



Agro-ecology Transition in Myanmar: Issues, Status and Stakeholder Mapping

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Abbreviations and Acronyms

ARI	Agricultural Research Institute
ABCs	Agribusiness companies
AE	Agro-ecology
AF	Agro-forestry
AFCO	ASEAN Forest Cooperation Organization
AFP	Agro-Silvo Fishery Project
ALiSEA	Agro ecology Learning alliance in South East Asia
BANCA	Biodiversity And Nature Conservation Association
BDA	Border area Development Association
BLO	Better Life Organization
CA	Conservation Agriculture
CAP	Collective Action plan
CARITAS	The Humanitarian and development organization of the Catholic Church
CBOs	Community Based Organization
CDZ	Central Dry Zone
CESVI	Cooperazione e Sviluppo Onlus (Italy based Organization)
CF	Community Forestry
CFI	Community Forestry Instructions
CFNWG	Community Forestry National Working Group
CF-UG	Community Forestry user groups
CORAD	Chin Organization for Rural and Agricultural Development
CPA	Consumer Protection Association
CSOs	Civil Society Organizations
CSR	Corporate Social Responsibility
CUSAR	Chulalongkorn University, School of Agricultural Resources
DAT	days after transplanting
DF	Department of Forest
DFID	Department For International Development
DOA	Department of Agriculture
DOF	days after transplanting
EBA	Arms Proposal in EU
ECCDI	Ecosystem Conservation and Community Development Initiative
ECLOF	Environmental Conservation and Livelihood Outreach Foundation
EcoDev	Economically Progressive and Ecological Development
EEET	External Environmental Expert Team
EEP	Environmental Education Project
EM	Effective Microorganisms
FAO	Food and Agriculture Organization
FBD	Farmers Business Development Technical Group
FD	Forest Department
FDA	Food & Drugs Administration
FERD	Foreign Economic Relations Department
FFS	Farmer Field Schools
FLE	Farmer Led Experiment
FREDA	Forest Resource Environment Development and Conservation Association

FSWG	Food Security Working Group
FUG	Forest User Group
GAA	German Agro Action
GAD	General Administration Department
GAP	Good Agriculture Practice
GDP	Gross Domestic Product
GIZ	German international development organization
GMS	Greater Mekong Sub-Region
GRET	Groupe de Recherche et d'Echanges Technologiques (French based INGO))
HDI	Human Development International (Index)
ICAST	International Conference on Agricultural Science and Technology
ICIMOD	International Center for Integrated Mountain Development
IGG	Income Generation Group
	Foundation for Income generation Educational and Community
INEDUCO	Development project
INFRC	International Nature Farming Research Center
INGO	International Non-government Organization
IPM	Integrated Pest Management
JICA	Japan International Cooperation Agency
KMSS	Kayuna Myanmar Social Service
LIFT	Livelihood and Food Security Trust Fund
LNGO	Local Non-government Organization
LRC	Local Resource Center
MADA	Multi-Agri Development Association
MAS	Myanmar Agriculture Service
MERN	Myanmar Environnement Réhabilitation-conservation Network
MFFVPEA	Myanmar Fruit, Flower and Vegetable Producer and Exporter Association
Misereor	Non-profit sustainable agriculture-based organization based in Germany
MLFRD	Ministry of Livestock, Fisheries and Rural Development
MNPED	Ministry of National Planning and Economic Development
MOAG	Myanmar Organic Agriculture Group
MOAI	Ministry of Agriculture & Irrigation
MoECaF	Ministry of Environmental Conservation and Forestry
MOGPA	Myanmar Organic Growers and Producers Association
MSE	Myanmar Sugarcane Enterprise
NAPA	National Adaptation Programme of Action
NEED	Network for Environmental and Economic Development
NPA	Norwegian People's Aid
NRM	National Resistance Movement
NRS	Northern Rakhine State
NTFPs	Non-timber forest products
OA	Organic Agriculture
OGB	Oxfam Great Britain
OISCA	Centre for Organization for Industrial, Spiritual and Cultural Advancement
PGS	Participatory Guarantee Systems
PHECAD	Pwe Hla Environmental Conservation and Development Organization

PP	Plant Protection
PPD	Plant Protection Division
RCA	Rakhine Coastal Region Conservation Association
RECOFTC	The Center for People and Forests (Ecology and Economic Development)
SAEP	Small-scale Aquaculture Extension Project
SAI	State Agricultural Institute
SALT	Sloping agriculture Land Technology
SAZ	Special Administrative Zone
SDF	Swanyee Development Foundation
SIT	Sterile Insect Technique
SLORC	State Law & Order Restoration Council
SLRD	Settlement and land Records Department
SPDC	State Peace & Development Council
SRI	System of Rice Intensification
SWC	Soil and Water Conservation
ToT	Training of Trainers
UMFCCI	Union of Myanmar Federation of Chambers of Commerce and Industry
UNEP	United Nations Environment Programme
UOF	University of Forestry
WFP	World Food Programme
WHH	Welthungerhilfe (former German Agro-Action)
WHO	World Health Organization
YAU	Yezin Agriculture University

1. Executive Summary

This report on situation review of agro ecological transition in Myanmar is the follow up feasibility study (Consultation workshop on agro ecology, held at Yangon, on 12 June 2013) with the support of Groupe de Recherche et d'Echanges Technologiques (GRET) conducting a stock taking of practices, actors, success stories and constraints to adoption of agro ecology principles in Myanmar agriculture sector. This study aims at further mapping agro ecological initiatives at local, state-divisional and national level with a three folded objectives:

- To review the overall agriculture development policy framework influencing agro-ecology activities
- To scope *allies* and *champions* for the promotion of agro ecology and to map the existing networks across Myanmar as part of the Mekong Region
- To feed the national and regional data base that will be hosted by an upcoming Mekong Region Agro Ecology Web portal through the elaboration of factsheets in order to provide broader visibility to each initiative

The report covers six schools of agro ecology: conservation agriculture (CA), organic agriculture (OA), agro-forestry/community forestry (AF/CF), integrated pest management (IPM), integrated farming (rice –fish culture) and system of rice intensification (SRI).

This text report is accompanied with (i) Factsheets (based on ALiSEA project templates) for agro ecology initiative identified hereby, (ii) Stakeholders Mapping in the Excel Matrix Table that focus more especially at who, what, where (identification of main stakeholders active in the field of agro ecology, geo-localize their field intervention, identification of CSOs leaders, researchers, development workers, agencies, etc. that are active in the dissemination of agro ecological practices, access level of integration of the stakeholders in local, divisional and or regional network.), and (iii) photo records of high resolution (about 3 to 5 MB) for cross references of the statement in this text report. At the end of the report, the bibliography on agro ecology documents and literature relevant to Myanmar is attached.

The paper is divided into three parts: the first part explains background context, the second reviews the policy and legal framework promoting or restricting the agro ecological activities and the third part is the explanation of six schools of agro ecological activities at country level, divisional (provisional) and local level and their linkages finally followed by brief discussion of *allies* and *champions* in respective activities.

1.1 Organic Agriculture (OA)

Organic market is slowly developing in Myanmar due to the low income of the majority of the population and low consciousness regarding food safety. Supermarket chain “City Mart” in Yangon has assigned a shelf for organic vegetables and fruits and branded rice. The main issue in the past was lack of a certification body for organic products. Myanmar Organic Agriculture Group (MOAG) carries out program to issue certification to organic growers and promote organic farming standard. Separate organization has been training potential growers to produce standard organic products. Members of Myanmar Organic Growers and Producers Association (MOGPA) was formed and have been conducting training potential producers for chemical free crop production and organic farming and then the members applied for certification. MOAG granted the certification to growers for organic farming while MOGPA certified the chemical free crop products. . Two organic fertilizer companies (Bio Supreme and Shan Maw Myae Co. Ltd. got the

certificates from MOAG and market the products in the country. For export, some companies attempted to get third party certificate from oversea.

Every Saturday, small organic market is organized by MOGPA members at Myae Pa Dae Thar/ Kandaw Gyi Lake, Yangon. At present, there are about 25 to 30 small organic growers producing chemical-free vegetables in Nyaung Don (Ayarwady Region), Pyin Oo Lwin (Mandalay Region), Hmawbi and Hlegu (Yangon Region) and sold at that market. Recently Golden Green organic market emerged at Kandaw Gyi Lake everyday and the suppliers are farmers of Hmawbi and Nyaung Shwe township. Coffee (Arabica) grown in homestead gardens in Ywa Ngan, Southern Shan State are organic by default and there are about 5000 growers in the area that could follow organic coffee production standard after being trained and practiced.

Myanmar Nature Farming Network has been formed with private ABCs companies and linked with Japan- based International Nature Farming Research Center as their partner. It is noted that organic agriculture has been initiated by commercial oriented investment-driven organic agribusiness approaches. Organic farming carried out by small holders is different from such approach. Small farmers in naturally endowed places such as upland gardens in Than Daung of Kayin, Ywa Ngan, etc., remote delta islands, etc. where there is no entry of agro-chemical companies have been growing chemical free crops primarily for home consumption and some for sale to nearby market centers. Small farmers rely on home- made natural pesticides and organic manure resulting in low cost, stable yield and moderate profit. Such OA could be observed in Nwardama village, Nyaung Shwe township.

Full package of OA is rarely practiced by farmers nor driven by extension workers in Myanmar. In the extension education programme, demonstration for compost making is a long-time and never- ending activity of Agriculture Department but there is rare demonstration on full package of OA. Formal advanced education covers segmented topics of OA in the related academic courses. The Japan –based training center Organization for Industrial, Spiritual and Cultural Advancement, International Training Centre (OISCA) established in Yesagyo, Magwae Region offers hands-on vocational training on full package of organic agriculture with uses of bokashi compost and several kinds of natural insecticides and crops –livestock integration to young farmer-students recruited from different parts of the country every year since 1997.

1.2 System of Rice Intensification (SRI)

Currently MOAI focuses on hybrid rice campaign with high inputs- based cultural practices what the ministry publicized as Good Agriculture Practice (GAP). There is less attention on SRI in the public sector.

GRET took the opportunity of introducing SRI in family farming areas of heavily populated Northern Rakhine State (NRS). After summer paddy cultivation season 2008 in 36 village tracts from the Maungdaw and Buthidaung townships it has been reported that 18% of farmers involved in summer paddy cultivation adopted SRI on 9.3% of the total acreage under cultivation. GRET continued transfer of SRI to Ayeyarwady after 2008.

