest resource managment", there were 28% of farm households answering "yes", accounting for a little greater 1/4 of total farm households.

4.2 Regression Results

4.2.1 Impact of Community Forestry on Total Income

The impact of community forestry on total income of the sample farm household was estimated using OLS multiple regression analysis. There were four models being estimated as indicated in Table 4-3. Model 1 just indicated the sole impact of community forestry on total income. Model 2 incorporated the impacts of demographic factors base on model 1. Model 3 further involved the impacts of land endowments based on model 2. Model 4 was a complete model involving all factors. The statistical characteristics of all four models were reported at the bottom of table 4-3.

The results of model 1 indicated that community forestry had a significant impact on total income. The coefficient of *CF Participation* was 0.75 and significant at 1%. For those farm household within the community forestry, they could have a greater total income. The significant and positive impact of community forestry on the total income was also found in model 2 and model 3, where the coefficient of *CF Participation* was 0.82, and 0.75, and significant at 5% and 1%, respectively. However, the coefficient of *CF Participation* in model 4 was 0.34 and not significant. This implied that impact of community forestry on total income was affected by other factors in model 4.

The results of model 2 indicated that the age, education level of the head of farm household, and household size had significant impacts on total income. The coefficient of *Age of the Head* was 0.01 and significant at 10%. This implied that elder farm households were possible to have a higher total income. The coefficient of *Gender of the Head* was 0.27 and significant at 1%. This implied that male farm households were possible to have a higher total income. The coefficient of *Household Size* was 0.06 and significant at 1%. This implied that larger household were possible to have a higher total income. The significant and positive impact of household size on the total income were reported in model 3 and model 4. However, the impact of the age, and education level of the head did not have significant impact on the total income in model 3 and model 4. The coefficient of

Educational level of the head was not significant in these three models.

Table 4-3. OLS Results Estimating the Effect of Community Forest Management on Total Income

Variables	Model 1	Model 2	Model 3	Model 4
CF Participation	0.75***	0.82**	0.75***	0.34
	(0.15)	(0.15)	(0.14)	(0.25)
Age of the Head		0.01*	0.01	0.01
		(0.01)	(0.01)	(0.01)
Educational Level of the Head		-0.13	-0.06	-0.04
		(0.19)	(0.18)	(0.17)
Gender of the Head		0.27*	0.13	0.11
		(0.16)	(0.15)	(0.15)
Household size		0.06*	0.09***	0.09**
		(0.04)	(0.04)	(0.04)
Farmland			0.29***	0.29***
			(0.06)	(0.06)
Forestland			0.03***	0.27***
			(0.01)	(0.01)
Policy				-0.22
				(0.14)
Subsidy				0.29
				(0.24)
Training				0.34**
				(0.16)
constants	6.99***	5.85***	4.87***	4.86***
	(0.08)	(0.48)	(0.49)	(0.49)
Statistical Characteristics				
No. of obs.	253	253	253	253
F-value	24.22	7.39	10.47	8.40
P>F	0.000	0.000	0.000	0.000
R^2	0.09	0.13	0.23	0.26

Notes: Level of Statistical significance 1% (***) 5% (**) 10%(*)

The results of model 3 indciated that both the farmland area and forestland area had significant and positive impacts on total income. The coefficient of *Farmland* was 0.29 and significant at 1%. For those farm household having larger farmland, they could have a great total income. The coefficient of *Forestland* was 0.03 and significant at 1%. For those farm household having larger forestland, they could have a great total income.The significant and positive impacts of the farmland area and forestland area on the total income were also found in model 4, where the coefficients of *Farmland* and *Forestland* were 0.29, and 0.27, respectively, and both significant at 1%.

The results of model 4 indicated that only *Training* of these three policy and insitutional variables had significant impact on total income. The coefficient of *Training* was 0.34 and significant at 5%. For those farm household being engaged in training, they could have a great total income.

4.2.2 Impact of Community Forestry on Forest Income

The impact of community forestry on forest income of the sample farm household was estimated using OLS multiple regression analysis. There were four models being

estimated as indicated in Table 4-4. Model 1 just indicated the sole impact of community forestry on forest income. Model 2 incorporated the impacts of demographic factors base on model 1. Model 3 further involved the impacts of land endowments based on model 2. Model 4 was a complete model involving all factors. The statistical characteristics of all four models were reported at the bottom of table 4-4.

