The Promotion of Climate-Smart Villages to Support Community-Based Adaptation Programming in Myanmar

Results of a Rapid Scoping Study

Working Paper No. 213

CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

Wilson John Barbon, Rene Vidallo, and Julian Gonsalves

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Abstract

This report presents the highlights of a scoping study conducted by the International Institute of Rural Reconstruction (IIRR) in Myanmar. The study was funded by CCAFS in support of a plan to test and develop climate-smart villages in Myanmar. In 2015, through the initiative of CCAFS and after consultations with various agencies, the Myanmar Ministry of Agriculture and Irrigation adopted the Myanmar Climate-Smart Agriculture Strategy (MCSAS). This document lays out climate change impacts to agriculture in the country in broad terms, as well as the vision and goals of making agriculture in Myanmar climate-smart.

The overall purpose of the rapid scoping study in Myanmar was to develop an effective design and pathway for the promotion of climate-smart agriculture, climate-smart villages and community-based adaptation (CSA/CSV/CBA) in addressing the increasing vulnerabilities of Myanmar smallholder agriculture. This rapid study is one step in implementing support programs for the 2015 Myanmar Climate-Smart Agriculture Strategy, which CCAFS has supported.

The study used the participatory rural appraisal (PRA) approach and tools to gather information from target groups. The team employed focus group discussions (FGDs) to elicit information about each of the four proposed CSV sites. All activities were facilitated by local NGO partners. A total of 93 individuals were engaged in the FGDs and key informant interviews (KIIs). During the mission, the team also visited and interacted with three local research stations engaged in crop varietal trials and production of quality seeds.

The nature of risks and vulnerabilities differ considerably from area to area, reinforcing the need for CSVs to adopt a location-specific strategy. Location-specific strategies, which feature community-based approaches, are more likely to deliver on the development outcomes that CCAFS has prioritized. Also, and probably more importantly, such CSVs ─ if implemented by local governments and civil society partners (NGOs) ─ are like to offer better prospects of being sustained and being mainstreamed by the national agencies, primarily the Department of Agricultural Research (DAR) and the Department of Agriculture (DOA).

CSVs in Myanmar should be considered focal points for incubating, testing, refining, and improving socio-technical processes for local adaptation. These interventions recognize the context-specific nature of current and anticipated climate change manifestations. CSVs generate locally-relevant, culturally–relevant, ecosystem-based adaptation options. CSVs are also focal points for generating the site-specific evidence of scalable CSA options, and such CSVs will be the basis for generating case studies, impact stories, and advocacy materials. CSVs are expected to serve as models for R&D agencies seeking ways to support local adaptation programs as part of the commitment under the Myanmar NAPA. This involves generation of cost effective and scalable models for fostering CSA adaptation, and adoption on a scale that makes a notable difference to peoples' lives and livelihoods.

IIRR recommends that the CSV process must be built on an existing local network of NGOs already implementing programs at the locations identified as potential CSV sites. This is to ensure continuity and follow-up on a regular basis by local front line workers.

The scoping mission team is convinced that the development community and the national research agencies are, as a whole, very enthusiastic and interested in exploring and testing the CSV approach for the promotion of CSA in the country. Opportunities for partnerships between local research stations, local NGOs, and local government (for instance the Department of Agriculture) provide a framework which might (in the long run) be a very sustainable and cost-effective approach to deriving location-specific solutions for national governments.

Ways to address the local impacts of climate change while promoting adaptive capacities (to deal with future climate risk) must be demonstrated via a network of action research efforts on the ground, where evidence is established, and out-scaled impacts are brought to the attention of planners and other decision makers.

About the author

Wilson John Barbon

Wilson is currently the Country Program Coordinator for Myanmar tasked to take leadership in setting up and establishing the IIRR presence in Myanmar. He started program development work in Myanmar in 2014, organizing and coordinating various events for IIRR in the country. He leads a small team of local Myanmar staff who are implementing IIRR's field programs in the country including school gardens for nutrition and climate-smart villages to scale out community-based adaptation.

As a concurrent position, he is also the Program Manager for Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) at the institute's Regional Center for Asia. He provides technical guidance and assistance to IIRR's country programs in the Philippines and Cambodia in the area of DRR and CCA.

For the past 3 years, he has been managing a regional 6-country program on NGO disaster preparedness in Asia in partnership with Give2Asia. Prior to IIRR, he worked for various Philippine NGOs in Mindanao and the Visayas. He has a background in Biology and Upland Natural Resources Management.

Rene Vidallo

Rene is the IIRR Philippine Program Director. He previously held posts in the Institute as RCA Program Specialist for Agriculture and Natural Resource Management and later as Program Manager for Food Security and Sustainable Livelihood. Aside from providing guidance and assistance to Philippine staff in program development, he also provides technical assistance to Cambodia and Myanmar staff on climate-smart agriculture programming.

He has worked for NGOs for most of his career as a development professional. He is a licensed Forester.

Julian Gonsalves

Julian is currently the Senior Advisor for Asia at the International Institute of Rural Reconstruction (IIRR) where he previously worked for 16 years, retiring as its Vice President (Program) in 2000. He is also a Technical Advisor for FoodSTART+ project of CIP. He also served as Senior Advisor at CIP-UPWARD. Julian Gonsalves served on the NGO committee of the CGIAR from 1997 to 2000.

He has undertaken several assignments with international and national agriculture research institutions as well as with national and international NGOs. He has undertaken missions with a number of CGIAR institutions including IRRI, IWMI, IFPRI, WFS, CIMMYT, CIP, CPWF, and ICRAF (now World Agroforestry Center). Until recently, he served on the Scientific Advisory Committee of the Canadian Food Security Research Fund (CIDA/IDRC). In recent years, he has devoted his time in doing scoping studies, program review, reformulation and evaluation missions on behalf of donors, international and regional organizations.

He has a PhD in Extension Education and International Agricultural and Rural Development from Cornell University. He also has a Master's Degree in Communication (knowledge utilization program) from Michigan State University, and a Bachelor's Degree in Agronomy from the University of Agricultural Sciences (Bangalore) India.

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The scoping team would like to acknowledge the support and important roles of the local non-government organizations in Myanmar who made it possible for the team to conduct field activities and meetings with key stakeholders. These partners are: Community Development Association in the Central Dry Zone in Mandalay region, Karuna Mission Social Solidarity, and International Rescue Committee in the hilly villages of southern Chin state**,** Kalyanna Mitta in the upland communities of Shan state, and Radanar Ayar Rural Development Association in the Ayeyarwaddy region of the Myanmar delta. Special thanks are also given to Yezin Agricultural University (YAU) led by the university rector to meet the team during the mission. YAU also made it possible for the team to meet key researchers at DAR in Naypyidaw, Myanmar. Finally, the scoping team acknowledges that without the support of CCAFS-Asia led by Dr. Leocadio Sebastian, this scoping mission and working paper will not be realized.

Contents

Acronyms

ADB	Asian Development Bank
CBA	community-based adaptation
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CDA	Community Development Association
CSA	climate-smart agriculture
CSV	climate-smart village
DAR	Department of Agricultural Research
DOA	Department of Agriculture
FAO	Food and Agriculture Organization
FGD	focus group discussion
GDP	gross domestic product
GOUM	Government of the Union of Myanmar
ha	hectare
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFAD	International Fund for Agricultural Development
IIRR	International Institute of Rural Reconstruction
INGO	International Non-Governmental Organization
IRC	International Rescue Committee
KII	key informant interview
KMF	Kalyanna Mitta Foundation
KMSS	Karuna Mission Social Solidarity
MASL	meters above sea level
MCSAS	Myanmar Climate Smart Agriculture Strategy
mm	millimeter
NAPA	National Adaptation Plan
NARC	National Agricultural Research Centers
NGO	non-governmental organization
PRA	Participatory Rural Appraisal
PVA	participatory varietal assessment
R&D	research and development
t	ton
UN	United Nations
UNDP	United Nations Development Programme
VFVL	vacant fallow and virgin lands

WASH	water, sanitation and hygiene
WB-WDI	World Bank-World Development Indicators
YAU	Yezin Agricultural University

I. Background information

This report presents the highlights of the scoping study conducted by the International Institute of Rural Reconstruction (IIRR) in Myanmar. The study was funded by CCAFS in support of a plan to test and develop climate-smart villages (CSVs) in Myanmar. In 2015, CCFAS supported the formulation of the Myanmar Climate-Smart Agriculture Strategy. CSVs play an important role in the scaling up and out of climate-smart agriculture. CSVs act as hubs for climate-smart agriculture practices as well as demonstration of location/context-specific adaptation measures. The scoping mission explored the potential role of CSVs for selected agro-ecological sites Myanmar.

IIRR is a CCAFS strategic NGO partner. IIRR is currently implementing the CSV approach in the Philippines. IIRR's CSVs in the Philippines are now part of the network of CSVs in 17 regions in the Philippines. IIRR also has ongoing program development in Myanmar with the aim of establishing a presence in the country. Through this scoping study and the projects scheduled to follow, IIRR aims to bring its successful experience in CSV work to Myanmar.

Myanmar is the second largest country in Southeast Asia bordering Bangladesh, Thailand, China, India, and Laos. It has rich natural resources – arable land, forestry, minerals, natural gas, freshwater and marine resources, and is a leading source of gems and jade. A third of the country's total perimeter of 1,930 km (1,200 mi) is coastline that faces the Bay of Bengal and the Andaman Sea. The country's population is estimated to be at 60 million.

In addition to its long coastline, Myanmar has a variety of geographical features. The Irrawaddy River flows through the middle of the country and develops into a large delta area at its mouth with important floodplains. This river system plays an important role in the country's agriculture with most of the agricultural land and population found along the river basin. The country also has mountains, high valleys, and plateaus that include the Shan Plateau. Myanmar also includes a huge number of upland areas. At least 4 states - Chin, Sagaing, Kachin,and Shan - are largely upland areas.

Myanmar has a tropical climate. The dry season runs from October to May and the wet season from May/June to early October, when the southwest monsoon starts. Temperatures in the country vary between 17 and 40 C. It is relatively cooler in the mountainous areas. As for rainfall, the upper region of country receives an average of 890 mm, the lower region about 5,080 mm. Most of the rainfall is received between May and October especially during the southwest monsoon.

II. An overview: Agriculture in Myanmar[1]

Agriculture is important to the economy of Myanmar, accounting for 36% of its economic output (UNDP 2011a), a majority of the country's employment (ADB 2011b), and 25%–30% of exports by value (WB–WDI 2012). With abundant land, water, and cheap labor, agriculture is a major driver of the Myanmar economy. However, only about 18% of the country's total land area of 68

[1]Asian Development Bank: Myanmar in transition: Opportunities and Challenges. Mandaluyong City, Philippines: Asian Development Bank, 2012.

million hectares is used for crop production and only 18.5% of this is irrigated. This leaves significant room for expansion in this sector.

Between 1990 and 2010, the areas planted with rice, beans, sesame seed, and vegetables have all expanded and output has increased considerably. Rice cultivation area nearly doubled and production almost tripled, showing the impact of both the expansion of cropped area and enhanced yields. Despite many challenges in this sector, agricultural production continues to rise. For instance, despite irrigation limitations, rice farms in Myanmar currently produce about 4.1 t/ha of unmilled rice, higher than the 3.4 t/ha in 2000 and not very distant from Viet Nam's 5.3t/ha, which is achieved with better agricultural support.

Livestock production for a long time contributed about 7.5% of the country's GDP. The livestock commonly raised include cattle, buffaloes, pigs, and poultry. Almost every rural household raises livestock and it contributes substantially to household nutrition and farm economy by providing protein (meat, eggs, and milk); farm working animals; and by-products (hides and leather). Raising livestock contributes to household income and comprises a sizable portion of household capital. Almost all livestock is raised using backyard methods, although some commercial production does occur near major cities.

Climate change is an established phenomenon in Myanmar, evidence shows an increasing temperature over time. Based on the country's experience, adverse impacts of climate change areincreasing incidence of drought, flooding due to heavy rains, stronger cyclones, and salinization of farms in the delta region. As an agricultural country with a large percentage of smallholder farmers, Myanmar's food security, nutrition, and livelihoods are bound to be greatly affected by the threat of climate change.

While agriculture contributes to the climate change problem, as it is one of the key sectors contributing to greenhouse gas emissions (GHG), it is also part of the solution, offering many opportunities for mitigating GHG emissions. Climate-smart agriculture (CSA) is one way to achieve short and long term agriculture development priorities in the face of climate change. CSA is anchored on three pillars: food security through agricultural productivity, adaptation by managing responses to climate variability, and mitigation by reducing GHG emissions from agricultural activities.

III. Myanmar climate-smart agriculture strategy

While CSA is a recent development buzzword, it is not entirely new in practice. Many CSA principles are founded on existing sustainable agricultural practices. CSA can sometimes be simply understood as environment-friendly and sustainable agriculture that takes climate variability and climate change factors into consideration. Its objectives are to increase agricultural productivity and income in a sustainable, environmentally sound manner; build the capacity of small farming households and food systems to adapt to climate change; and reduce agriculture's GHG emissions while increasing its carbon sequestration potential.