In 2004-2005, GRET focused on the introduction of the new practice relying on a deep support and follow up of the project team with establishment of demonstration plots, open field experiments at farmers' plot level and compensation / bonus incentive mechanism (in cash). The objective was to convince farmers about the SRI and to increase the number of participants in the SRI Farmer Led Experiment (FLE) activities implemented by the project in NRS.

Starting from Rainy Season 2006, the strategy for disseminating SRI practice was re-orientated taking into account that although farmers were more and more convinced by the technique, the total acreage under SRI cultivation was remaining quite low. Project focus shifted toward more technical support and provision of dedicated agricultural tools. Farmer Facilitators (FF) were recruited with both objectives to de-multiply the numbers of farmers reached by the SRI practice and to promote key farmers at village level with good technical capacities. Six technical meetings per season were organized: SRI concept, transplanting steps, 1st weeding, last weeding, flowering time (combined with pest control), harvest (and yield estimation).

Last but not least, it was found out that the availability and price of the iron rotary weeder promoted by the project was the main constraint in wider dissemination of SRI practice and increasing of total acreage. In 2007, GRET designed a new weeder, lighter, technically appropriate to NRS plot conditions and with an affordable cost for farmers (about 6 USD instead of 18 USD).

After 4 years of activity implementation, visual observation at village level showed a wide spread-ing of the practice in the plots. Meanwhile, GRET has directly involved over 5700 farmers in activi-ties addressing SRI practice in rainy and summer rice.

Since 2001, Metta Development Foundation, local NGO has conducted more than 600 Farmer Field Schools (FFS) where SRI has been taught as the major strategy for rice cultivation and it is said that as many as 50,000 farmers in Kachin and Shan States learned SRI in various degrees; at least 7,500 farmers, are believed to be using main practices of SRI. The number of beneficiaries may be estimated from the data base of the number of FFS opened across regions and State. Rice yields, which vary significantly from full scale SRI to partial practice are reported to be from 4 tons/ ha to 10 tons/ha, with most of the averages from 5 to 6 tons/ha (as compared to baseline yields of 2 to 3 tons/ha). During 2008, Metta introduced SRI in Ayeyarwady Region. About 359 farmers from FFS adopted SRI on 7,965 acres of rice in Ayeyawady Region for the period from 2009 to 2014. After 2011 up to 2014 in Kachin State, there are additional 160 farmers adopted SRI on 2000 acres of rice fields.

SRI modifications included experiments with direct seeding using labor-saving drum seeders. Metta nicely combined SRI with farmers' seed production practices under participatory guarantee system. It was observed on the way from Kan Gyi Daunt to Myaung Mya townships (Ayeyarwady Region) where SRI is being applied by seed growers. The villages involved are Kha Yang Kwin, Aha Nyar Su, Ye Twin Kone Gyi, Me Chaung Thaik . Momentum increased after 2012.

Seed production requires the transplanting of single plant seedlings and it is accomplished by farmers who simultaneously adopt SRI. Other INGOs involved in SRI diffusion are Welthungerhilfe (WHH, formerly known as German Agro Action, GAA) in Wa region and Ayeyarwady Region, and World Concern (Myanmar) in Kachin, Shan and Chin states. Some of Metta's partners such as Kachin Baptist Convention (KBC), Myanmar Baptist Convention (MBC), Urban Rural Mission (URM) are also adopting SRI. Catholic Convention such as Karuna Myanmar Social Service (KMSS) also adopted SRI. MBC developed SRI as their development programme and conducted training on SRI in Hmawbi township, Yangon Region. Main donors for SRI are SWISSAID and Livelihood and Food Security Trust Fund (LIFT). Dr. Aung Thu, Rector of Taung Oo University promoted SRI in and around his campus. In Yezin Agricultural University (YAU), there is no curriculum prescribing the course work on agro ecology but

ecology course is offered in respect of the climate change adaptation. In post graduate programme, research study happened to tackle the agro-ecological investigation dealing with SRI.

When SRI case study was undertaken in Ayeyarwady, it is noted that SRI practice is constrained by labour availability and their geographic conditions particularly flooding hazard. SRI with respect to labour intensive practice was shown to be overcome by labour saving practices such as direct seeding by drum seeder. It was demonstrated by Metta. Farmer's reasons for applying SRI are: saving rice seed to sow, easy to remove off-varieties, stability of yield, buyers' preference for rice seed quality. Farmers said that they could reduce chemical fertilizers and pesticides in SRI practice.

1.3 Conservation Agriculture (CA)

Myanmar has long been placing emphasis on soil and water conservation measures particularly in the ecologically fragile upland areas and ecologically deteriorating Dry Zone Region. Conservation agriculture focused on improved slopping land tillage practices via mulching, hedgerows, terracing and contour bunds. Terracing had been initiated since early 1960s by local elite farmers. But the changing process by poor farms was in slow motion. It is in the present decade that has brought about swift change due to intervention of development agencies. In hilly regions (Chin State and other uplands), small farmers could develop contour bunds, stone bunds and soil mulch with the assistance of UNDP and INGOs (GRET, etc.) under the Food for Work Programme of World Food Programme (WFP). The government agency such as Agricultural Mechanization Department of MOAI has involved in the changing process using heavy machineries but without the tool of social mobilization. Land Use Division of DoA assisted farmers developing contour bunds and sedimentation bunds in wider parts of the dry zone. Local NGO, Chin Organization for Rural and Agricultural Development (CORAD) backed up by GRET has assisted development of CA for 1604 households on 655 acres in 53 villages of 4 townships in Chin State from 2011 to 2015.

FAO/UNDP assisted farmers in turning their lands from barren stage to greening state by introducing sedimentation bunds and improved cultural practices to prevent soil erosion in the dry zone regions under HDI project period. From 2013 to 2015, GRET Dry Zone project office supported the farmers in three townships (Monywa, Yinmabin and Budalin) in conserving the soil in barren lands, land rehabilitation and development in various land categories (gully, forest land, grazing land and cultivated farmland). Farmers could reclaim 150 acres of fallow barren land into productive land in three villages over three years. Welthungerhilfe (WHH), assisted CA to farmers of 26 villages of Townships of Lashio, Thein Ni, Namtu, and Kutkai in Northern Shan State to adopt no-till- no-burn soil conservation technology. The project covered nearly 2500 households.

Inle Lake Rehabilitation is the country level important task and with the Norwegian government aid, conservation agriculture development is one of several measures implemented by development agencies, UNDP and local NGOs as partners. Soil and water conservation measures were developed in the upstream watershed areas of the Inle Lake by participatory approach with local farmers and local civil society organizations. There are also cases in some forest frontier areas that local farmers adopt CA without external intervention or assistance and the community keeps minimum tillage to prevent accelerated soil erosion.

1.4 Community Forestry and Agro-forestry (CF/AF)

The Forest Department issued the Community Forestry Instruction (CFI) in 1995, and initiated the promotion of Community Forestry in Myanmar. National Working Group has been formed at the Department of Forestry and there are CF Units at Union level, Region and State level and District level. As of 2015, total CF area is 201,832 acres. Total number of CF user groups (CF UG) is 828 in the whole country. The area of CF established in protected forest estate is 143,400 acres while outside protected area, CF area covers 58,567 acres. CF permit is the entry point for adopting pure timber plantation or agro-forestry planting by individuals or user groups.

After deadly cyclone Nargis hit lower Myanmar in 2008, the government has to wide open the entry point for LNGOs and development agencies. Since that time, community based agro-forestry and CF has been developed faster. UNDP, JICA, DFID, LIFT, CARE Myanmar and local partners such as ECCDI, FREDIA, EcoDev, MERN, Pyo Pin, etc. assisted community mobilization, income generation and set up of CF or agro-forestry in uplands and mangrove forest areas. Environmental conservation at community and individual farmer level measures of Local CSO such as PHECAD is observed to be outstanding in Southern Shan State. Likewise, it has been discovered in northern Shan State that the Buddhist monks play important role in conserving the forest and natural ecosystem by upholding the rule of law in the area. Thus crop fields in the forest frontier area are in the vicinity of readily available soil moisture for good crop growth.

1.5 Rice –Fish Farming

Department of Fishery (DF) is promoting the rice –fish farming in all possible areas. Aquaculture is well developing in Twante township of Yangon Region with spill- over effect on rice –fish farming. Karen state offers potential site but flooding hazard limits the success of full scale rice –fish farms. JICA attempts to promote small holder rice fish farming in view of income generation and nutritional well being. Its project support covers three to four years in lower Myanmar and it now extends to Upper Myanmar. Small farmers encounter major constraints such as illegal fishing and theft under weak rule of law in the affected area and present legal prohibition for conversion of paddy land into other uses. JICA puts forward the rice –fish farm layout design to overcome the legal restriction but this design itself is not durable beyond three years due to silt deposit from rice fields into shallow fish ditch. Several other constraints limit the rice-fish farming development.

1.6 Integrated Pest Management (IPM)

IPM has been initiated in early 1980s in Myanmar. But before wide dissemination of IPM awareness to farmers, farmers in the country driven by crop yield intensification targets become almost agro-chemical dependent and they are almost agro-chemical addicted under the various campaign of sale promotion by the private agribusiness companies. The Plant Protection Division (PPD) of Agriculture Department and development agencies such as FAO, UNDP and INGOs adopted the FFS approach in dissemination of IPM. Some donors are also in collaborating with PPD for the development of bio-control measures. As demand for food safety is increasingly driving, national campaign is needed to lead farmers to resort to IPM or they could properly use the agro-chemicals.

Chapter I

2. Background Context

Pattern of agro-ecological transition in Myanmar does not take place in similar way as in neighboring countries. In early 20th century, all Greater Mekong Sub-Region (GMS) countries had started from the traditional nature farming. Around 1930s, Myanmar became the World Champion of agricultural export reaching yearly 7 million tons of rice which were primarily grown from indigenous varieties, no chemical fertilizers nor pesticides, no fossil-fuel driven-engine but manual and cattle labour input on the expanded fertile delta land. Driven by the Green Revolution in 1970s, Myanmar had switched to a technology package of high-yielding rice varieties with agro-chemical inputs. Traditional monoculture was extended by multiple cropping with intensive summer paddy or post monsoon pulse crops. Under export-push high price incentive, farmers choke the pulses crop fields with pesticide sprays in large scale eliminating the natural enemies. Knowhow on integrated pest management (IPM) had been generated in the agricultural departments and research institutions in 1980s with technical assistance from FAO/UNDP. But there are still frequent gaps in technology adoption by farmers in most agro-ecological principles.