Table 4-4. OLS Results Estimating the Effect of Community Forest Management on Forest Income

Variables	Model 1	Model 2	Model 3	Model 4
CF Participation	0.98***	1.06***	1.04***	0.48
	(0.202)	(0.21)	(0.203)	(0.35)
Age of the Head		0.01	0.01	0.01
		(0.009)	(0.009)	(0.01)
Educational Level of		0.09	0.104	0.103
the Head		(0.25)	(0.25)	(0.25)
Gender of the Head		0.26	0.21	0.19
		(0.21)	(0.22)	(0.21)
Household size		0.102**	0.12**	0.11**
		(0.05)	(0.05)	(0.05)
Farmland			0.14	0.15*
			(0.08)	(0.08)
Forestland			-0.003	-0.004
			(0.01)	(0.01)
Policy				-0.47**
				(0.19)
Subsidy				0.495**
				(0.33)
Training				0.39*
				(0.24)
constants	5.84***	4.13***	4.87***	3.99***
	(0.11)	(0.64)	(0.49)	(0.704)
Statistical Characteristics				
No. of obs.	253	253	253	253
F-value	23.32	6.69	5.17	4.87
P>F	0.000	0.000	0.000	0.000
R^2	0.08	0.11	0.13	0.17

Notes: * denotes statistical significance of 10%, ** denotes statistical significance of 5%, *** denotes statistical significance of 10%; values in the bracette are standard error.

The results of model 1 indicated that community forestry had a significant impact on total income. The coefficient of *CF Participation* was 0.98 and significant at 1%. For those farm household within the community forestry, they could have a greater forest income. The significant and positive impact of community forestry on the forest income was also found in model 2 and model 3, where the coefficient of *CF Participation* was 1.06, and 1.04, respectively, and both significant at 1%. However, the coefficient of *CF Participation* in model 4 was 0.48 and not significant. This implied that impact of community forestry on forest income was affected by other factors in model 4.

The results of model 2 indicated that the age, and the education leve and age of the head of farm household did significant impacts on forest income. However, the household size had significant impact on forest income. The coefficient of *Household size* was 0.102

and significant at 5%. This implied that a larger houehold was possible to have a higher forest income. The significant and positive impact of househould size on forest income was reported in model 3 and model 4 as well. Meanwhile, the impact of the age, and nd the education leve and age of the head did not have significant impact on forest income in model 3 and model 4.

The results of model 3 indciated that the farmland area and forestland area did not have significant and positive impacts on forest income. The insignificant impact of forestland area on forest income was also found in model 4, where the coefficients of *Forestland* were -0.004. However, the significant impact of farmland area on forest income was found in model 4, where the coefficient of *Farmland* was 0.15 and significant at 10%. This implied that the more farmland the household had, the higher forest income they obtained.

The results of model 4 indicated that all three policy and insitutional variables had significant impact on forest income. The coefficient of *Policy* was -0.47 and significant at 5%. For those farm households knowiong the community forestry management policy in their area, they would have a lower forest income. The coefficient of *Subsidy* was 0.495 and significant at 5%. For those farm household receiving subsidy, they could have greater forest income.The coefficient of *Training* was 0.39 and significant at 10%. For those farm household being engaged in training, they could have greater forest income.

4.2.3 Impact of Community Forestry on Farm Income

The impact of community forestry on farm income of the sample farm household was estimated using OLS multiple regression analysis. There were four models being estimated as indicated in table 4-5. Model 1 just indicated the sole impact of community forestry on farm income. Model 2 incorporated the impacts of demographic factors base on model 1. Model 3 further involved the impacts of land endowments based on model 2. Model 4 was a complete model involving all factors. The statistical characteristics of all four models were reported at the bottom of table 4-5.

The results of model 1 indicated that community forestry had a significant impact on farm income. The coefficient of *CF Participation* was 0.42 and significant at 5%. For those farm household within the community forestry, they could have higher farm income. The significant and positive impact of community forestry on farm income was also found in model 2 and model 3, where the coefficient of *CF Participation* was 0.498, and 0.38, , and significant at 1% and 5%, respectively. However, the coefficient of *CF Participation* in model 4 was 0.34 and not significant. This implied that impact of community forestry on farm income was affected by other factors in model 4.

