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Final report

project

Strengthening Institutional Capacity, Extension Services and Rural Livelihoods in the Central Dry Zone and Ayeyarwaddy Delta regions of Myanmar (MyLife)

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1 Acknowledgments

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2 Executive summary

The aim of 'Strengthening Institutional Capacity, Extension Services and Rural Livelihoods in the Central Dry Zone and Ayeyarwaddy Delta regions of Myanmar' or the *'MyLife'* project, was to improve agricultural development and food security by shifting the focus of Myanmar's agricultural R&D onto farmers' livelihoods needs and effective farmer extension strategies; and to facilitate institutional capacity development for research, extension and policy change in the Ministry of Agriculture, Livestock and Irrigation (MOALI).

MyLife had three objectives:

1. **Understanding farmers' livelihoods needs and decision making**
2. **Improving farmer extension mechanisms and identify pathways to adoption**
3. **Institutional capacity and human resources development**

Rural household livelihoods analysis enabled a detailed understanding of farmer livelihoods portfolios and drivers for decision making. The livelihoods understanding informed the policy discourse around how to deliver effective extension services focused on farmers' needs.

To improve agricultural extension services, a Participatory Action Research (PAR) approach was utilised with the Department of Agriculture (DOA) staff, whereby research findings were progressively fed back into a process of collaborative discourse between MyLife researchers and DOA staff and senior MOALI officials for critical analysis, reflection, validation and action learning. The research findings and recommendations were framed in a way that rendered them actionable, and findings and learnings thus influenced policies, strategies, objectives and behaviours. This research resulted in the production of a policy discussion paper entitled *Towards a More Effective Agricultural Extension Sector in Myanmar: A Discussion Paper for DOA Institutional Development* which made eight recommendations, most of which are now being progressively implemented by MOALI. This policy paper resulted in the MyLife team being invited to conduct a policy development workshop within the *Amyotha Hluttaw* (House of Nationalities) of the Myanmar National Parliament in October 2017. At the workshop, the national parliamentarians endorsed the MyLife project's findings and recommendations, and made additional recommendations of their own. An additional outcome of this research was the production of five 'fact sheets' describing innovative extension practices in five townships around Myanmar. Over 450 MOALI staff have also been trained in Participatory Rural Appraisal techniques as a result of MyLife train the trainer activities.

MyLife conducted 'social capital' research in collaboration with NGOs and farming communities to identify strategies to build effective farmer groups to enable climate adaptation and connections to markets, and to improve food security. The research findings resulted in further research being conducted into how to develop successful local institutional arrangements for contract farming involving farmer groups, DOA, private sector parties and NGOs. Recommendations were made to DOA, and MyLife project staff have been invited to contribute to writing the Standard Operating Procedures for Myanmar contract farming.

An outcome of the social capital research was additional research to identify strategies to achieve rural women's social and economic empowerment, in collaboration with several rural development NGOs. A product of this research was a series of videos where rural village women tell their empowerment stories.

At Yezin Agricultural University (YAU - Myanmar's only agricultural University) MyLife conducted training and capacity development on qualitative research methods and modern teaching methods, and the development of an agricultural extension curriculum. The impact of these activities was the setting up of a new Agricultural Extension Department at YAU.

MyLife also produced numerous research outputs including: 24 Masters or PhD degree theses, and associated policy briefs; 5 journal papers, 2 book chapters; 7 conference papers; 10 YAU Faculty research reports; and 7 research monographs.

3 Background

With recent socio-political developments in Myanmar the focus is shifting to the country's rural poor, sustained food security, and the modernisation of the agricultural sector. This is reflected both in national policy as well as development activities undertaken by international development agencies and donors.

Given this context, huge research opportunities present themselves and have the potential to contribute to agricultural Research and Development (R&D), adoption research, and the restructuring of the extension sector. In particular, there is a large research demand in linking agricultural development and its potential to support rapid social change currently evident in the country.

The 'Strengthening Institutional Capacity, Extension Services and Rural Livelihoods in the Central Dry Zone and Ayeyarwaddy Delta regions of Myanmar' project or MyLife has focused on underpinning technical interventions of other research projects under the ACIAR Program "**Improving Food Security and Farmer Livelihoods in Myanmar**" - MyFarm with sound socioeconomic research to achieve adoption and socioeconomic change beyond case-study communities. Outputs delivered by MyLife project have supported both research leaders as well as Myanmar policy-makers to base agricultural development on evidence as to whether proposed interventions result in behaviour change and livelihood impacts.

Guidelines, processes and plans developed in this research will directly support planners, extension officers and researchers to measure the effects of proposed technical interventions. When introducing a new technology among Myanmar smallholders, researchers will be able to understand how the technology benefits the farmers (e.g. through income, labour saving, access to resources, skills development); extension officers will receive guidelines on how to engage with farmers (e.g. new, culturally adapted and tested engagement techniques); and policy-developers will be able to track policy outcomes and whether they correlate to farming system changes.

The aim of 'Strengthening Institutional Capacity, Extension Services and Rural Livelihoods in the Central Dry Zone and Ayeyarwaddy Delta regions of Myanmar', or MyLife project, was to improve agricultural development and food security by shifting the focus of Myanmar's agricultural R&D onto farmer decisions and effective farmer extension strategies in the Central Dry Zone (CDZ) and Ayeyarwaddy Delta (AD).

4 Objectives

MyLife project provided the socio-economic background to agricultural technologies formulated in the four commodity components of the ACIAR MyFarm Program (MyRice, MyPulses, MyFish, Dahat Pan). Furthermore, MyLife worked with the local extension services to help build a new strategy for extension delivery in Myanmar, as well as collaborate with agricultural research institutions to ensure ongoing institutional capacity development and policy support.

MyLife had three objectives:

1. Understanding Farmer livelihoods and decision analysis

To integrate an understanding of farmer livelihoods and household drivers of decision making into agricultural research and extension services in the Central Dry Zone (CDZ) and Ayeyarwaddy Delta (AD) regions.

2. Improving farmer extension mechanisms and identify pathways to adoption

3. Institutional capacity and human resources development

To identify and assess pathways for agricultural institutional capacity development for research, extension and policy change.

MyLife conducted research activities in three major areas: (1) rural household economics, livelihood portfolios, and drivers of decision-making: (2) extension pathways for technological change and farmer adoption; and (3) institutional analysis and capacity development of the Myanmar agricultural research and extension sector.

4.1 Farmer Livelihoods and Farmer Decision Analysis

To integrate an understanding of farmer livelihoods and household drivers of decision-making into agricultural research and extension services in the Central Dry Zone and Ayeyarwaddy Delta regions.

- Identifying rural livelihood types and mapping the extent of types to regional scale.
- Defining the impact of internal drivers, external drivers and macro trends on livelihoods and household decision making.
- Extending these knowledge outcomes to DOA, DAR, YAU and the four commodity-based components of the ACIAR Program using household surveys, focus group discussions and reference groups.

4.2 Improve Farmer Extension Mechanisms and Identify Pathways to Adoption

To identify, and support the implementation of, effective farmer extension methodologies.

- Building on the knowledge outcomes of Objective 1 (farmer livelihoods and decision analysis).
- Undertaking an analysis of farmer adoption and change processes at household level.
- Identifying farmer knowledge networks, social networks, and functioning groups, in order to identify the most effective engagement and extension strategies.
- Extending these knowledge outcomes to DOA, DAR, YAU and the four commodity-based components of the ACIAR Program.

- Stakeholder mapping, institutional analysis and policy analysis.

4.3 Institutional Capacity and Human Resources Development

To identify and assess pathways for agricultural institutional capacity development for research, extension and policy change.

- Baseline analysis of institutional and organisational structures, policies, strategies, processes and resources, for situation analysis; and to identify constraints and opportunities for institutional change.
- Undertaking needs analyses of organisational capacity building to identify cost-effective capacity building interventions in the rural/agricultural development sector.
- Developing collaborative institutional research teams, and collaborative behaviours, that will facilitate the longer-term implementation of change strategies beyond the life of the project.
- Through a collaborative institutional action-research strategy, to support DOA, DAR and YAU in identifying what institutional changes are necessary to maximise the adoption and impacts of the findings of the four commodity-based components of the ACIAR Program.
- Institutional capacity needs assessment and participatory strategic planning to improve impacts and adoption pathways.

5 Methodology

5.1 Crosscutting activities

5.1.1 Formation and implementation of the Research Management Team

A significant capacity development and institution-building achievement was the formation and effective functioning of MyLife's Research Management Team (RMT) – formed at the commencement of the Project in January 2014. The MyLife project has invested significant effort to build collaborative partnerships within the key partner organisations - Yezin Agricultural University (YAU), Department of Agriculture (DOA) and Department of Agricultural Research (DAR) at various levels – up to the national Ministry. The RMT was comprised members from each of these three key partner organisations, as well as international team members. The Myanmar-based members brought essential local expertise and knowledge to the project. They also played an important role in gaining ownership of project decision-making processes and outcomes by the participating organisations. The continued high-level commitment of the Myanmar-based members of the RMT has been a significant factor in the success of MyLife project.

Regular RMT meetings had a positive impact on facilitating these partnerships. These meetings were used to make project implementation decisions, plan activities and conduct capacity building.

5.1.2 Collaboration with other MyFarm program components

The following are the collaborative activities with the other 4 MyFarm program components.

1. Input into the design and development of the household livelihoods survey by the four commodity-based projects, in order to better reflect their information needs.
2. Workshops with the other four commodity-based projects during the 2015 Annual Meeting introduced them to the results of the household livelihoods analysis and interpretation.
3. Collaboration on numerous training activities (see 0 for more details).
4. Training in Participatory Rural Appraisal provided to the staff of the 4 commodity projects.
5. Cross-project activities with MyPulses project involving farmer participatory crop benchmarking (described in more detail below).
6. Two Learning Alliance research projects with Dahat Pan and MyRice (described below).

5.1.3 Cross-project with MyPulses project involving farmer participatory crop benchmarking

Farmer participatory crop benchmarking (FPCB) was initiated following the mid-term review of the ACIAR MyPulses project. This review coincided with ACIAR's announcement of available funding to promote collaboration between projects within the ACIAR/DFAT Myanmar Program. Experiments conducted by the ACIAR MyPulses nutrient management team showed weak and inconsistent responses to fertilizer applications and rhizobial inoculants, even though both are low/likely to be low in many of the soils in which those experiments were conducted. The ACIAR MyPulses team had already planned to do crop benchmarking to try to unravel the issues around variable yields. In their report, the mid-term reviewers recommended MyPulses undertake benchmarking in a more comprehensive manner, and to follow an adult-learning participatory approach. MyLife and MyPulses succeeded in obtaining funding from ACIAR and collaborated in a farmer participatory crop benchmarking research project.

The FPCB project involved both farmers and researchers/extension staff collecting soil and crop data from the farmers' fields. Regular group meetings between farmers and the researchers/extension staff were held to review and interpret the data and to plan for the coming cropping season, based on what had been observed and learnt. The differences between the FPCB R&E methodology and approach, and more traditional approaches include:

- researchers/extension staff working with groups of farming families rather than individual, predominantly male, farmers;
- all working together to collect data and, if agreed, to test treatments (e.g. fertilizer P);
- at the end of the season, combining the data for each group of farmers and, together, they interpret the data and learn about constraints to yield – so that, based on the new knowledge, farmers then plan to implement (do) something different in the next crop to improve yield;
- having the purpose to determine and use benchmarks for grain yield (what's attainable) and identify the key factors that affect yield (what's needed);
- using a participatory action learning process, in which farmers and researchers learn together as equals but with different knowledge, skills and experience - rather than researchers learning by themselves and then passing the new knowledge on to farmers, i.e. the traditional technology transfer approach.

A total of 94 farming families (husband and wife) were recruited into six farmer groups in three villages in Magwe Township. The project also worked in a fourth village in the same township with a male-only group. The benchmarking process followed an action learning cycle. This involved working with farmer groups to plan the benchmarking, implement the plan (plant, apply treatments, control weeds, etc.), observe outcomes, and reflect upon them in order to learn how to improve future management actions. Farmers and researchers made relevant observations as crops grew, and recorded yields. At the end of the season, the data were combined and all participants reflected on (interpreted) the results and discussed benchmarks for grain yield (what's attainable). The information and learning were used to plan for the next crop. In our approach to benchmarking, stakeholders also design simple experiments to generate relevant scientific knowledge. The benchmarking revealed large differences in yield between fields in the same year, pointing to the potential for most farmers to improve yield with existing technology. The best farm yields approached the potential determined by rainfall.

5.2 Objective 1: Farmer Livelihoods and Farmer Decision Analysis

A key premise of the research under Objective 1 has been that rural communities in Myanmar are characterised by a high degree of heterogeneity. For interventions to be relevant and accessible, they must understand this diversity, the broader context of rural change and how different households are responding.

The team under Objective 1 took an iterative approach to the development of a typology of households, similar to that outlined in Williams et al (2015), using a range of quantitative and qualitative methods to generate a broad grouping of households based on their resources, perceptions of risk and livelihood strategies. By defining a set of household types, we can examine how different households respond to different drivers of change, and which kinds of interventions or strategies may be best targeted to different types. In Myanmar, where landlessness is high, using household types is particularly useful for considering the dynamics between types (e.g. farming households and landless labourers).

Table 1 provides a summary of research methods and locations. Initial township and village selection for the household surveys was guided by DOA staff at township and district levels and aimed to:

- broadly capture the diversity of farming systems and livelihood activities in the Ayeyarwaddy Delta (AD) and Central Dry Zone (CDZ);
- include areas with varied remoteness/accessibility and proximity to towns;
- include sites shared with other ACIAR projects, as well as ‘control’ villages with no project intervention.

Table 1 Summary of methods applied to fulfil Objective 1

Method	Aim	Timing	Location	Research team
Household survey	Baseline information on household resources and livelihoods.	May 2014	Pyapon, Maubin, Kyaunggon, Pathein, AD	Asian Institute of Technology (AIT) , YAU, DOA, DAR
		October 2014	Pwint Phyu, Myingyan, Kyauk Pa Daung, Chaung-U townships, CDZ	AIT, YAU, DOA
Focus Group Discussion (FGD)	Understand dynamics of livelihoods, drivers of change, household decision making, aspirations.	October 2014	Pyapon, Maubin, Kyaunggon, Pathein, AD	AIT, YAU, DOA
		October 2015	Kyauk Pa Daung, Chaung U, Pwint Phyu	AIT, YAU, CSIRO, DOA
Expert workshop	Presentation of draft household types to participants at Annual Program Meeting to inform refinement of the HH types, including 'missing types'.	Dec 2016	NA	AIT, CSIRO
Validation	FGDs to test relevance and validity of Household (HH)types in different areas.	Feb 2016	CDZ	AIT, CSIRO
		Mar 2016	AD	AIT
Final survey	Topic specific surveys, FGD and interviews on issues of key importance: 1. Mechanisation of draught animals, 2. Access to financial services, 3. HH decisions to use farm machinery, 4. Impact of rural change on women's labour, 5. Emerging rural businesses and household livelihoods.	January 2017	Kyaukpadaung and Pwint Phyu – CDZ (topics 1, 2, 5)	AIT, CSIRO, YAU, IRRI
		February 2017	Maubin and Kyaunggon – AD (topics 3, 4, 5)	AIT, CSIRO, YAU, IRRI

5.1 Objective 2: Improve Farmer Extension Mechanisms and Identify Pathways to Adoption.

5.1.1 DOA Institutional Analysis through a Participatory Action Research (PAR) Approach

In order to facilitate the significant institutional change required to improve Myanmar's agricultural extension services, it was important that DOA staff were active and engaged in the multi-year institutional research process, and felt ownership of the research findings and recommendations. Consequently, a Participatory Action Research (PAR) approach was utilised, whereby research findings are progressively fed back into a process of collaborative discourse between research participants (DOA staff and senior MOALI officials) for critical analysis, reflection, validation and action learning. The research findings and recommendations were framed in a way that rendered them actionable, and findings and learnings thus influenced policies, strategies, objectives and behaviours.

The benefits of PAR are many, and include engendering a sense of ownership of the research objectives, process and findings among those who are to use the research results and transform them into action. Secondly, PAR is more likely to ensure that the research focus and research questions posed will be relevant to the needs of those for whom the research is being conducted. Thirdly, the feeding back of research findings for critical analysis by research participants enables

progressive learning and capacity development of all research participants, including researchers. Capacity development can be informal or formal. Fourthly, PAR can engender a sense of empowerment and control among researchers and participants, and this can be particularly important in institutional environments where power deficits are keenly felt. Institutional PAR is thus an internal, collaborative, and potentially empowering and transformative research process, and not confined to knowledge delivery by researchers as 'outsiders', as often occurs in other research approaches.

In this research, the participatory component of the PAR was achieved through three strategies. Firstly, at the commencement of the project, a Research Management Team (RMT) involving both MOALI staff and international researchers, was set up to guide the overall research project. Secondly, for the DOA institutional research component, an Institutional Research Working Group constituted of regional managers and a Deputy Director General was set up within the DOA Extension Division to help guide the research process, and reflect on and respond to research findings. Informal, semiformal and formal learnings were incorporated as part of the PRA process. Informal learning continued throughout the research process as research participants analysed and discussed research findings. Thirdly, research results were progressively fed back to annual national workshops (2015, 2016, 2017) involving DOA district and township managers for comment, discussion and validation.

Specific research objectives of the institutional analysis of DOA included the following.

1. Undertake a baseline situation analysis of organisational structures, institutional relationships, internal policies and strategies, and future organisational development plans at the national level.
2. Conduct an institutional analysis of government research and extension agencies at the township level to understand the effectiveness of policy implementation, as well as the responsiveness to rural needs.
3. Using a participatory action research approach, identify and assess pathways for agricultural institutional capacity development for research, extension and policy change.
4. Document and analyse the change process emerging from the participatory workshops to capture and share lessons learned with other relevant stakeholders.

Researchers, research subjects, and research users (collectively, 'research participants') worked collaboratively on identifying the research focus, the research questions, and desired research impacts and outcomes. Research findings were fed back in an *iterative* cycle of collaborative discourse between research participants for critical analysis, reflection, validation and action learning. Research findings and recommendations were framed in a way that rendered them *actionable.*

Methods used in this process included:

- initiation of a DOA *Institutional Research Working Group* comprised of senior management in DOA headquarters that guided the PAR process and provided feedback on draft DOA institutional policy brief;
- Workshops 1 (May 2015), 2 (May 2016) and 3 (May 2017) with DOA township and district level managers (48 people) to engage middle level DOA managers in the process; to provide them with an opportunity to express their views on the current focus and future of their organisation; and to allow them to progressively review and comment on the results of the MyLife project's institutional analysis of Myanmar's extension services.
- interviews with 12 DOA township & district managers (October 2015);
- Interviews and Focus Group Discussions (FGDs) at township level (220 respondents including farmers, village leaders, private sector, DOA staff);
- Learning Alliance research - to demonstrate how co-learning occurs with multiple stakeholders within different contexts and at different scales in Myanmar. This involved evaluative institutional research funded through project research grants

- *Innovative extension research* in 6 Townships - case study research on innovative DOA extension activities in Min Dat, Demasoe, Natogyi, Kyatpadaung, Myitkyina and Waimaw Townships, where key informants were local extension staff, farmers, NGOs and private sector representatives.

Table 2 Summary of methods applied to fulfil Objective 2

Method	Aim	Timing	Location	Research team (institutions)
Initiate DOA *Institutional Research Working Group*	Guide and manage PAR process, provide feedback on policy brief.	2016	DOA headquarters	YAU, DOA, DAR, UNE
Workshops 1	Engage middle level DOA managers, provide them with an opportunity to express their views on the current focus and future of their organisation.	May 2015	NPT	YAU, DOA, DAR, UNE
Workshop 2	Engage middle level DOA managers, provide them with an opportunity to express their views on the current focus and future of their organisation.	May 2016	NPT	YAU, DOA, DAR, UNE
Workshop 2	Engage middle level DOA managers, provide them with an opportunity to express their views on the current focus and future of their organisation.	May 2017	NPT	YAU, DOA, DAR, UNE
Interview 12 DOA township and district managers	During Workshop 2 in 2016 to validate research findings as well as undertake additional institutional research at township level.	May 2016	NPT	YAU, DOA, DAR, UNE
Interviews and FGDs at township level	220 respondents including farmers, village leaders, private sector, DOA staff.	Oct 2015	Minbu Township, Shwe Bo Township	YAU, DOA, DAR, UNE
Policy interviews with senior government officials	MOALI Deputy Minister and Permanent Secretary; DOA Director General and two Deputy Directors General; and the DAR Director General. Request general comments on the paper's findings and recommendations, and which recommendations the respondents felt should be further supported by the ACIAR.	Oct 2016	NPT	YAU, DOA, DAR, UNE
Learning Alliance Research	To demonstrate how co-learning occurs with multiple stakeholders within different contexts and at different scales in Myanmar. Evaluative institutional funded through project research grants.	2015-2016	Nyaung-U (in collaboration with Dahat Pan) Rice Learning Alliance (in collaboration with MyRice project) Maubin Township	YAU, UVS, UNE in collaboration with Dahat Pan

Farmer Reference Group Research	A longitudinal, qualitative study to track change processes and outcomes over time, which included examining drivers of farmer decision making and their adoption and adaptation strategies.	2015-2016		YAU, UNE
Case studies: Innovative extension research	Case study research on innovative DOA extension activities. Key informants were local extension staff, farmers, NGOs and private sector representatives).	Oct 2016, Feb 2017 May 2017	Mindat, Demasoe, Natogyi, Kyatpadaung, Myitkyina and Waimaw Townships	
High Social Capital Research	To identify and learn from existing high social capital rural groups in Myanmar.	2016-2017	Meiktila (CDZ)	UNE, CESVI
Contract Farming Research	To identify how local institutions including farmer groups, DOA, DAR, NGOs and private sector can collaborate effectively on contract farming arrangements.	2017-2018	Magwe Township (CDZ), Yangon region, Myin Gyan Township	UNE
Women's Empowerment Research	To identify the influence of NGO activities on rural women's empowerment in rural Myanmar.	2017-2018	Meiktila township (CDZ), Nyaung Shew Township (Shan State), Man Pan Township (Shan State), Hpa An Township (Kayin State)	UNE, CESVI, SIT, NAG

5.1.2 Innovative extension research

Research into innovative extension practice was conducted in October 2016, February 2017 and May 2017 in the townships of Kyaukpadaung, Demasoe, Mindat, Waimaw, Myitkyina and Natogyi, using a local institutional research approach. These townships were recommended by the project's Research Management Team members and their networks as representing innovative extension practice where DOA township extension staff were linking with other organisations and farmer groups in conducting their extension. As part of this research, interviews were conducted with DOA extension staff and the organisations and groups with whom they collaborate - including the private sector, farmer groups and non-government organisations (NGOs). The research highlighted that the benefits of inter-organisational collaboration were many and significant, including: more effective research and extension; leveraging of resources where resources were limited; trust-building between collaborating organisations and farmer groups; more effective satisfaction of farmers' technological and knowledge need; linkages between farmer groups and markets; and farmer income generation. Five 'fact sheets' in Myanmar and English languages were produced describing the outcomes of the innovative extension practice research.