In 2015, the Ministry of Agriculture and Irrigation adopted the Myanmar Climate-Smart Agriculture Strategy (MCSAS). This was developed as part of a CCAFS initiative and involved consultation with various agencies. The strategy document laid out climate change impacts to

agriculture in the country in broad terms as well as the vision and goals of making agriculture in Myanmar climate smart. The MCSAS serves as the foundation for the formulation of national policies that will govern agricultural development in the country within the climate change reality. The strategies in MCSAS are presented in terms of short-term strategies, medium-term strategies, and long –term strategies.

In Myanmar's drylands, where agricultural production is dominated by pulses, for example, a lot of farmers' traditional practices can already by classified as climate smart. Among such climate-smart practices are:

1. inter-cropping pigeon pea – mungbean – ground nut;
2. Optimizing crop residues as forage for livestock;
3. border planting of economically important perennials such as palms;
4. construction of small water impoundment ponds to irrigate farms;
5. utilization of perennial vegetation for forage; and
6. backyard gardening of drought resistant crops.

Such practices have been developed over time as farmers' traditional response to local farming challenges and climate variabilities in the dryland zone. However, there is still much room for improvement, especially considering the increasing unpredictability of climate variabilities. These necessitate that farmers continue to hasten the adaptation process (e.g. soil and nutrient management practices to regenerate soil, rainwater management, micro-dosing, microclimate manipulation, and seasonal planning using climate-based advisories). Moreover, farmer adaptation must be achieved at scale to efficiently utilize the limited public and private investments for CSA. To achieve this, a solid evidence base for CSA and community-based adaptation has to be established (with platforms for famer-based learnings), with select communities serving as lighthouses for more farming communities.

In addition to farmers already making incremental adaptations, there are a number of agencies in the country seeking to support and promote farmer adaptation processes. Many of these are international NGOs working with local NGOs. The growth of NGOs in the country has been facilitated by the relief and recovery work in the aftermath of cyclone Nargis in 2008. For that reason, many of the organizations began with a focus on disaster relief and recovery programming, but are now moving towards programming for long term development including the promotion of resilient livelihoods and climate-smart agriculture.

At this stage of transition in programming, it is important to adopt a more holistic and integrated approach to CSA, including themes such as disaster risk reduction, preparedness, livelihoods (including value chain work), and social protection.

The CGIAR network of research centers has sent scoping missions to Myanmar in the past year to explore engagement modalities in Myanmar. With CCAFS leading the effort to advocate for climate-smart agriculture (this included support for the preparation of a CSA strategy for Myanmar), it is expected that more attention will be given to climate-smart agriculture by planners, policy makers, the research community, and civil society players.

IV. Rapid scoping study: Approach and methodology

1. Overall Approach

The overall purpose of this rapid scoping study in Myanmar is to develop an effective design and pathway for the promotion of climate-smart agriculture, climate-smart villages, and community-based adaptation as an approach for addressing the increasing vulnerability of Myanmar smallholder agriculture. This study is one step towards implementing support programs for the 2015 Myanmar Climate Smart Agriculture Strategy, which CCAFS has supported.

Specifically, the 10-day scoping study had the following objectives:

1. Assess social, technological, and institutional landscapes with a view to the establishment of CSVs in four to five agroecosystems (upland, central drylands, and delta); and
2. Identify opportunities for the wider promotion of community-based adaptation (CBA) in Myanmar by reviewing current CSA practices and associated ongoing community level CBA programs in different agroecological/cultural environments in Myanmar.

Given the time limitation, IIRR deployed a 5-person team to conduct village-level focus group discussions and direct village observations, conduct on-farm interviews with farmers, and conduct interviews with government officials and research staff. The members of the team were:

1. Dr. Julian Gonsalves— IIRR Senior Adviser
2. Mr. Rene Vidallo— IIRR Philippines Program Director
3. Mr. Wilson John Barbon— IIRR Country Program Coordinator for Myanmar
4. Mr. Martin Van BawiLian— IIRR Country Program Officer for Myanmar
5. Ms. Van Sui Mawi — Contracted Translator and Research Assistant

2. Methodology

The study relied on participatory rural appraisal (PRA) methods and the IIRR team undertook the following activities:

1. Focus group discussions (FGDs) with farming communities; wherever possible, rapid participatory vulnerability assessments, and identification of community adaptation opportunities;
2. Key informant interviews (KII) with local agriculture stakeholders (local government officials, NGOs, businesses, local research stations/academe);
3. Consultation meeting in Naypyidaw to gather relevant stakeholders from civil society and government agencies; and
4. Report writing which included profiling of major agricultural livelihood and community-based adaptation opportunities, identifying opportunities for CSA at prospective CSV sites, and providing guidance for the promotion of CSVs in Myanmar.

The team employed FGDs to gather information about each of the four proposed target CSVs. In one village, a KII was conducted, whilean FGD was done in a location outside the village. All activities were facilitated by local NGO partners. A total of 93 individuals were engaged in the FGDs and KII. With the exception of the site in Chin State, most of the participants were male

(the research team was told that the women were busy harvesting crops). The villages visited were:

1. HteePhu Village in Nyaung U township, Mandalay State. FGD with 26 participants (all male);
2. MakyaukAia village, Kampetlet Township, Chin State. FGD with 34 participants (mostly female);
3. KyautNgat village, NyaungShwe township, Shan State. FGD with 16 youth leaders, KII with 8 participants (youth group); and
4. Ma Sein village, in Ayeyarwaddy region. FGD with 10 participants (mostly male).

The FGDs followed a generic question and answer process to gather information on the history and socio-economic profile of the village; the local crop production profile; seasonality issues and experiences with extreme climatic events; and experience with agricultural extension and services. Information gathered during the FGDs was cross-checked and validated during the field site visits. The team also visited farms within and nearby the villages to further understand the farmers' cropping systems and to observe notable climate-smart practices. Additionally, visits were made to government officers and research stations (3 research stations) to get additional onsite and relevant research information.

The itinerary of the study team, including information on the villages and organizations that the team met and engaged with during the mission, is attached in the appendix.

3. Implementation Partners

IIRR engaged the following local NGOs who were being considered as potential implementing partners in setting up CSVs in Myanmar:

Community Development Association (CDA)
CDA is a registered non-profit, non-political, local non-government organization established and based in Myanmar. It was incorporated under the laws of Myanmar in 1998 to implement community development interventions. It is registered as a local NGO in Myanmar. For several years, CDA has worked with partnerships for the effective delivery of support services and technical assistance to Myanmar's poorest communities. As part of its portfolio of partnerships, CDA has worked with various UN Agencies and INGOs since the response and reconstruction after Cyclone Nargis.

Since then it has evolved programs in nutrition, food security, education, and WASH and disaster risk reduction. CDA is currently implementing a livestock program under UNDP's climate change adaptation program in Myanmar. This project will run for 3 years in 70 villages in Nyaung-Oo, Mandalay region. CDA organized the FGD and the visit to the village in Nyaung-U.

Karuna Mission Social Solidarity/International Rescue Committee
These are two separate organizations that work together to implement programs in Kanpetlet township in southern Chin state. Karuna Mission Social Solidarity (KMSS) is a local NGO that undertakes social development activities in 16 dioceses in Myanmar. It works in cooperation with faith leaders, local authorities, ethnic groups, and community leaders at different levels. The main role of Karuna Myanmar is to coordinate with donors and diocesan Karuna offices through local

churches and to help diocesan Karunas in enhancing the capacity of the local people. Their activities include uplifting the overall living standard of the poor and the marginalized, regardless of creed and ethnicity. This is achieved through facilitating awareness training workshops, strengthening formal and informal education, fortifying health, and improving agricultural and livelihood opportunities. KMSS has five focal areas of intervention in Education, Health, Livelihoods, Social Protection, DRR, and Emergency.

The International Rescue Committee (IRC) in Myanmar seeks to help people whose lives and livelihoods are shattered by conflict and disaster to recover and gain control of their futures. IRC began work in Myanmar in 2008, providing humanitarian relief in response to Cyclone Nargis. Since then, the IRC has become a valued partner of both government and local aid organizations. As the country struggles to recover from ongoing conflict and natural disasters, IRC focuses its work in some of the most remote areas of the country, including Rakhine, Chin, and Shan states. IRC is supporting KMSS in implementing the development of local health systems in Kanpetlet township, southern part of Chin state. KMSS and IRC assisted in organizing the village visit and FGD in the hilly part of Kanpetlet.

Kalyanna Mitta Foundation (KMF)
KMF is a registered NGO in Myanmar, and runs programs for and by the youth. KMF's mission is to support young people to facilitate and co-create a sustainable future in Myanmar. Kalyana Mitta is a pali word meaning 'good friends'. KMF is grounded in a socially-engaged Buddhist perspective that encourages compassion, understanding, and solidarity among the diversity of ethnic and religious identities in Myanmar. This perspective is also underscored by an understanding that such values provide a strong foundation for sustainable social change. KMF has been active in organizing young farmers across the country to educate the next generation about the importance of sustainable development, natural resource management, and more recently in building resilience in agriculture. KMF arranged the FGD and village visit in central Shan state where they are working in the Inle Lake watershed area.

RadanarAyar Rural Development Association
In the aftermath of Nargis, a group of people established RadanarAyar using their own resources to help affected farmers in the cyclone-devastated areas. The founders included rice millers and rice traders who are also private philanthropists. RadanarAyar Association was first founded as a sister-organization of the Myanmar Rice Industry Association. It subsequently registered as a not-for-profit, non-religious, non-political, and non-partisan organization in 2010. RadanarAyar's approach to food security is centered on increasing the availability of food through improved production and trade, while also increasing the poor's ability to access food. RadanarAyar is based in Bogale, Ayeyarwaddy region. They have been partners with IRRI and LIFT in implementing agricultural research projects, seed production, and value chain development. RadanarAyar organized the FGD and visit to a village in the Bogale-Pyapon boundary.

4. Visit and Interaction with Local Agricultural Research Stations

During this mission, the team visited and interacted with three local research stations engaged in crop varietal trials and the production of quality seeds:

1. Dry Zone Agricultural Research Farm, Nyaung-Oo
   This station is under the Oil Seed Crop and Food Legume Division of DAR. It was established in 1985. Its mandate includes the development of locally adapted high-yielding varieties, and the formulation of appropriate agronomic strategies relevant to the unique challenges of farmers in the dry zone. The mandated crops of this station are pigeon pea, green gram, groundnut, and sesame.

2. Taryaw Agricultural Research Farm for Lowland Rice, ShweNyaung, Taungyi Township
   This station works on crop testing for lowland paddy rice and soya. They are also mandated to produce and distribute seeds for the area.

3. Aungban Research Station for Corn, Upland Rice, Wheat and Soya, Aungban Township
   This station works on crop varietal trials and organic practices for corn, upland rice, and wheat. The station produces seeds and distributes them to farmers, and also develops and promotes improved agronomic practices such as crop rotation incorporating rice bean.

V. Key findings

1. Strategies for promoting agro-ecologically appropriate CSA

1.1 Given the priorities identified by the Government of the Union of Myanmar (GOUM), CSV platforms in the country should address broader issues of food security, nutrition, and livelihood enhancement. This should be done by addressing current needs and priorities, while also finding ways to build adaptive capacity to future climate change. Risk capacity enhancement of local communities and their local support institutions such as the Department of Agriculture, local district authorities, and local NGOs should also be supported to address future climate risks. This is about preparing for the future, while meeting current livelihood needs. The Myanmar National Adaptation plan (NAPA 2012) stresses that adaptation and mitigation needs must be considered along with other important priorities such as addressing poverty. A well-designed CSA program must therefore reduce vulnerability to climate risks while simultaneously addressing poverty; this should be achieved using multiple-benefit approaches.

1.2 With poverty rates hovering around 25 percent (30 to 40 percent in the Delta) and with pressing issues of landlessness and other forms of tenurial insecurity (such as the limited recognition of mountain/upland dwellers engaged in shifting cultivation and customary tenure), a CSA/CSV strategy should also have an inclusive development objective, with clearly defined pathways for reducing poverty amongst smallholder and tenant farmers, and also amongst landless laborers providing services in agriculture.

1.3 Myanmar's subsistence-based smallholder economy is in transition from subsistence to cash economy, with commercial agriculture receiving priority attention from government and the formal R&D sector. Customary land tenure systems are also in transition from communal and ancestral ownership to privately owned land and the increased recognition of user rights. However, shifting cultivation areas are not entitled to formal tenurial security, and these farmers run a risk of losing lands. Under the 2012 Vacant Fallow and Virgin Lands (VFVL) Management Law, only permanent farmland can be issued land use certificates. Another new piece of

legislation, the Farmland Act (2012) allows land to be legally bought and sold with land titles. The risk of dispossession has therefore increased for those engaged in shifting cultivation.