The results of model 2 indicated that only the age of the head of farm household had significant impacts on forest income. The coefficient of *Age of the Head* was 0.02 and significant at 5%. This implied that elder farm households were possible to have a higher farm income. The significant and positive impact of the age of the head on farm income

was reported in model 3 and model 4, wehere the coefficients of *Age of the head* were both 0.01 and signifcant at 10%. However, the impact of the education level, and eductional level of the head, and house size did not have significant impact on the total income in model 3 and model 4.

Table 4-5. OLS Results Estimating the Effect of Community Forest Management on Farm Income

Variables	Model 1	Model 2	Model 3	Model 4
CF Participation	0.42**	0.498***	0.38**	0.34
	(0.18)	(0.18)	(0.16)	(0.29)
Age of the Head		0.02**	0. 01*	0. 01*
		(0.008)	(0.007)	(0.007)
Educational Level of		0.09	0.22	0.22
the Head		(0.22)	(0.201)	(0.203)
Gender of the Head		0.48	0.24	0.23
		(0.19)	(0.17)	(0.18)
Household size		-0.004	0.05	0.05
		(0.05)	(0.04)	(0.04)
Farmland			0.46***	0.47***
			(0.07)	(0.07)
Forestland			0.05***	0.04***
			(0.01)	(0.01)
Policy				-0.16
				(0.16)
Subsidy				-0.01
				(0.27)
Training				0.101
				(0.18)
constants	5.47***	4.04***	0.230	2.43***
	(0.101)	(0.58)	(0.203)	(0.58)
Statistical Characteristics				
No. of obs.	253	253	253	253
F-value	5.31	3.74	12.61	8.88
P>F	0.000	0.000	0.000	0.000
R^2	0.02	0.07	0.26	0.27

Notes: * denotes statistical significance of 10%, ** denotes statistical significance of 5%, *** denotes statistical significance of 10%; values in the bracette are standard error.

The results of model 3 indciated that both the farmland area and forestland area had significant and positive impacts on farm income. The coefficient of *Farmland* was 0.46 and significant at 1%. For those farm household having larger farmland, they could have a greater farm income. The coefficient of *Forestland* was 0.05 and significant at 1%. For those farm household having larger forestland, they could have greater farm income.The significant and positive impacts of the farmland area and forestland area on the total income were also found in model 4, where the coefficients of *Farmland* and *Forestland* were 0.47, and 0.04, respectively, and both significant at 1%.

The results of model 4 indicated that none of these three policy and insitutional variables had significant impact on farm income. This was a new finding compared to the impacts of the policy and institutional factors on the total income and forest income of

farm houseld.

4.2.4 Impact of Community Forestry on Off-Farm Income

The impact of community forestry on off-farm income of the sample farm household was estimated using OLS multiple regression analysis. There were four models being estimated as indicated in table 4-6. Model 1 just indicated the sole impact of community forestry on off-farm income. Model 2 incorporated the impacts of demographic factors base on model 1. Model 3 further involved the impacts of land endowments based on model 2. Model 4 was a complete model involving all factors. The statistical characteristics of all four models were reported at the bottom of table 4-6.

Table 4-6. OLS Results Estimating the Effect of Community Forest Management on Off-Farm Income

Variables	Model 1	Model 2	Model 3	Model 4
CF Participation	0.56***	0.65***	0.58***	0.31
	(0.203)	(0.203)	(0.19)	(0.34)
Age of the Head		0.01	0.01	0.01
		(0.01)	(0.01)	(0.01)
Educational Level of		-0.22	-0.15	-0.14
the Head		(0.25)	(0.24)	(0.24)
Gender of the Head		0.49**	0.304	0.29
		(0.21)	(0.21)	(0.21)
Household size		0.04	0.08*	0.079
		(0.05)	(0.05)	(0.05)
Farmland			0.42***	0.42***
			(0.08)	(0.008)
Forestland			0.01	0.01
			(0.01)	(0.01)
Policy				-0.18
				(0.19)
Subsidy				0.18
				(0.32)
Training				0.25
				(0.22)
constants	5.46***	4.39***	3.41***	3.239***
	(0.11)	(0.64)	(0.66)	(0.68)
Statistical Characteristics				
No. of obs.	253	253	253	253
F-value	7.74	3.70	6.87	5.16
P>F	0.006	0.003	0.000	0.000
R^2	0.03	0.07	0.16	0.17

Notes: * denotes statistical significance of 10%, ** denotes statistical significance of 5%, *** denotes statistical significance of 10%; values in the bracette are standard error.