5.1.3 Farmer Reference Group Research

The Farmer Reference Group Research was a longitudinal, qualitative study to track change processes and outcomes over time, which included examining drivers of farmer decision making and their adoption and adaptation strategies. The objectives were to:

1. Identify drivers to decision making over time in response to ACIAR commodity projects and non-project influences
2. Identify longitudinal livelihood impacts of project activities

3. Use farmer reference groups as a predictive assessment of the value, utility and attractiveness of new research/extension and technologies

Methods applied included in-depth interviews using a quantitative survey tool for the collection of socio-democratic characteristics, and a qualitative survey tool applied in 2015 and 2016 to document development and change.

Interview topics used in the study were: significant changes of social, economic, environmental factors at individual, household, community levels; accessing of extension services and advice; provision of extension advice and information to other farmers; shocks; credit; market access; effect of migration for farm tasks; changes of income; labour requirement and mechanisation in farming; and participation in formal or informal groups.

Final reports were presented at the Project's mid-term conference in June 2016.

5.1.4 High social capital farmer group research: including linkages to markets

This research has been implemented to identify and learn from existing high social capital rural groups in Myanmar and their collaborating institutions including NGOs, private sector and government organisations. Social capital is defined as those aspects of social organisation that lead to better development outcomes, and that contribute to, or enhance, community participation, internal and external communication, community decision-making, consensus building and conflict resolution. It is recognised that well organised and cohesive farmer groups with high levels of social capital are less vulnerable to food insecurity, and are better able to adapt to social, environmental and economic changes, including climate change adaptation. This cohesive group capacity is particularly important for small and poor farmers, whereby membership of an effective group allows farmer to farmer extension, learning and knowledge exchange, and facilitates household, gender and community empowerment processes. High social capital farmer groups are much better able to link to market opportunities and increase household incomes. This research had a strong focus on how to rapidly develop the capacity of farmer groups, including female farmer groups, to link to market opportunities and to adapt to changing environmental, social and economic circumstances.

The primary outcome of this research was the identification of strategies for developing effective farmer groups to enable climate change adaptation, to improve food security, and to connect to markets.

The following research objectives were intended.

1. Identify the **attributes of high social capital rural groups** across a range of socio-ecological zones in Myanmar.
2. Identify the extent to which the attributes identified in 1. above have contributed to **improved livelihood outcomes**, adaptability and resilience of these groups.
3. Undertake an analysis of the **behavioural norms and practices** which characterise high social capital groups in different contexts.
4. Identify the **causal factors and progenitors** leading to the development of high social capital groups.
5. Seek to develop **analytical tools** that will facilitate the functional classification of groups into stages of social capital development.
6. Identify **development intervention strategies** which are likely to enhance social capital attributes within rural groups.
7. Assess the extent to which social capital contributes to **rural development investment multipliers** to achieve development impacts and outcomes.

This research was undertaken during 2016 and 2017 in collaboration with the Italian international NGO CESVI in Meiktila Township in the Central Dry Zone. Individual interviews and focus group discussions were undertaken within 6 case-study high social capital farmer groups.

5.1.5 Contract Farming Research

The project conducted case study research dealing with contract farming in Magwe Township, Myin Gyan Township and Yangon Region, involving the production of black sesame, white sesame and mung beans for the export market. In this contract farming research, using key informant interviews and focus group discussions, the Project investigated the appropriate roles of farmer groups, the DOA, the DAR, NGOs, and the private sector stakeholders to enable the development of effective and efficient and equitable contract farming value chains. Each time case study research was conducted, the project was able to build a body of knowledge about how best to facilitate contract farming institutional arrangements for the export market. As part of this research, the research findings were fed back to the stakeholders at 2 workshops in Kyauk Se Township during 2017-2018.

Results of this will this research were also presented to DOA's national program planning workshop in Nay Pyi Taw in June 2018.

5.1.6 Women's empowerment research

Based on MyLife high social capital research with the NGO CESVI the project team decided to investigate the issue of women's empowerment further and conducted additional research into the impact of NGO activities on women's empowerment in rural communities in Myanmar.

The specific research questions were as follows.

1) Do women participating in NGO activities disseminate their knowledge to the rest of the population? And if so how does this dissemination take place?
2) Which factors contribute to the leadership of women in the communities? Is there improvement in women's leadership roles in communities collaborating with NGO's?
3) Which factors constitute discrimination against women in the rural communities?
4) Did NGOs contribute to a change in gender roles in the local communities and if so which change? Have some traditional gender roles been strengthened?

Research sites for this activity were Meiktila township (CDZ) with partner INGO CESVI (Oct 2017, March 2018); Nyaung Shwe township (Southern Shan State) with partner NGO Shwe Inn Thu (March and June 2018) and Man Pan township (Northern Shan State) as well as Hpa An township (Kayin State) with partner NGO NAG (June 2018).

Research sampling included:

- key informant interviews with executive level NGO staff;
- group interviews with local level NGO staff;
- a selection of 5 communities with significant women's empowerment progress and collaborating with an NGO;
- 1 control community (not collaborating with any NGO);
- in each community: 10 individual household surveys (beneficiaries, non- beneficiaries; 8 women, 2 men) in each community;
- in each community: 1 focus group discussion with survey participants

Methods used for the women's empowerment research activity included: key informant interview guides; group interview guides; a qualitative household survey instrument and focus group discussion guides as developed and administered using Kobo toolbox, an application for mobile device supported field data collection.

Data analysis is still in progress and publication of results is planned for 2019.

5.1.7 Women's empowerment video interviews

In June 2018 the UNE MyLife team conducted video interviews in three communities in Nyaung Shwe Township, Southern Shan State, which had previously participated in women's empowerment

research. The purpose was to document successful examples of how collaboration with an NGO can contribute to women's empowerment. In addition, interviews were conducted with Shwe Inn Thu staff and the program manager. Interview guides were developed for male and female community members, Shwe Inn Thu staff and the Shwe Inn Thu program manager.

The resulting videos will be shared with the NGO for marketing purposes as well as with DOA and DAR for training and teaching activities.

5.2 Objective 3: Institutional Capacity and Human Resources Development

Table 3 Summary of methods applied to fulfil Objective 3

Method	Aim	Timing	Location	Research team (institutions)
Initiate DOA *Institutional Research Working Group.*	Guide and manage PAR process, provide feedback on policy brief.	2016	DOA headquarters	YAU, DOA, DAR, UNE
Participatory analysis of organisational structures, policies, plans, strategies, resources, and internal and external institutional relationships and processes.	Institutional analysis of key organisations. Ownership of research and analysis process by each Myanmar organisation.	National workshops held: May 2015 May 2016 May 2017	NPT	DOA YAU DAR Regional Alliances UNE
Conduct key decision-maker 6 interviews.	Gain endorsement of the discussion paper's findings and recommendations, and stated their plans to commence implementing some of these recommendations.	October 2016	NPT	MOALI, DOA, DAR, UNE
Staff surveys for capacity needs identification.	Capacity needs analysis document produced for DOA and YAU.	Conducted during National workshop 2017	NPT	DOA, YAU, DAR, UNE
National workshops with DOA District and Township Managers	In-depth understanding of organisational culture and processes. Testing and validation of research findings	National workshops held: May 2015 May 2016 May 2017	YAU and Nay Pyi Taw	Completed.
Research Planning workshops.	Institutional research objectives, strategy and organisational ownership.	October 2016 February 2017 May 2017		RMT. At the 2017 workshop CESVI was also in attendance.
YAU curriculum development for agricultural extension and livelihoods courses at Yezin Agricultural University.	Curriculum includes knowledge outcomes from livelihoods and extension research	July and August 2016		Crawford Fellowship funding was gained for Dr Nyein Htwe from YAU.

5.2.1 Trainings

MyLife project implemented a range of training activities for the capacity and human resources development of partner organisations which included the following.

- Participatory Rural Appraisal Training (May 2015): provided by the UNE team to 9 RMT members. These 9 individuals trained 34 trainees from: YAU, UVS, Dahat Pan project, DAR, DOA, MyFish project.
- Training in Qualitative Research Techniques.
- Enumerator Training (October 2014): Provided to DOA staff to conduct the livelihoods survey.
- Qualitative Research techniques. Provided by the UNE team, for researchers undertaking research projects on Farmer Reference Groups (FRG), LAs and Institutional Analysis were trained in qualitative research techniques (semi-structured interviewing and focus groups).
- Livelihoods workshops run by AIT during the MyFarm Annual Meeting 2015 for the other MyFarm project component.
- Tools and Techniques for Effective Group Facilitation (March 2016).
- Training and Workshop at YAU in modern university teaching methods; and online teaching and learning (May 2016.)
- Training of DOA staff in Managing and Facilitating Farmer Groups (May 2016): provided as joint activity with MyPulses project to 14 DOA extension staff.
- Introductory training in gender awareness (May 2016).
- Follow up training on gender awareness: Ms Kuntalika Kumbhakar from PRADAN (September 2016), 11 participants (9 women, 2 men).
- Participatory Rural Appraisal Training: 50 participants in DOA's Central Agricultural Research and Training Centre (CARTC) (January 2017).
- Agribusiness Master Class: for AIT project staff (April 2017).
- Commcare training and workshops: AIT project staff attended training "Commcare Application Training and Workshop" held in Cambodia by ACIAR.
- Two regional workshops and one national presentation on results of the contract farming research.

5.2.2 Curriculum development for agricultural extension and livelihoods courses at Yezin Agricultural University

Educational capacity building focuses on the development of a modern agricultural extension curriculum, as well as introduction of modern teaching methods, including Problem Based Learning approaches (PBL). Dr Nyein Nyein Htwe has completed a Crawford Fund Fellowship in Australia to enhance her skills in how to formulate a modern agricultural extension curriculum, as well as an introduction to modern teaching methods.

The broad objectives of Dr Htwe's Fellowship were as follows.

1. To study modern tertiary teaching methods, and apply them to the development of an agricultural extension curriculum relevant to YAU.
2. To study the types of support given to undergraduate and postgraduate students in terms of developing key academic skills.
3. To develop agricultural extension teaching curricula relevant to various teaching levels at YAU.

As a result of her Crawford Fellowship and supported by UNE Dr Nyein Nyein Htwe has developed an extension curriculum that is now taught at YAU.

5.2.3 Study tours

MyLife project organised 2 study tours for project partners.

Study tour to Vietnam 27 May – 10 June 2017

In June 2017, the project led a 12-day study tour of extension services and associated research services in Vietnam for six Myanmar members of the project's Research Management Team from DOA and DAR, including the Director General of DAR. The focus of this tour was to illustrate innovative extension to Vietnam (see itinerary in Appendix 11.1). The tour involved visits to Vietnamese universities, a policy think-tank, research institutes and three innovative IFAD models of entrepreneurial farmer-farmer extension using out-grower and contract farming models. The impact on the development of participants' capacities, as well as benefits they will have received from learning and reporting on the Tour are expected to be significant.

Study tour to Australia 31 March – 13 April 2018

The objective of this study tour was to investigate innovative research and extension practices in eastern Australia of relevance to Myanmar (see itinerary in Appendix 11.2). In particular, there was a strong focus during the study tour on private sector and industry involvement in agricultural research and extension. The learning outcomes from the study tour to build on the outcomes from the Vietnam study tour which was conducted in 2017.

This tour made significant impacts, with: enhanced scientific knowledge of natural resource management issues and approaches through Landcare, and appreciation of new crop production technologies, post-harvest management, market orientation and market focused contract farming arrangements. Additionally, the co-funding of extension and research activities by public agencies and agricultural producers was noted with keen interest by the study tour participants.

DAR staff reported that: 'In the near future, it is strongly believed that associations of crop producers, contract farmers, seed growers, water users and other stakeholders will be formed in Myanmar'. Already DAR is facilitating the development of community-based farming models following the Australian examples.

6 Achievements against activities and outputs/milestones

Objective 1: To integrate an understanding of farmer livelihoods and household drivers of decision-making into agricultural research and extension services in the Central Dry Zone and Ayeyarwaddy regions.

Table 4 below describes the activities, outputs, milestones and outcomes of Objective 1.

Table 4 Activities, outputs and milestones Objective 1

No.	Activity	Outputs/ milestones	Completion date	Comments
1.1	**Engage with four commodity-based components (in Myanmar).**			
1.1.1	Provide support to on-ground research, advice in research design, and support for data collection relevant to socioeconomic component.	Collaboration Report on collaboration strategies and outcomes.	Y1, m4	Completed
1.1.2	Discussions with other components regarding socio-economic data collected as part of their projects. Discuss feasibility/utility of drawing out broad findings across data sets.	Components' input into survey questionnaire. Focused data reports on requested data.	Y1, m8 Y2, m6	Completed Completed
1.2	Collate and **review** available information on livelihoods, household decision-making, community social dynamics and extension services in CDZ and AD.	Project report; database and compilation of secondary data on livelihoods, decision-making, social dynamics and extension services.	Y1, m6	Completed
1.3	**Select eight township research sites**, four common to the other components, and four external to other components.	Sites selected and agreed to by components and project partners.	Y1, m3	Completed
1.4	**Household survey**			
1.4.1	**Baseline Survey**			
1.4.1.1	Design of household surveys in collaboration with other components and project partners (YAU, MAS).	Surveys to collect data on livelihoods, decision-making, social dynamics and extension services relevant to all five components, and complement data collected by other components.	Y1, m6	Completed
1.4.1.2	Training of survey interviewers (enumerators) and supervisors (from YAU).	Interviewers and supervisors trained and satisfactorily complete pilot survey.	Y1, m7	Completed
1.4.1.3	Piloting of survey instruments.	Final version of survey instrument developed.	Y1 m8	Completed
1.4.1.4	In each of eight sample township areas and four to six villages conduct household surveys (quantitative and qualitative) with baseline survey in Year 1.	Raw data files.	Baseline: Y1, m11	Completed

No.	Activity	Outputs/ milestones	Completion date	Comments
1.4.1.5	Preliminary statistical analysis of household survey results in AD and CDZ.	2-Volume 'Regional Profile' (previously referred to as 'data compendium').	Baseline by June 2015	Completed
1.4.1.6	Compilation of data specifically relevant to particular components (i.e. summarising questions included in survey by request of components, and other information as needed/negotiated).	Supplementary technical chapters.	Y2, m8	Completed
1.4.2	**Focus groups**. In each of eight sample township areas and four to six villages conduct focus group discussions.	In-depth understanding of livelihood strategies. Will complement the livelihoods survey and inform the development of household types.	Baseline: Y1, m11	Completed
1.4.2.1	Develop focus group discussion. Train interviewers in reference survey technique.	Focus group guide/questions developed. Interviewers trained.	Y1, m10	Completed
1.4.2.2	Conduct focus group discussions.	Transcripts (Myanmar language). English summaries .	Y2, m6	Completed
1.4.3	**Final surveys on key topics**			
1.4.3.1	Design of final surveys in collaboration with other components and project partners (YAU, DOA and DAR).	Surveys collect quantitative and qualitative data on specific topics: 1) collaboration with MYRICE; Changes in intensification, crop production system due to interventions (varieties, technologies, machines); 2) collaboration with Dahat Pan - impact of mechanization on draught animals & livestock rearing; 3) assessment of access to financial services by landless in rural areas; 4) impact of rural businesses on rural livelihoods; 5) factors affecting women's labour involvement in agriculture.	Y3, m11	Completed
1.4.3.3	For each topic, conduct survey (quantitative and qualitative) in four villages of two sampled townships in AD and/or CDZ.	Raw data files.	Y4, m4	Completed
1.4.3.4	Preliminary statistical analysis of survey results for key topics.	Five working papers on specific topics.	Y4, m10	Completed (included in appendices in each Compendium)

No.	Activity	Outputs/ milestones	Completion date	Comments
1.5	**Household typology**	Short descriptions / reports that explore the different types of households.	Y2, m12	Completed
1.5.1	First draft of types based on Household Survey (1.4) and Focus Group Discussions (FDGs) (1.5).	Short descriptions or visual mechanisms for communication of qualities for each type.	AD: Y2, m7 CDZ: Y2, m12	Completed
1.5.2	Field validation – confirming household types are locally relevant – looking for 'missed' types and types that may not be relevant.	Refined version of household types.	AD Y3, m5 CDZ, Y3, m9	Completed
1.5.3	Expert workshops. Aim to a) test / refine household types based on 'expert' knowledge; explore implications of different interventions (e.g. fish/rice etc) for different household types.	Final version of types.	Y3, m9	Completed
1.5.4	Working paper documenting process and findings for household types from baseline survey and final surveys on key topics.	Working paper.	Y4, m11	Presented paper at South East Asian Geography Association Conference in Jakarta, as the basis for 1.7
1.6	**Communication of knowledge outcomes** to internal and external stakeholders (including JICA, LIFT, UNDP, FAO and broader NGO sector).	Reports to ACIAR. Program annual review and planning meeting. Presentations and facilitated co-learning discussions at regional learning alliances. Also as per 1.5.3.	Annual review meetings; biannual newsletter and annual reports. Annual workshops with each of the regional learning alliances.	Completed – participation in annual meetings and ACIAR MyFarm showcase; Youtube videos. Nay Lynn (AIT Masters student) involvement in rice learning alliance.
1.7	**Journal paper** on household livelihood profiles in rural Myanmar.	Accepted for publication.	Y4, m12	In preparation

Objective 2: To identify, and support the implementation of, effective farmer extension methodologies (i.e. Improving Farmer Extension Strategy and Pathways to Adoption)

Table 5 below describes the activities, outputs, milestones and outcomes of Objective 2.

Table 5 Activities, outputs and milestones Objective 2

No.	Activity	Outputs/ milestones	Completion date	Comments
1.1-1.10	**Extension survey data** will be included in activities 1.1–1.10, as for Objective 1 for eight sample townships and four to six villages. Conduct household surveys (quantitative and qualitative) with baseline survey in Year 1, and final survey in Year 4.	Descriptions developed of: current agriculture and fisheries practices; information sources; knowledge networks; decision frameworks; social networks.	Baseline: Y1, m11	Completed
2.1	Farmer Reference Group interviews: stratified across household typologies, social capital and farmer group interviews in case study communities.	Identification of ACIAR project component impacts and technological change; livelihoods changes and vulnerability. Five case studies of high social capital farmer groups were undertaken with Village Development Committees and community beneficiaries in Meiktila township, CDZ.	Annual survey Y2, m3 Y3, m3 Y4, m3 August 2016 February 2017 May 2017	Research report completed and published Book chapter in publication
2.1.1	Develop and pilot reference group survey instrument.	Reference instrument developed and piloted.		Completed 2015
2.1.2	Train interviewers in reference group survey technique.	Interviewers trained in reference survey technique.		Completed 2015

No.	Activity	Outputs/ milestones	Completion date	Comments
2.2	High Social Capital Farmer groups (HSC) livelihood improvement, and linkages to markets: case studies of high social capital farmer groups and cooperatives undertaken with community beneficiaries, and government, private sector, and NGO stakeholders.	Book chapter accepted for publication; and due to be published before the end of 2018.	Case study field work Y 5 m2	Completed 2017
	Identification of strategies that rapidly build social, capital and linkages to markets and achieve income improvement.		June 2016	Completed
	Assessments of women's social and economic empowerment through collaboration with NGOs.	Survey summaries for NGO partners ACIAR workshop presentation.	Survey and Focus group discussions (June 2018)	Feedback reports to NGO partners completed June 2018
		Publication (in progress).	Data analysis in progress	Ongoing
		Video interviews showcasing women's empowerment.	Filming in Nyaung Shwe Township June 2018	Production Ongoing
2.2	Communication of knowledge outcomes to internal and external stakeholders (including JICA, LIFT, UNDP, FAO and broader NGO sector).	Annual reports to ACIAR. Annual review meetings; biannual newsletter and annual reports.	Completed 2018	Completed
		Program annual reviews and planning meeting.	October 2017	Completed
		Final program review and showcase.	October 2017	Completed
		Scientific blog (RAID).	January 2018	Completed
		ACIAR gender workshop.	June 2018	Completed
		Social media (UNE International Development).	October 2017 – June 2018	Completed
2.3	Journal paper on effective extension mechanisms.	Accepted for publication.	Y4, m12	In preparation

Objective 3: identify and assess pathways for agricultural institutional capacity development for research, extension and policy change

Table 6 below describes the activities, outputs, milestones and outcomes of Objective 3.