1.4 Land degradation was observed at all the sites visited by the scoping mission, but noted to be a significant concern especially in the dry zone and in the upland areas in central Shan. Land degradation manifestations such as low organic matter and declining fertility were frequently reported during the FGDs. In the dry zone the situation is particularly acute due to (near total) usage of organic crop residues for livestock feed. In the Delta, rice straw residues are frequently burnt especially in areas where dual rice crops are grown due to the short land preparation time between two rice crop cycles. Rebuilding degraded soils is an important element of a CSA strategy in Myanmar if the benefits from improved germplasm and other CSA technologies are to be maximized.

Fortunately, options can already be found: for example, crop rotation with rice bean is already being tested by the Aungban Research Station in Central Shan. Where legumes are grown after a main cereal crop such as in rain-fed rice areas and in the dry zone (discussed elsewhere in this report), fertility has been partly restored. Such good practices need to be retained, recognized, and promoted in local CSA programs. Addressing land degradation on farms and in surrounding landscapes requires that a bigger role be provided for on-farm forestry and agroforestry sectors. This could include the boundary-planting of leguminous trees on farm edges (as recommended by Nyaung-Oo Dry Land Research Station) and for green manuring with dual-purpose legumes (which also produce grain legumes for human use). Residue management and more effective preparation and storage of farmyard manure, combined with micro-dosing of chemical fertilizer, deserve further attention in efforts to address reported soil fertility declines. CSVs, which recognize the importance of a small-landscape approach (including micro watershed management), provide special opportunities for enhancing the ecosystem services by restoring degraded landscapes, conserving soil and water, and managing residues.

1.5 Diversification and intensification are key elements in a CSA strategy aimed at reducing vulnerabilities and risks resulting from climate change/natural disasters. This includes a need for more attention being paid to the role of trees and livestock in the dry zone and in the uplands, and increasing crop intensity (e.g. crop sequences, intercropping, crop rotation, etc). Inter-species, as well as intra-species diversification, can provide risk avoidance elements and better resilience on small farms. Numerous other examples were noted during the scoping mission in the different agro-ecological zones of the country and at the two research stations visited.

1.6 Malnutrition levels in Myanmar are remarkably high (stunting and underweight), and it is not surprising that the problem of malnutrition has recently being getting more attention (allied to, but sometimes considered as distinct from the health and agriculture sector). CSA provides opportunities (fruits, vegetables, small livestock, and legumes) for leveraging the nutrition contribution of agriculture. This should receive special attention in all proposed CSVs in Myanmar. Legumes provide this special opportunity for leveraging the nutrition contribution from farms in the rain-fed uplands, drylands, and mountains of Myanmar. There is already a rich tradition in Myanmar of intercropping and dry-season cropping of legumes (post-rice) in some parts of the delta. In the uplands and in the drylands, pigeon peas and peanuts are primary main season crops. These nutrition-friendly and climate-smart practices of legume intercropping/crop rotation, which can rarely be seen in other parts of Southeast Asia, can be further intensified and enriched using the CSA/CSV platforms. Research stations in Aungban and Nyaung-Oo have

undertaken farmer participatory research on legume crops, and have shortlisted promising crop varieties and have prepared seeds for distribution. Dryland horticulture and homestead gardens are promising major new areas for leveraging nutrition contributions through CSA interventions in Myanmar in both the drylands and the uplands.

1.7 There are other opportunities for multiple-benefit CSA approaches including the further intensification of livestock production among the landless (especially women) and marginal landholders. In the dryzone, livestock are already widely recognized as important assets, with most farmers owning large animals such as bulls for draft and transportation. The landless and the wealthy both invest in small livestock, especially goats including the well-known *Bagan* breed. In the delta villages visited by the scoping mission, large native pig breeds can be seen. These are raised by women and especially the landless. In the highlands, most of the meat consumed (chicken and pork) is raised within the community using low carbon footprint methods. In many cases, crops are grown partly to feed livestock (e.g. sorghum in the dry zone and corn in the highlands and uplands). Livestock is one of the more sustainable pathways for bringing households out of poverty in the agriculture sector, and such climate-smart agriculture practices must be preserved even as ways to improve livestock productivity should be explored.

1.8 Myanmar's different agro-ecological zones, including those visited by the scoping team, offer special opportunities for conserving agrobiodiversity by enhancing production levels while promoting and conserving simple practices, for example, feeding practice improvement, inclusion of leaf protein and high value fodder. In the few potential CSV sites visited by the team, there were already numerous examples of agrobiodiversity. In the highlands of Southern Chin visited by the team, corn, "Red Millet" or Finger millet, and White Millet (likely fox tail millet) and beans -including rice bean- are regularly grown and consumed. In the dryzone, two or three varieties of pigeon pea and peanut are intercropped with cowpea and other millets and sorghum. In the delta, the diversity is less associated with farms but more with homestead gardening. In the delta sites visited, there are nine varieties of rice for the saline, freshwater, and mixed zones in the delta region. In the upland areas, there is great diversity of upland rice, corn and oilseeds, and ginger among others. Many of these varieties are already stress tolerant and resistant to pests and diseases. Fortunately, some research efforts in the country feature local varietal selections in their list of recommended varieties. For example, the Aungban Research Station has identified 15 upland rice varieties for promotion, of which only one was bred by scientists. CSVs can also provide valuable platforms for conserving agrobiodiversity in schools and with the assistance of designated curator farmers. Even as new varieties are tested and introduced, the co-existence of local and improved varieties can be viewed as a risk aversion strategy. After all, genetic diversity and visibility is the basis for better resilience in a changing and less favorable climate. Climate-smart crops already exist in Myanmar, and they need to be conserved because of their relevance to both breeders and farmers.

1.9 Homestead gardens are a regular feature in all the agro-ecological zones visited by the team. Homesteads invariably include livestock such as large animals like cattle in the drylands, or pigs in the highlands or delta. Fruit trees (found in the drylands, uplands and mountains) and commercial crops like betel nut palms and coconut palms are found in the delta. The uplands are also rich in both large and small livestock. For the landless,especially in the delta, the homesteads provide significant off-season income sources (as through the sale of backyard vegetable crops and coconuts, etc.). The further improvement of homesteads through intensification and diversification, including livestock (as elaborated above) provide pathways for improving the

income, food and nutritional security of the poor, the landless or near landless, and female-headed households. The homestead practice can still be seen in most areas (unlike in parts of Southeast Asia where it is vanishing fast) and their role in the overall household food system can be further endorsed via CSA support programs.

2. Strategies for promoting CSA for different agro-ecological zones in Myanmar

2.1 For the purposes of this mission (given the limitations of time), **four** agro-ecological zones with distinct cropping systems were identified for exploration as potential sites for locating CSVs. These are the *central dry zone,* where rain-fed farming is practiced under low rainfall conditions of around 1,000 mm/year. These areas are not prone to flooding. They grow a single crop, depend on both livestock and dryland crops for their livelihood, and rely on off-season migration.

The team then looked at the township of Nyaung-Shwe located in the Inle Lake Watershed. This is an *upland area* in central Shan State. The village identified as a potential CSV is of moderate elevation. Formerly a forest, the area is now mostly occupied with farmers having tenurial rights that are fairly secure. This is an important agro-ecological zone because two thirds of Myanmar is in the uplands (spanning 5 regions in the country). At the village visited, farmers follow a traditional rotating fallow system with corn, upland rice, and opium as priority crops. A diversity of ethnic groups and languages can be found in this area.

Another proposed CSV site is located in the southern part of Chin State, and the team described it as being in a *highland sub-zone of the uplands.* This is still considered upland but because of the high elevation at 1,500 MASL it is being referred to as highland. The village being considered is part of Kanpetlet township at the foothills of Mt. Victoria, Myanmar's second highest mountain. The villages in Kanpetlet are hilly, mountainous regions where corn and millets predominate, followed by upland rice, legumes, and other crops associated with shifting cultivation systems (e.g. squash, oil seeds, and seasonal vegetables). Declining fertility and erosion of soils are problems on farms. However, forest cover is still intact despite shifting cultivation, and the team noted that this is due to low population pressures. Insecurity of tenure is a relatively new issue here (more than in other zones), although customary rights and regulations are still respected locally. (There is another section of the report which discusses implications for CSA). Food insecurity is most prevalent here due to poor markets and the near complete absence of agricultural services because of geographical isolation.

The fourth proposed agro-ecological zone for a CSV is the *delta region.* A potential CSV site was identified and is located in Bogale township. The delta areas are mostly floodplains with irrigation facilities and good soil fertility status. Multiple cropping is practiced (mostly rice based) though homestead areas are developed in a very intensive manner with crops of commercial relevance such as coconuts, betel nut palms, and pig production. The ease of accessing water for agriculture sets it apart from the other zones. However, issues of landlessness are also significant in this region with estimates ranging from 30 (in proposed CSV site) to 50 percent (in other parts of the delta).

2.2 CSVs and CSA strategies must recognize the differences across zones and states. No single strategy will work everywhere and tailoring to unique characteristics/considerations is

required. Ethnicity is a major consideration especially in the uplands/highlands and mountains. Cropping systems are unique to each agroecology and cultural food patterns/priorities. Elevations also differ considerably: from the flood prone delta to the mountainous Chin State (the proposed CSV is located at 1500 MASL). A range of climate risks were reported during the scoping mission: cold spells, drought, floods and rainfall variability, and extreme weather. Poverty levels also greatly differ, from 11.4 % in Kayah State to a high of 73 percent in Shan State. Soils in the visited sites in the dry zone had a pH of 6.3 to 6.5, while in the delta it was reported to be acidic at pH 5.5. The nature of risks and vulnerabilities thus differ considerably from area to area, again reinforcing the need for CSVs to adopt a location-specific strategy. Location-specific strategies which feature community-based approaches are more likely to deliver on the development outcomes which CCAFS has prioritized. Also and probably more importantly, such CSVs, if implemented by local governments and civil society partners (NGOs), are likely to offer better prospects for being sustained and being mainstreamed by the national agencies—Department of Agricultural Research (DAR) and the Department of Agriculture (DOA).

2.3 CSVs for Myanmar should be considered focal points for incubating, testing, refining, and improving socio-technical processes for local adaptation. These interventions recognize the context-specific nature of current and anticipated climate change manifestations. Additionally, CSV prepare for future climate risks by beginning to address current climate risks. They generate locally-relevant, culturally-relevant, ecosystem-based adaptation options. CSVs are also a focal point for generating the site-specific evidence-base of scalable CSA options and are the basis for generating case studies, impact stories, and advocacy materials.

Opportunities for collaboration also present themselves with the CSV model. One such is the possible involvement of Yezin Agricultural University (YAU) and their research staff following discussions undertaken with university officials during the mission.

Also, it should be noted that social and institutional dimensions will receive as much attention as the technical considerations. Social mobilization methods such as organizing learning groups, farmer to farmer extension, and local multiple-stakeholder platforms relevant to Myanmar should be tested to address the lack of regular government frontline worker presence/engagement in most rural areas (including in the proposed CSV sites). These social mobilization methods are also cost-effective in the long run for government.

Finally, and most importantly, special attention must be paid to meeting the expectation that CSVs serve as models for R&D agencies seeking ways to support local adaptation programs. This is part of the commitment under the Myanmar NAPA generation of cost-effective and scalable models for fostering CSA adoption on a scale that makes a notable difference to peoples' lives and livelihoods.

2.4 The model used by IIRR in the Philippines (under the CCAFS global CSV initiative) is considered relevant to Myanmar. During the scoping mission, IIRR made special presentations to key stakeholders in Myanmar's capital Naypyidaw to test the local response to these ideas for CSVs. The presentations made at YAU were attended by the Pro Rector and 3 key professors working on climate change. An introduction to the CSV approach was also provided in a briefing to the Rector of the university. Later, IIRR made a presentation to the two directors of DAR and a team of thirty other researchers. These were researchers from the Cereals and Industrial Crops divisions. In addition to these presentations, 15 copies of the CSV primer were provided to key

individuals. There is considerable interest in the CSV concept among members of the national research community and at YAU. The CSV model was presented as a methodological innovation for improving the relevance of adaptation options. It is an R&D tool, with outscaling and upscaling as complementary elements of CSV work. YAU is interested in the potential of the CSV approach and offered to assist CCAFs in case study research, economic analysis, and generating evidence. Plans are already underway for YAU to adapt three of the IIRR/CCAFs primers to the needs of Myanmar. These will be translated into Burmese with modifications and use of illustrations in their present form. This can be followed by a round of capacity development events in 2017/2018.