During the prolong military rule, Myanmar was hit by the sanctions of the western countries and Myanmar young professional peoples and a large mass of farmers lost the opportunities of exposure to farming sustainable development ways that the neighbouring countries had well access to. Most countries went far into the agro-chemical inputs-intensive commodities production but in timely way some parts of the countries have retreated to agro-ecological principles of farming. Myanmar as a closed economy has been neither here nor there. Myanmar hasn't reached to the state of inputs-intensive productive agriculture. On the other hand, its domestic resources become depleting. High poverty incidence drove millions of young people away from rural areas and turned them into overseas migrant workers. Due to large meat demand of neighbouring countries with rising income, about one third to half million cattle from Myanmar have been yearly traded in informal cross border channels. Farmers replaced cattle by cheap and poor hand tractors from border trade. In the end there is no recycling of cow dung in the crop fields.

During the green revolution style high yielding campaign, the government subsidized the price of agro-chemicals inputs and farmers started using these inputs. When agrochemical inputs trading was liberalized, there are supplies of these inputs in market price from native private companies. Entry of FDI in agro-chemical inputs industry was restricted by government. Myanmar farmers' use of inputs are more costly. Farmers received low selling price for their products. Myanmar's use of agro-chemical inputs is still lower than those of Thailand, Vietnam and other neighbouring countries. Again when a segment of organic farming is developing in neighbouring countries, Myanmar still lags behind due to the little support from outside development agencies.

Since the military rule, total agriculture was disintegrated into three ministries of crops, livestock-fisheries and forestry for separate authority domain. Each minister enacted the laws for license granting or exercising the authorities in their own domain from their own perspective. Farmers find large barriers to convert their paddy fields into home-stead fish pond or rice-fish farming or adopt agro-forestry in their farm. The current agricultural minister's drive for high productivity is based on hybrid rice with high inputs. He encourages hybrid rice-centered GAP

but excludes other options such as System of Rice Intensification (SRI) or other indigenous varieties.

After NARGIS cyclone in 2008, several INGOs got the entry into Myanmar. After the rehabilitation in the cyclone -hit areas, INGOs, Local NGOS, CSOs and development partners supported by UNDP, LIFT, SWISS, Norwegian and several donor countries and agencies carried out the community development initiatives together with the natural resources management and environmental conservation measures. The development aspect of the natural resource management has been slowly taking place and it has not yet reached a momentum. At this point, Myanmar study team, (San Thein and Aung Thin) attempted to compile the farmers' activities, case studies, agro-ecological networking and stakeholder mapping on six schools of agro-ecology (AE): SRI, Organic agriculture (OA), Integrated agriculture such as rice-fish culture, agro-forestry (AF) and community forestry (CF), Conservation agriculture (CA) and IPM observed during the short survey period of November to December, 2015.

Chapter II

3. Legal Framework Promoting or Inhibiting the Agro-ecological Transition

3.1 Constitutional Framework

In 1974 National Constitution, it had been prescribed that the State is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water. However, it did not mention any statement for the duty and obligation of the State to protect and conserve the natural resources and environment. Constitution of the Republic of the Union of Myanmar (2008), Section #37 states that

- (a) The Union (the State) is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union. It states further that;
- (b) The State shall enact necessary law to supervise extraction and utilization of State-owned natural resources by economic forces;

Section #45; The State shall protect and conserve natural environment

Section #390; Every citizen has the duty to assist the Union (State) in carrying out the following matters:

- (a) Preservation and safeguarding of cultural heritage,
- (b) Environmental conservation

At this reporting time, there are 25 laws and acts which may directly applicable to agro-ecological activities in all agro ecology schools from various sectors. The following Table summarizes the list of Myanmar laws, acts, and rules applicable to agro ecological activities and livelihood.

List of Agricultural, Forest, Fisheries and Environmental Conservation Laws Enacted by the successive Governments

Sr. No.	Title of the Law and Act	Year enacted	Government which first enacted	Primary Body of Jurisdiction; statutory authority
1	The Farmland Law	March, 2012	Pyidaungsu Hluttaw Law No. 11/2012	Ministry of Agriculture & Irrigation, (MOAI)
2	Farmland Rules	August, 2012	The Republic of the Union of Myanmar	Ministry of Agriculture & Irrigation, (MOAI)
3	The vacant, Fallow and Virgin Lands Management law	March, 2012	Pyidaungsu Hluttaw Law No. 10/2012	Settlement and land Records Department, Ministry of Agriculture & Irrigation
4	The Vacant, Fallow and Virgin Lands Management Rule	August, 2012	MOAI. Notification No. 1/2012	Central Committee, MOAI
5	The Pesticide Law	May, 1990	SLORC No. 10/90	Myanmar Agriculture Service (MAS)
6	The Plant Pest Quarantine Law	June, 1993	SLORC Law No. 8/93	Myanmar Agriculture Service

7	Fertilizer Law	October, 2002	SPDC Law No. 7/2002	Myanmar Agriculture Service
8	Fertilizer Law Amended	March, 2015	The Pyidaungsu Hluttaw Law No. 15/2015	Department of Agriculture
9	Fertilizer Regulations	July, 2007	SPDC	Fertilizer Committee, MAS
10	Seed Law	January, 2011	SPDC law No.1/2011	National Seed Committee formed under the Ministry of Agriculture & Irrigation
11	The Freshwater Fisheries Law	March, 1991	SLORC law No.1/91	Ministry of Livestock Breeding and Fisheries
12	Myanmar Marine Fisheries Law	April, 1990	SLORC Law No.9/90	Department of Fisheries, Ministry of Livestock Breeding and Fisheries
13	Law relating to the Fishing Rights of Foreign Fishing Vessels	April, 1989	SLORC Law No. 11/89	Dept. of Fisheries, Ministry of Livestock Breeding and Fisheries
14	Aquaculture Law	September 1989	SLORC Law 24/89	Dept. of Fisheries, Ministry of Livestock Breeding and Fisheries
15	Freshwater Fisheries law	March, 1991	SLORC Law 1/91	Dept. of Fisheries, Ministry of Livestock Breeding and Fisheries
16	Freshwater Fisheries Law 2 for Ayeyarwady Region	March, 2012	Ayeyarwady Regional Govt. Law	Ministry for Fisheries related, Ayeyarwady Regional Govt.
17	The Forest Law	November, 1992	SLORC Law No. 8/92	
18	Myanmar Forest Policy,	1995	SPDC	Ministry of Forestry
19	Community Forestry Instruction	1995	DG, Forest Dept	Ministry of Forestry
20	The Protection of Wildlife and Conservation of Natural Area Law	June, 1994	SLORC Law No. 6/94	Forest Department,
21	The Environmental Conservation Law	March, 2012	The Pyidaungsu Hluttaw Law No. 9/2012	Environmental Conservation Committee formed by the Government
22	The Conservation of Water resources & River Law	October, 2006	SPDC Law No.8/2006	Ministry of Transport
23	The Foreign Investment Law	November, 2012	The Pyidaungsu Hluttaw Law No. 21/2012	Myanmar Investment Commission formed under this law, Govt. of the Republic of Union of Myanmar
24	The National Food Law	March, 1997	SLORC Law 5/97	Food & Drugs Administration, (FDA), Dept. of Health
25	Animal Health & Development Law	November, 1993	SLORC law 17/93	Livestock breeding & Veterinary Dept., Ministry of Livestock Breeding & Fisheries

The State Law & Restoration Council (SLORC); The State Peace & Development Council (SPDC)

The Pyidaungsu Hluttaw = Union Parliament ; Hluttaw = Parliament

3.2 Farmland Laws

The primary source of policy conflict comes from land use right. In 2012 Farmland Law, section 9(b) states that the person who has the right to use the farmland has the right to sell, mortgage, lease, exchange and gift in the whole or part of the right to use the farmland in accord with the stipulated terms and conditions. But the farmland law prohibits by Section 12 (g) that farmers shall not use the farmland by other means without permission; by 12 (h) stating that farmers shall not change the originally cultivated crop with other kind of crop, without permission. The 2012 Farmland law is restricting farmers' disposal right.

In respect of application to alter originally cultivated crops to others: Section 28 states that (a) The Central Administrative Body of the Farmland may permit to cultivate other crops in low land (paddy land) after scrutinizing in accord with the stipulation so as not affect the sufficiency of rice which is the staple crop of the State. Section 28 (b) states: The relevant Region or State Administrative Body of the Farmland may, if it is to alter crops in the farmland except low land (paddy land), permits after scrutinizing in accord with the stipulations.

With respect to change of land use from paddy land into rice-fish farming or integrated farming, 2012 Farmland Law prescribes Section 30: In respect of application to use farmland by other means for the interests of the public: (a) the Central Administrative Body of the Farmland may permit to use the low land (paddy land) by other means with the recommendation of the Region or State Administrative Body of the Farmland.

Regarding the change of the land use from cultivated land other than paddy land into agro-forestry or integrated farming, permission shall be sought from the respective Region or State Administrative Body of Farmland according to the Section 30 (b).

Section 31 of Farmland Law gives warning that the Central Administrative Body of the Farmland may, if the farmland is not put into effect as the stimulated manner within six months from the permitted day --- confiscate such land. The Section 30 of the Farmland Law essentially prohibits the changing of agricultural lands into other business such as those for fish ponds, hotel, gasoline station, restaurants, housing, etc. in attempt to keep the paddy areas from being decline. Driven by rice self-sufficiency bias, the government enacted the farmland law allowing no flexibility in farmland use under diversified bio-physical and socio-economic conditions.

3.3 Aquaculture and Freshwater Fisheries Laws

Both Aquaculture Law, 1989/SLORC and Freshwater Fisheries Law for Ayeyarwady Region (2/2012, Ayeyarwady Regional Government) have prescribed that the Department of Fisheries shall grant the license to the applicant only after he/she had been granted *La Na 39* (now Section 30 of Farmland Law) by the Central Farmland Use Committee. The Aquaculture Law apparently avoids the policy conflict of farmland use versus fishery.

The Aquaculture Law of 1989 (Section 36) exempts household livelihood from application of fishery license if one aquaculture pond is adopted with water surface measuring no more than the area of 25 ft. by 50 ft. (0.02 acre). The law does not dis-encourage the small holders' livelihood.

Freshwater Fisheries Law, 1991 prescribes in Section (34): No one shall do the following in any fresh water fisheries water: (a) catching fish or causing mischief with explosive substance, poison, chemicals and dangerous materials of a like nature;(b) catching fish by a prohibited

method and fishing implements;(c) catching a fish during a prohibited period and at a prohibited place.