Table 6 Activities, outputs and milestones Objective 3

No.	Activity	Outputs/ milestones	Completion date	Comments
3.1	Institutional Research Working Groups (IRWGs) formed for each participating Myanmar organisation.	IRWGs formed and supported by participating organisations.	Y2, m1	IRWG provided comment on project's draft policy discussion paper emerging from institutional analysis research. At least one IRWG member attended IAR workshop on 15 May 2017.
3.2	Participatory analysis of organisational structures, policies, plans, strategies, resources, and internal and external institutional relationships and processes.	Institutional analysis of DOA YAU DAR Regional Alliances Ownership of research and analysis process by each Myanmar organisation.	National workshops held: May 2015 May 2016 May 2017	Completed
3.3	Conduct key decision-maker interviews.	Key decision-makers as opinion leaders and policy makers in the institutional change process.	October 2016	In October 2016, interviews were conducted with senior government officials including the MOALI Deputy Minister and Permanent Secretary; DOA Director General and two Deputy Directors General; and the DAR Director General. These officials endorsed the discussion paper's findings and recommendations, and stated their plans to commence implementing some of these recommendations.
3.4	Staff surveys for capacity needs identification.	Capacity needs analysis document produced for DOA and YAU.	April 2017	Capacity development plan for DOA produced in draft form.
3.5	Focus group interviews: staff and stakeholders.	In-depth understanding of organisational culture and processes Testing and validation of research findings.	National workshops held: May 2015 May 2016 May 2017	Completed
3.6	Research Planning workshops.	Institutional research objectives, strategy and organisational ownership.	October 2016 February 2017 May 2017	RMT meetings

No.	Activity	Outputs/ milestones	Completion date	Comments
3.7	YAU curriculum development for agricultural extension and livelihoods courses at YAU.	Curriculum includes knowledge outcomes from livelihoods and extension research.	July and August 2016	Crawford Fellowship funding was gained for Dr Nyein Htwe from YAU, to travel to Australia for nine weeks to study modern agricultural extension teaching methods at university-level, and extension research methods. Outcomes of Dr Htwe's visit were a revised extension curriculum for YAU and the adoption of modern teaching methods at YAU.
3.8.	Support for development of teaching materials.		July and August 2016	Dr Nyein Htwe's visit to Australia supported the development of agricultural extension teaching materials.
3.9	Communication of knowledge outcomes to internal and external stakeholders.	e-newsletter and reports to ACIAR Myanmar program annual review and planning meeting.	October 2016 Annual update meetings Biannual newsletter and annual reports.	Policy discussion paper produced entitled: 'Toward more effective extension sector in Myanmar' and circulated to senior MOALI decision makers. Printed outputs from mid-term project conference proceedings including policy briefs. Six research books have been published and printed.
3.10	Journal paper on institutional development of Myanmar's agricultural research sector.	Accepted for publication.	Y4, m12	Planned publication 2019

7 Key results and discussion

7.1 Crosscutting objectives – key results and discussion

7.1.1 Research Management Team

The establishment of the Research Management Team (RMT) has led to a strong, collaborative partnership between the key MyLife partner organisations - Yezin Agricultural University (YAU), Department of Agriculture (DOA) and Department of Agricultural Research (DAR) at various levels – up to the national Ministry.

The achievement of the formation and effective functioning of the RMT is that institutional collaboration between the three Myanmar government departments has been strongly forged, where previously there was very little collaboration between the three. In addition, the RMT members facilitated effective dissemination and communication pathways back to their employing organisations and senior officials. Care has been taken to, as much as possible, devolve decision-making power regarding project activities to the RMT members, and the collaborative decision-making process.

7.2 Objective 1: Farmer Livelihoods and Farmer Decision Analysis – key results and discussion

7.2.1 Household types

Household types are summarised in Figure 1. Not only are there regional differences but the structure and resource access of households vary greatly and, to a large extent, determine the development path of households. Rather than treating the rural population as a homogenous whole, we identified groups: those which have the potential to intensify production and transcend their livelihoods, those which will remain subsistence-oriented smallholders in the medium-term future and others which may exit the rural workforce.

Given that agriculture in Myanmar is still very much a process driven by manual labour, the availability of agricultural labourers is critical to maintaining production. Mechanisation efforts are underway (see below) but cannot be enacted instantly. At the same time, rural landless have only labour migration as an opportunity to escape the poverty trap. The analysis presented here takes a systemic view of these issues and poses questions about the future of agricultural development in Myanmar. This allows for the identification of policy interventions that support a stable and sustainable agriculture as the backbone of Myanmar's economy.

Recent development in rural Myanmar leaves little choice to small-scale farmers than to either (a) find non-farm work or (b) intensify agricultural production through machinery and fertilisers. While the former usually comes with de-intensification of the production system and yield losses, the latter comes with high investment and maintenance costs. In the Ayeyarwaddy Delta (AD), Myanmar’s centre for rice production, farming households do not always have a choice. As in other countries of SE Asia, the general tendency is to increase inputs into the production system in order to make up for labour scarcity and to compete in regional markets. This does not mean, however, that the production systems become more efficient. While they have yet to reach levels resembling industrial agricultural systems, energy balances become increasingly unfavourable, without positively affecting the households’ profit margins. This leads to the assumption that for most rural households the move towards intensification is simultaneously a decline into a poverty trap.

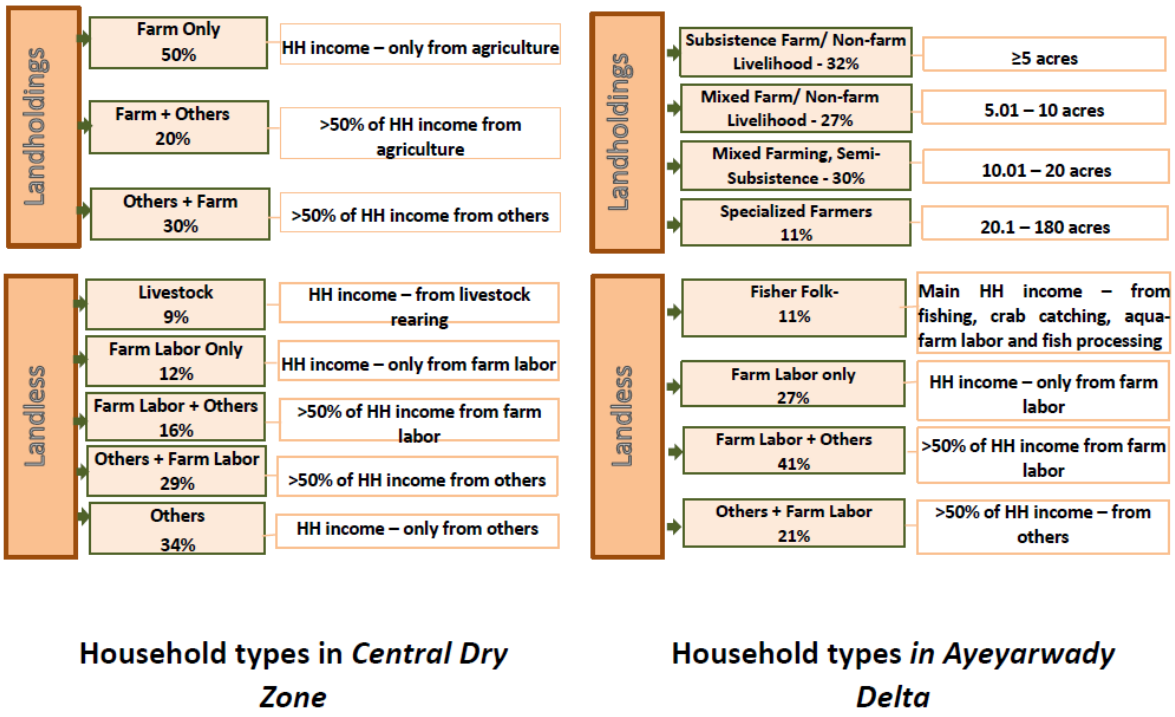

Figure 1 Household types developed by the MyLife project

7.2.2 Rural mechanisation and farm labour

Traditional links between landless and farming households are weakening due to the emergence of new industries and increased urbanisation creating new opportunities outside of the agricultural sector. While agricultural development schemes encourage intensified agricultural production and mechanisation, labour shortages increasingly arise in the peak cropping season as the number of farm labourers are drawn to better-paid off-farm jobs. Farmers respond with farm mechanisation that reduces the labour requirement. Data from this research shows that only a small percentage of landless households in either the Central Dry Zone (CDZ) or AD region rely on agricultural labour alone. Instead a shift was observed towards more diverse livelihood portfolios and non-farm work. This trend further amplifies labour shortages and leads to consequent production loss. Most farm machines, however, can substitute for animal power but cannot replace the human labour sufficiently to make up for the shortages. Furthermore, farmers suffer from the inadequate quality of farm machines and high maintenance costs. This research highlights farm labour shortages, as a result of non-farm development, and argues for considering that the effectiveness of the farm mechanisation processes will be ineffective without concomitant infrastructure development and access to support services.

7.2.3 Rural changes and women's involvement in agriculture (AD)

In agriculture, female labour plays an important role and contributes up to 50.5% of rural farm labour. Agricultural labour, however, is being affected by ongoing changes, such as farm mechanization, industrialisation and non-farm sector development. Research was conducted in AD region of Myanmar to look into: 1) how women are included in the labour market for agriculture; 2) which factors (farm mechanisation and non-farm sector development) affect women's labour contribution in crop production; and 3) what the impacts are of these changes on women's livelihoods. The results show that about 60% of adult female household members work in the farm sector. However, the total number of working days in agriculture has been decreasing over the past five years because of the utilisation of farm machines (combine harvesters) and changes to agronomic practices (from transplanting to broadcasting, and using herbicides). As a consequence, job opportunities in the farm sector have been decreasing for both men and women. Women traditionally have responsibility

to care for children and the elderly. Female migration, especially for married women, is hindered by traditional division of labour around the household as well as cultural norms and social hierarchies. As many off-farm jobs require people to migrate, women are constrained in their ability to take up these opportunities compared to men. The research paper sheds light on the female workforce and trends in rural employment for women.

Findings from the final surveys confirmed that a rural transition embracing new technologies and a reduced labour force is taking place in many areas, but that a host of limitations remain which may severely affect successful agricultural production in the future. One concern, for example, is the rate of outmigration from rural areas into urban centres or industrial zones. While small farms struggle to mechanise at a rate that can counteract this trend, it is rural infrastructure that is holding mechanisation back. It was observed that mechanisation can be rapid if rural infrastructure (roads, electricity, rural suppliers) is present, such in some parts of the AD. In contrast, however, most of the CDZ still does not have adequate access to basic services. Therefore, mechanisation cannot proceed as needed because of lack of power, transportation facilities, market access, skilled labour, and so on. As outmigration continues it may, thus, result in a decline in productivity, despite the efforts of international community support such as the MyFarm program. These trends need to be closely monitored and projects specifically designed to address their effects. This can be said specifically after observing the failures of Myanmar's hybrid rice programs of the past. Due to interrupted supply chains and lack of market opportunities, much was invested with very little impact among small farmers.

7.2.4 Rural mechanisation and draught animals (CDZ)

Farmers have been encouraged to use farm machines (especially two-wheeled tractors) to increase crop productivity, with the effect of displacing draught animals. Based on a household survey and focus group discussions in the CDZ of Myanmar, farmers prefer using motor ploughs and hand tractors for ploughing and harrowing as a solution to farm labour shortages, but they are still using cattle for levelling and transportation. More than half of farm households explained the motivation for replacing cattle with mechanisation lies with a shortage of family labour due to migration and non-farm sector development. Correspondingly, the purposes of cattle rearing are changing from draught animals to extra income sources or safety net assets. These issues highlight the inter-relationships between farm mechanization and livelihood transformations among farm households as rural Myanmar changes.

7.2.5 Access to financial services by landless in rural areas (CDZ)

Access to financial services, and credit in particular, has been highlighted as a major challenge for rural innovation. This is even more pertinent to landless households who do not qualify for state-subsidized credit schemes in rural Myanmar. Based on the household surveys and focus group discussions in the CDZ region, there are two types of loan providers for landless households: (i) formal organizations with lower interest rates, group payment systems and fixed repayment times; and (ii) private sources in village communities with high interest rates but no fixed repayment time. Village grocers are one of the key loan providers for landless households because the landless usually buy food in credit. Landless households have less capacity for managing loans to improve their livelihoods and it leads to their becoming trapped in a debt cycle. Taking loans to repay another loan has become very common among landless households. Periodical repayment systems and a lack of regular income mean landless households are struggling with debt. To improve livelihoods of landless households, rural development efforts need to consider capacity development and income generating activities in the design and implementation of programs that provide loans.

7.2.6 Household rationale for the adoption of farm machines (AD)

The use of farm machines has become increasingly common in the study areas in the last 10 years, largely in response to labour shortages. Although some farm machines are accessible, they are not

in use because of their unsuitability for local field situations. Farmers' decisions to buy or use farm machines largely depend on local field requirements such as labour shortages and crop intensification. Therefore, farm mechanization development programs should be based on local requirements.

AIT has produced a video presenting results of the livelihoods analysis including interviews of major sector stakeholders. Interviews with MyLife Research Management Team members were also filmed by the Farmers Channel, regarding the impacts of the project on their personal and professional lives. These videos can be viewed on the UNE International Development Facebook page: (https://www.facebook.com/uneintdev/videos/1957135547893803/)

7.3 Objective 2: Improve Farmer Extension Mechanisms and Identify Pathways to Adoption – key results and discussion

7.3.1 Institutional Analysis of the extension sector in Myanmar

The main findings of the MyLife investigation of the Myanmar agricultural extension sector were that:

- in general, DOA often has a weak relationship with farmers;
- many DOA staff believe that farmers do not trust them;
- some innovative Township Managers and their staff are doing very good work (documenting some of these innovative activities was a focus of additional research to develop innovative extension fact sheets in six townships);
- DOA mainly contacts larger, wealthier, male farmers ("contact farmers");
- many smaller farmers and female farmers have little DOA contact;
- limited and ineffective collaboration between DOA and DAR;
- limited collaboration between DOA, Private Sector and NGOs;
- significant benefits happen where multiple-stakeholder extension collaboration does occur with DOA (with private sector and NGOs);
- unequal opportunities for professional development and promotion within DOA;
- inadequate human and material resources;
- remote states and regions are more disadvantaged than other areas;
- extension staff education level is low and training limited (some are only agricultural high school level, especially in remote areas).

This research produced a policy discussion paper entitled *Towards a More Effective Agricultural Extension Sector in Myanmar: a Discussion Paper for DOA Institutional Development* which contained key findings, strategies for action and six key policy recommendations, and was presented to DOA in October 2016.

Recommendations formulated in this policy brief were that the following be implemented.

1. Staff training and capacity development in farmer livelihoods, and participatory research and extension processes (PRA trainings and household livelihoods research).
2. Increased *utilisation of farmer groups* for participatory needs-assessment and extension activities.
3. *Extension targeting* of *smaller farmers* and *female farmers*.
4. DAR *research and extension collaboration* with DOA.
5. Staff *training* and capacity development in key *technical areas*.
6. *Decentralised* agricultural development *planning* involving multiple stakeholders MOALI, farmers, NGOs private sector: at regional and local levels.
7. *Increased NGO and private sector collaboration* with DOA.

8. *Performance-based promotion* and reward systems for DOA.

Senior government officials, including the Deputy Minister, Permanent Secretary, two Directors General (DOA and DAR) and two Deputy Directors General (DOA) were interviewed in October 2016 to gain their response to these recommendations, and in general there was strong agreement with all recommendations.

These research findings and recommendations were presented during a DOA National Action Planning Workshop in May 2017, attended by four members of the Myanmar National Parliament *Agricultural Affairs Committee*.

The findings and recommendations were also presented to national parliamentarians during a MyLife workshop in the Myanmar National Parliament within the Amyotha Hluttaw (House of Nationalities) in October 2017. The national parliamentarians endorsed the MyLife project's findings and recommendations, and made some additional recommendations of their own.

7.3.2 Learning Alliance Research

Two Learning Alliance (LA) research projects were funded by the MyLife project. One livestock regional LA was conducted in collaboration with the livestock-focused Dahat Pan in the northern part of the Central Dry Zone, at Nyaung Oo Township. The second was a township level rice LA conducted in collaboration with the MyRice project at Maubin Township in the Ayeyarwaddy Delta.

Dr Thet Khaing led the livestock LA research with the Dahat Pan, as part of the YAU Faculty research portfolio conducted by the MyLife project (see Appendix 11.4).

This livestock-focused research found that the LA approach was useful for building bridges between farmers, researchers and NGO staff associated with livestock farming. However, there is scope for improvement in several areas. The greater autonomy and informality of the learning process meant that lessons learned were not always fully explained, shared or documented, and may well have provided a learning agenda that suited only some of the farmers. Furthermore, the follow-up to learning experiences could be more systematic and strategic.

With respect to technology transfer, technologies to be introduced should be provided in ways which are timely and useful for local situations. Also, to encourage the acceptance of new livestock-related technologies by farmers, it is important that NGOs, the Livestock Breeding and Veterinary Department (LBVD) and University of Veterinary Science (UVS) staff work collaboratively. These stakeholders should also ensure they are familiar with the application of the technology under the field conditions actually experienced by livestock farmers.

Mr. Aung Phyo led the rice LA research in collaboration with MyRice project (see Appendix 11.4).

Conclusions and recommendations from the rice LA research are that farmers invent and develop many technical devices, machines and procedures, without a need for modern science and formal research. Prominent among farmers' innovations and developments is farm machinery and, indeed, most of the agricultural technology in use throughout the world has come from informal field-based innovation. In turn, scientists often base their research on technologies developed by farmers. In the case of the Maubin LA, it was found that farmers actively discussed the farm machinery provided by the International Rice Research Institute (IRRI) and made adjustments to the machinery to adapt it to their field conditions. Furthermore, 90 percent of the technologies developed and promoted by the IRRI have been brought from Asian farmers to the IRRI, by Asian researchers visiting the IRRI for one-year sabbaticals (Goodell 1982).

This LA research confirmed that the most successful researcher-developed technologies were those that the key stakeholders modified the most. Therefore, a co-development model is needed in which the key stakeholders and formal researchers develop technologies together, particularly in the adaptation phase. The improvements and adaptations made by farmers should be monitored, and relayed back to and assessed by formal research, to crystallize and disseminate the specific

principles or lessons developed. Farmers' learnings arise from the activities which constitute their day-to-day practice, and are experiential rather than experimental. Unlike researchers, farmers live and work on their farms; they have more time for observation and have the potential advantage that their unintentional perception may go hand in hand with intentional analysis, innovation and adaptation.

Overall, the joint learning process brought about by the Participatory Impact Pathway Analysis (PIPA) workshops, held as part of this LA research, and the LA itself provided outstanding networking approaches which all stakeholders could use. This learning process improved the capacities of stakeholders in the rice value chain and provided an enabling environment for them to explore ways of working together and with other interested groups. Through this experience, farmers realized that they could be value chain participants with a more active role in determining the profits they make from their harvests. The inclusive learning approaches also created new and trusting alliances among rice value chain stakeholders who share the goal of launching Myanmar back into the rice export market.

However, this research revealed that it can be difficult for professional researchers to know farmers' preferences and to understand the complexity of farmers' situations. However, farmers can express the problems they perceive to be relevant, and scientists and farmers need to connect to describe problems deserving of research so that research proposals and activities are formulated to solve problems of the end-users. It is essential to transfer major responsibility for adaptive testing to farmers, who should be encouraged to evaluate and adapt research outcomes and technologies to meet their own needs using their own ideas, methods and economic options. Farmers also have an advantage in disseminating agricultural innovation and can assist researchers and industry with this. Farmers consider it risky to adopt innovations coming from socially distant outsiders, compared with those innovations developed or promoted by other farmers. Therefore, where farmers working with researchers have acquired useful new knowledge, they can share it directly via their many social networks.

The rice-focused LA approach was useful for building bridges between farmers, researchers and extension workers in the specific context of rice-farming in Myanmar. The LA interactions led to a largely research-led mode of learning, about agronomic processes, by engaging farmers with experimentation and demonstration plots, implementation of protocols, discussion of technologies and presentation of research data. This LA approach supported explicit learning and adaptation, evidenced by an evolving technical learning agenda and reflection by farmers on their agronomic adjustments. The LA increased the number of stakeholders with whom farmers interacted and within this broader network, the learning agenda of farmers expanded beyond the initial concerns or interests targeted by the project.

Although the LA was valuable in linking technical and socio-institutional innovation, and fostering self-directed learning and experimentation with a broader agenda, it was not a perfect solution for making research more inclusive. Improvements could be made in several areas. For example, as for the livestock-focused LA, lessons were not always fully explained and shared, probably because the informal and rather self-directed learning process may have led to learning agendas and methods which suited only a specific sub-group of farmers. Also, the follow-up to learning experiences could be made more systematic and strategic. Nonetheless, reducing control from the research side and allowing a wider set of stakeholders to engage and guide the research agenda and flow of learning was likely to have been conducive for aligning interdependent stakeholders. This will support the creation of a more co-operative and enabling institutional environment for the future uptake of technology.

Furthermore, this LA research indicated that activities planned for farmers should be consistent with the actual conditions experienced by the farmers and whether the farmers can afford to undertake such activities given their limited resources. In addition, for technological transfer to occur, the technology and equipment should be introduced at a time and in ways relevant to local situations. In this regard the role of the facilitator is vital - it is one of the most important factors enabling farmers to accept a new technology. However, the facilitator should appreciate the application of the new technology in the context of the field conditions being experienced by the target farmers.

Overall, the LA facilitated farmers' learnings about the quality of rice grain required by the market, so farmers could produce better quality grains according to market standards and so sell product for a greater profit. The LA also built good communication and strong linkages between various stakeholders participating in the rice value chain. These positive developments will be reflected in the progress of future change and the basing of such change on LA-related experiences of what works and what doesn't.

This study made recommendations to the Myanmar Government, regarding public-private partnerships that would improve learning and adaptive capacity in the rice sector. The Government of Myanmar also used technical assistance from the IRRI for the development and implementation of the Myanmar Rice Sector Development Strategy (MRSDS), launched in May 2015. The MRSDS will serve as a guide for stakeholders to revitalize the country's rice sector and for Myanmar to regain its preeminent role in the global rice market. Thus, with the support of findings from this study, the LA approach can now be used as one way to further the co-operation among different rice (or other) value chain stakeholders and to link smallholder farmers to the market.

7.3.3 Cross-project activities with the MyPulses project involving farmer participatory crop benchmarking

One key factor affecting yield was the timing and amount of crop nutrient inputs (mineral fertilizers and farm yard manures). Farmers and farming families independently used new knowledge and learning about timing and nutrient inputs to develop action plans to change their farming practice based on their own unique farming situation. Whilst this project identified the need for many farmers to increase nutrient inputs (and for others to reduce them), it also showed that leaching may reduce the effectiveness of soluble nutrients such as S and N. Therefore, it is concluded that nutrient management strategies that address the risk of leaching are likely to deliver major yield improvements. The project purposefully recruited farming families (married couples), not just male farmers which is the default norm in Myanmar extension, so as to investigate potentially untapped opportunities for change when women are given previously unrecognised rights.