VI. Recommendations for establishing CSVs

The IIRR team suggests the following guidance in the implementation of CSVs in Myanmar:

1. *Actively engage local stakeholders in the process of establishing CSVs*. IIRR recommends that the process of establishing CSVs should build on a local network of local NGOs already implementing programs in the identified potential CSV sites. This is to ensure continuity and follow up on a regular basis by local front line workers. The program should also engage DA (at least at the township levels) and relevant research partners in each of the four proposed sites. YAU staff will be valuable as co-researchers to help document the CSV process, undertake cost-benefit, adoption, and scaling out impact studies at each site. Later in the process, say after a year of CSV work in the 4 identified sites, the program could then establish links to a second circle of CSVs to be managed by other NGOs, INGOs, NARCs or CGIAR institutions. These are entities with large pre-existing programs in country that might benefit from CSV ideas. For example, there are several INGOs implementing climate change adaptation programs as follow-up in disaster recovery and resilience programs after Cyclone Nargis in 2008. ACIAR is also actively supporting research programs in the country – working with ICRISAT for instance. FAO and IFAD are significant stakeholders in supporting and implementing agriculture-based livelihoods development and poverty reduction. There is a role for CSVs as platforms for deriving location-specific CSA and associated social learning processes for future outscaling by these other important players.

2. *Implement an iterative socio-technical process in each CSV identified.* At each CSV, the conduct of PVA studies and a mapping of potential CSA options (traditional or science-derived) needs to be undertaken. A program of action research can be developed for each CSV with emphasis on participatory processes to support community-based adaptation. The adoption and refinement of approaches will be supported by establishing a community innovation support fund (managed by local NGO) which will provide initial investment costs (based on a repayment model). For example, improved seeds or pigs and goats will be provided to the farmers and the landless on a repayment arrangement of 1:3 to serve as community seed and livestock bank. Each CSV would also feature a bigger role for the school as repository of agrobiodiversity collections to support farmer experimentation while also serving as a platform for school nutrition. Homestead agriculture will receive special attention (small livestock, semi-commercial vegetable cultivation, and small scale orchards and dryland horticulture). Fodder banks will also be established in each village to serve as sources of feed and fodder during drought periods. Fuel banks will be developed through dual purpose programs that help replenish degraded landscapes in and around the village. And of course, cereal and legume crop production would receive

attention because of their role for food security. These crops include millets, rice, corn, and grain legumes.

Mid-year and annual engagement of researchers including partners from the DOA and others will also be conducted to provide inputs to improve program quality of the CSV. This will be part of the regular monitoring and documentation activities of the CSV process. These partners will be organized into a CSA/CSV Advisory Team. Farmer to farmer extension models would be tested at each site. Learning materials and advocacy materials would be identified as well. On an annual basis, each site would be featured for a learning event and roundtable discussion; this method has been effectively used in the Philippines to influence government and other civil society stakeholders.

3. *Support for a 3-year program on CSV in Myanmar, implemented in 3 smaller phases.* IIRR proposes 3 major phases for CSV work in Myanmar. This can be supported in a single3-year project or can be broken down into smaller annual projects. These are the proposed phases of the 3-year program:

1. *Year One*: This year will be devoted to establishing the CSVs, the conduct of baseline and other studies, the formulation of a CSA/CBA plan and formalizing the role of YAU, DAR, and DOA as partners. Year one will also entail a range of small opening-wedge activities at the 4 proposed CSV sites. These activities will include PVS trials, homestead gardens, fodder and fuel banks, school agrobiodiversity heritage gardens, and a Community Innovation Support program to be managed by the local NGO partners.

2. *Year Two*: In year two, a more structured CSA plan of action will be developed aimed at wider community engagement in adoption of CSA options at scale (trees, improved cropping systems, livestock). Year two will also start to look at inter-CSV exposure visits to facilitate learning in the network. Farmer-centered extension systems will receive more attention in year two with the conduct of farmer innovation fairs on an annual basis, identification farmer experts and promoters, etc. The promotion of the CSV concept within the wider community would be initiated in the second half of year two. This includes promotion of the CSV to a second circle of stakeholders of INGOs, donors, and multi-lateral agencies (ADB, World Bank, UN agencies, etc) who would want to adopt the CSV process in their existing programs.

3. *Year Three:* The third year of the program will focus on more advocacy efforts to promote uptake by national agencies and civil society players. This will be made through the conduct of case studies and writing of policy papers targeted for decision makers in Myanmar. Year three will also see roundtable discussions and conferences that bring the academe and government together for an evidence-based and research-driven policy advocacy.

VII. Conclusion

The short scoping mission provided the team with considerable insights on the potential for CSVs as a platform for promoting community-based adaptation. This is primarily because of the teams' reliance on local NGOs that already had presence in the visited areas and had firsthand knowledge and databases on the communities visited.

Early arrangements were made by IIRR program officers based in Myanmar, so there were no major logistical hitches. The engagement in Myanmar over the past three years provided many opportunities for IIRR to establish an informal network of contacts including alumni from its international courses. These contacts came in handy and IIRR will continue to rely on these front liners in the future. The IIRR team conducted the study was also previously involved in the conduct of two roundtable discussions in October 2016 in Myanmar, and therefore had some familiarity with the issues in smallholder agriculture.

The research team visitedYAU and had the opportunity to visit the Rector and the climate change team at the university (who were involved in the preparation of the CSA strategy commissioned with CCAFS support). The visit provided a platform to discuss CSV principles and practices and their relevance for the country. Also, the same was done with over thirty researchers attending an in-house event at the DAR office in Yezin, Naypyidaw. At this event, a presentation was made and feedback sought from researchers including three Senior Directors of the different crop divisions.

The visit to three research stations provided opportunities for the team to confer informally with researchers. The CCAFS support in preparing the CSA strategy for Myanmar served as an important reference document throughout the period. However, the team recognized that this was a very short mission, and it has relied heavily on actual site visits and on information derived from community level interactions (during focus group discussions) and consultations with local NGOs. This provided special validity to a study that considered addressing issues related to community-based adaptation.

The scoping mission team is convinced that the development and the national research communities very enthusiastic and interested in exploring, developing, and testing the CSV approach for promotion of CSA in Myanmar. Opportunities for partnerships between local research stations and local NGOs and local government (for instance the Department of Agriculture) provide a framework which might (in the long run) be a very sustainable and cost effective approach to deriving location-specific solutions for national governments.

Ways to address the local impacts of climate change while promoting adaptive capacities (to deal with future climate risk) must be demonstrated via a network of action research efforts on the ground, where evidence is established and out scaled, and impacts are brought to the attention of planners and other decision makers.

Annex 1: Summary of Myanmar CSA strategy[2]

Agriculture contributes the lion's share of national revenue and plays a key role in reducing poverty in Myanmar. However, climate change has already had adverse effects on the industry and continues to add burdens to farmers. Late or early onset of the monsoon season, longer dry spells, erratic rainfall, increasing temperature, heavy rains, stronger typhoons, and flooding are common climate events that have been occurring more frequently in the recent decade. Deforestation, industrialization, and increased greenhouse gas (GHG) emissions are just some of the factors currently contributing to climate change in Myanmar. Agricultural practices also contribute GHGs to the atmosphere. Climate-smart agriculture (CSA) seeks to optimize the benefits and minimize the negative trade-offs across food security, agricultural development, and climate change adaptation and mitigation. The key elements of CSA include contributing to food security by increasing agricultural productivity, resilience of agricultural systems through adaptation, and mitigation by reducing GHG emissions or enhancing carbon sequestration and managing interfaces with other land use management. The Myanmar CSA strategy encompasses the development of technical, policy, and investment conditions to achieve a sustainable agricultural development for food security and nutrition through climate-resilient and sustainable agriculture. In 2014, during the 24th ASEAN summit, Myanmar committed to apply CSA to contribute to regional food security and environmental protection.

Myanmar's agriculture is distinguished by a number of special features that set it apart from other sectors:

1. The sector's role in producing food and meeting the people's basic survival needs;
2. Specificity of agroecological contexts makes uniform tactics and solutions ineffective;
3. The vulnerability of the sector to climate change compared with other sectors;
4. Its adaptation needs and mitigation potential; and
5. Its complex links to food security, and broader land use, fisheries, livestock, and forestry policies

Myanmar's population and the per capita calorie intake, both expected to increase between 2015 and 2050, will require significant increases in agricultural productivity in the context of more constrained availability of resources. With agriculture contributing about 30% of the country's gross domestic product (GDP) and providing employment to approximately 60% of the population, the impacts of climate change on agriculture would have repercussions on the livelihoods, food production and the overall economy of Myanmar. At the same time, the agriculture sector holds significant potential to mitigate climate change through reduction of GHG emissions and enhancement of agricultural sequestration.

Myanmar's CSA strategy should be socially, culturally, and politically appropriate, environmentally friendly, and economically feasible in order to promote and attain sustainable agriculture, food security and nutrition, agricultural development, and climate change adaptation and mitigation. The strategy also aims to provide context and analysis for addressing agriculture in international climate negotiations to better inform climate negotiators and other stakeholders by identifying options and unpacking issues of interest.

Myanmar has various ecological zones with rice as the main crop. For this reason, the country's CSA strategy should be primarily focused on rice-based farming systems. While rice and other crops are the backbone of agricultural production, livestock, and fisheries provide protein foods and contribute partially, if not fully, to livelihoods of the rural populations. In the past, hydro-meteorological hazards have affected rice production in many regions in Myanmar, and are

[2] Myanmar Climate-Smart Agriculture Strategy, September 2015

probably the main triggers of food insecurity. In the most food-insecure zones, drought is the major agricultural challenge. The southeastern parts of the country have low soil moisture which has remained below the average level. Agriculture and crop production in Myanmar are strongly affected by rainfall patterns as crop cultivation is mostly rainfed.

The Ministry of Agriculture and Irrigation (MOAI) and the Ministry of Livestock, Fisheries and Rural Development (MLFRD) have lain down policies, objectives, and strategies for the development of the agriculture sector, putting priority on food security and rural poverty reduction. These policies, objectives, and strategies indirectly encompass mitigation and adaptation strategies for climate change as they relate to the improvement of the country's agriculture sector. Early actions on climate change have allowed the country to prepare for near- and long-term agricultural adaptation and mitigation action, closely linked with national food security and nutrition policies. Measures include data collection, policy development, and support for demonstration activities. Pursuance of early action activities would generate country-specific data and knowledge, as well as experiences on various agricultural practices and policies, which could inform long-term national strategies.

By 2030, Myanmar aims to have achieved food security and nutrition and climate resiliency, with a globally competitive agriculture sector attaining high productivity through climate-smart good agricultural practices (GAP) resulting in a higher standard of living, especially in the rural areas. Feeding the country's population in the context of climate change will require gradual and significant expansion of agricultural products. Adopting agricultural practices that are able to withstand changes in climate and contribute to the reduction of GHG emissions require the application of new technologies, modification of existing ones, and revision of relevant laws and policies.

Climate change adaptation and mitigation in the agriculture sector will have to be pursued in the context of food security and nutrition. Although there are practices that hold great potential to address climate challenges, there is no national policy framework within which to build and operate. Given this situation, early action holds great potential for Myanmar to take positive action in the short run that can inform national policy. The ability to act depends on improved measurement systems, tools, and techniques for adaptation and mitigation.

Annex 2: Description of target Villages in the 4 Agro-Ecological Zones

AGRO-ECOSYSTEM AND VILLAGE NAME	**DRYLAND, SANDY SEMI-ARID SOIL HtiPhu Village, Nyaung-U Tsp**	**HIGHLAND, (EL. ~1,500 MASL) MakyaukAia Village, KanpetletTsp**	**UPLAND/HILLY, (EL. ~800 MASL) KyautNgat Village, NyaungShweTsp**	**LOWLAND DELTA Ma Sein Village, Bogale Tsp.**
Population	***1,177***	***No information***	***~1,000***	***239***
Households (HH)	***560***	***53***	***~200***	***118***
Accessibility	• Village and farms accessible by land transport	• Village accessible by land transport • Farms are far from village and needs at least 0.5 hours trek to access nearby farms	• Village and farms accessible by land transport during dry months • Accessibility difficult during rainy season due to bad road conditions (although accessible by 4WD vehicles)	• Beside main highway • Recently constructed concrete bridge that connects the village to the main highway made it more accessible. • Raised pathway with bricks traverse the village. • Elevated walkways to HHs are usually done using coconut husks
Village History	• Old farming village of (~ 2,000 years old) • Water shortage historically cause migration, usually to Kaya state (as laborers to state farms) • With hundred years old communal pond (1-hectare area) located around 1 km from village • Permanent migration is usually among young people	• Village dates to colonial time (around 1889) when first inhabitants settled in areas near the road • Original settlers were employees of British police stationed in Kanpetlet • Administration of village lands is by family of first inhabitant (system still exists) • Original settlement was in higher elevation but moved to current location	• Century old village under bamboo forests • First settlers composed of 20 HHs • Original village is the area where the 20 HHs are located • Growth of village outward from 20 HHs, additional HHs are built in peripheries outside the 20 HHs • HHs are primarily bamboo craft producers. The traditional livelihood consists of bamboo craft making (walls, handicrafts, basket and mats) and subsistence farming of rice and vegetables outside the village (done through shifting cultivation)	• Inhabitants settled in the village around a century ago • Original landscape when first settlers came was swamp dominated by mangroves and nypa