The results of model 1 indicated that community forestry had a significant impact on off-farm income. The coefficient of *CF Participation* was 0.56 and significant at 1%. For those farm household within the community forestry, they could have greater off-farm income. The significant and positive impact of community forestry on off-farm income was also found in model 2 and model 3, where the coefficient of *CF Participation* was 0.65, and 0.58, respectively, and both significant at 1%. However, the coefficient of *CF*

Participation in model 4 was 0.31 and not significant. This implied that impact of community forestry on off-farm income was affected by other factors in model 4.

The results of model 2 indicated that the gender of the head of farm household had significant impacts on off-farm income. The coefficient of *Gender of the Head* was 0.49 and significant at 5%. This implied that male farm households were possible to have a higher off-farm income The significant and positive impact of household size on the total income were not repeatedly found in model 3 and model 4. However, the impact of house size had significant impact on off-farm income in model 3, but not in model 4. Moreover, the coefficient of *Age of the heand,* and *Educational level of the head* were not significant in these three models.

The results of model 3 indciated that the farmland area had significant and positive impacts on off-farm income. The coefficient of *Farmland* was 0.42 and significant at 1%. For those farm household having larger farmland, they could have greater off-farm income. The significant and positive impact of the farmland area on off-farm income was also found in model 4, where the coefficients of *Farmland* was 0.42, and significant at 1%. The coefficient of *Forestland* was 0.01 both in model 3 and model 4, and not significant. It could not deduce a stable causal relationship between forestland area and off-farm icome.

The results of model 4 indicated that none of these three policy and insitutional variables had significant impact on off-farm income. This was the same finding compared to the impacts of the policy and institutional factors on farm income of farm houseld.

4.3 Discussion

4.3.1 Impacts of community forestry on income

This study indicated that community forestry had consistent and significant impacts on total income, forest income, farm income, and off-farm income in the models without considering the impacts of policy and institutional factors. In anther sentence, community forestry did not have signifanct impacts on each type of income in the complete model with policy and institutional factors. This might be caused by potential correlationship existing between community forestry participation and policy and institutional factors. In order to testify this possibility, this study cacluated correlationship coefficients between all independent variables. The results were as following table 4-7.

It was found that the correlationship coefficient between *CF participation* and *Training* was 0.57, and the correlationship coefficient between *CF participation* and *Subsidy* was 0.79. These indicated that *CF participation* was modestly correlated to *Training,* and somewhat highly correlated to *Subsidy.* These two results could be used to interprete why community forestry had significant impacts in the models without the terms of policy and institutional factors, and then did not have significant impacts in the models with the terms of policy and institutional factors. Moveover, the correlaship coefficient between *Training* and *Subsidy* was 0.49, which was close to 0.5, a critical value of modest

correlationship.

Therefore, the further study should be cautious to fix the correlationships between community forestry and policy and institutional factors. A better definition and meansurement might be an opition in priority. In case that the importance of forest income in the toal income, this study preferred to believe that the community forestry did have positive impacts on income of the household.

Table 4-7. Correlationship coefficients between the independent variables

	CF	Age	Edu	Gend.	HS	Farml.	Forestl.	Policy	Training	Subsidy
CF	1									
Age	-0.12	1								
Edu	-0.06	0.12	1							
Gender	0.05	0.01	-0.05	1						
HS	-0.08	0.13	0.02	-0.12	1					
Farmland	0.06	0.06	0.17	-0.04	-0.16	1				
Forestland	0.06	0.04	0.05	-0.06	0.01	0.06	1			
Policy	0.14	-0.09	-0.05	-0.04	0.05	0.02	-0.03	1		
Training	0.57	-0.13	-0.01	-0.06	-0.02	0.02	0.03	0.11	1	
Subsidy	0.79	-0.03	-0.08	-0.07	0.01	0.04	0.04	0.14	0.49	1