Female farmers in Myanmar do not traditionally have the same rights, access and opportunities as male farmers, and are therefore not recognised as farmers in the same way. Preliminary work on changing how women farmers perceive themselves, and how others perceive them began during this project, as part of a process of shifting societal attitudes and norms in directions that allow women to fulfil their potential as farmers. The project evaluation showed that for male and female farmers, acquiring knowledge and learning through a participatory action learning process in farmer groups was valuable to them. The action learning process whereby data collected from farmers' own fields were presented, analysed and discussed in farmer group meetings, followed by farmers using their new learning to reflect on their current practice and formulate action plans, was effective in leading to practice change. It enabled farmers and farming families to make significant changes to the ways they consider and apply fertilizers and manure, with regard to timing, amounts and types.

Specifically, the project led to an increase in the use of split applications of N and S fertilizers, based on observations in the 2016 monsoon crops. Some farmers experimented with this in the post monsoon crop with good results. Two key practice changes reported by farmers in their 2017 action plans (i.e. to change the way they use and apply mineral fertilizers) were implemented by 95% of farmers participating in the evaluation survey. Furthermore, these farmers reported that this had a positive impact on yields and costs, especially for groundnut. Thus, benchmarking has potential as an improved approach to extension in Myanmar, and provides an ideal vehicle for integrating the most important knowledge of soils and crop agronomy. However, more work is required on some of the key determinants of yield (particularly plant protection) and to cover all major crops. Training is also required to increase the knowledge and skills of advisory staff, although training materials could easily be developed for extension staff.

The approach to benchmarking used in this project, involving close collaboration between farmers and researchers, shed light on the reasons for yield gaps and the lack of responses to fertilizers that had been difficult to elucidate in previous research trials on research stations and unsupervised

experiments on farmers' fields. These insights have enabled the MyPulses team to set directions for future research, such as the complementary use of organic and inorganic fertilizer, split applications of soluble fertilizers and slow-release inorganic fertilizers. Engaging with dual-adult households meant that wives gained access to new knowledge which they would otherwise be excluded from, or be reliant upon their husbands to impart to them. Participating female farmers' understandings of the key project messages based on scientific learnings was similar to that of male farmer participants. The project set a precedent for the DOA Magwe office to purposefully engage with female farmers. The evaluation indicated that involving female farmers has dividends for joint decision making between husband and wife, particularly in a context where women appear to have more influence over household budget allocations for agricultural inputs than men. Overall, the project provided a blueprint for the further development of crop benchmarking in Myanmar as a modern approach to extension, should the opportunity arise.

7.3.4 Farmer Reference Group research

This research was conducted in collaboration with MyLegumes and Dahat Pan ACIAR projects as part of the YAU Faculty research projects (see Appendix 11.4).

The level of education of respondents in the selected townships was that of monastery education to middle school level. Households of the study areas were medium-sized (5.1-6.5 persons) and the dependency ratio was relatively low to medium (21.21- 42.62). Migration was high for Meiktila Township, as people were leaving to work elsewhere. The source of income for the head of the household was agriculture in Tatkon and Nyaung U but livestock in Meiktila Township. The primary source of household income in Tatkon was agriculture, and that of Nyaung U was service and agriculture. However, the source of annual income for Meiktila households was remittances from their older children. The proportion of expenditure was similar among townships. Farmers in all selected areas did not cultivate their own land, due to the limited availability of water and scarcity of labour. In Tatkon and Nyaung U, most respondents raised cattle for agricultural production purposes; however, most of the respondents in Meiktila raised village chickens followed by small ruminants.

Most of the respondents in the study areas experienced pre-monsoon drought and the loss of their crops. Crops were next sown when it rained. The main extension services in the study areas were provided by the DOA, DAR, agrochemical companies and farmer-to-farmer extension. The farmers reported that using a planter saved labour, seed and time, and that the planter was useful with some modification. However, the tyre wheel was inconvenient during driving and a lug wheel improved performance. The farmers thought that difficulties getting spare parts, and moving the planter from farm to farm (no farm roads, large farm sizes) would be the main problems for using the planter at the farmer level.

The villagers were invited to participate in the Dahat Pan project and showed interest in doing so. However, most of the villagers do not understand the objectives of the project very clearly. The livestock owners are interested in feed because of their experience of feed shortages during the dry season, and are aware of the advantages of sowing forage.

7.3.5 Research project and YAU policy briefs

A number of higher degree research projects and YAU Faculty research projects contributed to Objective 2 and produced final reports and policy briefs (see Appendices 11.3, 11.4, 11.5). These reports are also available on the YAU website for further dissemination (http://opac.yau.edu.mm).

7.3.6 Innovative extension practice fact sheets

The MyLife project's institutional analysis research of the DOA highlighted some major weaknesses and shortcomings in DOA's approach to extension and engagement with farmers. Nevertheless, as part of this research, some examples of innovative extension practice emerged. It was considered that it would be useful to conduct further research on this innovative extension practice, and highlight

constructive examples of effective extension being conducted by DOA staff. Based on key informant interviews with district and township managers during this project's annual DOA participatory action research workshops, six townships (Min Dat, Demasoe, Natogyi, Kyatpadaung, Myitkyina and Waimaw) were selected in which innovative extension practice research was conducted. Key informant interviews were conducted with DOA township managers and their staff, DAR staff, farmer groups, NGOs and private sector stakeholders with whom DOA staff were effectively collaborating.

As a result of this research, five two-page fact sheets were produced in both English and Myanmar language and distributed to DOA for further dissemination among their staff and senior government officials.

The value of this research, and the resulting fact sheets, has been to demonstrate that, even with limited resources and training, motivated and skilled township managers can undertake very effective extension activities that meet the livelihood needs of farmers.

This research on innovative extension practice made the following findings in the case study townships, that:

- DOA staff made effective and frequent contact with farmers, and worked with farmer groups;
- DOA staff had a strong focus on meeting farmers' knowledge needs and livelihoods needs, and improving their incomes;
- DOA staff actively collaborated with other stakeholders, including NGOs and private sector participants when possible, with the benefits being that DOA was able to leverage resources provided by other stakeholders such as transport, funding for training materials, facilitation enabled by NGOs, and linkages to good quality inputs and produce markets facilitated by private sector participants;
- farmers interviewed had a very high opinion of the DOA staff, and felt that DOA staff had a strong focus on meeting farmers' needs;
- high levels of job satisfaction were reported by DOA staff working in these collaborative relationships;
- NGOs and private sector participants reported that collaboration with DOA gave them access to technical knowledge that was not otherwise available.

7.3.7 Contract Farming research

This research found that for contract farming to be successful, the development of robust, trustworthy and effective local level institutional relationships was critical. The local parties to contract farming included farmer groups, DOA, DAR, NGOs and private sector organisations.

Overall, this research made the following conclusions.

1. Some organisation has to take responsibility for managing the overall contract farming system and institutional relationships, in order to meet the farmers' interests. In the case study research, this role was sometimes played by either an NGO or DOA, or shared by both organisations. In none of the case study areas were farmer groups or associations yet sufficiently strong, skilled or knowledgeable to be able undertake this role. However, in one case study area, Magwe, a large farmer association had been formed, and with the support of the local NGO Network Action Group (NAG), may develop this capacity over time.
2. Adoption of Good Agricultural Practice (GAP) standards and quality assurance testing may impose additional costs on farmers when moving from their traditional production systems.
3. For farmers to adopt GAP standards and practices, a price advantage is required that compensates them for the additional GAP costs.
4. Farmers need to know their financial breakeven point when using GAP and implementing quality assurance testing.

5. The private sector produce collectors must provide a fair purchase price to farmers that reflects the cost of production, and the profit that they are making for selling GAP-accredited products.
6. If farmers form groups, they are better able to share technical and market price information and undertake collective negotiation with input sellers and output buyers.
7. Small farmer groups can manage the quality control and meeting of GAP standards, and reduce the labour requirements of DOA staff in undertaking GAP monitoring and quality assurance assessments.
8. Farmers have more control over price and increased price certainty with contract farming.
9. GAP processes and records had the benefit of enabling farmers to calculate their costs of production.
10. With the introduction of GAP standards farmers are more aware of safe use of agricultural chemicals and food safety issues.
11. Farmers may have 3 stakeholders (DOA, NGOs and private sector) working for them to meet the farmers' interests.
12. Farmers became more knowledgeable about good postharvest practices under contract farming arrangements.
13. DOA may become more effective in their work with farmers, and DOA staff achieve higher job satisfaction.
14. Where smallholder farmers do not form groups, they struggle to engage with the value market chain, undertake the learning process associated with contract farming, and are in a weaker position in negotiating with private sector stakeholders.
15. Where contract farming was successful, amongst farmer groups, DOA, DAR, NGOs and private sector organisations, the following roles were critical.

DOA:

- providing training in GAP;
- providing technical advice;
- actively promoted contract farming;
- conducted on-farm research;
- aided contract development in the interests of the farmers;
- collaborated with other stakeholders;
- acted as a relationship broker between farmer groups and private sector operators;
- aided in contract development;
- facilitated collaboration between contract farming stakeholders;
- negotiated on behalf of farmers with the private sector; and could take on a mediation role between farmers and private sector;
- undertook farmer mobilisation and group facilitation;
- provided overall system management in the interests of farmers.

Farmer groups:

- self-organised into groups;
- provided effective group governance and good leadership to ensure trustworthy behaviours and quality control;
- provided self-governance of groups for producing quality products and meeting GAP standard, and monitoring and ensuring their members obeyed the GAP rules;
- collaborated in the production system;
- undertook good recording of production and labour costs to enable calculation of the "breakeven price" they should receive as a minimum for their product;
- undertook good recording to enable tracing of produce back to source growers;

- self-managed the monitoring of farmer adherence to GAP standards, to reduce the labour costs of DOA.

NGOs, where present:

- undertook overall system management in the interests of farmers;
- undertook farmer mobilisation and group facilitation;
- provided farmer trainings in non-technical areas such as financial management, leadership, record keeping, etc.;
- wrote contracts;
- negotiated on behalf of farmers with input sellers (e.g. of fertiliser) and crop collectors;
- facilitated linkages to market chains;
- provided machines for grain cleaning and bags for grain storage.

Private sector participants, primarily produce buyers:

- aggregated products for export market;
- provided quality control and feed back to farmers;
- undertook quality classification for obtaining different market prices;
- provided storage facilities; and managed storage risks (pests, fire, etc.);
- gave farmers a better price for products than local prices;
- in the case of one operator, organised a festival for 500 farmers every year;
- gave farmers 100% of domestic price for products intended for export;
- in the case of one operator, provided 50% profit sharing with farmers for the extra price gained on the export market.

The results of this research were shared during two contract farming workshops at Kyauk Se research farm in 2018. The objectives of these workshops were to share knowledge, identify key roles, develop collaborative business relationships, and initiate a discussion between 30 Kyauk Se Contract Farming stakeholders (Farmer Groups, DAR, DOA and the private sector). In addition, a national presentation to DOA regional and national managers was given during their annual meeting in Nay Pyi Taw in 2018.

As a result of this research, the Director General of the DOA has requested that UNE continue the contract farming research beyond the MyLife project. The Director General has also requested that UNE researchers contribute to writing the national ‘Standard Operating Practice’ guidelines for contract farming in Myanmar.

7.3.8 High social capital farmer group research

This high social capital (HSC) research had 3 objectives, which aimed to answer the following questions.

1. How is social capital expressed, and what are its attributes and indicators in the case study agricultural communities?
2. What is the range of *behavioural* expressions of HSC, and how can these behaviours be stimulated and developed in other communities?
3. How can rural development support a lower social capital rural group and, through carefully designed development strategies, build social capital in an effective and reasonably rapid fashion?

The results of research Objective 1 are summarised in Table 7 below.

Table 7 S ocial capital attributes exhibited by case study communities, their implications for improved household livelihoods, and attribute indicators

Social Capital Attributes	Household Livelihood Implications	Attribute Indicators
1. **Participation in networks:** Central to the concept of social capital is the existence of interlocking networks of relationships between individuals and groups. Bridging social capital networks are developed.	Participation in networks allows individuals to take advantage of the opportunities provided by group membership, including social learning, attracting larger bundles of resources and services, pooling community resources in times of hardship, and sharing experiences and the outcomes of on-farm adaptive trials of new technologies and practices.	• Number of and quality of *horizontal linkages* (involving provision or sharing of resources, exchange of knowledge and training, formation of partnerships etc.) formed with other groups at the same functional level or similar geographic area (e.g. local government agencies; other farmer groups; local NGOs; local private sector/agribusiness). • Number and quality of *vertical linkages* formed with other groups at a higher institutional, political or geographical level (e.g. higher level 'umbrella' groups of farmer groups; district and regional government agencies; research organisations; non-local private sector organisations).
2. **Reciprocity:** Reciprocity, or the expression of mutual relations (giving and receiving) between individuals or groups to each other, is also at the centre of social capital.	Collective actions such as co-operative tree planting, sharing of valuable information and knowledge, loans of equipment, and donations of time and resources, are all based on the principle of reciprocity: e.g. farmer to farmer extension and training; village credit and loan schemes; collaborative works.	• Number and variety of cooperative group works or activities. • Extent of sharing of knowledge (for example, within training and adoption of new technologies and practices, workshops and field days, production benchmarking and cooperative learning activities; sharing of knowledge on markets, business skills, and enterprise skills). • Collaborative trainings conducted within group or community; and between communities. • Extent of sharing of resources; farm tools and machinery; money; goods; land; animals; credit schemes.
3. **Trust:** Trust is based on the expectation that others will act in mutually supportive ways, or at least will do no harm. Alternatively, trust may relate to the expectation that others will act in a consistent and predictable manner.	Trust is a critical issue with regard to collaborative behaviours such as required for market cooperatives, and landscape-level natural resource management within participating communities. Trust and reciprocity are often closely linked, as reciprocal social arrangements often require a minimum level of	• Sharing of personal or potentially sensitive information within the group during co-learning, training or extension activities such as farmer field schools, production benchmarking, or during farm walks. • Exhibitions of trust and the development of positive relationships between community groups and government and NGO agencies demonstrated by such

Trust engenders a willingness to take risks in a social context.	trust. Trust is an important attribute of both bonding and bridging social capital.	actions as the use of agencies' extension and advisory services. • Transfer of management responsibility for programs, projects and funding allocation from donors/implementers to community groups and networks.
4. **Positive social norms:** Social norms are the standards and patterns of behaviour set and monitored by the group.	The identification and encouragement or enforcement of positive social norms, and discouragement of negative norms, within a group can improve community well-being and household livelihoods. Participatory and collaborative behaviours, conflict resolution and consensus building behaviours all contribute to helping communities to plan, take action and adapt. The group may impose formal or informal sanctions upon those individuals who do not observe the community group's accepted standards of behaviour.	• History of collaborative works. • Individual and community works and project activities are well-implemented and well-maintained. Group monitors and audits the timeliness and quality of individuals' works. • Collaboration for access to produce markets. • Group rewards appropriate behaviours, and penalises inappropriate behaviours. • Positive changes in gender relations and contributions to women's social, economic and political empowerment. • Low levels of vandalism, and damage to individual and community property. • Tidy, rubbish free, and well-kept village common areas. • External funding is well administered and accounted for. • Innovative project proposals developed that reflect community needs.
5. **Proactivity and innovation:** A critical outcome of the development of social capital is that of personal and collective action.	The advantage of proactive groups and communities are that they are likely to demonstrate motivation and continually ask questions, seek opportunities, and take actions that will lead to better livelihood and NRM outcomes.	• Group strategically plans at the group level, and monitors and evaluates plan implementation. • Group is somewhat aware of internal and external forces of change (social, economic, environmental and political); and plans to take advantage of opportunities and mitigate threats. • Group seeks innovation, adaptation, and positive change. • Development of new products for markets or development of new markets, or income generating activities. • Development of innovative community plans and project proposals to address future needs.
6. **Problem or issue identifiers:** High social capital groups have the ability	Where groups can identify problems or issues at the early stages of their development, then community	• Groups identify and work to address problems or issues in the early stages of their development,

to identify issues or problems at the early stages of their emergence, or even predict future issues or problems before they occur.	efforts, internal and external resources, and support services can be allocated in the appropriate manner.	or where local awareness or recognition of issue is still low. • Project proposals seek to address new issues.
7. **Local resource mobilisers:** Groups with high social capital have the ability to mobilise local resources.	• The ability to collectively and rapidly mobilise local resources means that communities can seize opportunities and mitigate threats at the community and household levels. • The advantages of a local resource mobilisation with regard to community development or natural resource management are that investments made by governments, NGOs and other organisations may be multiplied many times once local resources are mobilised.	• Historical evidence of resource mobilisation and distribution in time of opportunity or hardship. • Level of group contributions in cash or in-kind to projects. • Level of investment multipliers for each unit of donor investment (through community co-investment and cost-sharing).
8. **Learning from mistakes and successes, and scaling up and extending best practices:** High social capital groups and organisations have the ability to learn from their mistakes, identify successful strategies and technologies, and scale up and extended these strategies and technologies throughout the group and to others outside the group.	• Within agricultural and pastoral development and NRM there is a continual need to improve upon old strategies and technologies and develop new ones. • The community-adaption challenges posed by climate change and food insecurity require that communities rapidly develop, test and adapt new technologies and practices in order to maintain livelihoods and to survive.	• Evidence of lessons learnt, group learning, successful technologies and best practices being accumulated and documented. • Successful technologies, innovative practices and lessons learned being extended both within the group and outside the group. • Field days, seminars and trainings conducted by group for members and non-members. • Active farmer to farmer extension strategies employed.

9. **Social Protection:** High social capital groups may mobilise resources to specifically target the disadvantaged, poorer, or more vulnerable members of their community. Where groups undertake a social protection role, this indicates a high level of social capital.	• Social protection by the group provides individual households with a safety net should their circumstances deteriorate. • Aiding poorer or vulnerable members also engenders an altruistic group consciousness. • A group that adopts a social protection role is in a stronger position to achieve community-level adaptation to climate change, and the development of community-level food security strategies.	• Evidence of disadvantaged community members being targeted as of recipients of group benefits.

An important objective of this HSC research was to identify those causal or explanatory factors that contributed to the building of social capital in the case study groups. Broadly, both bonding and bridging social capital were important contributors to the success of groups. Such factors can potentially be utilised to purposefully build social capital in poor and disadvantaged communities.

The following factors were identified by this research as being instrumental in successfully developing HSC.

1. Provision of development interventions that progressively scaffold communities in building social capital.
2. A high level of individual commitment to the group, sense of unity and trust among group members.
3. Effective leadership and governance.
4. Participatory, transparent and inclusive group-level decision making.
5. Demonstration of clear benefits to group membership when compared with individual agency.
6. Clearly defined and governed positive behavioural norms and rules focused on group-wellbeing.
7. Effective conflict resolution.
8. Social protection of poorer, disadvantaged or more vulnerable members of the community.
9. Development of aspirational group-level goals that also met household livelihood needs,
10. ‘Look and learn’ visits to other HSC communities,

7.3.9 Women’s empowerment research

While in-depth data analysis is still in progress, preliminary results for Meiktila and Nyaung Shwe townships have been presented at the ACIAR gender workshop in Nay Pyi Taw in June 2018. 142 individual household surveys, 15 focus group discussions and 2 key informant and 2 staff group interviews have been used as the database for these preliminary results.

Preliminary findings

The International NGO CESVI has operated an integrated community development project (Shae Thot) funded by USAID in 2700 villages between 2011 and 2018. The priorities for this project were: 1) maternal and child health; 2) livelihoods and food security; 3) water, sanitation and hygiene; and 4) strengthening community governance. The model was based on the initiation of Village Development Committees but lacked an explicit focus on women's empowerment.

The Shwe Inn Thu program has been working successfully in Nyaung Shwe Township since 2009 and is focusing on women's empowerment, democratic governance, health, livelihoods, and the formation of women self-help groups. Community activities include the establishment of community banks (e.g. of rice, livestock, agriculture, education).

In both the above research sites women share knowledge gained through NGO activities with men and women both within and outside their households. They use formal settings (e.g. meetings) and informal settings. Social welfare activities, in which women play important roles, are also used to share knowledge from trainings. Women often have an information multiplier effect when they occupy leadership roles and are members of multiple groups. In the Shwe Inn Thu communities casual farm labourers working for other farmers have also been identified as knowledge brokers.

Factors contributing to women's empowerment and leadership are meetings, trainings and general group activities. Women have increased their technical knowledge, confidence, income (i.e. more freedom to invest), social status, community administration and activity in small businesses (wish to create income from home). In both sites individual women have been elected to be local administrative leaders. Access to finance has also been identified as one factor giving women the opportunity to take on leadership roles.

Responding women did not feel discriminated against, but there were gender differences in salaries, preferences of the sex of children and land ownership at both sites. Gender roles have gone through a positive change for women in all communities. Certain traditional role models have been enforced through project activities. In Nyaung Shwe Township, targeted trainings on gender awareness have contributed strongly to gender role changes.

In conclusion, women are important knowledge brokers. Both the Shae Thot program focusing on village development and the Shwe Inn Thu activities have increased women's leadership and confidence levels. There was no self-perceived discrimination, but many different expectations and norms. The communal gender roles have changed through empowerment of women. The multi-organisational approach implemented by Shae Thot has been able to address many community needs.

It was also found during the earlier social capital research that NGO development activities not specifically focussing on women's empowerment, but which build community social capital, can also achieve women's social and economic empowerment impacts. For example, transparent and inclusive community decision making processes, as well the role models provided by female NGO staff, can have a strong influence on improving women's decision making roles in rural communities. Thus, empowerment can be achieved by explicitly or implicitly increasing women's knowledge, involving them in groups and achieving income security. Building the confidence of women and gaining their trust are major roles an NGO must take on is they wish to empower the female sector of a community.

More complete and in-depth analysis of this data is continuing and a research paper will disseminate results of this research activity.