			• Intensive agriculture only practiced in the last 15 years as livelihood shifted from bamboo-based livelihood towards agriculture-based livelihood (bamboo became secondary livelihood)	
Landholding	• Majority are landowners, with average landholding 2 acres • 125 are considered landless HHs and usually work as farm labor	• 37 HHs have "access" to farm lands → this means traditionally defined areas they farm • Average landholding is 2 to5 acres • Few HHs have as big as 20 acres • 18 HHs are landless (tenants) but still have backyard they can grow crops • Tenants however can also still access village lands for farming provided with approval by village leader (family of first settler)	• With customary laws on land utilization and allocation: village leader decides on land management as well as in purchase and selling of lands • Most HHs "own" land → designated farm lands outside the village • Ownership of lands can be transferred to children. Sale of lands however must be agreed by village leader	• Half of the households own land and the other half are considered "landless" • All however own the lots and their backyard • Average landholding is around 3 to 5 acres (to verify) • Farms (rice areas) are located outside the village • Few HHs reside outside main village near their farms
Main livelihood	• Farming of cash crops (peanut, pigeon pea, tomato) • Harvest of tamarind • Paid labor in neighbors' farms • Few HHs engage in palm sugar production • No practice of seasonal migration for paid labor • Selling of livestock in times of emergencies	• Farming of cash crops, mainly of elephant foot yam and red millet (for wine production), • Tenants are usually laborers • Rice and corn grown but mainly for HH consumption (staple crops) • Pigs and poultry grown as backyard activity	• Farming of cash crops (ginger, upland rice, ground nut, and linseed oil) • Bamboo crafts (mats, walls, basket, handicrafts) now a secondary livelihood, previously it was the main source of income • Upland rice and vegetables for HH consumption • Poultry, mainly chicken for HH consumption and sometimes for selling	For HHs with lands: • Rice farming (2 crops) • Vegetable production • Coconut • Betel nut • Pigs • Duck farming (10% of HHs) For landless HHs: • Vegetable production • Betel nut • Coconut • Pigs • Chicken and ducks (backyard scale)

Important HH assets	• Cows and carts are most important HH asset, used as draft animal for farming and transporting water and goods • Only few HHs have cows • Majority of HHs have goats but the number is diminishing due to high cost of herding fee • Very few have pigs due to high cost of pig feeds	• HHs maintain backyard gardens where they grow vegetable as well as some fruit trees (e.g. Avocado) • All households have chicken (small scale) that they sometimes sell to markets when needing cash • Majority raise pigs (1-3 heads), also sold when cash is needed • Goat raising is done by very few HHs as open grazing causes problems among neighbors	• Collective farming is practiced among households → e.g. 3-5 people take turns in helping each other in farming their respective farms • Few HHs have cows and buffalo, which they use as draft animals (fetching water and commodities and land preparation) • Few HHs have hand tractor • HHs without draft animals and hand tractor rent for land preparation • Chicken raising done in backyard scale • Very few HHs engage in pig raising, but rare • A good number of HHs have motorbikes	• Boats are important asset for all HHs as they use it for transporting goods to and from village • Pig production is a widespread practice and pigs are important asset for most HHs • Almost all HHs raise 2-3 heads of pigs. Maximum of 5 heads • Some have hand tractor used in rice paddies • Better-off HHs have buffalo used in land preparation in rice paddies
Community resources	• Communal pond is the most important community resource, but sometimes dries up in very dry years • A hundred years old traditional system for use and management of the pond exists • Government constructed communal well in 1982, repaired in 2008 by JICA. It is powered by a diesel engine and runs mainly during dry months (when water from pond is limited)	• A forest area exists near the spring → source of water made accessible by installing pipes to the village, a world bank supported project • A small patch of forest near the village is also maintained (~acres) as a protected area. This is a new community initiative resulting from improved awareness of the importance of forests	• 2 communal springs located more than 5 kms from the village is shared with 2 to 4 other villages in NyaungShwe. • Villagers transport water from the spring using motor bikes and/or carts • Village used to have more springs but eventually these dried up after loss of forests due to intensification of agricultural production • Surrounding areas outside the village used to be forested but such types of forest patches diminished over the years due to expansion of farm lands	• River system that flows up to backyards is probably most important resource (for a transportation, irrigation for paddies and vegetable gardens)

			• Village is traversed by creeks which have water during rainy season and used as watering hole for cattle until water dries out in summer • With very few remaining small patches (usually ~ 0.5 to 1 hectare) of forested areas → those revered as habitat of "evil spirits" and areas around Buddhist monasteries	
Social services	• Lack of water for HH and irrigation is main social issue • Rainwater for HH purposes is collected in jars using roof gutter (service from Plan International WASH project in the village) • Electricity for around 30 HHs supplied by solar panels. The rest have no electricity. • At least one small truck owned by a villager to transport people and commodities to and from market. It runs only when there is enough number of villagers willing to pay for cost of transportation. • With primary school within the village	• Water for HH consumption is accessible within the village (delivered through pipes from spring) • Health services accessible • No electricity in village • Cash for work projects before by WFP, GREEN Myanmar, CARE and JICA • With primary school and small Christian churches	• With one community nurse trained in delivering babies • No electricity, although this is a decision by villagers as bamboo and electric lines do not go well together. • With primary school within the village • Water for HH consumption collected from rainwater harvesting systems • With monastery within the village	• Water for drinking and HH consumption collected from rainwater harvesting systems • All HHs however construct wells within the backyard they use for gardening and livestock (and at times for HH use) • With primary school in the village • With monastery within the village

Annex 3: Description of Agricultural Commodity Profile in Each Village and Agro-Ecological System

AGRO-ECOSYSTEM AND VILLAGE NAME	**DRYLAND, SANDY SEMI-ARID SOIL HtiPhu Village, Nyaung-U Tsp**	**HIGHLAND, (EL. ~1,500 MASL) MakyaukAia Village, KanpetletTsp**	**UPLAND/HILLY, (EL. ~800 MASL) KyautNgat Village, NyaungShweTsp**	**LOWLAND DELTA Ma Sein Village, Bogale Tsp.**
Main Farming system	Dryland, semi-arid agriculture • Sedentary farming in dryland, sandy loam soils in semi-arid environment • Rain-fed single cropping systems due to uni modal rainfall patterns • Degraded soils with low organic matter (soils with pH just above 6) • Residue management (mostly for livestock feeding not for soil replenishment) • Intercrop of peanut-pigeon pea • Assured tenurial security for small holders	Highland agriculture • Shifting cultivation: 2 years crop cultivation and 7 to8 years fallow • Due to low population pressure fallow periods remain long in farms far from village, some HH members temporarily relocate to tend the farm • With few sedentary farms (backyard gardens) • Customary Tenure laws still practiced (some risks as new legislation does not recognize shifting cultivation)	Upland agriculture • Sedentary farming in defined farmlands • HHs maintain several lots they farm for 2 years and fallow for 3 years • Cropping pattern in cultivated plots is ginger with intercrop → upland rice → upland rice (if soil is still good and with good moisture → linseed oil → fallow for 3 years • Degradation of upland soils noted as result of soil depletion and intensive cropping and poor soil management (slope lands subject to erosion)	Lowland delta agriculture • Sedentary farming with intensive cropping systems due to availability of water • Lowland irrigated and flood-prone rice farms as dominant agro-ecosystem landscape • Acidic soils (pH 5.5 and below) some areas also affected by salinity • Poor residue management (rice straw not generally used) • Dominant crop however in terms of number of HHs engaged in production is betel nut, and coconut next • Village is characterized by thick canopy and multi-story of various perennial crops (coconut, betel nut, banana, citrus, nypa, littoral mangrove species) and other understory crops (taro, vegetables) • Flooding especially in monsoon usually occurs, prompting villagers to construct elevated houses as well as elevated gardens.

AGRO-ECOSYSTEM AND VILLAGE NAME	**DRYLAND, SANDY SEMI-ARID SOIL HtiPhu Village, Nyaung-U Tsp**	**HIGHLAND, (EL. ~1,500 MASL) MakyaukAia Village, KanpetletTsp**	**UPLAND/HILLY, (EL. ~800 MASL) KyautNgat Village, NyaungShweTsp**	**LOWLAND DELTA Ma Sein Village, Bogale Tsp.**
				• Presence of tenurial security for small holder farmers
Key crops and schedule	***Peanut/Groundnut:*** • Planting done in June to July (with rains start) • Harvest starts October for short duration variety (3 months) • Harvest ends January for long duration variety (6 months) • Short duration variety is grown extensively for selling • Long duration variety is grown in smaller areas for oil production. It also commands higher price • Nuts are separated from whole plant after drying • Remaining biomass is stocked for cattle feed • Storage of nuts done after drying for selling when price is more favorable and for seed for next cropping ***Pigeon peas:*** • Planting done in June-July alongside peanuts • Harvest done in December to February • Only one variety used for long time • Whole plant is harvested • Similar with peanut, biomass is stocked for feeding livestock	***Red Millet (Finger millet)*** • Main cash crop • Used for wine production • Planting is March to April then harvest in August to September ***Elephant foot yam:*** • Now a major cash crop • Introduced through a project 8 years ago, by CARE • With high demand as it is exported to China • Availability of planting material is a major concern for most • Others White millet i.e. Foxtail millet • farmers (due to high cost and lack of capital) • 7 to 9 months cropping • Planting can be done all year but harvesting is done between October to December. • Priority crop grown in sedentary farms ***Various beans*** • Priority is growing white beans (high demand from traders) • "Star" beans and other types also grown	***Ginger*** • Land preparation starts in winter season • Planting done in summer (March) and harvested in December intercropped with other cash crops (usually chili, soya and other beans, and taro) ***Upland rice*** • Planted as next crop after ginger • After harvest of ginger, land is prepared in preparation for upland rice planting. • Upland rice is broadcast in June/July when rainy season starts and harvested October • Immediately after harvest, if soil is still good, some opt for another cropping or rice (October to February/March) • Despite upland rice cropping, HHs still sometimes suffer from lack of rice and they must purchase from market outside the village • Rice hay is stored as forage for cattle during summer months	***Paddy Rice (2 cropping cycles):*** • Planting for rainy season cropping done in May and harvest ends in November (not simultaneous planting) • Rainy season varieties used are the 135 to 150 days types • In rainy season, farmers transplant seeds since farms are usually flooded. • Planting for dry season cropping starts immediately after rainy season cropping in November and ends in May. • Dry season varieties used usually last 110 to 120 days. • In dry season crop, farmers broadcast seeds • Farmers do not stock up seeds and just buy from local agricultural shop (they prefer certified seeds) • Burning straw is usual practice • Fertilizer application done 4 times: during land preparation, 15 to 20 days old, panicle initiation and before flowering → this is learned from extension work of NGO and government

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	• Farmers stock seeds for next cropping • Sorghum grown as intercrop but mainly as fodder source ***Tomato*** • Planting done in June-July as soon as rains are available • Harvest done in December to January • Emerging commercial crop with those having access to irrigation ***Tamarind*** • Harvest from trees growing within backyard and farm • Harvest time December to April • Some HHs buy tamarind, others sell directly to nearby market ***Other crops growing in village but in limited quantity and only for HH consumption:*** • mango • custard apple • dragon fruit • various gourd • pumpkin • various types of beans • corn ***Millet, sorghum and various types of beans are grown in farms as intercrop between pigeon peas (main crop) for food and forage purposes***	***Corn and rice*** • Grown for HH consumption only. both as staple food • Seeds broadcasted immediately after land preparation in February-March. Due to belief that seeds that catch the first rains in May produce best yields • Good quality corn seeds are bought from Yezin research centers • Most store open pollinated corn varieties for next cropping • Planting is done March to April and harvest in September to October. ***Sedentary farms and backyard crops*** • few sedentary farms within the village near (usually near HHs) • Avocado naturally grows in community as backyard tree, now being actively promoted by fruit tree growers cooperative (outside Kanpetlet) • Other perennial species are tea and citrus • Elephant yam is a preferred cash crop (good market) • Ether short-term crops (e.g. mustard, peanuts)	***Linseed oil*** • Last crop grown in cultivated plots before it is put to fallow for 3 years ***Avocado*** • A very few number of HHs started planting avocado as result of promotion of "ecological farming" system by KMF ***Corn*** • Corn is planted as intercrop with ginger but mainly for forage purposes. Corn is not a staple food but they still grow it for their draft animals. • Cattle are fed with corn grains as concentrate (locals observed that animas performed better in land preparation when fed with corn.	***Betel nut production*** • Planted in backyard and also as border plant • Continuous harvests from April to December • Dominant crop within the village, along with coconut ***Coconut*** • Same as coconut • Provides good source of income for farmers all throughout the year • Usually 8 harvests in a year ***Backyard Vegetable gardening*** • Main livelihood of landless HHs all throughout the year • Major vegetable crops are water cress, bitter gourds, cucumber, bottle gourd, squash, lady finger, eggplant, and chili • Done in elevated gardens in backyard ***Banana*** • As understory crop under coconut and betel nut ***Taro*** • Also as understory crop