Despite this legal prohibition, the rule of law is not strong enough yet. The staff strength of the Fishery Department is too weak to monitor or prevent the illegal fishing or illegal use of the fishing gear attached with battery- shock in most parts of open areas, canals and rice fields as well.

3.4 Agro-chemical Inputs Related Laws

There are a number of agricultural specific laws governing seed production, fertilizer production and trade, pesticide application, etc. With respect to environmental conservation or pollution control, Section 3 (d) of Fertilizer Law (2002), has stated: to assist top-soil conservation and environmental conservation by using fertilizers systematically by agriculturalists. Fertilizer Law prescribes the duties and functions of fertilizer committee and under Section 5 (d): the law issues necessary directives to prevent environmental pollution and hazards to human beings and animals in respect of fertilizer business. In the follow up fertilizer regulations, it is stated in rule number 2 (b) that application for fertilizer registration will be scrutinized by the authorized fertilizer committee whether the fertilizer is causing no risk and adverse effect on human health and environment and “registered fertilizer” means it is qualified to be free from health and environmental risk.

According to Section 2(a) of the Fertilizer Law, “Fertilizer” means chemical fertilizer, bio-fertilizer or natural fertilizer which consists of the material that can assist to cause chemical change in the soil or by other means plant nutrition for the growth of fruits, flowers, crops and plants. In such expression, it does not include any natural fertilizer made by any grower for use in his own farm. It is clear that Fertilizer Law does not obstruct or interfere the process or use of natural fertilizers by small farmers if they carry out agro ecological activities. Again, one of the objectives of the Fertilizer Law as stated in section 3 (d) is to support the conservation of soil and environment by utilizing suitable fertilizer. Fertilizer law is noted to be friendly to agro ecology principles.

The practical issue is Myanmar is still lacking adequate laboratory facilities and lab- based testing centers for verification of the specification of the products and product warranty. There is limited capacity of testing and verification for content and species composition of bio agents, wide array of mycorrhiza and microbe in the submitted samples of the products claimed to be organic in trading. It may cause problems in the case of dispute or illegal trading of agro-chemicals, or bio fertilizers for observing rule of law. The same issue is applicable to the Pesticide law.

In the Pesticide Law (1990), conditions for compliance by the pesticide users are prescribed under Section 32 (e), the decision of the Managing Director of Myanmar Agriculture Service (the name changed to Department of Agriculture, DOA) based upon the opinion of the Director General of the Health shall be complied with in respect to harvested food crops containing pesticide residues higher than the permitted level. By Section 40, the law encourages training and issue certificates of recognition as certified pesticide applicators to ensure systematic handling and application of pesticides. The 1990 Pesticide law has been revised to a large part. The revised portion mainly deals with the license granting issue. The revised act has not come out yet.

In pesticide law, detail instruction should be issued how the pesticide shall be disposed. Under regulation number 30 (i), it states that pesticides, active ingredients or packing materials to be disposed of due to any reasons, shall be done so according to the instructions of the Myanmar Agriculture Service (now DOA). Information should be readily available to the pesticides producers, users or traders as regards the disposal instruction to avoid pollution and keep away from the residual toxic ingredients.

Pesticides which had been banned for use in most countries have been still illegally imported through the border trade and these pesticides are cheaply marketed to farmers. Myanmar becomes the dumping ground for such banned agro-chemicals. These are so cheap and small farmers readily use it, paying little attention to natural insecticides. Some herbicides such as diaquat and paraquat were banned for use in other countries but these are still traded in Myanmar through the border channel. Such illegal marketing and uses should be monitored and placed under surveillances. The pesticide law should clearly spell out the sufficient penalty for such offences.

3.5 Environmental Conservation Law

In the Environmental Conservation Law (2012), Section 3 expresses the objectives of the law as related to the agro-ecology principles;

(b) to enable to lay down the basic principles and give guidance for systematic integration of the matters of environmental conservation in the sustainable development process:

(d): to reclaim ecosystem as may be possible which are starting to degenerate and disappear.

(e): to enable to manage and implement for decrease and loss of natural resource and for enabling the sustainable use beneficially

The environmental conservation law is enacted to enable the nation to emerge a healthy and clean environment and to enable to conserve natural heritage for the benefit of present and future generations. It guides the investments to be carried out in responsible way to keep the economy and social and environmental conservation in balance. It entrusts the Environmental Conservation Committee (ECC) to carry out to environmental conservation and a system of EIA and SIA as to whether or not a project or activity to be undertaken by any Government department, organization or person may cause a significant impact on the environment. The Ministry of Forestry had been reorganized in 2012 into the Ministry of Environmental Conservation and Forestry (MoECaF) in order to execute its mandate for the environmental conservation.

3.6 Community Forestry Instruction

The Community Forestry (CF) Instructions apply primarily to land classified as forest. However, it happened that villages have lands classified as agricultural land and these lands are available and suitable for forest trees planting rather than for cropping purposes. If these villages apply for community forestry on agricultural lands, they must apply the land use right through Survey and Land Records Department (SLRD) which name has now changed to Farmland Management and Statistics Department. The process is quite difficult for land use change. Adoption of the community forestry or agro-forestry on agricultural land may go through the long process involving SLRD, Forest Department and General Administration Department (GAD).

Former CF Instruction (1995) was restrictive by forcing rigid design of trees planting to follow 12 ft. by 12 ft. spacing and to accommodate 200 trees with seasonal cropping in the applicants' plot. Now the Forest Department changed the instruction to be flexible to the CF user groups. The department now accepts the locally fitted design and allows user groups mosaic of different land uses or landscape approach. The flexible regulation is friendly to group of small farmers to adopt CF or Agro-forestry (AF). After CF has been granted, small farmers could practice AF in group or in individual way. In Myanmar, only after user group has been permitted to set up CF, the group or individual could lead to adopt AF. It could be said that CF is the entry point for three possible options: pure tree plantation, conservation and value addition of natural forest based CF, and AF proper. The last option is meeting the criteria of agro ecological category. But it could be said that the second option could meet the agro ecological criteria too if it provides the non timber forest products, medicinal and herbal plants, grass and fodder for livestock and integrated agricultural crops in multiple layer of tree canopies, inclusion of high value crop such as elephant foot yam, cardamom and finally multiple functions such as conservation of soil moisture and ground water table which is vitally important to crop cultivation. Hence there is possibility of integrating trees, crops, livestock and fishery in AF.

3.7 Government Strategies on Poverty Alleviation

The present government, soon after the inauguration in May, 2011 put forward the *National Strategy on Poverty Alleviation and Rural Development* (NSPARD) focusing on eight strategic priority areas. Most of these relate to agriculture and the rural economy: (i) agricultural production sector, (ii) livestock and fishery sector, (iii) rural productivity and cottage industries, (iv) micro saving and credit enterprises, (v) rural cooperative tasks (vi) rural socio-economy, (vii) rural renewable energy, and (viii) environmental conservation. Since these tasks are huge and widespread, the present government has only placed the agenda on the right tract with several tasks remaining to tackle such as poverty alleviation, sustainable management of natural resources and the environment, disaster preparedness and risk management and mitigation of/and adaptation to climate change. The National League for Democracy (NLD), landslide winning party in National Election has announced the small holder inclusive agricultural growth policy. The new government is going to consolidate some interrelated ministries leading all the stakeholders to expect that issues of crops, livestock, fishery and forestry will be integrated with synergy and possible avoidance of sub-sectors conflict of interests.

3.8 The Present Government Structure

Before 1989, total agriculture was under the same umbrella of the Ministry of Agriculture and Forest. Fisheries and livestock departments were included. Thereafter the ministry was disintegrated. Thus the jurisdiction of the agricultural land is under the Ministry of Agriculture and Irrigation (MOAI); that of forest land under Ministry of Environmental Conservation and Forestry (MoECaF); tapping and conserving of fishery resources under MLFRD, etc. Administration and policy measures are under separate jurisdiction while, in reality, the livelihood of farmers and rural people are often dependent on the integration of crops, livestock, forest products and/or fisheries. In delta and coastal area, livelihood combination of farmers is farming and fishing. In dry zone, farmers depend on both farming and backyard livestock breeding. In uplands, farmers depend on farming and forest. Thus under the separate administrative structure, the policy support for the integrated farming, agro-forestry, rice –fish farming or agro-ecology

practices becomes complicated and segmented and in most cases, policy conflicts often encountered.

The ambitious targets of all the previous government authorities are achieving yield increase, export promotion, GDP increase and along this route they are driving farmers to boost crop productivity, increased use of agro-chemicals, pesticides and all possible quick win measures and are not well aware of the consequences of malpractices of agro-chemicals. Authorities are allowing everyday and very frequent advertisement for chemicals on TV and FM which is distorting the traditional knowledge of farmers who are applying AE practices. Agro-chemical companies are also competing each other by various means of sale promotion attractive to farmers, regardless of the real effects of chemicals or consequences. There is no measure of the government enforcement for the corporate social responsibility (CSR) of the agribusiness companies (ABCs) to respect and follow the environmental conservation and sustainable agriculture.

3.9 Food Safety and Consumer Protection Law

On March 14, 2014, Consumer Protection Law was passed. Food safety was enacted on March 21, 2014. The laws are intended to address product safety. The law mandates criminal penalties for those who distribute unsafe products. It has provisions on the rights and responsibilities of both manufacturers and consumers. It establishes a Committee for Consumer Protection and provides for how it will operate. There are also sections on dispute resolution and on sanctions for violations. Those who distribute products that are not safe may be subject to up to three years of imprisonment and up to 5 million kyat (about US\$5,000) in fines.

3.10 Organic Product Certification

Myanmar government agencies have not passed any regulations about organic food certification. With regard to the question on the establishment of organic zone or urban organic farm put forward by Parliamentary member, Deputy Minister for MOAI replied that organic farming will be implemented in Nay Pyi Taw, Bago and Ayeyawady Regions and Chin State. The products that meet 75 percent organic standards can be labelled as traditional-turned-organic ones while the products with at least 95 percent organic standards can be sold as organic products. Department of Agriculture will establish an organic farming zone, give the training, provide technical assistance and help the entrepreneurs for the availability of organic certification and local and foreign marketing (New Light of Myanmar Volume XXI, Number 284, 25 January 2014). At present, the private sector initiatives are leading the promotion of organic products production, certification and marketing. The Core Agriculture Support Programme 8163 of Asia Development Bank (ADB) started supporting Participatory Guarantee System (PGS) in Myanmar and ADB project requires that the government agencies need to form Central Control Committee for PGS and need to establish the necessary standards.