7.4 Objective 3: Institutional Capacity and Human Resources Development– key results and discussion

7.4.1 Mainstreaming of participatory rural appraisal training

Following the initial training of 34 people, by MyLife RMT members, in Participatory Rural Appraisal (PRA) techniques, similar training has been conducted for 120 DAR staff and 300 DOA staff. The training is now part of the Central Agricultural Research and Training Center (CARTC) curriculum, and is delivered to all commencing DOA staff. The curriculum has also been translated by a MyLife RMT member into Myanmar language.

DOA has five mobile training teams. Ms Myint Myint Aye is responsible for Kayah and Shan State, and she has conducted PRA training there, with participants including young extension staff as well as district and township managers.

At least 450 MOALI staff, as well as other stakeholders, including farmers, have now been trained in PRA techniques as part of the project-initiated activities.

MyLife funded two PRA video documentaries, produced by the Farmer's Channel, to serve both as publicity and instructional videos. These videos have subsequently been used as training videos as well as having been broadcast several times on the Farmer's Channel.

7.4.2 Impact videos

The MyLife project produced two videos (one in English, one in Myanmar language) presenting the impact that the MyLife project has had on RMT members and their organisations. These videos were presented at the MyFarm program showcase in October 2017. The English version can be viewed on the UNE International Development Facebook page (https://www.facebook.com/uneintdev/videos/2008912452716112/).

7.4.3 Trainings

MyLife training activities have been instrumental in substantially improving the capacity of YAU, DOA and DAR staff to undertake a number of activities. These training activities have achieved the following outcomes.

- Enhanced qualitative research capabilities and qualitative data analysis skills using Nvivo
- Provided skills in PRA, and the PRA curriculum is now embedded in DOA's central training centre near Yangon, so that this training will persist beyond the MyLife project lifetime. Hundreds of staff have now been trained in PRA techniques, and PRA techniques are now part of the agricultural extension curriculum at YAU.
- Skills and techniques in gender analysis and facilitating women's empowerment have been instilled.
- Trainings in modern university teaching methods have been provided.

The project successfully fulfilled its objectives within the timeframe and provided valuable contributions to teaching and research activities at YAU by providing capacity building, and research and project management.

7.4.4 Improved teaching and research at YAU: setting up of an extension department at YAU and the introduction of modern teaching methods

A new Agricultural Extension Department was set up at YAU as a result of the following MyLife project's activities.

- Guest lecturing by UNE staff at YAU on modern extension methods on numerous occasions.

- Workshops conducted with YAU academic staff on modern teaching methods
- The undertaking of extension research in the field YAU academics, supported by preparatory training in extension research methods
- The support provided for Dr Nyein Nyein Htwe, a MyLife RMT member, to travel to UNE for eight weeks to study modern teaching methods, and to develop an extension curriculum.
- Two YAU academic staff (and one Department of Agricultural Planning staff) are currently undertaking PhDs at UNE under John Allwright Fellowships, which will considerably increase the capacity of YAU staff upon their return.

The new extension department is led by Dr Nyein Nyein Htwe. Through MyLife project's activities a modern extension curriculum and modern teaching methods are now in place at YAU that will have a significant impact on the skillset of approximately 400 future YAU graduates.

A situation analysis study conducted of students' perceptions of teaching at YAU conducted by Ms. Nang Ei Mon as part of one of the MyLife project funded YAU faculty research projects. A survey was conducted in July 2016, of 98 Yezin Agricultural University students. Student responses identified 17 effective teachers, and these teachers were subsequently asked in to describe their effective teaching methods. As a result of this research, recommendations were made that supported the development of modern teaching methods at YAU.

7.4.5 DOA extension services policy discussion paper

The DOA policy discussion paper *Towards a More Effective Agricultural Extension Sector in Myanmar*, and the Participatory Action Research (PAR) process conducted over 2.5 years with DOA staff that led up to the development of the discussion paper, had two substantial impacts on the Myanmar agricultural extension policy and practice.

Firstly, the PRA process had a significant impact on the discourse surrounding the delivery of effective extension services in Myanmar, as it provided the opportunity for a frank situation analysis of current extension services. Secondly, the PRA research process highlighted the key issues that should be addressed and made key recommendations for addressing these issues.

To various degrees, DOA and DAR have commenced implementing all of the eight recommendations made within the policy paper listed below.

1. Staff training and capacity development in farmer livelihoods, and participatory research and extension processes (PRA trainings and household livelihoods research).
2. Increased *utilisation of farmer groups* for participatory needs-assessment and extension activities (operationalising this recommendation was informed by the additional *social capital research* that was conducted).
3. *Extension targeting* of *smaller farmers* and *female farmers (*operationalising this recommendation was informed by the additional *gender research* that was conducted).
4. DAR *research and extension collaboration* with DOA.
5. Staff *training* and capacity development in key *technical areas*.
6. *Decentralised* agricultural development *planning* involving multiple stakeholders MOALI, farmers, NGOs private sector: at regional and local levels.
7. *Increased NGO and private sector collaboration* with DOA (operationalising this recommendation was informed by the additional *innovative extension practice research* that was conducted).
8. *Performance-based promotion* and reward system for DOA.

7.4.6 Study Tours to Vietnam and Australia

Two study tours were conducted as part of the MyLife project: a study tour of agricultural research and extension in Vietnam in June 2017; and a study tour of agricultural research and extension in New South Wales, Australia, in April 2018.

Vietnam Study Tour

The Vietnam study tour was very successful. Many lessons, with relevance to Myanmar, were learned, and contacts were made to enable future international and inter-institutional collaborations. Also, the presence of the Director-General of Myanmar's Department of Agricultural Research, U Naing Kyi Win, among the Vietnam tour members was advantageous for the implementation of key learnings from the tour.

One result of this study tour was the initiation of a research collaboration between the Myanmar DAR and the private Vietnamese company UV Win Coffee Cherry and a presentation on the coffee research and business model applied in Vietnam during a stakeholder workshop organized after the tour by DAR in Taunggyi, Myanmar's Southern Shan State.

Another impact of the Vietnam study tour was a subsequent decision by MOALI to set up a policy unit within Myanmar's Department of Agricultural Planning, similar to the unit that operates in Hanoi.

A report of the study tour, including recommendations for actions by MOALI, has been completed and presented to MOALI (MOALI 2017). That report included the recommendations listed below.

1. MOALI of Myanmar should consider sending a delegation to evaluate the Institute of Policy and Strategy for Agriculture and Rural Development's (IPSARD's) policy advisory model in more depth and detail for restructuring or reformation of its institutional structure in order to pursue needs of farmers and rural people.
2. Under an IPSARD type model in Myanmar, the government should consider earmarking funding to ensure the delivery of public goods and services, and not rely on donors or the private sector for these types of goods and services. Funding by donors and the private sector can be sought for those investments that are not clearly public goods and services.
3. The Yezin Agricultural University (YAU) should consider furthering its rural development role by requiring research staff to also undertake extension and rural development as part of their current activities.
4. Enhancement of YAU staff capacity in extension education should be a priority to enable YAU to increase its role in training DOA extension staff as a service provider for the future.
5. Increase budget allocation for extension training, in general, and increase the DOA budget.
6. Flexibility is required to allow more technical and extension training to be provided to YAU and DAR staff.
7. MOALI should take advantage of Thai Nguyen University of Agriculture and Forestry (TUAF) scholarship program for Myanmar students, and YAU should consider lecturer or professor exchange visits with TUAF.
8. DOA should consider engaging with lead farmers to stimulate local entrepreneurship that supports and increases the income of small scale poor farmers.
9. In Myanmar, formulation of a unit or section under the MOALI to provide market information, market analysis and develop linkages with farmer or producer groups should be an urgent requirement for commercialization of agricultural products.
10. Investigation should be undertaken by the MOALI of the Vietnamese model of farmers unions as a key stakeholder in facilitating farmer-to-farmer extension and market linkages.
11. A study tour should be dispatched from YAU to visit TUAF and Hue University of Agriculture and Forestry to analyze their roles and structure, and assess how they do research, development and extension and the relevance of this approach for the Myanmar context.

12. DOA relies on Subject Matter Specialist (SMS) but DAR should work with DOA to provide specialist commodity based technical advice that DOA extension staff can adopt.
13. Pilot models/extension methodologies are needed for scientists, extension staff and farmers working together to respond to farmer needs with respect to local production and market linkages.
14. Exploration of co-funding models with the private sector for enhancing high value or value added commodities should be practiced by MOALI.
15. When engaging with for-profit enterprises, the research institute (DAR) needs agreements that enable co-funding regulation, so that they can cooperate with private sector organizations on new findings or research outputs.
16. MOALI should conduct rigorous cost-benefit analyses for developing the business case to meet Good Agricultural Practice (GAP) standards in relation to particular crops and local social and economic circumstances. The global standard includes labor and environmental conditions, not just production conditions.
17. MOALI should recognize that enabling farmers to access markets requires both technical and non-technical training (e.g. training in group management and mobilization, planning and decision making, and financial management for groups). MOALI should ensure that such training is provided as part of its capacity development program for farmers.

A number of the above recommendations have now been implemented, including the first recommendation; and since this follow-up visit to IPSARD, Myanmar has instituted the equivalent policy think tank within the Department of Agricultural Planning.

Australian Study Tour

The purpose of the Australian study tour was to expose senior government officials from DOA and DAR to farmer-led research and extension, the involvement of the private sector in research and extension, and the role of industry levies and industry groups in undertaking research and extension. The lessons learned with relevance to Myanmar were considerable, and the impact of these learnings will extend over several years.

Notable among the tour participants were the Deputy Director-General of Myanmar's DOA, U Hla Myint Aung, and the officer responsible for administering 16 DAR research stations, Dr Khin Thein Nyunt.

The following recommendations were made as result of the study tour.

1. That Myanmar develop a funding model for research and extension similar to that of Australia, in which funding for research and extension comes not only from government but also from other sources such as growers, industries and related organizations. Such a model could enhance the Myanmar Government's limited budget allocation for research and extension, by utilizing funds from other beneficiaries such as growers and industries, and implementing more efficient and effective research and extension activities.
2. That Myanmar adopt the practice of strong collaboration among the Government, private organisations and growers (as occurs in Australia) to implement an effective and efficient research development and extension system. Agricultural land management research development and extension could be improved in Myanmar by developing strong collaborative linkages among the DOA, DAR, Agribusiness, NGOs and development partners.
3. The formation of Landcare groups and encouragement of holistic approaches to land management are is crucially important for sustainably managing agro-eco systems for the long-term. Most crop production practices in Myanmar are focused on increasing production without any consideration of sustainability. Such crop production practices should be improved by focusing on sustainable land management.

4. Applied (rather than academic) collaborative research should be carried out in Myanmar's regional research stations, between the DOA and DAR. This could be similar to that conducted by Australia's NSW Department of Primary Industry which mainly focuses on applied research based on farmers needs and market demand, although pure academic research is also conducted in Australian research stations.
5. Myanmar's agricultural production should be practiced with a focus on water use efficiency and water quality as, like Australia, water is a most precious natural resource in much of Myanmar. Also, as is practiced in Australia, Myanmar's water policy could be reviewed and amended over time.
6. Agricultural production and business plans in Myanmar should be linked with local and regional agri-business and related industry stakeholders, as such linkages were seen to support successful Australian models of agricultural production.
7. A diversified agricultural production system focusing on integrated crop-livestock practices could be implemented in Myanmar, and be recognized (as in Australia) as a different form of agricultural production with a more diverse agro-ecosystem.
8. Private agricultural extension models, based on farmers' needs and market demands and linked with Government research and extension, should be encouraged in Myanmar, as they work successfully in Australia.

8 Impacts

8.1 Scientific impacts – now and in 5 years

It is too early to measure the scientific outcomes and impacts that have resulted from the project. However, the scientific outputs produced under Objective 1 contribute to an expanded set of data and resources for future projects, for which it would be reasonable to expect impacts in the future. The two livelihoods compendiums for AD and CDZ regions will provide useful information to improve research and extension planning and implementation. The findings of final surveys, which focused on specific issues of rural change, will be useful in designing future research and extension activities by government, NGOs and the private sector. In addition, household types can be applied in selecting target groups for agricultural extensions.

The comprehensive data collected and analysed for Objective 1 have been presented at several conferences and recognised by the Southeast Asian Geographer's Association, and won best paper at their 2017 annual conference in Jakarta, Indonesia.

There is also early evidence of the methods and approaches used in Objective 1 (specifically development of household types) being sought after or applied in other projects. For example, International Water Management Institute has expressed interest in further developing the household types as part of a proposal to look at ground-water management in the CDZ. Similar methods have been applied in a baseline survey conducted as part of a project entitled "Empowering Civil Society and Governmental Agencies to Mainstream Biodiversity and Ecosystem Service Values into Development Plans for the Chindwin River Basin, Myanmar" as well as an ACIAR-funded project entitled "Sustainable Intensification and diversification in rice for NW Cambodia (CamSID, ACIAR project CSE/215/044)".

8.1.1 Higher degree research and small research projects funded and supervised by MyLife

The project achieved scientific impact through providing research grants to students for Masters and PhD degrees, and to Faculty members of YAU for conducting research related to project objectives. The research covers the fields of rural livelihood, poverty reduction and institutional analysis.

Twenty three (23) PhD and Master students' research projects were completed as a result of funding and supervision by the MyLife Project (see Appendix: Higher degree research projects conducted within MyLife project).

Eight (8) research projects for MyLife have been completed by Faculty members at YAU (see Appendix 11.4).

One of the conditions of the MyLife research funding was that all researchers should produce a short one- to two-page policy briefs that made recommendations to government as a result of the research findings.

All the MyLife projects have contributed to the available national database and scientific discourse within Myanmar, and internationally to the Myanmar agricultural extension sector, with innovative extension approaches supporting rural livelihoods in the CDZ and AD regions of Myanmar.

8.2 Capacity impacts – now and in 5 years

8.2.1 Capacity impacts within partner organisations

The primary direct capacity impacts of the MyLife project relate to improving the capacity and operation of Myanmar research and extension institutions (DOA, DAR and YAU). These organisations were the primary capacity building targets of MyLife.

The following impacts were achieved through trainings and study tours conducted by the MyLife project.

- Increased scientific rigor by researchers: with respect to survey/interview techniques, data management, qualitative methodologies, mobile supported data acquisition, data analysis.
- Increased ability to engage with rural communities: via participatory rural appraisal training of 9 RMT members, who subsequently trained 34 trainees; with hundreds of MOALI staff now having been training in PRA techniques.
- Increased employability of Masters students as a result of enumerator trainings.
- Continuing collaborations between YAU, DOA and DAR have developed with Vietnamese institutions.

MyLife has also sought to support the development of local staff and students through training and participation in field research activities. Government staff, including those from YAU, DOA, DAR, and other MOALI departments, and the Myanmar Agricultural Development Bank have been trained in research methods and interview techniques.

Immediate impact can be detected among local DOA collaborators who have been trained and have supported the implementation of the various data-gathering tools. These collaborators have learned to apply rigorous research instruments.

The mainstreaming of participatory approaches through training over one hundred DOA staff members, combined with the DOA institutional analysis and discussion paper, will have significant impacts on the skills, behaviours and attitudes of front line extension staff. It will enable them to better focus on farmers' livelihoods, and technological and knowledge needs.

Through the engagement of MyLife with local and international NGOs (e.g. CESVI, Shwe Inn Thu, NAG) the project has been able to raise awareness of the significant impact their programs have on social capital, livelihoods and women's empowerment. This is likely to influence future NGO activities.

The research capacity development of young researchers, particularly through project-funded Masters research grants, has been a focus of Objective 1 and is a major achievement of the MyLife project. The project supported 11 Masters and 1 PhD student who have gone on to contribute to the development of Myanmar in related fields and occupations. Many students have indicated the value of their research experience in their current work, *viz*:

> "*From this ACIAR project I got a lot of knowledge. How to conduct the research well, how to emphasise it, how to overcome the problems, and how to get the success and how to reach the destination. I can apply this in my current job very well. When we think of rural development, we need to consider how to increase the income of rural people and how to improve the livelihoods of rural people. This knowledge is very useful in our current job*" – Dr Wah Wah Htun, former PhD student and current Project Officer, Myanmar Institute for Integrated Development.
>
> "*I am currently working as a marketing specialist in Saemaul Undong (SMU), a Korean project in Myanmar. I can apply the research experience to my current job. There are many kinds of analytical thinking I use when make a decision in my current job*" – Yin Min Hmwe, former Masters student, now Marketing Specialist, KOICA.

> "*My master thesis was about cattle value chain analysis which will leverage policy and technical interventions*" – Min Thein, former Masters student now Membership Development Officer, Myanmar Exporter Association.
>
> "*The study from my research really helped me with the job because during the research we are reading a lot of the materials, so these materials are really helping with the background knowledge, as well as already knowing the natures of what happened on the ground level. So this kind of things can be reflected in the job study*" - Naw Dora, former Masters student, now Sustainable Development Coordinator, Royal Norwegian Embassy.
>
> "*I have learned a lot about the research coordination and gained some communication skills like how to listen to the communities and their perceptions, and how to deal with the policy maker and development planners. For this current work, I apply most of those [*skills*] and I feel I got some professional experience in research and writing from this*" – Khin Yanadar Oo, former Masters student, now Policy Officer for Water Governance, Oxfam, Myanmar.

Overall, the value of research conducted was confirmed by former Rector and current Permanent Secretary in the Ministry of Agriculture, Dr Tin Htut:

> "*Our people have a chance to work with ACIAR we get more understanding… sometimes we professionals have a hard time to understand our own problems. So with ACIAR ….we were able to deal with more of a problem focus, and coming up with the solution. … soft skill and policy outlook, policy perspective, policy options. ACIAR research let us more understand each other – rural, urban – narrowing the gap. In fact we have experienced that, of course preliminary finding of ACIAR researchers [*was that*] rural livelihoods and landscapes are changing dramatically because of more migrant labourers… and particularly agriculture is no longer remunerative… we want to be able to focus on particularly rural development. All in all I think ACIAR research will bring us more understanding, more pathways, which way we go to narrow the gap between rural and urban*."

Two YAU staff and one Department of Agricultural Planning (DOP) staff (all women) are currently undertaking John Allwright Fellowship PhDs at UNE. Their names and research topics are:

- Thida Chaw Hlaing – Myanmar Food Security Policy and Strategy.
- Tin May Yu Aung – development of floriculture industry and market chains as an alternative livelihood and income generating strategy for Myanmar small farmers.
- Ei Mon Thid Kyaw – the impact of migration on rural women in Myanmar.

Two project team members have received Crawford Fund Fellowships that have contributed to increasing their individual capacities and led to impacts for their institutions. These team members are:

- Ms Aye Sandar Phyo, Research Associate of AIT, received the 2015 Crawford Fellowship to visit Australia for eleven weeks (7th March, 2016 to 23rd May, 2016).
- Dr Nyein Nyein Htwe from YAU (July and August 2016).

Myanmar staff at AIT, Soe Soe Htway and Aye Sandar Phyo, have been able to support work done by Dr Bill Pritchard, University of Sydney, in a project funded by the Australian Research Council (ARC), conducting baselines and validating Dr Pritchard's data against data generated in MyLife. They have also carried this expertise into other contexts, such as the CAMSid project in NW Cambodia (University of Sydney). By virtue of these efforts, they have gained scholarships for further

(PhD) study at renown universities in Australia (University of Sydney and University of Melbourne), which will bring experiences gained in Myanmar back into the Australian research community.

Successful cooperation between CSIRO and AIT has led to Aye Sandar Phyo winning a Crawford fund fellowship, which allowed her to work with CSIRO researchers on research related to Myanmar.

In future, young researchers who were involved in the MyLife project will continue to have impacts on the agricultural and extension development in their respective roles and organisations. Upon graduation these students have moved on to the following organisations:

- Chulalongkorn University, Thailand;
- Fauna and Flora International, Tanintharyi Region
- CESD Food Security Policy Project – Myanmar;
- Fruit, Flower and Vegetable Producer and Exporter Association, Myanmar;
- UNOPS, Myanmar;
- Office of Natural Resources and Environmental Policy and Planning, Thailand;
- Royal Norwegian Embassy, Myanmar;
- Advancing Life and Regenerating Motherland (ALARM), Myanmar;
- Department of Industry, Myanmar;
- KOICA, Saemaul Undong Project.

Further impacts are expected, for up to five years after the completion of MyLife , as a result of the capacity building undertaken by the project. Some higher industry-level and downstream capacity impacts will become evident over 5–10 years, or longer.

Future impacts will be achieved via teaching and training (i.e. curriculum development at YAU, DOA Extension Division, and the Central Agricultural Research and Training Center). MyLife expects to have a lasting impact on the capacities of current and future extension professionals in Myanmar. With the newly established Extension Department at YAU further development of research and extension teaching through undergraduate and postgraduate programs will be achieved as a direct result of MyLife activities.

8.3 Community impacts – now and in 5 years

Through the achievements of MyLife substantial community impacts will be achieved in the next 5 years.

Research findings of MyLife will have an impact on refining and increasing the relevance of Myanmar agricultural research and extension services, through embedding a livelihoods understanding and perspective within other ACIAR projects, and with the government organisations YAU, DOA and DAR.

Household types, developed from the findings of MyLife household surveys and field validation surveys, will provide valuable information for planning projects in rural areas in the future. In addition, the findings of the students' research have given better understanding of which factors are affecting farmers' decisions about their agriculture and livelihoods.

Research and extension services of DOA and DAR can better understand farmers' needs, and identify constraints and drivers to technological and behavioural change. Results of MyLife, such as household types, have been shared with local (Township) DOA officers, which enables them to make use of this data for future planning activities.

YAU can disseminate knowledge about real-life situations in rural communities to the students, who will be future community leaders as agricultural extension agents and scientists.

Community impacts are likely to be achieved in the medium to longer term (5 to 10 years) following project completion and fall into two areas:

1. R&D and extension focus on farmer household needs will lead to improved farmer access to effective and relevant agricultural and fishery extension services;
2. building effective and proactive farmer groups.

The two livelihoods compendiums and regional profiles for AD and CDZ regions will provide useful information to improve research and extension planning and implementation. The findings of final surveys, which focused on specific issues of rural change, will be useful in designing future research and extension activities by government, NGOs and the private sector.