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		• Variety of gourds and other beans		
Border planting of trees on farms	• Yes, mostly with palm for sugar production	• Not practiced in shifting cultivation • with border planting in sedentary farms (smaller plots)	• Yes, with various forest species (what remained of previous forest cover) • Pine species are however preserved even if it is within the farm plot	• Yes, usually with betel nut and coconut
Fertilizer management	• Heavy use of commercial fertilizers in farms since biomass retention in farms is not practiced • Animal manure is collected and used as fertilizer	• Not practiced, 7 to 8 years fallow period allows soil regeneration after intensive cultivation	• Animal manure is collected and incorporated on farmlands usually for ginger production • Use of commercial fertilizer practiced although in small quantities	***In rice farms*** • Fertilizer application done 4 times: during land preparation, 15 to 20 days old, panicle initiation and before flowering → this is learned from extension work of NGO and government • Burning of rice straws extensively practices
Livestock and poultry	***Cows*** • Few HHs own, used as draft animal • Landowners without cows hire during land preparation • Fed with forage grown in farms in most parts of the year • Forage is harvested from forest during dry months (March to May) when sorghum & millet is not available ***Goats*** • Open grazing in forest areas	**C*hicken*** • Done by all HHs but only at backyard scale • Provides quick cash when needed ***Pigs*** • Raised by majority of HHs, only few quantities (1 to 3 heads) • Fed with locally available materials (corn grits & banana trunks) ***Cows*** • Only few have cows, used as draft animal	**C*hicken*** • Done by most HHs but only at backyard scale • Provides quick cash when needed ***Cows and buffalo*** • Only few HHs • Fed mainly with rice hay stocked in households for summer months • In other months of the year, open grazing is practiced (usually in farms under fallow)	***Pigs*** • Pig production as major livelihood activity for almost all HHs • Average number of pigs raised: 2 to 3, maximum of 5 • Feeds pigs with commercial feeds in first 3 months, remaining months (4^{th} month to 1 year) until it is sold is with locally available materials (rice bran-based) • Uses local breed

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	• Grazing in forest areas usually done as HH activity. In some cases, HHs pay others to do it **C*hicken*** • Done only at backyard scale	• Observed feed management: grazing (no confirmed cut and carry practice) • No observed growing of forage species ***Goats*** • Very few HHs engage in it • Traditional practice of open grazing, which causes problems among neighbors • No observed growing of forage species		***Chicken*** • Most HHs raise chicken on backyard scale ***Duck raising*** • Very few HHs engage in commercial duck raising ***Aquaculture*** • Previously done even within backyard but not anymore as fingerlings from river is now limited
Market	• Around 20 kms from village • Staple food (Rice) is bought	• Around 3 km from village	In Heho township	In Bogale township, accessible by boat through river networks that runs up to backyards of households

Annex 4: Community perceptions of changes in farming/livelihood patterns (and related presentations of seasonality issues)

AGRO-ECOSYSTEM AND VILLAGE NAME	**DRYLAND, SANDY SEMI-ARID SOIL HtiPhu Village, Nyaung-U Tsp**	**HIGHLAND, (EL. ~1,500 MASL) MakyaukAia Village, KanpetletTsp**	**UPLAND/HILLY, (EL. ~800 MASL) KyautNgat Village, NyaungShweTsp**	**LOWLAND DELTA Ma Sein Village, Bogale Tsp.**
Perceived climatic changes	• Lesser available water for irrigation and household • Irregular rain patterns • Lesser amount of rainfall ***Recorded changes by nearby research station:*** • Higher temperature (from 39^{o} in 1985 to up to 45^{o} in recent years) during dry months (recorded by research station) • Rains comes much later in recent years: monsoon used to start 2nd week of July but now comes around early August	• Occurrence of hotter summer (e.g. 2015 and 2016) • Irregular and unpredictable rainfall • Occurrence of very cold days in winter	• Irregular and unpredictable rains is main observed change • Late onset of rains, recently monsoon started late (August instead of June/July) • More intense rains	• Not much observed changes in • Changes in water level of rivers was observed • During dry months, there is lesser water in the river compared to before, observation is that even during cold months, the water level is already lower • In rainy season, higher water lever of rivers is observed
Impacts	• Around 10 years, farmers shifted crops from sesame to peanut as former is more prone to crop failure during drought • More frequent occurrence of drought conditions e.g. In 2011, 2012, and 2015 • Crop failure especially of peanut • No crop failure with pigeon pea but with very low yield and low quality pods, and observed diseases	• Drier summer and irregular rains caused germination failure especially for corn and millet → germination is affected when several days of hot weather follow first rains. • First rains initiate germination of broadcasted seeds in farms but following days of no rain result to failure in germination	• Lack of rains in July-August poses a big problem in ginger production. Insufficient rains result to significant low yield such as what happened in 2015 and 2016 • Strong rains during planting season cause washing out of germinating upland rice (due to erosion)	• Higher water level is a major concern as it results to more flooded paddy rice • Special concern of flooded fields during harvest season. It makes it more difficult to harvest and dry

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	• Availability of forage even from forest was minimal • mangoes had disease		• While non-climate related, the more significant impact comes from price drop of ginger → impact was young people were forced to work outside the village (temporary migration)	
Coping mechanisms	• Selling of livestock, mainly goats • Borrowing money from neighbors	• In above case (e.g. 2015 and 2016), farmers must replant (re-broadcast seeds), when there is sufficient amount of rains	• crop failures result to temporary migration especially of young people to Heho to work usually as hired labor in construction work and/or agricultural work (harvest, planting)	• No special coping mechanisms identified

Annex 5: Summary of Agricultural Extension and Services in each of the Village and Agro-Ecological Zone

AGRO-ECOSYSTEM AND VILLAGE NAME	**DRYLAND, SANDY SEMI-ARID SOIL HtiPhu Village, Nyaung-U Tsp**	**HIGHLAND, (EL. ~1,500 MASL) MakyaukAia Village, KanpetletTsp**	**UPLAND/HILLY, (EL. ~800 MASL) KyautNgat Village, NyaungShweTsp**	**LOWLAND DELTA Ma Sein Village, Bogale Tsp.**
Projects and interventions	**UNDP funded project** • just started and involving several institutions (CDA, soil conservation, FBD) • Focus of project is improvement of agricultural production and value chain through capacity building for farmers (training) • Only CDA (focused on livestock) has staff presence in the community **PLAN CMDA project** • Water sanitation and hygiene project • Involved installation of household water harvesting systems and capacity building on sanitation and hygiene	• Most project interventions are on WASH, nutrition, and cash for work • Projects implemented before are by WB-CDD and UNDP • Agricultural development projects implemented in the village by CARE (introduction and value chain development of elephant foot yam) • **IFAD-funded project in 2017:** planned project in nearby village --> agricultural extension services featuring the development of crop nurseries (focus on fruit trees and elephant foot yam)	• 2 projects were noted by key informants, both focused on providing micro-credit to households • The 2 projects are by PACT Myanmar and the government's Green Development Project. • KMF organizes youth group in the village and provides awareness raising campaigns on "ecological farming." • Members of youth group are convinced by the importance of incorporating more perennial species (fruit trees) in current farm systems but also report that decision is still with the head of the household.	**Agricultural extension project from RadanarAyar and also local Agriculture Ministry office** • Focus on capacity building (training) on improved agronomic practices for rice. • Government extension worker visits the village (not regular) and provides information on new rice varieties, rice trading, and other information. • On-site training done once (on fertilizer management)
Government Research and Extension centers	**Dryland research station in Nyaung U** • JICA-funded station of the Department of Agricultural Research • Conducts research on soil and water conservation practices involving 4 main crops: pigeon pea, green gram, sesame and peanut	No nearby research station	**Taryaw Agricultural Research Farm:** • Under the Department of Agricultural Research. Located in ShweNyaung, Taungyyi Township in Shan State • conducts trials on key crops: rain-fed lowland paddy rice production, soya beans and sunflower	**With presence of IRRI-managed trial farms in nearby villages** • New rice varieties • Village also learned about the new varieties and also learned that local varieties out-performed IRRI-introduced rice varieties

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	• Peanut research involves 3 types of varieties: short duration (95 – 110 days), long duration (180 days) and mid-duration (140 days). • Pigeon pea research on super early maturing variety • Produces and distributes good quality seeds to farmers • Conducts farmers' trials and field days • Also, conducting research and extension on green leaf manure technology using Gliricidia • Maintain nursery of Gliricidia and distributes seedlings to farmers • With research on other dryland crops such as horse gram, sorghum, cassava and millet		• tested and promoted SRI among farmers but scaling out did not happen due to difficulties in terms of labor demands and water management • produces and distributes good quality seeds (foundation, certified, registered seeds) • source of 2 most popular rice varieties: Shwe Yin Aye and Shan Paw Kywe	
	Livestock Department District Office in Nyaung U • Main program is vaccination of cattle, treatment of animal diseases and training of farmers on such aspects • Just started artificial insemination project • Conducts breeding improvement of cattle for draft purposes. 2 main breeds of draft cattle with Myanmar genes are: Theri and Schereli		**Aungban research center**: • Research station of the Department of Agricultural Research (DAR) • Conducts research on major upland crops: upland rice, wheat, maize, soya, sugar, linseed oil, sugarcane • Started research on millet and sorghum • Produces and distributes good quality seeds of wheat, maize, upland rice	

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	• Other services involve capacity building of farmers on improving goat breeding practices. Identified 3 main breeds of Bagangoats that are resilient to drought. • Also providing capacity building to farmers on feeding systems • Has village technicians (termed as "blue cross") who provide animal health care services		• Conducts research on fallow technologies, using rice bean as fallow crop **There are also other research stations in Heho that conduct research on livestock, and other crops such as vegetables (not visited).**	

Annex 6: Itinerary of the Scoping Studies in Myanmar CSA/CSV
10-21 December 2016

Date/Time	Activity	People and Agencies Involved	Highlights
December 10	Arrival in Yangon 5PM and overnight stay in Yangon		
December 11 (Sunday)	Travel to Bagan Arrival 12 noon Meeting with Nyar Na, Project Manager, Field Coordinator of Community Development Association (CDA) in Nyaung-Oo, Mandalay	Community Development Association (CDA	The meeting with CDA was to orient the team about the profile of the village we are considering for CSV work. The team talked about broad information about livelihoods, distance of the village to the nearest trading area and information about local government projects and other NGO interventions.
December 12 (Monday)	FGD in NyaungOo AM: Village FGD c/o CDA PM: Visit and interviews: Dryland Research Station	Community Development Association (CDA Ms. MyintThidar, Senior Research Assistant, Dry Zone Agricultural Research Center, Nyaung-Oo Farm, Nyaung-Oo Township	In the morning the team conducted the FGD with at least 25 farmers in HteePu village, NyaungOo. The FGD looks at the village history, description of farming system, how the farmers experience climate change, current coping response of farmers to climate change and a mapping of agencies providing services to the village. In the afternoon, the team visited and met with the staff of the Dryzone Agricultural Research Station in Nyaung-Oo. The team learned of the programs and priority crops for research in the station. The team also learned of the station's recommended varieties of groundnut, pigeon pea, sesame and green gram. The station committed to support working with IIRR in setting up a CSV in HteePu village.
December 13 (Tuesday)	2PM: MakyaukAia Village FGD in Kanpetlet	Karuna Mission Social Solidarity (KMSS)	After arriving in Kanpetlet early in the afternoon, the team proceeded to the target village for possible CSV work. The village name is MakyaukAia. This village is about 1500 meters above sea level and the primary

Date/Time	Activity	People and Agencies Involved	Highlights
			farming system is highland shifting cultivation. The farmers grow corn, millet and vegetables. The FGD with farmers followed the same elements as from the first FGD.
	Dinner Meeting with NGO working in Kanpetlet	• Karuna Mission Social Solidarity (KMSS) • International Rescue Committee (IRC)	In the evening, the team met with the staff of KMSS and IRC. The intention of this meeting was for the team to better understand the current programs of KMSS and IRC in Kanpetlet and to explore the potential of alignment of these programs with the work on CSV/CSA. Currently, the main program on KMSS and IRC in the area is on health and nutrition. But they are willing to work with IIRR in fund raising and program development.
December 14 (Wednesday)	PM: Visit and Meetings with Research Stations in Central Shan state	Taryaw Agricultural Research Farm for Lowland Rice, ShweNyaung, Taungyi Township Aungban Research Station for Corn, Upland Rice, Wheat and Soya, Aungban Township	Upon arriving in Heho Airport, the team proceeded to visiting 2 research stations in the area. These are research stations of the Department of Agricultural Research (DAR) of the Ministry of Agriculture, Irrigation and Livestock. The team interacted with the researchers in these two stations to learn about priority crops for study. The team also learned about the availability of planting materials and seeds of crops most suitable to climate change in the area. These stations can also provide these to the farmers.
December 15 (Thursday)	AM: Village FGD in the morning with site visits to farms around Inle Lake, NyaungShwe Township	Young Farmers leaders and members organized by Kalyanna Mitta Foundation (KMF)	In the morning the team conducted an FGD with the leaders of the different village level young farmers groups organized by Kalyanna Mitta. The FGD followed the same format as the other FGDs. As these young farmers came from different villages, it was very difficult for the study team to identify possible village for CSV work. So the team decided to let one member (Rene) to remain in NyaungShwe to visit an upland village as a potential for CSV work while the rest of the team head back to Yangon in the afternoon.