3.11 GI products

Currently Ministry of Science and Technology (MOSTe) is handling the application process for Geographical Indication (GI) qualified products. In the last 2103, The Comité Interprofessionnel du Vin de Champagne (CIVC) has successfully recorded the first GI -

‘Champagne’ - in Myanmar under the recordation procedure with the Registry of Deeds and Assurance. The certificate was issued in January 2013 under registration number IV/13428/2012, making ‘Champagne’ the first GI to gain official protection in that country.

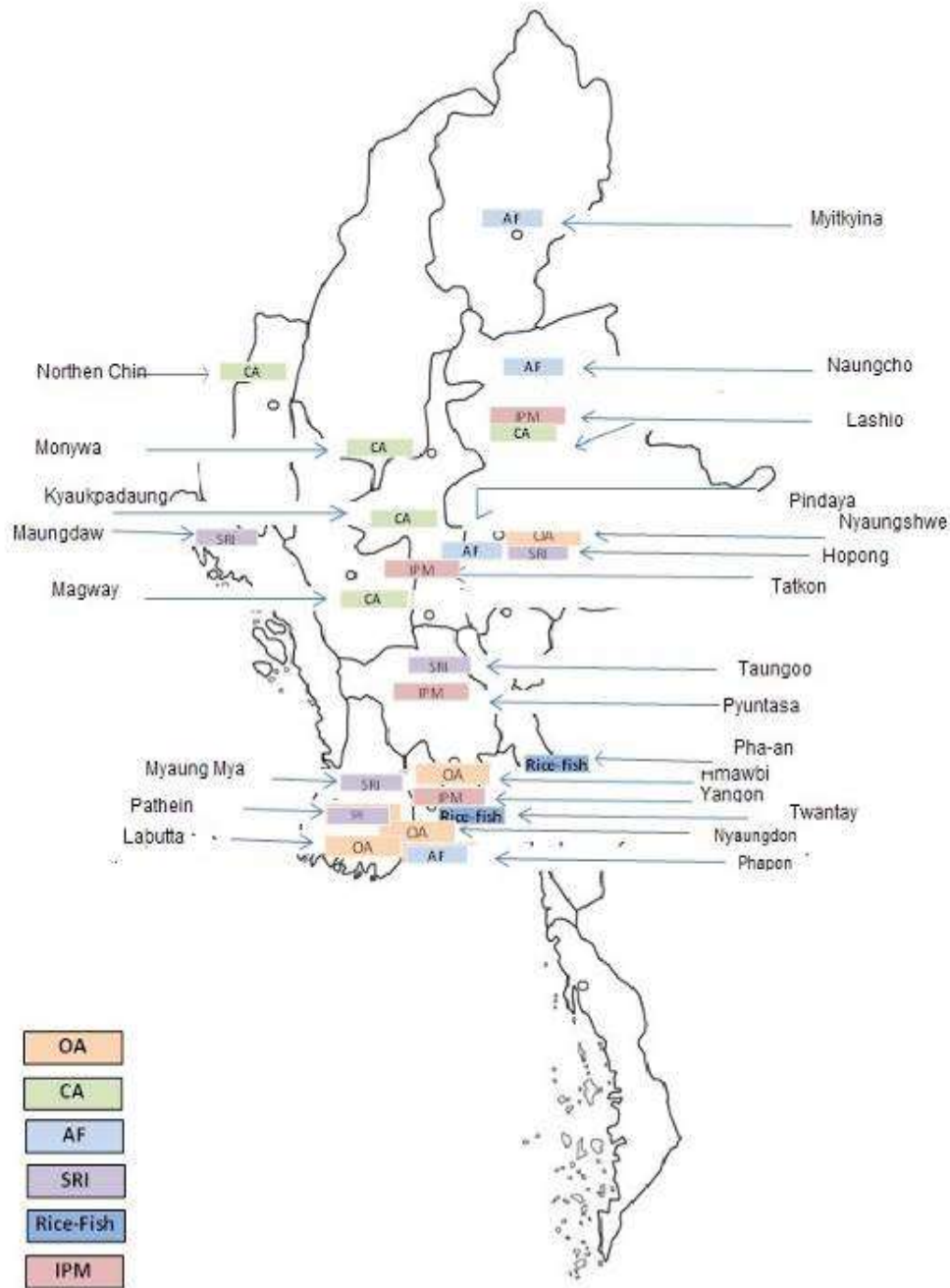
3.12 The Present Government Status for Developing Climate Smart Agriculture

To date, there are very few agricultural policies directly related to climate change in Myanmar. However, the President U Thein Sein stated during the 24th ASEAN Summit on May 10, 2014 that Myanmar agrees to apply the Climate- Smart Agriculture (CSA) approach, which would contribute to regional food security and environmental protection. Towards this, the MOAI and the MLFRD is laying down policies, objectives and strategies. Other laws that in one way or another relate to climate change mitigation or reduction of GHG emissions and pollutants are the: Forest Law Act (1992); Wildlife Act (1994); and the Protected Area and Forestry Policy Statement (1995). Along with this, Myanmar’s Agenda 21 (MA21) was promulgated in 1997 and National Commission for Environmental Affairs (NCEA) was formed and outlined the programs and activities for promoting and achieving sustainable development in the country. The NCEA was dismantled in 2011 and was reorganized into the National Environmental Conservation Committee (NECC) in April 2011. NECC comprises 19 line ministries including the MOAI. It serves as the focal point for various international environmental conventions including the United Nations Framework Convention on Climate Change (UNFCCC) in Myanmar. Under the NECC, the MOAI is driving some climate resilient technologies in line with its food security policy. Projects related to cultural practices such as GAP, SRI, resistant crop varieties, organic farming and cropping pattern experiments are also conducted for climate change adaptation by the Department of Agriculture (DOA). In September 2013, first national consultation meeting on “Climate-Smart Agriculture Strategies in Myanmar,” was facilitated by the Consultative Group for International Agricultural Research (CGIAR) Research Program on Climate Change, Agriculture and Food Security in Southeast Asia (CCAFS SEA) and the International Rice Research Institute (IRRI). As an outcome of this support, MOAI has drafted the Myanmar Climate-Smart Agriculture Strategy in September 2015. <https://cgspace.cgiar.org/rest/bitstreams/63308/retrieve>.

Chapter III

4. National Agro-Ecology initiatives in Myanmar.

Distribution of agro ecological activities currently on-going in Myanmar, 2015-16



4.1 Organic Agriculture

4.1.1 Country Level Overview

Organic farming is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system as stated by Food and Agricultural Organization (FAO/WHO Codex Alimentarius Commission, 1999). Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. Pioneer works have been initiated in Myanmar to meet these criteria.

Cow dung (cattle manure) is one of the fundamental production inputs in organic farming as well as it has been widely and customarily used by Myanmar farmers. Farmers and draft cattle are considered to be partner in farming but the situation changed now. Grazing lands established since the British colonial times have been encroached or converted into other uses and the village

community grazing lands are now disappearing in the whole country. On the other side, cattle are being smuggled or traded illegally across border to China and Thailand due to large demand of the meat there. Engine power- driven hand tractors replaced the cattle in most parts of the country except in dry zone and upland areas. Usage of cow dung is declining.



A situational analysis was conducted in delta and coastal areas, dry zone and upland areas covering 720 farm households from 27 villages in random in the year 2014 by Food Security Working Group (FSWG) research team (Roelofsen *et al.*, 2015). It could be said that rice farmers do not use organic manure or cow dung at all in delta and coastal areas in both monsoon and

summer season. In upland areas, farmers used organic manure or cow dung in maize planting by about 46 % of the farmers. In potato planting, 100 % of farmers used cattle manure while in cabbage planting, 98.5 % apply it. In fact, this cow dung has been bought and transported from the dry zone area over long distance to townships of Kalaw, Pindaya and Ywa Ngan in Southern Shan State. Cow dung could be considered to be traditional and basic component that small farmers could use it in practicing AE. It could also serve as substrate for bacterial decomposition of his farm residues. When cow dung is in shortage, farmers loose one option to pursue AE activities.

It is true that organic farming implies much more than the use of cow dung alone but cow dung based organic manure is essential component of organic agriculture and it is farmer-friendly input. It is also farmyard by- product offering cheap input for small farmers. If cow dung is lacking or limited and agro-chemical is relied much, retreat or switch to organic farming could be a long way. Moreover, reliance on agro-chemical inputs alone will cause financial burden onto small farmers.

In dry zone area, 87 % of farmers apply organic manure in sesame growing and 21 % apply cow dung whereas 9 % use EM based humus in groundnut cultivation. In green gram, only 1 % of total farmers apply organic manure. The great concern is that farmers are applying only agro chemical inputs such as compound or phosphates fertilizers regularly and the plants are more vulnerable to attack of sucking insects which has led to incidence of mosaic virus as compared to the case of natural manure application in the field. Rhizobium fertilizers supply is also dwindling. Myanmar is the world's leading export country for pulses but the whole country's pulses fields are encountering yellow mosaic virus.

4.1.1(a) Issues of Organic Farming: Market, Certification and Stakeholders

There is currently little demand for organic products. People now express more concern about food safety since vegetables are treated with excessive pesticides, Organic products are at present more expensive and often less presentable. The normal cabbage price is MMK 300 per piece (0.25 USD) while the purple coloured cabbage in organic market was sold @ 0.80 USD. Tomato ordinary is sold @0.25 USD per kg while the organic tomato was 0.75 USD per kg. Myanmar Emerald Land Trading sold the organic crops at that Kandaw Gyi market for papaya 1.06 per piece, banana 1.63 per bunch, water cress per small bundle 0.16 while the regular market prices are 0.40, 1.0 and 0.12 USD respectively.

In Yangon, supermarket chain City Mart sells organic vegetables – such as carrots, radishes, and mustard – as well as fruit, mushrooms and rice. One City Mart manager said that the main issue in the past was the lack of a certification body for organic products, The super markets were unwilling to put the product on the shelf just on the basis of the distributor's or supplier's claims that their products were organic.