8.3.1 Policy impact

The MyLife project has been very successful in engaging policy developers and implementers, and has had substantial policy and institutional impact. Research results were presented at a parliamentary workshop in 2017 and started a policy dialogue with multiple stakeholders, including policy makers. Recommendations include specific policies to strengthen the capacity development of rural communities and women farmers. Of the eight recommendations made to government in the policy discussion paper *Towards a More Effective Agricultural Extension Sector in Myanmar,* most have now been adopted to varying degrees by MOALI.

Every funded small research project was required to produce a policy brief making recommendations based on the research findings. These policy briefs will contribute to and support ongoing policy dialogue within MOALI. Many research findings, such as the relationship between agriculture, migration and landlessness have the potential to make significant contributions to the policy discourse on agricultural development in Myanmar. Policy briefs were translated into Burmese and shared widely across the Ministry.

8.3.2 Economic impacts

While this was not a planned impact area for MyLife, the normative adoption of this more participatory extension approach within MOALI is already having significant positive impacts on the economic outcomes for poor farming communities.

A more efficient extension system will have a direct impact on productivity and performance of the agricultural sector leading to positive economic impacts. The MyLife livelihood study results are expected to have a positive economic impact if the recommendations to strengthen rural communities are taken up by the public and private sectors.

As a direct result of the Vietnamese study tour, and the following sesame contract farming workshop, 1100 acre of sesame farm land were contracted and linked to the Japanese export market with favourable prices for Myanmar producers. Resulting impacts are improved income, food safety and the applying of good agricultural practices by local producers. This sesame business model is one of the achievements of trade promotion in Myanmar and should expand to other states and divisions, with collaborative efforts by international organisations, NGOs, International NGOs, the private sector, government and farmers.

8.3.3 Social impacts

While this was not a planned impact area for MyLife, there may be some indirect impacts in terms of highlighting the prevalence of landless households as part of broader discussions with Myanmar Research program components. Through integrating livelihoods, participation and gender awareness into research and extension practice and policy MyLife will have indirect social impact on rural communities in Myanmar. The adoption of participatory approaches by MOALI research and extension staff will contribute to social empowerment and community development of poor farmers and, in particular, female farmers.

8.4 Communication and dissemination activities

8.4.1 Participation in ACIAR meetings

Project team members participated in ACIAR meetings throughout the duration of the project, to share knowledge and experiences of MyLife project. These ACIAR meetings included, the:

- ACIAR Myanmar Program Annual Meeting in Bagan, November 2014;
- ACIAR Annual Program Meeting, December 2015;
- ACIAR Annual Program meeting December 2016 (Livelihoods Day);
- ACIAR Annual Program meeting Nay Pyi Taw and MyFarm showcase October 2017.

8.4.2 Mid project research conference (June 2016, YAU)

Under the guidance of Dr Theingi Myint, the ACIAR project-funded researchers presented at the two-day mid-project research conference held at YAU in June 2016. These research papers will be edited for publication in a book form, including summaries of major research findings and policy briefs. This body of research showcases project-funded Masters and PhD student, and Faculty, research and has been distributed to UNE, MOALI, YAU, DOA, and DAR, the ACIAR Yangon office, ACIAR showcase and FAO day. The six books listed in 10.1.6 have been published and printed, and another ten books (listed in Appendix 10.1) have been printed and distributed.

8.4.3 MyFarm Final Program Meeting and Showcase (12-14 October 2017, Nay Pyi Taw)

Presentation of project results and publications occurred during the meeting and showcase. Hardcopies and digital copies of all MyLife publications were shared with participating stakeholders. Digital copies of all report are also available on the YAU website at http://opac.yau.edu.mm.

8.4.4 FAO day 2017

The MyLife project showcased its research products and findings at the national Food and Agriculture Organisation's day at Nay Pyi Taw, 2017.

8.4.5 ACIAR Gender workshop (12.-13. June 2018, Nay Pyi Taw)

The MyLife project had a strong presence and key role during the ACIAR Gender Workshop. Three presentations focused on results of MyLife research activities, and one presentation shared outcomes of the cross-over research activity with the Farmer Participatory Crop Benchmarking Project of the MyPulses project.

8.4.6 Scientific blog and social media

To increase the awareness of the general public about MyLife women's empowerment research, a UNE project team member published a blog on the women's empowerment research activity in Meiktila Township, on the Researchers in Agriculture for International Development (RAID) blog (see 10.1.7 Other resources)

Several posts regarding MyLife activities have also been shared on the UNE International Development Facebook, Twitter and Instagram sites.

9 Conclusions and recommendations

9.1 Conclusions

The implementation of the MyLife project proceeded as planned and a constructive network was made of key contacts across the government, private sector, civil society and farmers, together with the Myanmar research community. This network will benefit anyone who was involved in the project and continues to work in Myanmar. Primarily, these are the Myanmar project staff who will remain in-country to continue important agricultural development work, but also includes many overseas researchers who are involved in similar projects, funded by ACIAR or otherwise.

Conditions for international-standard research in Myanmar remain difficult, especially for in-country researchers. They are limited by the lack of infrastructure, institutional immaturity, the political transition process, the lack of education nationally, and the remoteness of many small farmers across the country. Myanmar research is dependent on projects, such as MyLife, in order to receive the appropriate training, capacity building, networks, publication outlets and knowledge exchange, which enables them to do their jobs. Capacity building is critical in Myanmar, where many leaders are not equipped with the skills and knowledge needed to provide adequate conditions for agricultural development to progress. MyLife supported many of them in various ways, and it was well appreciated by partners, leaders and communities.

This project had substantial impacts on the policy discourse and institutional development of agricultural extension services; improved knowledge on how to achieve social and economic empowerment of women farmers, how to build effective high social capital farmer groups for connections to markets, climate change adaptation and food security; and how to enable multi-stakeholder contract farming arrangements with smallholder farmer groups.

Excellent relationships were developed with YAU, DOA and DAR staff and senior managers, private sector stakeholders and farmer groups. Considerable capacity development impacts were also achieved with these staff.

9.2 Recommendations

One broad recommendation is to continue enabling an observation of socio-economic trends in Myanmar, which is not necessarily focused on technical solutions, mechanisation, or input intensification, but, rather, looks at the context, the backdrop against which agricultural development happens. Such observation supports research teams and involved partners to understand the complexity of the environments they work in and the sociological effects their interventions may have on target communities: smallholder farmers and rural women.

Policies need to be developed to facilitate strengthening of the capacities of extension services in the Ayeyarwaddy Delta and Central Dry Zone of Myanmar. Specific policies need to be developed to support the engagement and capacity building for women farmers.

The following recommendations are made for further high priority research and capacity development.

1. Under new leadership, DOA has demonstrated a strong intention to improve the design and delivery of agricultural extension services, and develop stronger collaboration with DAR research services, private sector operators and NGOs. This process could be actively supported through continuing the type of Participatory Action Research and institutional development approach that was utilised in the MyLife project, and enhanced by targeted capacity development activities.
2. Interest in contract farming is rapidly escalating in Myanmar, but the capacity of contract farming stakeholders to develop effective local institutional arrangements and the trust

required for market development is still low. Contract farming can achieve considerable benefits for farmers, government and private sector operators, and consumers. The initial scoping research conducted by the MyLife project has highlighted the key roles that need to be played by various government, farmer, NGO and private sector stakeholders for successful contract farming arrangements, and identified some of the factors that influence the success or otherwise of contract farming. This research could be continued through multi-stakeholder participatory action research processes and DOA has formally requested that this research effort does continue.

3. Decentralised agricultural development planning was one of the recommendations that was highlighted in the MyLife policy brief on improving extension services. The national Government has progressively adopted this recommendation, and has increasingly decentralised funds to regions and states, and encouraged the regions to develop their own agricultural development plans. Rural development planning is a complex multi-stakeholder process, and regional governments currently have a limited understanding and capacity to undertake this process. A research and capacity development intervention targeting decentralised agricultural development planning in a few case study pilot regions using PAR research processes, would enable the requisite knowledge and capacity to be developed.
4. Facilitating the social and economic empowerment of women should be a priority for the Myanmar government. This is both a policy issue, as well as an operational issue. The current capacity of MOALI to undertake necessary women's development activities is limited. The MyLife project's research with a series of NGOs highlighted a range of methods whereby effective women's empowerment strategies could be identified and implemented. Enabling governments to utilise similar approaches in partnership with farmer groups, NGOs and private sector participants, is worthy of further investigation, and has the potential to deliver its considerable benefits for Myanmar's rural women.

10 References

10.1 List of publications produced by project

10.1.1 Reports and products

MOALI (2017) *Outcomes and Recommendations of the Myanmar Department of Agriculture Extension Services Institutional Development Action Planning Workshop*, MOALI, Nay Pyi Taw.

MOALI (2017) *Vietnam Study Tour Report and Recommendations,* MOALI, Nay Pyi Taw.

Soe Htway et al. (2017) "Baseline Survey Report: Ayeyarwaddy Delta" ACIAR reports.

Soe Htway et al. (2017) "Baseline Survey Report: Central Dry Zone" ACIAR reports.

Prior, J. and Carnegie, M. (2016) *Towards a More Effective Agricultural Extension Sector in Myanmar: A Discussion Paper for DOA Institutional Development*, Policy Discussion Paper, ACIAR Project Report.

10.1.2 Innovative extension fact sheets

The following innovative extension practice fact sheets were produced in English and Myanmar Language:

- Innovative Extension Practice in Min Dat Township, Chin State;
- Innovative Extension Practice in Demasoe Township, Kayah State;
- Innovative Extension Practice in Natogyi Township, Mandalay Region;
- Innovative Extension Practice in Kyatpadaung Township, Mandalay Regio;
- Innovative Extension Practice in Myitkyina Township, Kachin State.

10.1.3 YAU research papers

The following research papers have been printed and distributed to relevant organizations during the ACIAR MyFarm program showcase (12 – 14 October 2017) and 2017 FAO day.

Chan, NA (2017) Study on Agricultural Labour Migration: Factors Affecting Crop Profitability and Migration Status in Kyaukpadaung Township. AIT payment.

Htwe, NN (2017) Agricultural extension history in Myanmar.

Khaing, AA (2017) Extension education curriculum in higher agricultural institutions.

Lin, KS (2017) Gender Perspective for Adoption of Agricultural Technologies by Farm Households in Central Dry Zone.

Linn Linn, H (2017) Local institutional analysis of research and extension networks (DOA/DAR/Dept. Vet Sc. and Forestry/farmers) at local township level in Dry Zone Area in Myanmar.

Mon The, NE (2017) How to teach effectively to agricultural university students.

Myint, SS (2017) Alternative Livelihoods and Coping Strategies for Disaster in Rural Households in the Central Dry Zone.

Oo, SP (2017) Extension methodologies for different agricultural technologies/or How to do extension for different agricultural technologies.

Oo, EP (2017) Impact of Labour Migration on Rice Farming in Maubin Township, Ayeyarwaddy Region.

Tun, YY (2017) Investigating The Migration Patterns, Gender Perception and Migrant Remittance on Rural Household Development in Myanmar. YAU research paper.

10.1.4 Journal papers and book chapters

Published

Grunbuhel, CM (2017) Rural changes: changes in agricultural productivity are sweeping through Myanmar and care is needed to manage the effects on social structures and labour practices. *Partners in Research and Development II/2017*.

Hlaing, TC and Prior, J (2017) Opportunities and Challenges of Visualization and Open Data in Food Security Analysis. In *Data Visualization and Statistical Literacy for Open and Big Data* (pp. 69-101). IGI Global.

Submitted

Aye San Dar Phyo et al. (2017) "Does mechanization make up for farm labour shortage in rural Myanmar?" submitted to *Journal of Agriculture and Rural Development in the Tropics*.

Soe Soe Htway (2017) "Adaptation to water scarcity and livelihood diversification in the Central Dry Zone of Myanmar" submitted to *Asian Journal of Agriculture and Rural Development.*

Grunbuhel, CM et al. (2017) "Agricultural modernisation and energy inputs in low-energy systems of the Ayeyarwaddy Delta, Myanmar" submitted to *Ecological Economics.*

10.1.5 Conference presentations

Grunbuhel, CM (2017) "A typology of resource use adaptation among rice-farming households in Asia", paper presented at the 3rd Global Land Project Open Science Meeting (GLP 3rd OSM 2016), Beijing, 24 to 27 October, 2016.

Grunbuhel, CM (2017) "The Role of Landless Households in the Sustainable Agricultural Intensification of Myanmar", paper presented at the 3rd Global Land Project Open Science Meeting (GLP 3rd OSM 2016), Beijing, 24 to 27 October, 2016.

Grunbuhel, CM (2017) "How political development drives traditional agriculture towards the energy trap", paper presented at the 12th Conference of the European Society for Ecological Economics, Budapest, 20-23 June, 2017.

Myint, T, Win, ZM, Linn, KS (2018) Rural Women Livelihoods: Time Allocation and Technological Adoption in Ayeyarwaddy Delta and Dry Zone, Myanmar. The ACIAR Gender Workshop 12.-13.6.2018, Nay Pyi Taw, Myanmar – Session 3 ACIAR projects integrating the gender lens.

Ni Zaw, TN, Prior, J (2018) Women and their significance for high social capital groups in rural communities in Myanmar. The ACIAR Gender Workshop 12.-13.6.2018, Nay Pyi Taw, Myanmar – Session 3 ACIAR projects integrating the gender lens.

Prior, J and Carnegie, M (2017) "An Institutional Analysis of Myanmar Agricultural Extension Services: Opportunities and Challenges", paper presented at the *International Conference on Regional Perspectives on Population, Development and the Environment* at Yangon University, 2-3 February, 2017.

Roschinsky, R, Prior, J, Ni Zaw, TN, Nyunt, TT (2018) The impact of NGO interventions on the empowerment of women in rural communities in Myanmar. The ACIAR Gender Workshop 12.-13.6.2018, Nay Pyi Taw, Myanmar – Session 4 The roles of NGOs in community development and agriculture.

10.1.6 Books

The six books listed below have been published and printed, and another ten books (listed in 11.1 Appendix 1) have been printed and distributed.

Htun, WW and Myint, T (2016) Determinants of Sustainable Microfinance Performance Through Social Capital Improvement Towards Rural Development in Myanmar. Publication No. 05-YAU-ASEM-2011-043.

Maung, TW and San, C (2016) Study on Food Security Status and Coping Strategies of Rural Households in Myingyan Township, Dry Zone Area. Publication No. 04-YAU-ASEM-2011-043.

Myint, T, Mon The, NE, Thidar Kyaw,EM, Aung,YM, Myint, T and Win, ZM (2016) Workshop Report Institutional Analysis of Yezin Agricultural University (SWOT Analysis). Publication No. 02-YAU-ASEM-2011-043.

Nyein Htwe et al. (2016) Proceedings of Mid-Term Research Conference. Publication No. 01-YAU-ASEM-2011-043.

Tun, A and Yu Lwin, H (2016) Assessment of Rural Livelihood in Kyaukpadaung Township as Affected by Pact Microfinance Program. Publication No. 03-YAU-ASEM-2011-043.

Win, ZM and Myint, T (2016) Gender Role and Decision Making in Household Economic Activities between Farm and Landless Households in Bogale Township. Publication No. 06-YAU-ASEM-2011-043.

10.1.7 Other resources

Roschinsky R (2018) Motoring ahead in Myanmar. Blog written for RAID – Researchers in Agriculture for International Development. Access via: https://www.raidaustralia.net/index.php/news/item/729-motoring-ahead-in-myanmar

11 Appendices

11.1 Appendix: Vietnam Study Tour itinerary

Day	Date	Itinerary	Locations & Travel mode / accommodation/ time of day
1	Sun 28th May	Arrive Hanoi	Overnight Hanoi, Golden Lotus Luxury Hotel
2	Mon 29th May	Hanoi	1000-1130 Meet with staff of Institute of Policy and Strategy for Agriculture and Rural Development (IPSARD) Overnight Hanoi, Golden Lotus Luxury Hotel
3	Tues 30th May	Thai Nguyen City Bac Kan (northern highlands)	0700 Travel Hanoi to Thai Nguyen City 0900-1200 Meet with staff of TUAF 1230-1400 lunch in Thai Nguyen City 1400 Travel Thai Nguyen City to Bac Kan Overnight Bac Kan, Bac Kan Hotel
4	Wed 31st May	Bac Kan (northern highlands) Hanoi	0800 Meet with representatives of CSSP Coordination Office and representatives from Bac Kan's Farmers' Association at CSSP Office, Bac Kan City 0900 Travel to My Phuong commune (30km from Bac Kan City) to visit the Nhat Thien's Canna Noodle Processing Facility and a Peeled Wood Production Collaborative Group 1100 Return to Bac Kan City for lunch 1200-1330 Lunch 1330-1500 Visit a private owned company, Minh Be's Agricultural Product Export and Processing Company (10km from Bac Kan on way to Hanoi). 1500 Travel Bac Kan to Hanoi by road 3.5 hours Overnight Hanoi, Golden Lotus Luxury Hotel
5	Thurs 1st June	Hue City (central Vietnam)	0845 Travel Hanoi to Hue (by air 1 hour 10 mins) 1330 – 1630 Meet with staff at HUAF from: Faculty of Land Resources & Agricultural Environment Faculty of Agricultural Extension & Rural development Centre for Rural Development in Central Vietnam Centre for Climate Change Study in Central Vietnam Faculty of Animal Science 1630-1730 Meet A/Prof. Huynh Van Chuong & Rector Board Overnight Hue, Saigon Morin Hotel
6	Fri 2nd June	Quang Tri province (central Vietnam) Hue City (central Vietnam)	0700 Travel Hue to Bac Binh village to visit cattle model 0900-1130 Bac Binh village visit 1130 Go to Dong Ha city 1200-1300 Lunch in Dong Ha city 1300-1400 Hien Luong bridge visit 1400-1700 Return to Hue with stops to see diversified agricultural system in central Vietnam Overnight Hue, Saigon Morin Hotel
7	Sat 3rd June	Travel day Hoi An	0800 Travel Hue to Hoi An by road, arrive by mid afternoon Overnight Hoi An, Hoi An Historic Hotel
8	Sun 4th June	Hoi An Buon Ma Thot Dak Lak province (central highlands)	Travel Hoi An to Da Nang by road 1700 Da Nang – Buon Ma Thot (by air, arrive 1815) Overnight Buon Ma Thot, Dakruco Hotel

9	Mon 5th June	Buon Ma Thot Dak Nong province (central highlands)	0800-0900 Meet and greet at Highlands Agriculture & Forestry Scientific Institute (WASI). 0900-1000 Tour of Institute facilities 1000-1100 Tour of WASI research farms 1200-1300 Lunch in Buon Ma Thot 1300 Travel by road to Gia Nghia town, Dak Nong (80km) 1600-1700 Meet 3EM project director and staff at DPI Overnight Dak Nong, Dak Nong Lodge Resort
10	Tues 6th June	Dak Nong province (central highlands) Saigon	0800-0845 Travel to Dak Rlap district 0845-1000 Meet Bon Hiep Cooperative in Dak Rlap district 1130-1130 Meet IFAD supported women's credit and savings group 1300 Lunch in Dak Rlap district 1400 By road Dak Rlap to HCM City Overnight HCM City, Saigon Prince Hotel
11	Wed 7th June	Ben Tre (south Vietnam) Saigon	Visit IFAD/government project: Adaptation to Climate Change in Mekong Delta 0600 By road HCM City to Ben Tre (1 hr 45mins, 90 km) 0800 AMD Ben Tre projects will greet the group at Rạch Miễu Bridge (Ben Tre end) 0800-0900 Travel to rambutan production group, Tien Long village, Chau Thanh district 0900-0930 Intro to Ben Tre and rambutan production group 0930-1130 Touring rambutan farm visit hosted by farm owner 1130-1300 Lunch 1300-1400 Travel and visit to ornamental plant farm, Vinh Thanh village, Cho Lach district 1400-1430 Working groups and discussion with farmers and team leaders 1430-1630 Touring and discussing. Team leader hosting visit to ornamental plants and tree-shaping techniques 1630-1830 Travel Ben Tre to HCM City Overnight HCM City, Saigon Prince Hotel
12	Thurs 8th June	Saigon	0900-1130 Study Tour Debrief Saigon Prince Hotel 1300-1630 Saigon Walking Tour Overnight HCM City, Saigon Prince Hotel
13	Fri 9th June	Saigon	Overnight HCM City, Saigon Prince Hotel
14	Sat 10th June	Depart to Yangon	

11.2 Appendix: Australia Study Tour itinerary

Date		**Study Tour Details**
31/03/2018 - 1/04/18	Sunday	Fly from Myanmar to Armidale via Sydney
2-Apr-18	Monday	**Armidale District**
		Tour of University of New England; Lecture Overview of Tour objectives, itinerary and visits
3/04/2018	Tuesday	Landcare in the Armidale Area
		PM - Drive to Tamworth -
		NSW Department of Primary Industries Agricultural Research Centre – how the state Department of agriculture manages research and extension – changes in the last 30 years.
		Overnight Tamworth
4/04/2018	Wednesday	Visit AMPS Pty Ltd (Agricultural Marketing & Production Systems) – speak with Nigel Herring CEO - grower-based research and extension plus commodity trader