Moreover, farm households' household income was impacted by natural resource management practices. At the community level, there is an urgent need to address the issue of collective natural resource management. The ability to create legislation for the management of national resources was substantially impacted at community level (Nkonya et al., 2008). Community involvement could greatly boost the income of farm households (Nkonya et al., 2008). Sustainable and inclusive forest management could boost rural sources of livelihood, decrease poverty-level farm household income, enhance farm household quality of life, and preserve social stability. The growth rate of an economy decreases as the percentage of the poor increases. Community forestry, though, can help because it can offer farm households multiple sources of income. However, as McDermott (2009) pointed out that community forestry must be profit-oriented in order to be able to reduce poverty.

4.3.2 Impacts of demographic factors

Regarding impacts of demographic factors on the income, the results were varied in different models and corresponding to different type of incomes. Household size had significant impacts on total income and forest income, but not on farm income and off-farm income. The former results were intutitve for a larger household could have more labor in generateing income. The later results might be determined by farm households' limited labor resources allocated to farm and off-farm work.

The age of head of household had a significant impact on farm income. This has been observed in many existing literatures. For those elder head of household, they were more

willing to be engaged in farm work. This might be caused by a demand of adult labor in community forestry management and off-farm work, the elder head of household could not have more opportunities in these two types of work, and then could not not have greater forest income and off-farm income.

A significant counter-intutive finding was that the education level of the head of the household did not have significant impacts on any type of income in all models. Usually, it was widely believe that the education could play positive impact on rural income enhance by improving their capability in managing nature resources. A possible reason might a general poor education service in the study areas, which made the heterogenous impacts different level of education could not be well stated. Another possible reason might be the fundamental education, including of primary education, and secondary education, had little impacts for farm household to improve their human assets in practice.

The impact of gender of head of farm household was not significant in all models. This indicated the previous inequality of resource allocation, management and related revenue generation and sharing in the study areas had been removed. This also indicated a great improvement of resolution of gender related issues in the study areas.

4.3.3 Impacts of land endowment

Regarding the impacts of land endowment, the results were diversified. The farmland area had significant impacts on total income, farm income, and off-farm income. The forestland had impacts on total income, and farm income. This forestland should, but not, have impacts on forest income. This might be determined by the complex composition of forest income. According to the field survey, the local farm household could collect non-timber forest products both from the forestlands obtained by themselves, and from the forestlands obtained by the communities. To this sense, a decomposition of forest income is needed in further study for a better and more accurate understanding of the impact of this term.

This study divided the study area's community forest management households into four groups: (1) those that heavily relied on forests but were more likely to turn to agriculture to escape poverty; (2) those that used nearby forests as income sources; (3) those that used trees on their own land; and (4) those that processed and traded non-timber forest products. This implies that before community forestry could be used as a channel to raise farm households' income and alleviate poverty, it is needed to obtain a sound understanding on farm households’ plan of forestland utiliation. Furthermore, the results implies that there is little impact on household income in these locations from community forest management. This was primarily caused by the measurement of forest income was not clearly differed to non-timber forest products. Community forestry offers an excellent alternative for disadvantaged farming communities and families to escape poverty and diversify their sources of income.

Similar to this, a research found that farm households' livelihoods depend on a variety

of livelihood choices in areas with underdeveloped local economies. In addition to their primary sources of revenue from producing crops and timber, and breeding animals , they may also rely on the adjacent forests for their subsistence (Mutune et al., 2015). It's also possible that among the various varied livelihood methods, forest farm will inevitably replace other sources of household income due to disparities in farm households' engagement in community forestry.

4.3.4 Impacts of policy and institutional factors

This study indicated impacts of different type of policy and institional factors on income of farm household. Notedly, policy and institional factors had significant impacts on forest income, and then on total income. The insignifant impacts of policy and institional factors on farm income and off-farm income might be determined by the measurement of these factors concerning forest management, and community forestry development, rather than agricultural development and off-farm work opportunities.