4.1.1(b) The Role of the Government Agencies and State Economic Enterprise in OA

There is no clear role of the government agencies particularly the Ministry of Agriculture and Irrigation (MOAI) in promoting organic farming. Around 2008, Heads of the crop-related departments organized themselves to form the Organic Product Certification Body and it aimed to promote the export of the organic products. Somehow it ceased to be functional. At the Department of Agriculture (formerly MAS), a guideline committee was formed to formulate the organic certificate guidelines. One director level official was assigned to draft the organic certificate guidelines. But it was discontinued and set aside and the department reoriented to design the guidelines for Good Agricultural Practices (GAP) based on ASEAN – GAP guidelines after 2012. The department received the Australian technical assistance to design Myanmar GAP in alignment with ASEAN GAP. Both ASEAN GAP and Myanmar GAP has been published by the department and the information was not disseminated via Department website.

During the period from 2002 to 2005, State-owned sugar enterprise (Myanmar Sugarcane Enterprise, MSE) had the opportunity of exporting organic sugar through Thai- based European company to European Union (EU) market. Sugarcane growers of one MSE's factory were planting sugarcane alongside the Sittaung river flood plain areas and with no agro-chemical inputs, the sugar product of that factory conformed to the organic standard. After improvement of the factory machineries and structure, MSE's trade partner got the third party certification and could sell the sugar as organic sugar. However, since the sugarcane purchasing price was fixed by the government, there was neither bonus nor additional payment to sugarcane growers from the

government's factory despite advantage of sale of organic sugar. Later MSE attempted to get the export licence through one EU dealer. The export to EU under the Generalized Scheme of Preference in Everything but Arms Proposal (EBA) in EU sugar sub-sector requires the endorsement of the government that the country is in the category of Least Developed Country. MSE and its partner sought the endorsement from the respective authority department. The Ministry of Foreign Affairs of the Military Government denied it and organic sugar trading had come to an end. Myanmar military government always sought the legitimacy of its holding power over the country and its existence and it denied any comment on poverty or LDCs status of the country during its rule. Thus the request letter for endorsement regarding the LDCs status of Myanmar was a sensitive question to the ruler.

4.1.2 Private Sector Initiative and Local Level Situation

For the purposes of food safety, Myanmar Organic Agriculture Group (MOAG) is carrying out a program to issue legal certification to organic growers and promote organic farming standard. MOAG was established in 2006 for the development of organic agricultural products by means of 3rd party certification. It is voluntary but not mandatory. Chairman U Hnin Oo ² reported that MOAG has own standards and guidelines which are equivalent to internationally accepted standards and he claimed that MOAG standard is almost the same as EEC 834/2007 and EEC 1235/2008 and also with ISO 65. MOAG officials said that they will engage with international organization such as IFOMA accredited organization for transaction of certificates in the future.

MOAG permitted to use its LOGO depends on the conditions of whether conversion or full-fledged organic. MOAG issues the organic Guideline manual to the farmer and in case if necessary, special instructions were given to the farmer for specific purposes. According to their statement, inspection sub committee made at least two times for single harvest. Inspection has been made for the entire farm which was registered under organic management system of MOAG.

The organ gram is consisting of the Inspection Body, patrons and Advisory Council. The latter council is affiliated with FOSTA (Myanmar Food Science & Technology Association), Crops, livestock and fishery related government agencies. Chairman of Inspection Body is U Hnin Oo. Agribusiness companies (ABCs) are motivated by the opportunities of high value organic products market. Two organic fertilizer companies (Bio Supreme, one of Supreme Group of Companies) and Shan Maw Myae ³ got the certificate and market the products in the country. The latter company markets four products. Up to now, there are seventeen ABCs who applied for the certification. FAME organic farm of Pharmaceuticals Industry, Thar bar Wa Silver River Co. ltd. etc. were also included in the list.

One pickled tea leaf marketing company related to Palaung Tea Growers and Producers Association (PTGPA) not only got the certificate of MOAG but also sought certificate from the

²Contact: +9595002717; +959-8602484 (email: hhninsapphire@gmail.com)

³contact phone: +951 229791- 7, +951 -215549, +951-215673) for Bio Supreme: No.19 (C), Nawadae Garden Estate, Hlaing Tharyar township, Yangon: email: sales.sbtg@supreme-companies.com and contact address of Shan Maw Myae Co.,Ltd.Head Office: No (243), 1st floor (left), Bo Aung Kyaw Street (Middle Block), Kyauktada Township, Yangon, Myanmar. Ph : 01-370969. Fax : 01-370969; Email : nl@shanmawmyae.com

foreign country as third party certification for export of its tea product. Its tea products are procured from the ethnic hill dwellers in Shan State. Number of tea growers exceed one thousands of indigenous people.

In most cases, yields from organically cultivated crops are about half of what a regular field can produce, and MOAG-certified organic products are normally sold as conventional products because there is no real organic market. For farmers, there is little economic incentive to switch to OA. The results varied with respect to different types of farmers. One big entrepreneur from UMFCFI, Yangon acquired 100 acres as land concession by the government at Naypyitaw for model organic farm and cost of production of organic crops in his show piece farm is quite high. For middle farmers who purchased external organic inputs and hired labourers, their profit margin of organic crops is also low. It is noted that real profit is gained by small farmers (from Nwa Da Ma village, Nyaung Shwe township) who adopted the organic farming with the technical assistance of the Sae Da Na LNGO supported by Nippon Foundation starting from 2009-2010.(Remark: This LNGO ceased to support OA since the Nippon Foundation mainly focused on building schools in remote upland areas.) According to the former agronomist of Sa Da Na LNGO, the state of the organic farmers' return in Nwa Da Ma village is as follow;

1st Year : Both production costs and crop yield of chemical based farming are higher than OA. Net profit is not much different.

2nd Year : Crop yield from OA started increasing. Net profit becomes almost the same.

3rd Year: Both crop yield and net profit are higher in OA than in chemical based farming.

Dr. Than Than Sein, initially served as Training Coordinator of MOAG⁴. She is now serving as Vice Chairman of Myanmar Fruit, Flower and Vegetable Producer and Exporter Association (MFFVPEA). Dr. Than Than Sein's simultaneous attempts are conducting intensive training to potential growers and opening the small organic market every Saturday at Kandaw Gyi Lake side. The movement was in the name of Safe Food from Safe Farm. They shifted their attempts to promote production of chemical free crops. Dr. Than Than Sein with specialties in microbiology and mycorrhiza technology is both a trainer and promoter for organic product and safe foods in Myanmar. She has been conducting training for organic products growing and producing trained growers during the period from 2010 to 2016.

Key members of MFFVPEA started organization of Myanmar Organic Growers and Producers Association (MOGPA) and they perceived that before Myanmar is not ready for the genuine organic product market and so, they should aim for Safe Food from Safe Farm and they started producing chemical free crops by organizing the following partners access to local farmers.

- i) Pyin Oo Lwin township (Mandalay Region) Kanote OA group,
- ii) Sein Le Oo group, Htaut Kyant town, Yangon Region
- iii) Shwe Myae Thit group, Nyaung Done township, Ayeyarwady Region

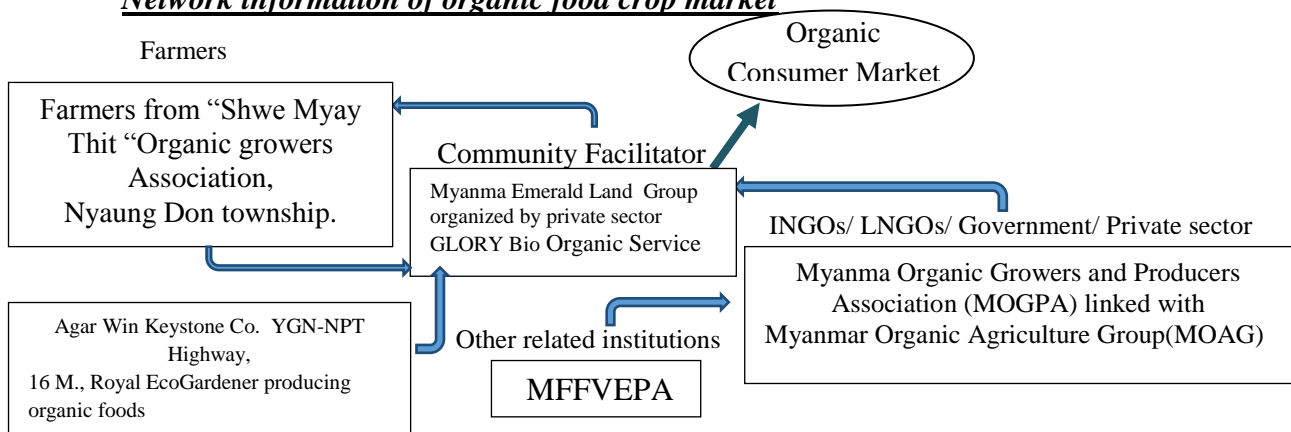
⁴Vice –President of Myanmar Fruit, Flower and Vegetable Producer and Exporter Association (MFFVPEA) (mobile +959 970533371, email: thanthan.sein@gmail.com) Contact address: No. 29, UMFCFI Office Tower Min Ye Kyawswa Street, Lanmadaw Township, Yangon

- iv) Myanmar Sein Lan Myae group, Wa Net Chaung village, near Fu Gyi hill in Hmawbi township, Yangon Region (This is a 70 acres land of group ownership with share holding.
- v) Mother Earth group, Phaung Gyi, Yangon Region
- vi) Nae Yi Lin Mushroom Production
- vii) Dagon International organic farm, Naypyitaw

MOGPA conducted inspection for chemical free condition in 10 affiliated farms. The chemical free certificates are then issued to the qualified farms. Local indigenous rice variety “Taung Pyan” was grown. Some chemical free growing of fruits and vegetables (Papaya, lemon, mango, agar wood, pomelo, banana, asparagus, onion, mushroom and seasonal vegetables) is included. Every Saturday, the products are marketed at Myae Pa Dae Thar/ Kandaw Gyi Lake where Daw Thida Tun publicized organic foods to the people who devoted to health care. There is a social network among group members. One of the organic growers is GLORY Bio Organic Service, Bio Organic Fertilizers & Products which perform private organic growing, food collections and selling service in the platform of Myanmar Emerald Land Group (Interview with Daw Thida Tun, Joint Secretary of MOGPA).

Organic producers get the certificate from MOGPA. It does work in its scope of the domestic market. MOAG certified organic products while MOGPA certified chemical free crops. Actors were the same from MOAG but later opinion differed and people split to form these two groups. Both groups acted independently of the government agencies except that the testing materials and samples may be sent for analysis by laboratories run by the government departments.