		Visit Greg Gilbert, Greg Gilbert Consulting and Agro Max Consulting – discuss the place of private agronomists in agricultural systems.
		Meet with Richard Daniel, CEO, Northern Grower Alliance – discuss their agronomist-based research and extension model
		Travel to Coonabarabran - Overnight
5/04/2018	Thursday	**Dubbo**
		Meet with Maurie Street - CEO, Grain Orana Alliance – grower-based model
		Macquarie River Food & Fibre – private organisation representing 500 irrigators along the Macquarie River
		Irrigation Research & Extension Committee (IREC) – getting water users to better manage the resource
		Overnight in Dubbo
6/04/2018	Friday	**Drive to Griffith general tour of Griffith township - overnight**
7/04/2018	Saturday	Irrigation Research & Extension Committee (IREC) – getting water users to better manage the resource
		Murrumbidgee Irrigation – Public to private – Managing a large and diverse irrigation scheme that also supplies water to the towns of Griffith and Leeton
		Rice Growers Cooperative – meet with Gae Plunkett, Rice Extension Officer, to discuss the New South Wales rice industries approach to research and development. Visit a number of farms to view rice harvest and discuss research and development priorities with the farmers.
		Overnight - Griffith
8/04/2018	Sunday	Brian Bortolin, Extension Officer, Wine Grapes Marketing Board, to discuss research and development in the wine grape industry.
		Barry Haskins, Ag Grow Consulting – private agricultural consultant that also conducts research
		Overnight Griffith
9/04/2018	Monday	**Leeton**
		Webster's – Walnuts Australia – orchard & processing
		Rice growers Cooperative Mill – Rice growers Association.
		NSW DPI Yanco Agricultural Institute – visit up-to-date soil and chemical laboratories, rice breeding program, greenhouses
		Drive to Wagga Wagga; overnight Wagga Wagga?
10/04/2018	Tuesday	Cotton Research and Development Corporation – Kieren O'Keefe, Regional Development Officer – different research and development model to the Rice Growers Cooperative. Visit farms, speak with growers, see cotton harvest.
		Deakin University – irrigation research and extension model
		Overnight Wagga Wagga
11/04/2018	Wednesday	**Drive to Canberra**
		Afternoon - Visit GRDC
		Evening flight from Canberra to Sydney
		Overnight Sydney
12/04/2018	Thursday	**Sydney - free time. Overnight Sydney**
13/04/2018	Friday	**Fly from Sydney to Myanmar**

11.3 Appendix: Higher degree research projects conducted within MyLife project

No	Name	Affiliation	Title	Completed
1	Ms. Khin Yadanar Oo	AIT	Small-scale mud crab fishery of Ayeyarwaddy Delta: A case study of Bogalay Township.	May 2013
2	Ms. Su San Win Pe	AIT	Household members' migration and child labour in rural areas of Central Dry Zone of Myanmar: a case study in Kyauk Pa Daung.	May 2014

No	Name	Affiliation	Title	Completed
3	Mrs. Eaindra Theint Theint Thu	AIT	Challenges to farming systems and rural livelihoods as well as household responses to farm labour migration: A case study in the Central Dry Zone of Myanmar.	May 2014.
4	Mr. Min Thein	AIT	Analysis and improvement of cattle value chain in Meiktila Township, Myanmar.	May 2014
5	Mr. Nay Linn Soe,	AIT	Institutional analysis of extension services and capacity development of agricultural sector in Myanmar.	May 2014
6	Ms. Katika Punbautoom	AIT	Factors affecting decision-making of farmers on rice farm investment under changed land tenure policy: A case study of Pyapon Township, Ayeyarwaddy Delta of Myanmar.	May 2016
7	Ms. Naw Dora	AIT	Assessment of local land tenure security and its impact on rural Farmers: A case study in Pyapon Township, Ayeyarwaddy Region of Myanmar.	May 2016
8	Ms. Nandar Aye Chan	YAU	Impact of urban development on the agricultural sector in Kyauk Pa Daung and Nay Pyi Taw council area.	ongoing
9	Mr. Nay Min Maung	AIT	Analysis of rice farmers' time utilization on farming and non–farming activities in Pyapon Township, Ayeywaddy Region in Myanmar.	June 2016
10	Mr. Thet Ko Ko Latt	AIT	Role of the private sector in dissemination of agricultural information among pulse growers of Chaung-U Township in Sagaing Region, Myanmar.	June 2016
11	Mrs. Yin Min Hmwe	AIT	An economic assessment of modern rice drying technology in Maubin Township, Myanmar: In case of Solar-Bubble dryer	Dec 2016
12	Ms. Aye Aye Tun	YAU	Impact of Microfinance programs on Rural Livelihood in Dry Zone Area in Myanmar	Sep 2015
13	Ms. Thandar Win Mg	YAU	Food Security Status and Coping Strategies of Rural Households in Myingyan Township in Dry Zone Area	Sep 2015
14	Ms. Nandar Aye Chan	YAU	Impact of urban development on agricultural sector in Kyauk Pa Daung and Nay Pyi Taw council area.	Nov 2015
15	Ms. Zin Mar Win,	YAU	Gender Perspective in Household Income Composition between Farm and Landless Households in Bogale Township, Ayeyarwaddy Region.	Oct 2016
16	Mrs. Honey Lin Lin	YAU	Local institutional analysis of research and extension networks (DOA/DAR/Dept. Vet Sc. and Forestry/ farmers) at local township level in the Central Dry Zone Area in Myanmar.	July 2017
18	Ms. Wah Wah Tun	YAU	Determinants of Sustainable Microfinance Performance through Social Capital Improvement Towards Rural Development in Myanmar.	Oct 2016
19	Ms. Mya Darli Thant	YAU	Livelihood, technology adoption and decision-making behaviour of farmers at household level in CDZ Myanmar.	Oct 2016
20	Ms. Ei Phyo Oo	YAU	Impact of Labor Migration on Rice Farming in Maubin Township, Ayeyarwaddy Region.	Aug 2017
21	Ms. Khin Sandar Lin	YAU	Gender Perspective in Adoption of Agricultural Technologies by Farm Households in Central Dry Zone.	Sep 2017
22	Ms. San San Myint	YAU	Alternative Livelihoods and Coping Strategies for Disaster in Rural Households in the Central Dry Zone.	Sep 2017
23	Ms. Thuzar Myint	YAU	Findings of DOA Township Level Institutional Analysis, Minbu..	
24	Ms. Yin Nyein Aye	YAU	Gender Role and Determinants of Rural Income Through Social Capital Improvements in Meiktila Township	June 2018

11.4 Appendix: YAU faculty research projects within MyLife project framework

1. **Dr Nyein Nyein Htwe**, YAU. Farmer Reference Groups Research Regarding the Technology Adoption and Decision-Making Practices of Farmers (in collaboration with MyLegumes and Dahat Pan ACIAR projects).
2. **Dr Thet Khaing,** YAU. Impact of Learning Alliance Group on Livestock Farmer Livelihoods in the Central Dry Zone, Myanmar (collaboration with Dahat Pan ACIAR project).
3. **Mr. Aung Phyo,** YAU. Evaluation of the Impact of the Learning Alliance Group on Rice Farmer Livelihoods in Maubin Township, Myanmar (collaboration with MyRice).

4. **Ms. Nang Ei Mon The and Ms. Ei Mon Thida Kyaw,** YAU. How to teach effectively to agricultural university students.
5. **Dr. Nyein Nyein Htwe**, YAU. Extension education curriculum in higher agricultural institutions.
6. **Mr. Soe Paing Oo**, YAU. Extension methodologies for different agricultural technologies.
7. **Ms. Aye Aye Khaing**, YAU. Agricultural extension history in Myanmar.
8. **Ms. Ye Mon Aung**, YAU. Institutional Analysis of YAU (SWOT analysis).

11.5 Appendix: Summaries of research findings of completed Masters projects

1. Researcher: Khin Yadanar Oo

1.1 Research Topic: Small-scale Mud Crab Fishery of Ayeyarwaddy Delta: A Case Study of Bogalay Township

1.2 Abstract

The mud crab resource has the potential to improve the socio-economic status of coastal communities. Mud crab farming is an alternative livelihood activity, which is eco-friendly and could raise the economic status of poor coastal fishers and unemployed youths. The Mangrove Crab is found in muddy areas associated with mangroves and sea grass beds in the tidal mouths of rivers and sheltered bays. Mangrove deforestation is likely to have a negative impact on mud crab populations and fisheries since mud crabs are closely associated with mangroves throughout their life cycle. The coastal population of Myanmar includes significant numbers of poor and vulnerable people with the majority dependent on fishing activities and aquatic products for income and nutritional security. Resources from mangrove forests support the livelihoods of the people of Myanmar in a variety of ways. Mud crabs are one of the most commercially important marine resources contributing to the livelihood of poor fishers in Myanmar. This study investigated the income contribution of small-scale household mud crab production to the coastal community and their awareness about the role of mangrove forests in their livelihood, particularly for mud crab capture and culture. Then the status of small-scale mud crab production was explored in terms of technology, management and government support.

1.3 Findings

- Mud crabs have high economic value and are in demand by foreign countries, so mud crab cultivation could raise the income of resource-poor coastal communities.
- Both capturing and small-scale subsistence-level fattening of mud crabs are widely established practices throughout the delta region of Myanmar and have the potential for expansion.
- Mud crab fattening has been developing in the delta region and could potentially expand to serve domestic and global markets.
- Development of successful mud crab fisheries is constrained in numerous ways, and there is little technical support from government and NGOs.
- Transportation of mud crabs from fattening ponds in the Ayeyarwaddy Delta to market is quite simple. As mud crabs survive well, each crab is tied up and put into a basket with other crabs. However, losses of crabs do occur, due to improper handling.
- The potential environmental impacts from mud crab fisheries were relatively low compared with other aquacultural activities.
- To develop any mud crab fishery activity in a sustainable way, the use of various species and culture methods, and ways they could fit into existing social structures need to be considered.

1.4 Relationship to the Project

Contributes to Objective 1: Livelihood analysis of the ACIAR project, by giving an understanding of the importance of mud crab farming for the livelihood of coastal communities, including that of the Delta

region. Mud crab farming has potential as an alternative livelihood for small scale households, as well as for fishery development.

Useful for Project components: Livelihoods and Extension, and MyFish.

2. Researcher: Susan Win Pe

2.1 Research Topic: Household Member's Migration and Child Labour in Rural Areas of the Dry Zone of Myanmar: A Case Study in Kyauk Pa Daung Township

2.2 Abstract

In Myanmar, migration from rural areas to the cities, and abroad, has been common over the past decades. In the dry zone of Myanmar, agriculture is the main source of support for peoples' livelihoods, providing income, food and employment. However, constraints on agriculture such as unfavourable weather conditions, high input costs and low production have led farmers of the dry zone to increasingly utilize migration as a livelihood strategy. Agricultural labour shortages, due to migration, have impacted on children left behind, increasing their farm labour contributions and their roles in domestic and agricultural work. Although the relationships between remittances and schooling or between parental migration and children's educational performance have been given much research attention, there has been less focus on the effect of migration of household members on child labour. Previous studies on child labour have demonstrated that among the possible external and internal causes of child labour, migration has one of the main influencing factors. Therefore, this study examines whether migration of household members provides additional domestic and farm work for children left behind.

2.3 Findings

- Migrating people are sons of households, mostly aged 21-30 years, who have generally been engaged in farming before migration. This means that there tends to be a lack of young male farmers in the study area.
- Farm labour shortages due to out-migration of young men become a serious issue in villages, particularly during labour-intensive agricultural periods such as planting, weeding and harvesting.
- When the demand for labour is greater than the availability of labour, farmers experience difficulties. They must wait for sufficient labourers during peak periods, pay double rates or utilize vulnerable remaining family members (both children and the elderly).
- Out-migration creates hardship for family members left behind and requires that remaining family members, both young and old, engage in agriculture more. As migration is male-dominated, it is female family members left behind who carry the burden of having to work more than previously.
- Children from families from which men have migrated had more additional farm work than children from families without migrants. Girls were found to be engaging more in agricultural work than boys, based on expected gender roles for girls and boys where boys are expected to help more with agricultural output. However, while remaining girls do more farm work, boys tend to work more with caring for the cows.
- Overall, it can be inferred that more female family labour, including children, is utilized on farm land after migration of a male household member.

2.4 Relationship to the Project

- Contributes to ACIAR Project Objective1: Livelihood analysis, by giving an understanding of the migration pattern of household members, and the linkages between migration of household members and child labour in rural areas. Understanding the cause and impacts of child labour is important so

that working children might be supported. It is also important that the impact of migration may be different with regards to gender.

Useful for Project components: Livelihoods and Extension.

3. Researcher: Eaindra Theint Theint Thu

3.1 Research Topic: Challenges and Responses of Farming Households from Labour Migration: A Case Study in the Dry Zone of Myanmar

3.2 Abstract

Migration for employment is a common phenomenon for many developing countries. However, the recent movement of rural agricultural people from the rural dry zone of Myanmar has created a shortage of farm labour for agricultural crop production. This study explored the contributing factors and impacts of rural out-migration on farm households and their response strategies, to maintain their farming systems, despite labour shortages. This study used an exploratory research design with a sequential mixed method strategy. Both structured and unstructured approaches were used for data collection. The results found that male migration was common in the study areas. The combined effects of existing agricultural policies, unfavourable climatic conditions, low crop yields, low household annual incomes, low wages for labourers and limited job opportunities were the driving forces behind rural out-migration in the dry zone of Myanmar. The main reason for migration was the expectation of better jobs and income, to provide for households remaining behind. Results indicated that migration reduced the sown areas and crop yields of some major crops. Although there were no significant changes in male family labour utilization, use of female family labour and both genders of hired labour were significantly increased after migration. However, the rural farm households of the dry zone still maintain their farming systems by using their traditional division of labour and labour-shortage response strategies. Agricultural and rural development project plans, effective labour-saving technologies and further research on farm labour, rural out-migration and labour utilization are needed, to reduce the labour loss from agriculture, and improve agricultural farming systems, crop production and livelihoods of rural farming households.

3.3 Findings

- The massive out-migration from the study areas started after 2003, and reached a peak in 2010. After 2010, the migration rate declined, as most of the young people had already migrated and found work at their destinations.
- Following the out-migration period, labour shortages had increased by about 20%. Insufficient farm labourers meant labourers were hired from nearby villages. It was very difficult to get enough laborers during peak seasons, with most households having to wait until labourers were available.
- Family members remaining increased their working days and working hours, so there was no significant reduction to the family labour force for crop production. But the days and hours per hectare of hired male and female labour increased significantly for major crop production.
- Female family members increased their working days and working hours to replace the loss of work of the migrated male family members.
- Labour division based on the of dexterity of labourers was another strategy used to overcome reduced labour availability. Labour division was mostly based on the nature of the task, gender and type of labour. Difficult tasks were done by males while easy and time-consuming tasks were done by females.
- The cause of labour shortages was not only the migration of family members, but also the occupation changes of hired labourers. Landless hired labourers from the study villages changed their livelihood activities from on-farm to off-farm because of a lack of regular income after the growing season. If farmers continue using migration as a major alternative livelihood strategy to address their lack of income, labour shortage are likely to become more serious in the future.

3.4 Relationship to the Project

- Contributes to ACIAR Project Objective 1: Livelihood analysis, by providing an understanding of the impacts of labour shortages due to migration on crop production, and the strategies used by farmers to address those shortages. A knowledge of effective response strategies is vital for maintaining the productivity of household farming systems, and improving the sustainability of agriculture and livelihood development because the environment is changing, resource availability is unpredictable, and complexity is present.

Useful for Project components: All components, as labour availability is key to any agricultural project in the country.

4. Researcher: Min Thein

4.1 Research topic: Value Chain Analysis of Live and Beef Cattle in Meikhtila Township, Myanmar

4.2 Abstract

This study aimed to identify the main stakeholders in, and map out, the live cattle and beef cattle value chain in Meikhtila Township of Myanmar, identify problems and constraints of that value chain and make recommendations for the development of cattle production through the value chain approach. Quantitative and qualitative assessments were used to assess the live cattle and beef cattle value chain. This study identified three groups of stakeholders, which were agro-pastoralists, cattle traders, and operators of butcheries and retailers. In the study area, the livestock market structure was made up of a three-tier system, where marketing takes place at the farm level, the regional market and in the terminal market. From terminal markets and slaughterhouses, meat reaches consumers via various routes. Profitability for all stakeholders was calculated, based on the gross margin per one head of cattle. The producers received the biggest profit for a period of four years, followed by the processors and retailers, while the trader/broker earned the least. However, on average, the traders transported 10 head of trading stock per month and sell at the terminal market, while processors and retailers processed an average of 27 head per month at the terminal market. This study showed that the cattle production system of the study area is poor, and that livestock keeping/production is not a commercial. Constraints, such as low prices, lack of capital to invest in cattle raising, no or poor access to credit and training**,** inadequate veterinary care**,** poor breeds, feed shortages, lack of institutional support, are faced by the producers.

4.3 Findings

- Cattle production systems are unproductive due to poor pasture management, poor genetic material, inadequate management practices, weak infrastructure, poor provision of veterinary health services, unfavourable weather conditions and lack of information on production practices and access to capital.
- Cattle sales are relatively evenly spread throughout the year with three main peak periods: February to March, May to June, and September to November. Producers sell their cattle their villages, nearby villages and to some extend at regional markets. The stakeholders they sell to are smallholder farmers and traders.
- The most important attributes used by cattle buyers are the disease status, and age and sex of the cattle – depending on whether they will use the cattle in their farming system or fatten them.
- All payments are direct payments, not contracts for payment, so that producers have no worry regarding late payments and fraud.
- Traders generally bought cattle directly from the producers at the farm level and, to a small extent, from the regional town market. The cattle price is determined by negotiation between seller and purchaser, based on attributes of the cattle. The most important attributes are age,

estimated weight, absence of disease and overall condition of animal. Of secondary importance are sex, pelt condition, pelt colour, and least of all, breed.

- The livestock market structure follows a three-tier system, with different stakeholders involved in buying and selling of beef cattle. At the first level, stakeholders including local farmers and rural traders transact at the farm level, with 1-3 head per transaction. At the second level, smallholders and small traders from various locations bring their animals to the regional town market. In this regional market, both traders and stallholders operate, as well as butchers and traders from terminal markets who come to buy livestock. At the third tier, the terminal market, butchers and traders market numerous slaughter-type animals. Meat is sent, from the terminal markets and rural abattoirs, to final consumers via various channels.

4.4 Relationship to the Project

- Contributes to ACIAR Project Objective 1: Livelihood analysis, by helping understand how production and stakeholder activities in the cattle value chain coordinate and interact with each other horizontally and vertically; and how the cattle value chain could be improved and contribute to long-term rural development.

Useful for Project components: Livestock.

5. Researcher: Nay Lynn Soe

5.1 Research Topic: Institutional Analysis of Extension Services and Capacity Development in the Agricultural Sector of Myanmar

5.2 Abstract

This research undertook institutional analyses of extension services and capacity development activities in the agricultural sector of Myanmar. The research objectives were to map the extension services in Myanmar, compare the agricultural extension services provided across government, private and international NGO (INGOs) and NGO institutions. This study also analysed the strengths and weaknesses of institutions, to determine potential for greater collaboration, coordination and integration among extension services at the local level.

This study selected the Headquarter offices of the Agricultural Extension Division (AED) under the Department of Agriculture, the Livestock Breeding and Veterinary Department and Department of Fisheries under the Ministry of Livestock, the Fisheries and Rural Development, Central Agricultural Research and Training Centre, the Golden Key Agrochemical Company, and Groupe de Recherche et d' Exchanges Technologique (GRET) and other INGOs for analysis. Maubin Township was selected as a case study site to analyse the role and responsibilities of local institutions, and determine how local institutions, DOA, DOF, LBVD, IRRI and pesticide sellers were coordinating and cooperating with each other.

AED establishes good organizational structures, and its role and responsibilities are more obvious than for other institutions, particularly INGOs/NGOs and the private pesticide company. In addition, AED has at least some linkages with INGOs and UN agencies, to help operate development projects throughout Myanmar, but very few linkages with private sector agricultural extension activities. However, most of the agricultural extension plans of AED have a top-down approach and lack consideration of farmers' needs and production issues in the different agro-ecological zones. In addition, AED has no written agricultural extension policy. To practice an effective integrated extension approach, the government should establish concrete extension policies involving all stakeholders. It appears that these township level institutions are each working on agricultural activities according to their own agenda. There is a lack of coordination and collaboration for extension services, with overlap and duplication in some villages.

Planning, implementing, evaluating and decision-making processes for extension programs should have a bottom up approach. Collaboration and coordination among institutions, at national and township levels, should prevent overlapping of services and increase the effectiveness of extension activities.

5.3 Findings

- Agricultural extension services delivered by AED utilised a top-down approach, had few incentives for extension staff and staff were poorly motivated and managed, lacked means of transport, rarely involved local people in extension planning, provided no suitable market or prices for farmers, and too many farmers to give advice (with a farm family to extension worker ratio of 1130:1).
- AED extension plans are top-down and emphasize production, with no reflection of farmers' needs or production issues in the different ago-ecological zones. Their extension service has very weak linkages with other institutions at national and international levels.
- The Agrochemical Company was carrying out different kinds of extension activities, oriented to market profit and sales volumes. It did not have formal extension methodologies or an extension team and there was no appropriate institutional structure.
- The Agrochemical Company is very important in providing extension services but has very weak linkages with other sectors such as government and INGOs/NGOs. The Company only has linkages with the Plant Protection Division MOALI (Yangon), to register their agrochemical products. There is no coordination or collaboration with other government departments. However, the agrochemical company does provide adequate incentives and facilities for field or extension workers.
- INGOs/NGOs (GRET) practice bottom–up and participatory extension approaches. They provide assistance and technology based on essential needs such as seed production training, weed and rodent control, etc. They have linkages with other local or international INGOs/NGOs at both headquarter and township levels. They have international agricultural experts and a national project coordinator is leading their project under the guidance of international experts.
- All projects of INGOs/NGOs have time limits and after projects conclude there is no follow-up monitoring. So, these institutions do not know how the technologies they provided operate over the long term or contribute to sustainable practices.
- At township level, each institution operates its implementation activities separately. Only two institutions, DOA and IRRI, collaborate with each other to provide agricultural extension services.
- AED has a proper organizational structure and their role and responsibilities are clearer than those of other institutions. Sometimes, however, it is difficult for AED to deliver new technologies to the grass roots level because of the centralized approach of AED. Another constraint is AED's budget limitations as they could not provide subsidised support for farmers to attend training or demonstrations.
- INGOs/NGOs and government agencies have linkages and work on some projects together at both national and field levels.
- The private company operated alone and collaborated very little with other institutions. The private company only had linkages with other peer and overseas companies to import their chemical products.
- Overall, there was no integration of extension services among institutions within the agricultural sector of Myanmar. Even under the same division within government there was weak interaction and a lack of collaboration and coordination. Each division or department in government agencies was working by themselves and there was no concrete extension policy in Myanmar.

5.4 Relationship to the Project

Contributes to ACIAR Project Objective 2: Provision of extension services, by providing information regarding the extension system provided by government, INGOs/NGOS and a private company, as well as information on collaboration and cooperation among institutions providing extension services for Myanmar.