The subsidy and training had been testified to have significant and positive impacts on forest income. The two policy instruments also received high attentions in community forestry program. This also implied the two pocliy instruments should been set in priority in further development of community forestry. More details of the subsidy and training need to be investigated in further study for a better application of them into future program design and implementation. However, a weakness of the application of the subsidy in this study should be highlighted. The subsidy could be some amount of fund flowing directly into forest income, which made the causal relationship explored in this study be lack of theoretic significance.

The impacts of policy on income seemed to be counter-intuitive in this study. Usually, it was believed that those who had better understating of policy should be beneficial more from the policy. A possible reason could be that the community forestry program being implemented in the study areas were well known by most farm households. This made this study be difficult to identify the function of the policy. To this sense, the measurement of policy impacts in this study is needed to be improved to isolate its connection with the existing community forestry program.

5. CONCLUSION AND RECOMMENDATION

5.1 Conclusion

In conclusion, this study is conducted to reveal the impacts of community forestry on rural farm households' income in Thailand based on a case analysis in six communities in Bueng Kan Province, located in the upper northeast of Thailand. The statistical descriptive and regression analyses are jointly applied in this study based on the first hand and secondary hand data collected during the study.

This study reveals the importance of community forestry in the study areas. The forest income, basically from farm households' involvement in community forestry, has become a major income source in the households' total income, which a significant excess than farm income, and off-farm income. A comparative analysis between those farm household within and without the community forestry also indicate that the former group benefits from the community forestry with a great total income, and forest income. However, this study has no intention to argue that the community forestry has been developed well enough and had played significant roles in poverty alleviation and reduction, for a lack of dataset before and after the implementation of the community forestry program in the study areas.

The income of farm household in the study areas are determined by they demographic characteristics, land endowment, and policy and institutional factors. These results are generated by application of multiple OLS regression models. The community forestry has significant and positive impacts on total income, forest income, and farm income, when the influences of policy and intuitional factors are isolated. This reveals the measurement of policy and intuitional factors in this study needs to be improved to reduce the existing modest and somewhat high correlationships between the community forestry participation and policy and intuitional factors.

The impacts of demographic factors of the farm household on their income are varied in different models and to different type of income. House size is found to have significant impact on forest income and then total income. Age of the head of farm household only has impact on farm income. The impact of gender of the head of farm household is not significant in all case. The impact of educational level of the head of farm household is not significant in all cases. These finding indicates a particular situation when focusing on the community forestry in Thailand.

The impacts of land endowment are diversified. The farmland area had significant impacts on total income, farm income, and off-farm income. The forestland had impacts on total income, and farm income. The further concern should be levied on a better measurement of community forestry related activities and their income.

The impacts of policy and institutional factors are basically intuitive and feasible except the impact of knowledge of the policy. This counter-intuitive results need to be investigated in further study, based on the idea pointed by this study to define and measure

the policy factor in a better way.

5.2 Policy Implications and Recommendations

This study, based on above mentioned findings, clearly indicates the importance of community forestry on income enhance in rural area of Thailand. To this sense, this study firstly suggests the government accelerates the development of community forestry in nationwide. Notedly, there have been many community forestry programs being implemented right now Thailand. However, these programs are dominated by forestry authorities without fully support from other authority departments, such as, agricultural and rural development departments. A joint effort from multiple departments surely will provide more strong venture for more successful contribution of community forestry to income enhancement and rural development.

Secondly, this study suggests a better plan of land held by the farm households in the area of community forestry program being implemented. The forestland held by the farm households need to be better allocated for a more significant economic efficiency. The inadequately positive impact of lands is not well investigated in this study. In case that the adult labors in the households are limited, the lands, including of farmlands and forestlands, will not be efficiently used if the households are lack of enough labors. To this sense, the community forest program could be designed or developed in a better by incorporating the land endowment in the specific sites, which can facilitate an effective and efficient combination of lands, labors and other production factors.

Thirdly, this study suggests a continuous adoption of policy and institutional of training and subsides. Regarding prevailing poor education level, and inadequate impacts of the primary and secondary education on the impacts, the training becomes a necessary tool for farm household to improve their capacity in forest management and relevant income generation. Compared to training, the subsidy is needed as well in a near future. However, this study does not suggest to conduct a flexible subsidy policy, which should be always used to benefit the poorest and weakest group. This study also supports the subsidy flowing into the capable farm households if they can make significant roles in favor of the poorest and weakest groups.