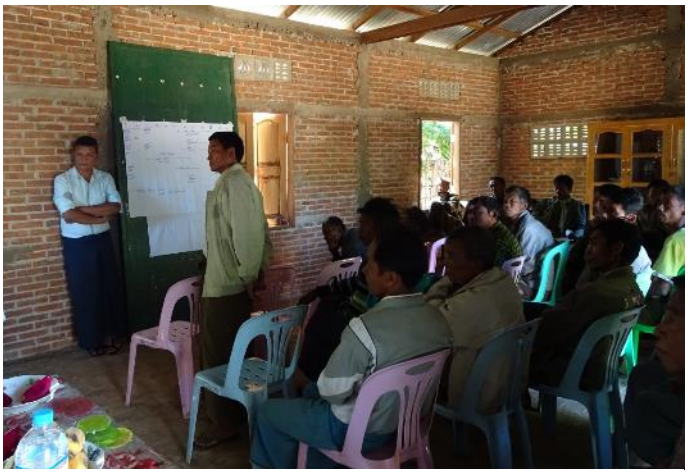
Date/Time	Activity	People and Agencies Involved	Highlights
December 16	AM: Village Visit in Upland Village in Heho, Shan State	Rene and Kalyanna Mitta Foundation Staff	Rene visited the upland village with KMF staff. He conducted interviews with farmers and observe the village to assess its potential as a CSV.
December 16 (Friday)	AM: Meeting with Yezin Agricultural University	From YAU: Dr. MyoKywe, Rector Dr. Nang HsengHom, Pro-Rector Dr. NyomarThwe, Lecturer, Plant Breeding Dr. Shwe Mar Than, Lecturer, Economics Dr. MyintThuzar, International Relations Officer	At the YAU meeting, the team with senior leadership of the university including the university rector, the pro rector and key staff active in the climate change work of the university. The team shared to them the primer and briefs on CSA and CSV developed by IIRR with support from CCAFS. They are very interested to using the materials to integrate in classroom instruction. They are interested in translating these materials in Myanmar language. The team also explored the potential role of YAU in the CSV work and this mainly in conducting on-site research to generate the evidence for CSA/CSV. The YAU publishes a journal and presenting the evidence of CSA/CSV in these journals will be helpful in influencing policy making in Myanmar.
	Meeting with Department Agriculture Research (DAR)	From DAR Dr. Thant LwinOo, Director, Rice and Cereal Crops Division and Agronomy Division Dr. Aung Moe Myo Tint, Deputy Director, Rice and Cereals Division Dr. Maun gMaung Tar, Director, Industrial Crops and Horticultural Crops Section	Later in the afternoon, the team met with key leaders of the Department of Agricultural Research (DAR)—the government's primary agency for agriculture research. Dr. Julian Gonsalves made a short presentation about CSA/CSV to the maize researchers all over the country who are in Naypyidaw for a meeting. The DAR showed interest with CSV work and they suggested that IIRR should coordinate also with the Department of Agriculture, the agency in charge for local level extension.
December 17 (Saturday)	PM: Meeting with MIID	For MIID: Joern Kristensen, Director, Myanmar Institute of Integrated Development (MIID)	Back in Yangon, the team met with Joern Kristensen, Director of the Myanmar Institute of Integrated Development (MIID), a local NGO in Myanmar specializing in research and technical assistance. From

Date/Time	Activity	People and Agencies Involved	Highlights
			this meeting, the team gained a better understanding of the Myanmar context especially the policies around land tenure, natural resources management, local agriculture extension and nutrition programming.
December 18 (Sunday)	PM: Meeting with RadanarAyar in Bogale, Ayeyarwaddy Region	ThuraAung Executive Director and Head of Programs RadanarAyar	After arriving in Bogale township in Ayeyarwaddy Region, the study team met with ThuraAung, the Director of RadanayAyar, a local NGO in Ayeyarwaddy implementing programs to develop agriculture in the delta. They are partners of IRRI and LIFT as well. IRRI made the recommendation for the study team to engage RadanarAyar. In this meeting, the team talked about the intention of setting up CSV in Bogale-Pyapon townships. The team also got to know more the programs and priorities of RadanarAyar.
December 19 (Monday)	AM: Village visits and FGD in a village in Bogale	Wilson, Rene, Julian + Research assistant RadanarAyar community workers	In the morning the next day, the team visited the village in Bogale considered as a CSV. The village name is Ma Sein. Like any village in the delta, the primary production is rice followed by backyard growing of betel nuts, vegetables and some livestock like pigs and ducks. The team conducted an FGD with the village leaders following the format from the previous FGDs.
	Debriefing meeting with ThuraAung, RadanarAyaw 3pm: Travel back to Yangon	ThuraAung, RadanarAyar Wilson, Rene, Julian + Research assistant	After the village meeting in Ma Sein, the team met with ThuraAung for short debrief meeting with him. The team shared to ThuraAung the potential of the village for CSV work and that IIRR is very interested in working with RadanarAyar to make this a reality. One of the possible element to be included in this CSV would be school gardens to address malnutrition and as a potential source for planting materials for backyard vegetable growing.

Date/Time	Activity	People and Agencies Involved	Highlights
December 20 (Tuesday)	AM: Meeting with Kalyanna Mitta Foundation	For Kalyanna Mitta • BoboLwin, Executive Director, KMF • MyintMyintTun, Program ME, KMF	The purpose of this meeting is to provide feedback to the head of the organization, Kalyanna Mitta Foundation, as the lead implementing partner for the CSV in the uplands of Central Shan state. The BoboLwin also suggested if it's possible to add one additional CSV in the southern part of Inle Lake watershed. The study team did not commit to this but will be considered depending on resources. Also the team learned more about the nature and programs of Kalyanna Mitta. Working with them for this CSV will be a unique in a sense that this will be a CSV with strong young farmer involvement which is not found in other CCAFS CSVs.
	PM: Meeting with Welthungerhilfe (DWHH)	For DWHH: Peter Hinn, Country Director, DWHH-Myanmar	For this meeting, IIRR pitched for possible support from DWHH to setup the CSV network in Myanmar. IIRR and DWHH have a long history of strong partnership in the Philippines and India back in the 1990's. IIRR hopes to revive this partnership hopefully in Myanmar to support IIRR's intention to implement CSV and CSA in the country. Nothing concrete yet committed by DWHH but they committed to continue to talk with IIRR.
December 21	AM: Travel back to Manila		

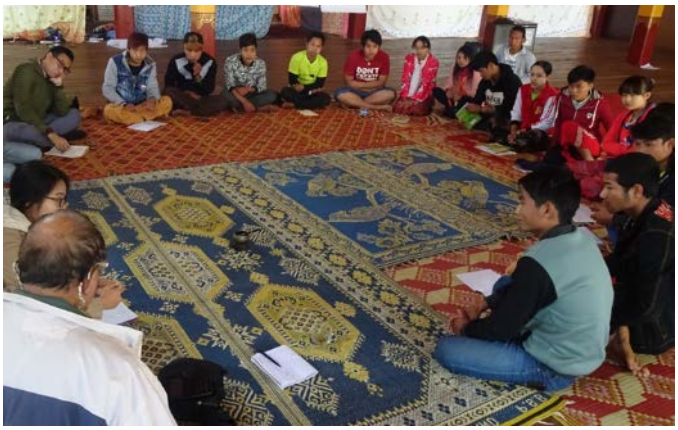
Annex 7: Photos from the Scoping Mission Field Visits

A. Village Level Focus Group Discussions:



FGD with farmers in HteePu village, NyaungOo, Central Dry Zone Myanmar; facilitated by program manager of CDA

IIRR staff, Van BawiLian and Dr. Julian Gonsalves facilitating the FGD with highland farmers, mostly women, in MyaukAia village in Kanpetlet, southern Chin State.



Scoping team facilitating the FGD with young farmers' groups from villages around the Inle Lake watershed communities.

Focus Group Discussion with community leaders and farmers in Ma Sein village, Bogale Tsp.

B. Ocular Inspections and Farm Visits

Van BawiLian, IIRR Staff, member of the scoping mission showing the team of the pigeon pea grown in the HteePu village, dry zone

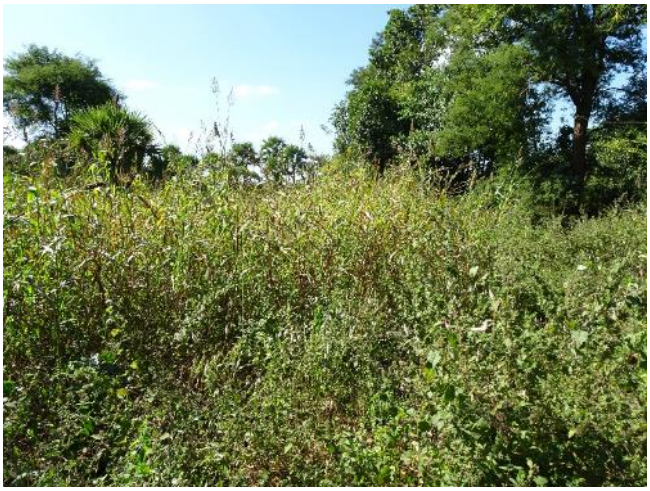
Scoping team interacting with the researchers at one of the farms at the Aungban Research Station, Shan state

C. Key Informant Interviews/Meetings

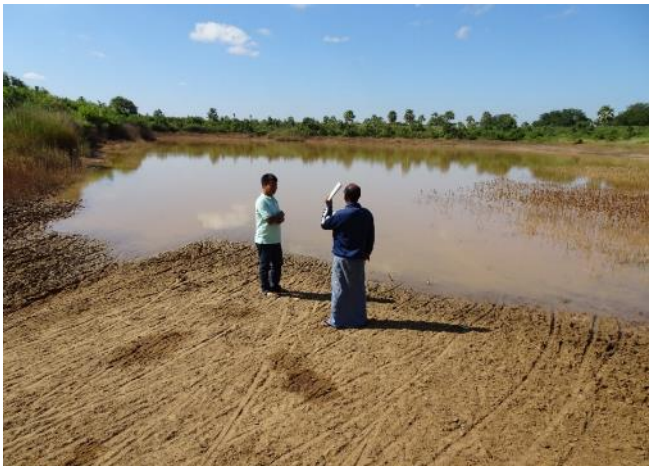
Interview of researcher at the Dryland Research Station at Nyaung-Oo, dry zone

Dr. Julian Gonsalves making a pitch for CSVs at the meeting of researchers at the Department of Agricultural Research, Yezin, Naypyidaw

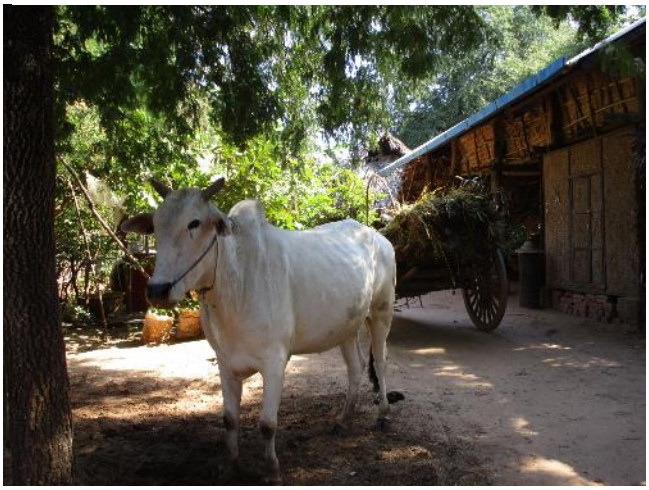
Photos from the Dry Zone Agro-Ecological Zone (HteePu Village, Nyaung-Oo, Mandalay Region)



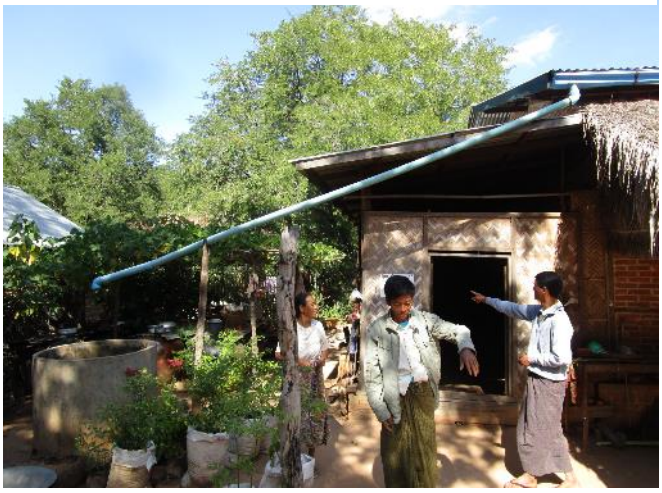
Pigeon Pea, a major dry zone crop



Artificial pond in the HteePuvillage to help cope with the lack of water



Cows are important household asset as a work animal and for transporting water from source to farms.