Useful for Project components: Livelihoods and Extension.

6. Researcher: Katika Punbuatoom

6.1 Research Topic: Factors Affecting Decision-Making of Farmers on Rice Farm Investment under Changed Land Tenure Policy: A Case Study of Pyapon Township, Ayeyarwaddy Delta of Myanmar

6.2 Abstract

The research examined factors affecting farmers' decision-making on rice farm investment in Pyapon Township, Ayeyarwaddy Delta of Myanmar. This study includes two major objectives: to analyse the relationships between input and production, including cost and return, of rice among three groups of farmers based on land tenure types; and to analyse factors influencing farmers' decisions to invest in rice farming. Factors are divided into three groups: economic, social and biophysical. The research was conducted in Pyapon Taman Village which is situated in Ayeyarwaddy Delta region. The area of Pyapon Taman has farmers who gained a land use certificate after new land policies were introduced in 2012, farmers who do not have a land use certificate and farmers who hold both types of land. Based on these three groups of farmers, 89 sampled households were interviewed using a structured survey questionnaire, to provide quantitative and qualitative data. Of the 89 households, a group of 52 households were "secure tenure" farmers as they had a land use certificate, 18 households who did not have a land use certificate were the "insecure tenure", and 19 households who held both types of land provided a "semi-secure tenure" group. The survey found that farmers used high yielding seed varieties, agrochemical inputs and farm machinery as the key inputs to increase productivity. The only obvious differences among groups of farmers with different tenure types were annual income, and access to credit from the government bank (only available to farmers with a land use certificate). From the perspective of economic efficiency, farmers from semi-secure and insecure tenure groups were economically inefficient and lost revenue while the secure tenure group received small returns. Comparing situations before and after obtaining a land use certificate, yields of paddy increased gradually while the quantity of inputs also increased, doubling or tripling. Multiple linear regression showed that land holding size, age of household head, income from rice, total cost of machinery, quantity of fertilizer, quantity of fuel and number of family labourers were correlated with yields. Factors affecting farmers' investment decisions were analysed using a weight average index (WAI), to determine the degree of influence of various factors. As a result, economic factors had the strongest influence for secure and semi-secure groups of farmers, followed by biophysical and social factors. However, biophysical factors ranked the most important factor for farmers from the insecure group, followed by economic and social factors. However, economic factors were selected in at least 7 out of 8 cases, so are for rice farmers' investment decisions. Almost 6 out of 7 farmers in the three groups indicated biophysical approaches had a strong influence. For social factors, farmers' experiences and food security were the first and second most important priorities for decision-making across all three groups. Most farmers from the three groups intend to continue investment in rice farming, with only a small percentage planning to change crop patterns or land use. For the secure group, they want to continue investment due to the benefits of access to credit and loans from the government bank, while farmers from the insecure group cannot access this opportunity due to their land category. Farmers from the insecure group need to hold land legally and believe strongly that changed land tenure policy will give them a chance to have land ownership before they see economics as being important. For the semi-secure group, the main problem was that they had financial constraints and struggle to

maintain their livelihood. However, they did not want to give up on land because they can still receive income from producing rice on it. Labour scarcity and volatile rice prices, coupled with the high cost of inputs and low productivity were common concerns in the study area. Recommendations are provided suggesting involvement of stakeholders in formulating appropriate policy and implementing the project for rural development, to encourage farmers to increase their productivity as well as generate a better livelihood from rice farming.

6.3 Findings

- It was clear that many farmers from semi-secure tenure and insecure tenure groups cannot generate profits from rice. They lose revenue after they sell their harvest as they cannot cover the cost of inputs due to low productivity and the low price of rice.
- Farmers from the secure tenure group do receive a net income, although small after calculating for input costs, and not enough to cover their household expenditure.
- In the case of the semi-secure tenure group, it was also found that they overused inputs by nearly triple when compared to other groups, but their productivity did not always increase. This can be assumed that fertilizers, pesticides and weedicides may not be applied appropriately for seed varieties and depend on the utilization of other inputs and the conditions of farmers' fields.
- Results showed that to produce high yields of rice, high cost machinery and large amounts of fertilizers were applied to small land holdings.
- Farmers appear to be business owners or agrarian entrepreneurs who manage their small business, control every step of operational activities and aim to maximize profit from high productivity.
- The decision-making on rice farm investment relies on many factors influencing farmers, rather than just a single factor.
- The main factors considered by farmers from secure tenure and semi-secure tenure groups are economic factors, while the insecure tenure group were most concerned with biophysical factors. The second most important factor for farmers from secure and semi-secure tenure groups was biophysical factors, and for farmers from the insecure tenure group it was economic factors.
- All these factors can affect farmers, in terms of increasing or decreasing their farm productivity and so lead to success or failure of their business.
- In the process of decision-making, farmers deal with constraints, risks and uncertainties, some which they can control and others they cannot.
- Although farmers face risks and uncertainties contributing to the volatile price of rice, high costs of inputs, and uncertain conditions of land and weather, they still need to continue growing rice as their families have done so for a long time. They strongly believe and hope that their investment decisions will bring about more worthwhile returns someday.
- In conclusion, efforts to expand the area of intensive rice cultivation may not be the answer for reaching higher productivity. However, changes in rice varieties and other inputs could lead to gains in productivity.

6.4 Relationship to the Project

Contributes to ACIAR Project Objective 1: Livelihood analysis, by providing information on the factors, including holding a land use certificate, that affect rice farmers' decisions about crop production.

Useful for Project components: MyRice, MyPulses, and Livelihoods and Extension.

7. Researcher: Naw Dora

7.1 Research Topic: Assessment of Local Land Tenure Security and its Impact on Rural Farmers: A case study in Pyapon Township, Ayeyarwaddy Region of Myanmar

7.2 Abstract

The agricultural sector of Myanmar has suffered for a long time from a multiplicity of rules and regulations, insufficient and poor infrastructure, inadequate policies and planning, a constant lack of credit, and an absence of tenure security especially for farmers. The rigidity of past land tenure rules and regulations prevented the cultivators having land use rights including rights to transfer, sell, lease or mortgage land. This situation has negatively impacted on agricultural productivity. When the Farmland Law and the Vacant, Fallow and Virgin Lands Management Law (VFV) came into effect in 2012, farmers who had land designated within certain categories of farmland or were recorded by the Department of Agricultural Land Management and Statistics (DALMS) could obtain a farmland use certificate from the relevant ward or village tract Farmland Management Body (FMB). This was recognised as their overdue tenure opportunity of official land use rights. Unfortunately, there are many farmers who cannot access this opportunity because they are cultivating areas categorized as VFV lands, which are not recognized for cultivation by the government although the land has been farmed for many years, as permitted previously by the authorities. With the above background in mind, this research focused on farmers of Pyapon Township in Ayeyarwaddy Delta region to explore the impact on farmer households and the condition of their tenure security by comparing a group of farmers able to access a farmland use certificate with a group not eligible to apply for a certificate. While only some farmers are eligible to apply for a certificate, it appears that the application process is not difficult. However, for those able to hold a certificate, many have limited understandings of the benefits and applications of the land use certificate. Holding a land use certificate does not provide benefits for farm inputs, productivity or income but it does give legal land status to the farmer. A land use certificate brings better tenure security for farmers who are eligible to hold one while the conditions on farmland without a certificate remain unchanged, although still have some flexibly regarding land use.

7.3 Findings

- Comparisons of farming on land with or without a land use certificate shows that farmland with certification has better inputs, yields and income than farmland without certification. Also, levels of inputs, yields and income increased for farmland with certification when situations ‘before’ and ‘after’ certification were compared.
- The land use certificate does not do much more than provide a legal land holding status, as there are yet to be changes in farm investment and productivity However, this might be different if the impact is measured after the land use certificate has been held for more than five years.
- Farmers who hold a land use certificate felt more secure regarding their land tenure than farmers who are do not hold a certificate.
- The certificate holders do not comprehensively understand how to use their rights conferred by certificate. However, they sell and mortgage their certified lands within their inner circle who they can trust.
- The tenure status of rural farmers is not completely secure even for farmers who hold a certificate because there are other laws that provide for land expropriation, especially the Land Acquisition Act and National Constitution. These laws can require that certified land be taken over for public purposes, although compensation is paid to the certificate holder where such land is released.
- Therefore, certified farmers do not have full tenure security but they are able to access credit may be given priority for receiving government extension services, as they are officially recorded as farmers working on recognised farmland.
- Lands without formal recognition are less well protected as the land can be taken from the farmer’s use based on state interest.

7.4 Relationship to the Project

- Contributes to ACIAR Project Objective 1: Livelihood analysis, by giving information about the status of land use certification and land tenure security which could not be included in household surveys. The holding of a land use certificate and tenure security can bring positive changes for rural livelihoods.

Useful for Project components: All components, as a land use certificate can affect land use change in the long term.

8. Researcher: Nandar Aye Chan

8.1 Research Topic: Study on Agricultural Labour Migration: Factors Affecting Crop Profitability and Migration Status in Kyaukpadaung Township

8.2 Abstract

This study was carried out to examine the impact of labour migration on agricultural crop productivity in Kyaukpadaung Township. The specific objectives were to observe the profile of migrants and migration patterns, income composition, changes to agricultural labour utilization, factors affecting profitability of currently grown intercropping and factors affecting the out-migration status of farm households in the study area. Fifty-nine migrant and 58 non-migrant farm households were selected from Inntaw and Ywartanshay villages for household surveys and field observations in October 2014. Data analysis used descriptive statistics, cost and return analysis, profit function and a logistic regression model. Results showed that it was mostly active agricultural youth labour who migrated and went to work in the non-agricultural sector in urban areas. International migration accounted for about one third of total migration and was less than internal migration. Internal migration was caused by push factors including unfavourable factors such as poor crop production and low farm income. The urban sector was a pull factor, providing better income-earning opportunities than the agricultural sector. Remittance was positive in relation to returns from crop production, getting more profit and improving household income but not at a significant level. In the study, migrant farm households invested more in crop production by increasing inputs, hiring labour for farming activities, etc. Therefore, higher yields and profits were earned by migrant farm households. Profit from current cropping patterns can be obtained by efficient use of land, labour and capital inputs and high crop prices. Migration status of households did not show a strong relation to crop production profitability but it was positively correlated. The out-migration status logistic function showed that migration from farm households related to young male members, with the highest education level and who were seeking to work in a non-farm activity. The rest of the non-migrating family members would have low education levels, be female and aged people who must then participate in farming. Therefore, agricultural technologies and practices, machinery and extension/education programs must be targeted and affordable for poorly educated female and aging people. As opportunities to earn higher incomes provide the pull factor for migration, the agricultural sector could be improved by providing opportunities in rural communities for small and medium enterprise (SME) development and a better-value chain process for various crops. Moreover, as remittance/off-farm earnings used for farming activities and farm investment impacted positively on the agricultural sector, development of long-term plans for the agricultural sector, and for the country's economic development, should consider the migration status of farm households, farmers' education levels, gender issues and farm labour availability in specific regions.

8.3 Findings

- Mostly young active agricultural male labour migrated to work in the non-agricultural sector in urban areas.
- International migration occurred but less so than internal migration. Internal migration resulted from unfavourable factors such as poor crop production and insufficient farm income.
- The urban sector has more income opportunities than the agricultural sector. Earnings from migration were remitted to farm households, providing about half of the farm household's income and money for crop production investment (e.g. increased inputs, hired labour) and household expenditure.
- Agricultural incomes were lower than those of other sectors but incomes of migrant farm households were higher than non-migrant farm households, due to remitted urban earnings and higher crop incomes.
- In the study area, male out-migration reduced the availability of hired male labour and migrant farm households used more hired female labour in crop production.

- Migrant farm households used more hired labour for manual weeding, harvesting and threshing than non-migrant farm households. Therefore, migrant farm households could conduct post-harvest processing more effectively, especially threshing and cleaning, than non-migrant farm households. Therefore, higher yields and greater profits were earned by migrant households.
- Remittance from urban earnings to farm households was positively correlated, but not significantly so, with crop production and greater profit. Profits can be obtained from the current cropping pattern, as shown using the profit function, by efficient use of land, labour and capital inputs and high crop prices.
- Migration status showed a positive, but not strong, relationship with crop production. Migration from farm households related to young males, higher education levels and people seeking to work in non-farm activities. Therefore, better educated young men usually look for opportunities in other places and non-agricultural sectors to manage their household problems, so migration is one of their livelihood strategies.

8.4 Relationship to the Project

Contributes to ACIAR Project Objective 1: Livelihood analysis, by giving information on how factors such as land, labour, input utilization and crop price affect crop profitability; and how migration can affect the agriculture sector.

Useful for Project components: MyRice, MyPulses, and Livelihoods and Extension - as understanding the factors that affect agriculture is helpful in the context of rural area development.

9. Researcher: Thet Ko Ko Latt

9.1 Research Topic: Effectiveness of Private Sector in Agricultural Extension among the Mung Bean Growers of Pwintbyu Township in Magway Region, Myanmar

9.2 Abstract

This research analysed the agricultural extension activities provided by agrochemical companies to mung bean growers in Pwintbyu Township of Magway Region of Myanmar. The main objective of the research was to assess the effectiveness of the private sector in agricultural extension among the mung bean growers. The specific objectives were to study the types of agricultural extension methods and approaches provided by the private sector, and to assess the effectiveness of the private sector in providing extension services to mung bean growers. The research was conducted with three types of farmers (small, medium and large farmers) in two villages. A survey questionnaire was the main research tool, with 120 sample respondents. The research focused on quantitative analysis with the support of qualitative analysis. The main finding of this research is that the extension approach currently used in the study area by agrochemical companies is a training and visit approach. There were three main agricultural extension activities delivered by agrochemical companies. These include individual methods such as field visits, shop visits and telephone calls; group contact methods such as group meetings; and mass contact methods utilising radio, TV and leaflets. This study shows that shop visits, group meetings and leaflets were the most effective methods to disseminate agricultural information among farmers, and satisfied the farmers' needs for extension. Most of the farmers receiving agricultural information from agrochemical companies through shop visits, group meetings and leaflets changed their insecticide use, compound fertilizer and foliar fertilizer amounts following their receipt of the technological information. The crop yields of these farmers also changed after the farmers had received technological information. Thus, the provision of extension services by agrochemical companies is effective for mung bean growers. This study shows that farmers considered that field visits provided by the agrochemical companies were weak but that a lot of farmers want this form of extension activity. Therefore, the extension agents should increase their efforts to perform in-field extension activities. This study also shows that use of mass media such as radio and TV for extension is still weak. Therefore, government should promote, for a moderate price, the use of mass media by the private sector for providing agricultural information rather than product advertising. Although farmers received specific technological information, it addressed some aspects of product

use well but others poorly. The weak aspects of how knowledge about farming practices and specific supporting programs is extended to farmers should be explored and appropriate services provided to all farmers by extension staff.

9.3 Findings

- Various types of agricultural extension activities were provided by the agrochemical companies to increase yields of mung beans obtained by growers in the study area.
- The extension approach used by agrochemical companies in the study area is a training and visit approach.
- Agrochemical companies try to sell their products at the same time as they deliver extension activities and modern technological information to farmers.
- If agrochemical companies can provide evidence that the products increase production, they will convince the farmers to use the products and further enhance their working process.
- Large farmers received more extension services via individual and group methods than the small and medium farmers, because large farmers were the contact farmers of agrochemical companies.
- Invitations and attention provided by agrochemical companies to small farmers were weak.
- Technological information received by most farmers from the agrochemical companies concerned the chemical dosages to use, wearing protective clothes, foliar fertilizer application, weeding methods and correct storage methods. The study shows that extension activities of agrochemical companies are very important for mung bean growers.
- There were changes, in the study area, in mung bean production due to improved farming practices among farmer groups after the farmers received the technological information delivered by agrochemical companies, and changed their behaviour.

9.4 Relationship to the Project

Contributes to ACIAR Project Objective 2: Provision of extension services, by providing information regarding extension systems of government, INGOs and private companies, and on the collaboration and cooperation of institutions providing extension services for Myanmar.

Useful for Project components: Livelihoods and Extension.

10. Researcher: Nay Min Maung

10.1 Research Topic: Analysis of Rice Farmers' Time Utilization on Farming and Non-farming Activities in Pyapon Township, Ayeyarwaddy Region, Myanmar

10.2 Abstract

The natural resources of the world are constantly being used by farmers. To understand how particular farmers make decisions for natural resource management it is useful to understand the relevant farming systems. Household decision-making can also impact on implementation of sustainable natural resource management by farmers, as such decision-making is a non-economic factor affecting time utilization and farm system management by farmers. This study analyses rice farmers' time utilization on farming and non-farming activities in Pyapon Taman Village in Pyapon Township, Myanmar. This study selected 85 households, using a stratified random sampling method, to be surveyed by questionnaire. Data collected during the survey were analysed using descriptive statistics, analysis of variance and cross tab tabulation. The findings showed that farmers of medium-sized farms spent more hours in unpaid productive activities (household agricultural work and fishing) than small or large-scale farmers. Large-scale farmers spent more hours in productive work (livestock keeping)

than others and small-scale farmers spent more hours on caring for babies, domestic work and leisure activities than others. The analysis of variance revealed significant differences in the amount of time spent on farming activities (unpaid fishing activities) compared with other activities among the small, medium and large-scale farmers. More labour is required and utilized during the summer than during the monsoon season, as farmers must complete agricultural activities within less time due to the short growing period of summer rice varieties. The total labour utilization for the monsoon season was statistically significant among the groups of farmers, for the use of male family labour, female family labour and hired male labour. For the summer season, there were significant differences for the use of male family labour and female family labour among the three groups of farmers. Labour migration had only a small effect on all farmers. They all faced labour scarcity due to migration and addressed this problem by using farm machines instead of labour. Further research, to help reduce the poverty rate of rural regions, should be conducted on rural youth, to understand their participation in and time-utilization for farming and non-farming activities.

10.3 Findings

- The mean time spent on productive unpaid fishing activities was significantly different from time spent on other activities for the three groups of farmers.
- The medium-scale farmers spent more hours on unpaid productive work (household agricultural work and fishing activities) and baby care than small and large-scale farmers; and large-scale farmers utilized more hours in productive work (unpaid livestock keeping and community work) than small and medium-scale farmers. Also, large-scale farmers spent more hours on domestic and baby care work and leisure time, than medium and small-scale farmers.
- Males spent more time on unpaid productive work (household agricultural work and livestock keeping, and fishing activities) than females, while females utilized more hours in domestic work and taking care of the baby than males. Men also spent more hours on leisure time than women.
- During the monsoon season, small-scale farmers had the highest average working hours in raising the field boundaries, while medium and large-scale farmers spent more working hours on harvesting activities.
- In the summer season, small-scale farmers used more time for reaping activities while medium and large-scale farmers used more time for harrowing and raising field boundaries.
- The summer season had significantly greater labour requirements and utilized more labour than the monsoon season, as the farmers had to carry out their agricultural activities within less time due to the short growing period of summer rice varieties.
- The total labour utilization for the monsoon season was statistically significant among the groups of farmers for the use of family labour male, female family labour and hired male labour. For the summer season, there were significant differences for the use of male family labour and female family labour among the three groups of farmers.
- In the study village, only a few households of medium and large-scale farmers owned buffalo, highlighting the importance of using farm machinery, and the greater use of machines in the summer season than in the monsoon season.
- Using machines can save labour and time and influences time allocation. Farmers will increasingly use machinery in the future, due to the increasing scarcity of labour, although hiring machinery has a high cost compared with hiring labour.

10.4 Relationship to the Project

Contributes to ACIAR Project Objective 1: Livelihood analysis, by providing an understanding of time utilization by rice farmers on farming and non-farming activities.

Useful for Project components: All components, as labour availability is key to any agricultural project in the country.

11. Researcher: Yin Min Hmwe

11.1 Research Topic: Assessment of Postharvest Drying Methods for Paddy in Maubin Township, Myanmar

11.2 Abstract

This study surveyed 176 farmers, from five villages of the Maubin Township in the Ayeyarwaddy Delta region, Myanmar. The aim was to observe whether postharvest technology improvement is essential for these farmers. Best-Worst Scaling (BWS) analysis was used initially, to evaluate farmers' priorities when using a postharvest technology. Then, principal component analysis (PCA) was done to identify the major associated variables proposed by BWS. Thirdly, a cluster analysis provided individual weightings for each of the associated variables. The results showed that farmers gave the highest rating to the attribute 'seeds selection', for their crop revenue improvement; and that they were willing to control the humidity level of paddy to get a higher paddy price. For postharvest technology improvement, faster drying would be the major concern among farmers, for avoiding weather risk. Although there is incentive to dry paddy, farmers often fail to do so. Well-dried grains should be differentiated and offered for higher prices.

11.3 Findings

- Postharvest losses of paddy are threatening the economic benefits to farmers in most developing countries, as the economic value of rice largely depends on whole-grain milling quality.
- Myanmar needs strategic postharvest operation systems to reduce quantitative and qualitative losses of paddy.
- Since most farmers were concerned about unnecessary paddy losses, their perceptions and priorities for using an appropriate postharvest method were important.
- On-farm drying methods require less capital investment but cause unnecessary postharvest losses.
- Off-farm drying is less time consuming and has lower operating costs but provides lower economic returns for farmers.
- Assessment of whether farmers were considering the development of postharvest drying operations as an important priority was interesting.
- Significantly, farmers from the different villages had different perceptions regarding postharvest drying systems.
- Farmers were attentive to humidity control, soil fertility management and pest management to obtain economic gains from their paddy. However, farmers sometimes failed to control the humidity level of their existing drying systems.
- Most farmers were only willing to practice a postharvest drying technology if they were experiencing an emergency situation.
- A large group of farmers would like to use more intensive labour to finish the drying process more quickly. However, some farmers would favour a drying technology if it had a faster drying speed, utilized a short time and an enormous handling capacity.

11.4 Relationship to the Project

Contributes to ACIAR Project Objective 1: Livelihood analysis, by providing an understanding of productivity for different postharvest drying methods for paddy, and evaluating how these methods fit with farmers' priorities in Maubin Township, Ayeyarwaddy Delta, Myanmar.

Useful for Project components: MyRice and MyLife.