5.3 Limitations and Recommendations for Future Research

The author has very clear understanding on the limitation of this study. Due to the negative impact of COVID-19 pandemic, the author had to participate in online courses learning in Thailand. The poor network service, inadequate communication and discussion with the course teachers, challenged the author to form a solid theoretic knowledge system, and master the econometric regression method well. More informative and convincing evidences should have, but not, been provided in this thesis also due to the inconvenient field survey caused by the pandemic. The thesis should have offered more details of community forestry and rural livelihood in Thailand.

Even though, the author believe that this study still has some merits. Besides the possible theoretic and practical significance, this study provides some interesting cues for future studies. Firstly, a better definition and measurement of policy and institutional factors will generate more practically meaningful findings for enlargement of impacts of community forestry on enhancing income. Secondly, a long-term study on the community forestry in more sites is needed to reveal the temporal and spatial impacts of the community forestry on the income. This will generate more stable results as reference for developing community forestry.

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APPENDIX
Questionnaire

Socio-economic Information of the Head of Household

please tick ✓ appropriate in the box provided below and fill in the blank spaces where necessary.

1. Gender ( ) Male ( ) Female
2. Age: ……..
3. Status ( ) Single ( ) Married
   ( ) Divorce ( ) Widowed
4. Household members: …….
5. Education
   ( ) No educational background
   ( ) Primary School
   ( ) Secondary school certificate
   ( ) Diploma Certificate
   ( ) Others please write ……..

Household Economy & Livelihood

Sources of income

(a.) Total annual household income_____USD
(b.) Farmland area_____ha
(c.) Names of field crops_____,_____,_____
(d.) Total income from farm_____ USD
(e.) Forest land area_____ha
(f.) Forestry products_____,_____,_____
(g.) Total income from forestry_____USD
(h.) Breed species_____,_____,_____
(i.) Total income from non- timber product_____USD
(j.) Other income (Wage, Salary) _____USD

Capital and property

Type of housing:

☐Brick and tile structure ☐Bamboo and wood structure ☐Adobe structure

☐Others，please specify_____

Housing Area_____square meters

Household appliances and facilities_____

Production equipment and facilities_____

Infrastructure Availability

Access to Drinking water: ☐Yes ☐No

If "Yes", please indicate the type of drinking water for daily use

☐Public tap-water ☐Well water ☐Spring water

☐Others：please specify_____

Is this household electrified? ☐Yes ☐No

Access to broadcast (television) signal: ☐Yes ☐No

Access to telephone (cellphone) signal: ☐Yes ☐No

Broadband internet access : ☐Yes ☐No

Living expenses include:

Expenditure on food and drinks_____USD

Expenditure on education_____USD

Expenditure on Health services_____USD

6. Does the implementation of community forestry improved rural livelihood?

☐Yes ☐No

7. Which period does the rural livelihood be better off?

Before Community Forestry 1975 [ ] After Community Forestry 2015 [ ]

8. What kind of farming tools do you use on your farm?

Modern Tools [ ] Traditional Tools [ ]

9. States other farming equipment you have.

10. Do you live near a community forestry site? ☐Yes ☐No

11. Do the access to market from your forest site close or not? ☐Yes ☐No

12. Did your family receive any subsidy support from the government or any other agency in promoting community forestry management? ☐Yes ☐No

If "Yes", please include the main sources of poverty subsidy?

① Government Poverty Funding

② Charity Organization or Social Donations

③ Relatives and Friends

④ Others, please specify_____

13. Have you participated in community forestry management program? ☐Yes ☐No

14. Have you participated in forestry knowledge/skills training that can help in sustainable or rural forest resource management? ☐Yes ☐No

15. Your overall assessment of community forestry management program?

☐Dissatisfied ☐Not very satisfied ☐Somehow satisfied ☐Quite satisfied ☐Very satisfied

16. Is there any policy on the management of the community forestry in this area?

☐ Yes ☐ No

17. How effective is the policy?

☐ Highly effective ☐ Effective ☐ Ineffective

18. If there is a community forestry project, what are your hopes or suggestions?

……

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