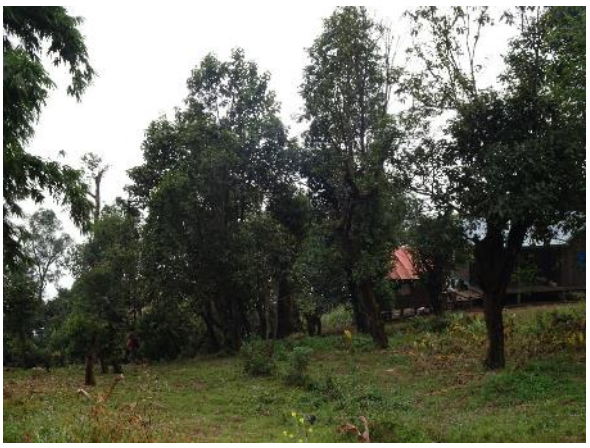


Rainwater harvesting as coping mechanism of households This one is from Plan International project.

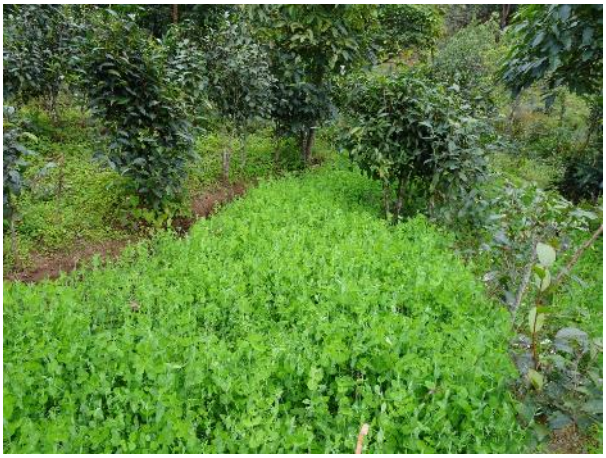
Two varieties of pigeon pea in the HteePu village, dry zone

Aerial shot of the dry zone from the plane; farms with mostly palm trees as boundary

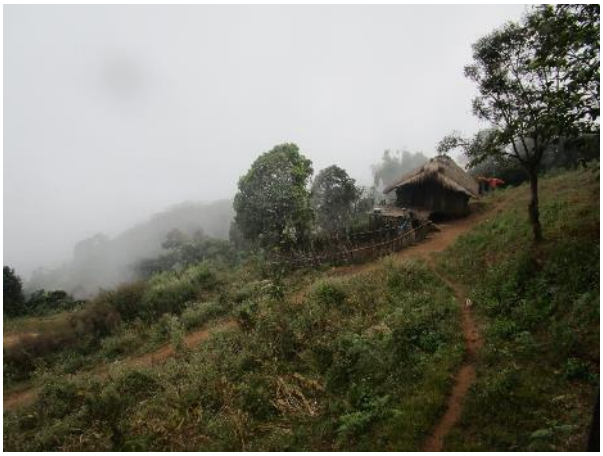
Photos from Highlands/Upland Agro-Ecological Region (MyaukAia Village, Kanpetlet, Chin State)



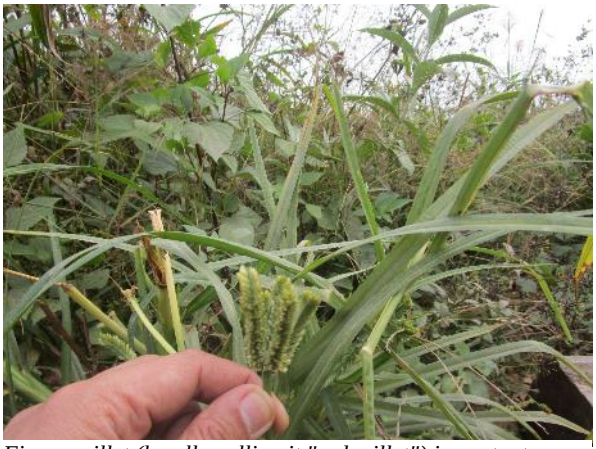
Avocado is one of the key crops grown in the village.



Village gardens planted with beans and tea



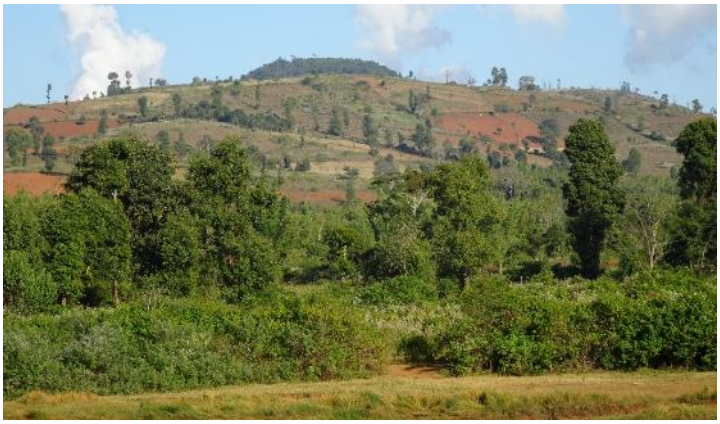
A typical village house in MyaukAia village at 1,500 masl



Finger millet (locally calling it "red millet") important ingredient in a popular local wine

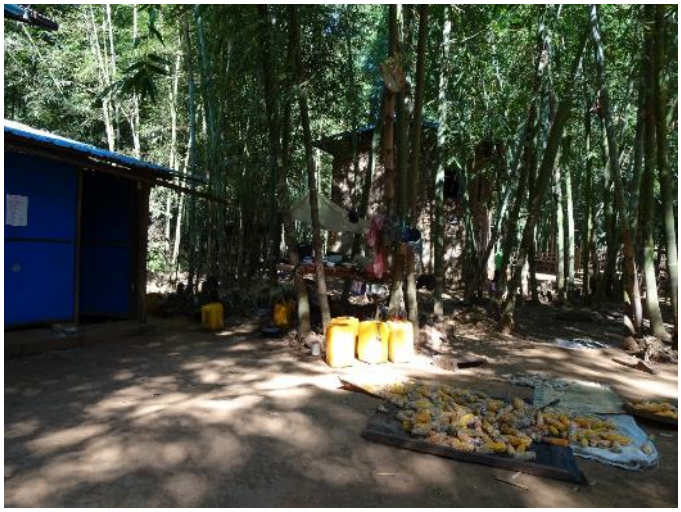
Woman harvesting elephant foot yam, important cash crop in the village

Photos from Upland Agro-Ecological Region (KyautNgat Village, NyaungShwe, Shan State)

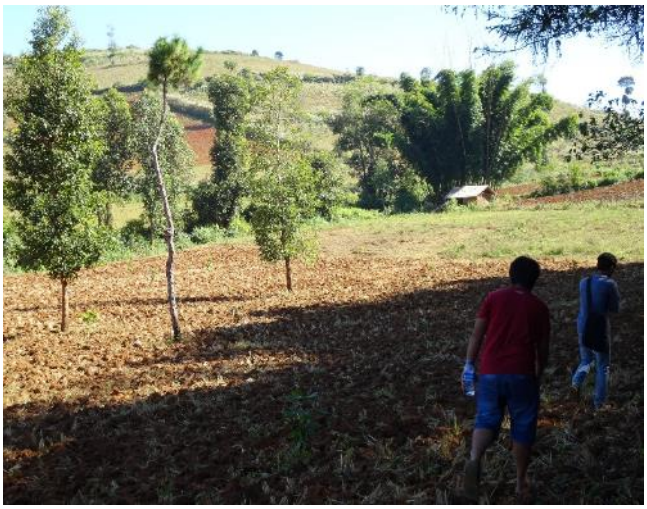


Landscape of the upland village in Shan state

Aerial view from the plan of the hilly upland landscape of southern Shan state

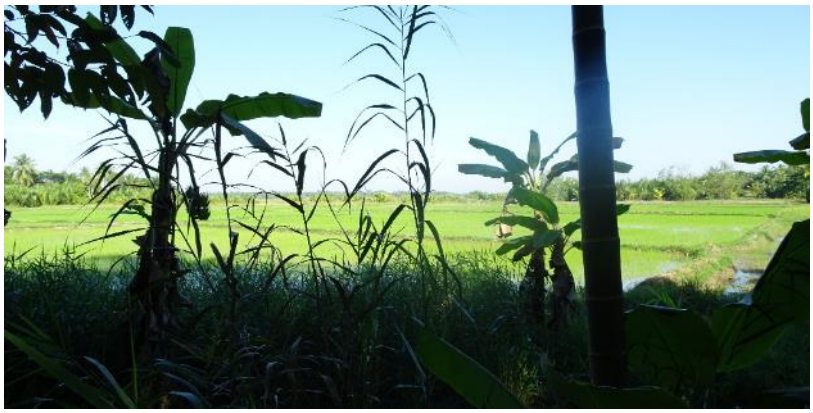


Corn and bamboo as important crops in this upland village

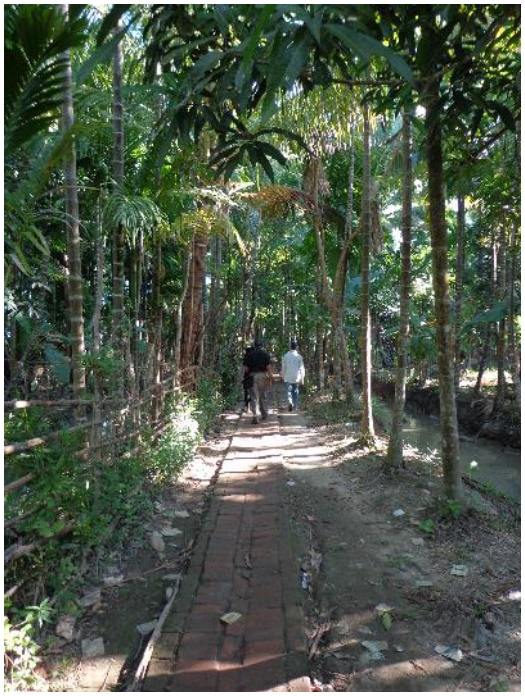


Farmers started to introduce trees into the farming system.

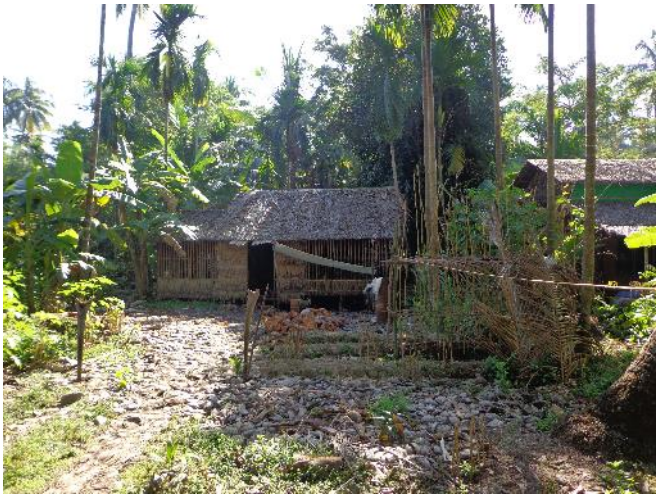
Photos from Lowland Delta Agro-Ecological Region (Ma Sein Village, Bogale, Ayeyarwaddy Region)



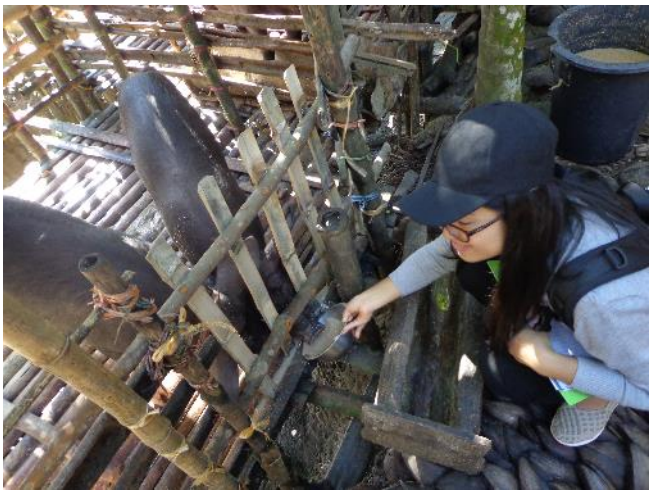
Rice paddies at the back side of Ma Sein Village, Bogale



Pathway going into the village, note the tree cover and canopy of the community



Most of the households like this grow vegetables in their yard.



Pig raising is another important livelihood for women and for households without land.

Small boat like this is a valuable asset of the household to transport goods using the crisscrossing waterways of the delta.

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