Network information of organic food crop market



Earlier organic rice market leaders are Daw Tin Tin Win (contact phone - +959-5150525) and Daw Theint Theint, who started selling “Thabarwa” (meaning natural) brand rice in 2000. They applied to the MOAG for organic certification in 2009 and received it in 2012. Her source of supply is alluvial land mass of Labutta township, Ayeyarwady Region. There is no summer rice and is free from agro-chemicals. The rice is initially sold as Natural rice. Later she attempts to get certification as organic rice. It is now sold at Organic Product shelves in City Mart and Ocean supermarkets. There are three to four supermarket centers that start selling organic foods now in Yangon.

At present, there are about 25-30 small organic growers producing chemical-free vegetables in NyaungDon (Ayayarrwady Region), Pyin Oo Lwin (Mandalay Region), Hmawbi and Hlegu (Yangon Region) delivering their product to Saturday organic market.

Another organic market “Green Gold” has been recently opened by Marlar Myaing Co. Ltd. at Kandaw Gyi Lake beside its agro-chemical sale centre. The company procured the organic crops products from two places: from its own farm at Nyaung Hna Pin farm, Hmawbi township and organic growers of Nwa Da Ma village, Nyaung Shwe township, Southern Shan State. At Nyaung Hna Pin farm, the company works jointly with farmers brought from Myin Gyan (Dry zone) township to produce organic crops. Farmers in Nwa Da Ma village were trained by LNGOs in 2009 for organic farming with home-made natural pesticides, dochatkin, bokashi compost making, trigoderma based compost, bone meal, etc. Over 50 farmers who requested for OA were trained and they are now growing groundnut, garlic, vegetables (tomato, egg plant, pumpkin, turnip, etc. in organic ways. Farmer leader is U Kyaw Than. They are Inthar ethnic.

One group that is working outside the MOAG certification scheme is the Consumer Protection Association (CPA). The association was formed in August 2012 and it has about 500 members. It plans to grow organic mushrooms and paddy. It’s chairperson is U Ba Oak Khaing. It aims to raise consumer awareness and consumer right to the public. Later the Food & Drug Administration forms the network with municipal committee, police force, government staff of the Trade Promotion and Consumers Affair Department of Ministry of Commerce and CPA to investigate the food safety status of the products of the producers and manufacturers. The CPA also conducted organic food crops growing training and food safety training. The CPA members are self-supported and they tend to seek funding. Some of the members become involved in selling organic food in the organic market. Some members of CSOs criticized CPA for being involved in organic marketing. With different opinion and objective, some professionals formed the Myanmar Consumer Union (MCU) recently to raise the consumer awareness and consumers rights. The MCU is said to be right based, non-profit organization. The members are not allowed for selling organic products. The chairman and vice –chairman of MCU are U Maung Maung and Daw Win Win Kyi respectively who focused on food safety and food quality. The MCU is affiliating with Yangon Technology University to be able to open the master level degree programme on food science and technology. Myanmar is lacking at present the higher degree level food science and technology education.

The coffee growing in Ywa Ngan township is also organic by default. All small growers have their small plots of garden in which tea or coffee and fruit trees are grown with no external inputs. There is recycling of litter into the soil enriching the soil humus. There is diversified cropping in the garden and pest incidence is not severe and there is no pesticide spray in the garden. The coffee (Arabica) is verified by the foreign buyers and coffee specialists to be in good standard. If the third party certification scheme could be introduced into this area, Ywa Ngan coffee could meet the export criteria of organic product after some measures of improvement and adjustments by the small holders.

During the stop-over in Ywa Ngan, coffee gardens of organic nature were noted. (Coffee garden of one villager in Naban Gyi village, Ywa Ngan township has been taken photo and is placed in Photo display sheet.). In his village, there are 650 households and all farmers grow coffee in home gardens. Presently, there is a Ywa Ngan Organic Coffee Grower Association led by U Win Aung Kyaw, Chairman. Farmers of several villages become members of the

association. Total coffee production volume is about 700 MT from the township of Ywa Ngan (about 4000 ft. above sea level), Southern Shan State. All are produced by small holders

The private sector initiative is attempting to expand domestic organic market. With its expansion, the follow-up steps will be needed to carry out activities such as sticking to the code of conduct in organic farming, responsible investment in the farming, inclusion of small farmers in the business and seeking opportunity of exporting high quality organic products. The spill over effect will be expected to improve the livelihood of local small farmers who adopt the nature farming by default and food safety insurance to the consumers.

4.1.2(a) Attempts to Develop Myanmar Nature Farming Network



Multi-Agri Development Association (MADA) is a non-profit, non-political and non-government organization. It is one of active working groups operating nature farming related capacity building training and services for rural development and environmental conservation.

It was initiated with capacity building training on agriculture since 2005 and was founded in February, 2010 with well experienced professionals who worked in the agriculture sector. At the preliminary stage of organization establishment, local networking strategy with prompt, adaptable tactic and flexible management system was practiced to suit current local situation. Myanmar Nature Farming Network has been formed with private ABCs companies involved as shown below.

1. Shan Maw Myae Company (organic inputs)
2. Bio Supreme Company (Organic inputs)
3. Mar Lar Myaing Enterprise Ltd., Yangon
4. FAME Pharmaceuticals (Organic farming for medicinal plants)
5. Myanmar Organic Agricultural Group (MOAG)
6. Network for Environmental and Economic Development (NEED-Myanmar)
7. Myanmar Florists Association

Their Partner is International Nature Farming Research Center (INFRC) which is based in Japan standing on the basic principles of Nature Farming, with slogans "Respect Nature and Conform to Its Laws" and "Allow the Living Soil to Exhibit Its Great Potential Abilities." In addition, the technology of Effective Microorganisms (EM) currently promoted as a vital component technology in Nature Farming was introduced in the mid-1980s. They use the term "Kyusei Nature Farming" abroad, where the word Kyusei means "saving the world" in order to distinguish it from other natural farming systems.

It could be said that the private sector has been initiating the organic agriculture related production and marketing such as processing and production of organic manure, marketing and distribution of their organic based products. They also pursue export of the high value agricultural produces.

But there is still limited role of small holders in linking to this private sector- led network. The domestic market is also offering slim opportunities as the outlet of organic products. The majority of Myanmar population is in low income segment. Apart from low purchasing power, consumer consciousness for food safety is not very high. If the income level of the consumers is rising, the network of the nature farming- based private sector will be rapidly linked to the small

holders. Organic growing standards and skills would be transferred by the organic farming groups. This channel could be likely to wide open in coming years.

4.1.2(b) Approach of Small Scale Organic Farming

Organic farming by small holders is different from commercial oriented investment-driven organic agribusiness approaches. Overburden of cash input is prone to risk for majority of small holders. They minimize cash inputs and primarily rely on their own labour inputs and uses of natural resources and farm by-products to meet the nutrient requirement of their farms and to keep minimum pests incidences. Crop growing is supplemented by the nutrient recycling of their backyard livestock keeping. They happened to be subsistence farmers and degree of commercialization for their farm output is rather low. By better understanding of biological and socio-economic systems design of small –scale farming, organic agriculture could be promoted in small holder inclusive pathway.

The INGOs (such as GRET, WHH, SWISSAID etc.), LNGOs (Metta, Doh Taungthu, etc.) and development organizations are attempting to build up the capacity and knowhow of small farmers to use native materials through recycling of farm residues, synthesis of natural insecticides, application of chemicals-free practices, etc. This process is slow and limited in few areas and after the withdrawal of the project, beneficiaries could not continue the process by themselves. The project period may be short and beneficiaries could not sustain the activities by themselves. Some beneficiaries may not have the ownership sense for the activities. There is no market opportunities in the downstream level.

Shwe (meaning Golden) Danu Self-help Local Development LNGO (Pindaya- based, Southern Shan) supported by SWISSAID(Myanmar) is organizing the farmers to pursue natural resource management practices and selected and sent the local farmers to Ecological Farming Alliance Workshop opened in October, 2015 at Moe Kaung, Kachin State. The training programme was supported by SWISSAID and host LNGO is Metta Development Foundation. SWISSAID invited two interesting farmers from each CSO such as PHECAD, Shwe Danu and Southern Shan Local Development Organization (SSLDO), etc. Although over twenty farmers attended all these trainings, only one dedicated farmer is found continuously adopting the nature farming in his farm. His name is U Hla Min. He received more than four organic farming trainings in previous years. He sent his son to OISCA –Yesagyo training school (nature farming oriented) for one year. He regularly processed Bokashi compost using inputs as follows:

Cow dung - 45 basket local (own farm by product with value – 18,000 MMK)

Sunflower cake – 16 kg (own farm by product with estimated value 11,000 MMK)

Rice Bran - 8 local baskets (9600 MMK bought from the market)

Ash – - 6 local baskets (kitchen waste)

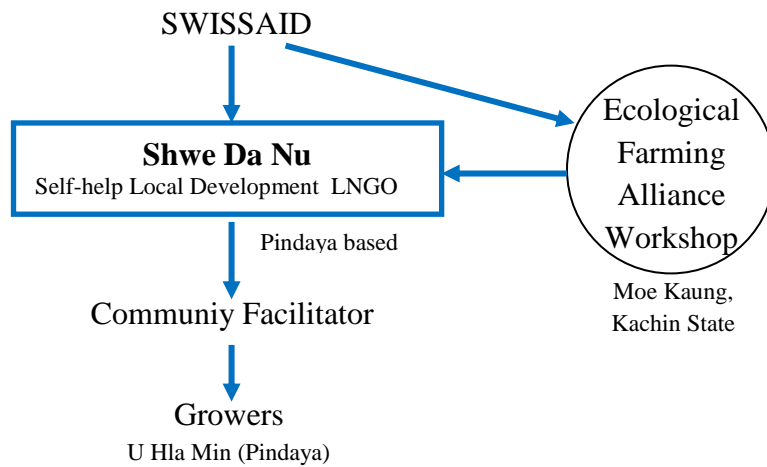
EM solution (Diluted EM is sold by DOA. Farmer formulated EM in 1:1:98 of water).

He dissolved palm jaggery in water by 1:2 to make EM substrate.

He also synthesized natural insecticide following the instruction given in the training by DOA in 2012 at Thein Kone, Pindaya township.

He said that his rice crop grown with natural inputs produced low yield in first year. Later the moderate yield level was stabilised. His vegetables are not growing as big as that of his

neighbours. He diversified his small garden with varieties of coffee, tea and alligator pear under natural condition. He said that he is satisfied because he is afraid of health hazard. He found some of his villagers ill-affected by pesticide hazards. He is one of the participants joining the Feasibility Study Workshop on Agro ecology conducted by GRET at Yangon in 2013.



The reason why other local farmers did not follow nature farming has been explained by community facilitator of Shwe Da Nu. Other farmers received one training only and their awareness level is low. They started compost making occasionally but they did not believe that natural insecticide does affect pest as chemical pesticides. SWISSAID community worker said that the level of awareness was not the same among all trainees and awareness of U Hla Min is higher than others'. U Hla Min said that there are two potential adopters of nature farming coming up. His relative farmer saw the performance of stable yield of his rice farm grown under nature farming while the other rice fields treated under agro-chemicals are giving yield decline. His relative offered U Hla Min to jointly cultivate in the former's farm on crop share basis.

SWISSAID Myanmar completed its 18- month pilot project for Ecological Farming Alliance and it is learned that the agency is going to launch three years project of ecological farming related activities.

4.1.2(c) The Role of Formal Education and Training Centers on Organic Farming

The only agricultural school which offers organic farming-oriented training in Myanmar is Organization for Industrial, Spiritual and Cultural Advancement, International Training Centre (OISCA). It was established in Yesagyoo, Magway Region in 1997 by the Memorandum of Understanding between the Ministry of National Planning and Economic Development (MNPED) and OISCA, International Japan. The MOU stipulates for OISCA working in cooperation and coordination with Department of Agriculture (DOA), MOAI.

DOA- OISCA Training Center has organized annual 10-month practical hands-on training on its about 11 acre of training farm. There are about 20 trainees (male and female in about equal ratio) from various parts of the country. The school has been provided by OISCA, an INGO based in Japan, while Department of Agriculture provides guidance, legal assistance, and coordination with other agencies concerned.

Activities on organic farming: the training center has pig breeding and poultry farming divisions while rice and vegetables are cultivated. It is typically agriculture with livestock raising as a major sideline. Pig dung and chicken droppings are made into organic fertilizers with the help of effective micro-organisms (EM). The training is conducted in the fields, giving them guidance

on how to make and apply organic fertilizers – bokashi and compost to improve soil. After more than ten years of time, the effect of soil improvement becomes noticeable. Some of the farmers approach the school to purchase bokashi made at the Training Center in order to apply it to their fields. The center produces several kinds of natural insecticides (insect repellents). Instead of using agro-chemicals, the Center adopts natural system of controlling insects

At higher educational level in Yezin Agriculture University (YAU), undergraduate and post graduate level teaching deals with fragmented portion of organic farming as far related as to the respective disciplinary academic course works, not as specialized organic agriculture subject. The same thing is true in the diploma level agricultural training and education in State Agricultural Institute (SAI). In the extension education programme, technology demonstration for compost making is a long- time and never- ending activity of DOA but there is no demonstration on full package of organic agriculture. Long term soil fertility demonstration trial without adding any chemical fertilizers had been established since the colonial time at Mandalay Central Farm and it was continued until 1980s and the land was later turned into the urban area by the respective army commander of the military government. In short, the government agencies have no consistent provision of the support to farmers for pursuing the pathway of organic farming development. .

4.2 System of Rice Intensification (SRI)

4.2.1 Country Level Overview

4.2.1(a) Introduction of System of Rice Intensification Practice in NRS and Delta by GRET

Northern Rakhine State (NRS) is one of the most populated areas of Myanmar. Extension of cultivable land has reached its limit. Under high land-man ratio, small land holders can only partially ensure the household food security. NRS farmers are usually good at crop management but strongly lack any access to new practices and improved technologies. Field assessment showed that some agronomic practices in rice cultivation were needed to be improved or changed. System of Rice Intensification (SRI) was a good opportunity for NRS farmers. GRET is a French-based INGO working in NRS since 1990s. GRET's objective in introducing SRI was mainly to increase the production of rice, targeting and supporting the most vulnerable farmer households.



From Dry Season 2004-05 to Dry Season 2005-06, GRET focused on the introduction of the new practice with deep support and follow up of the project team with establishment of demonstration plots, open field experiments at farmers' plot level and compensation / bonus incentive mechanism (in cash). The objective was to convince farmers about the SRI and to increase the number of participants in the SRI Farmer Led Experiment (FLE) activities.

After 4 years of implementation, GRET has directly supported 4500 farmers in the SRI-FLE activity and 1282 farmers in Farmer Field Schools (FFS) addressing SRI practice in rainy and summer rice. After summer paddy cultivation season 2008 in 36 Village Tracts from the Maungdaw and Buthidaung Townships it was reported that 18% of farmers involved in summer paddy cultivation adopted SRI on 9.3% of the total acreage under cultivation (Pierre, Ferrand, 2013).

SRI has proven to be a very efficient technique to increase the paddy production in NRS (over 1 ton/ha in average as compared to the traditional farmers' practices). Based on the experience gained through NRS project, GRET continued introduction of SRI in Ayeyarwaddy Delta. SRI has been an important tool to support agriculture revitalization after the consequences of Cyclone Nargis to take advantage of rice yield improvement possibility.

First GRET set up few demonstration plots at experienced farmers' level aiming at identifying ways to introduce SRI practices in the framework of existing crop production methods. SRI practice was tested in 2008-09 summer paddy season. Principles of SRI and its potential for being complimentary to quality seed production were discussed with farmers in awareness meetings. The results showed that SRI practices did not show inferior performance than conventional practices in all demonstration plots. Superior grain yield allowed ensuring a good promotion of the innovative methods. Seed rates in all demonstration plots were significantly lower than that of conventional broadcasted method (average of 2.2 baskets / acre in

demonstration plots while farmers usually use 6 baskets / acre in summer rice)(Hla Min *et al.*, 2009).

Large household family size, small farm holding size and need for family food security are pre-conditions for adoption of labour intensive SRI and SRI is also an agro-technique generating high labour productivity and input use efficiency. From this perspective, adoption in NRS is believed to be more successful than in Ayeyarwady Region.

4.2.1(b) Role of YAU and other Universities in Agro ecological Learning

There is no curriculum prescribing the course work on agro ecology in Yezin Agricultural University (YAU). Ecology subject is being offered in the Department of Plant Breeding, Physiology and Ecology while in other academic departments, agro-ecological principles are incorporated in the relevant disciplinary course works as one or two chapters. Post graduate research study happened to tackle the agro-ecological investigation.

In a master's thesis “Weed Management for SRI” undertaken at YAU in Myanmar, Soe Thura evaluated the effectiveness of different weed control methods in SRI by carrying out two experiments during the dry and wet seasons of 2009. An economic analysis indicated that rotary weeding at 15 days after transplanting (DAT) followed by hand-weeding at 35 DAT was the most cost-effective weeding method for SRI when compared to other combinations of hand-weeding, rotary weeding and herbicide application. Researchers at Taungoo University led by Dr. Aung Thu, Rector (now retired and become politician) are using SRI methods to grow rice on 50 acres of their 285-acre compound. In October to November 2012, they are planning to share their experience with local farmers, who are being encouraged to switch to SRI in the hopes of increasing their yield. The outcome is the follow up of SRI by some farmers nearby the campus, Dr. Aung Thu reported. Two big farmers adopted the SRI method after Dr. Aung Thu left the university. The farmers are growing rice and sold their rice mostly as seed. The method of using 10-12 days old seedlings, pulling seedlings and transplanting is well accustomed to the transplanting labourers who regularly hired by these two big farmers. According to District Agriculture officer, these two big farmers in Taung Oo continued adoption of SRI. ..

4.2.1(c) SRI and Metta Development Foundation

In 2000, Metta Development Foundation conducted its first experiments with SRI in Kachin State. After a disappointing first year(yields of 1.97-2.73 t/ha - apparently due to late planting) the 2001 average was 5.5 t/ha compared with the typical yield of 2.5 t/ha. In the next two years, the average remained over 5 t/ha.

Since 2001, Metta has conducted more than 600 Farmer Field Schools (FFS) where SRI has been taught as the major strategy for rice cultivation and it is said that as many as 50,000 farmers in Kachin and Shan States participated in FFS training or learned the methods of SRI in various degrees. The number appeared to be exaggerated since it may be based on the number of trainees from series of FFS. As a conservative estimate taking into account the number of FFS opened by Metta, about 5,000 farmers are believed to be using main practices of SRI. Rice yields, which vary significantly with the practices used, are reported from 4 tons per hectare to 10

tons/ha, with most of the averages from 5 to 6 tons/ha (as compared to baseline yields of 2 to 3 tons/ha).

During 2008, SRI methods were introduced with FFS approach by Metta Foundation in Ayeyarwady Region. In 2009-2010, the Metta Development Foundation expanded SRI promotion with CARITAS-Swiss funding (Federation of Catholic aid) to help cyclone-affected communities in the Delta region. Trained in Farmer Field Schools, 633 farmers cultivated 679 acres of rice, harvesting a total of 808 metric tons of rice in three townships of the Ayeyarwady Region.

Initially 35 facilitators were trained by the Metta-CARITAS project. Thirty three Farmers' Field school was conducted in Laputta, Myaungmya, Pathein and Kangyidaung townships of Ayeyarwady Region in the 2009 rainy season. A total of 688 farmers (617 male and 71 female) participated in these schools, averaging 21 farmers per FFS. The project distributed drum seeders and rotary weeders to the farmers to use with SRI methods on their fields. Among those trained, 633 farmers proceeded to cultivate a total of 679 acres of rice. From the cultivated 679 acres, a total of 40,398 baskets (808 metric tons of rice), worth US\$ 202,000 at the current local price, were produced. Kabir, Humayun (2008, 2010) gave a comprehensive review on SRI in his updated websites.

SRI modifications included experiments with direct seeding using labor-saving drum seeders. During 2013, SRI began operating through the Farmer Field School set up in Loi Law in Kachin State by SWISSAID and local organization Aung Sett Kyar, with funding from the Livelihood and Food Security Trust Fund (LIFT). (Metta Development Foundation Annual Reports (2011-2014).

U Khin Maung Latt, National Sector Coordinator (Agric.& Forestry) of Metta Development Foundation nicely incorporated SRI into the farmer' seed production scheme which precisely requires the single plant transplantation in high grade seed production plots. U Khin Maung Latt (2015) from Metta Development Foundation reported the yearly adoption rate of SRI in different States and Regions as follows;

Adoption of SRI in Northern Shan State (source: Khin Maung Latt ,2015)

Year	FFS farmers	Farming acre	Yield per acre (basket or 20.86 Kg)*		
			Before SRI	Current	Difference
2011-12		15		58.3	
2012-13	60	42.3		53.1	
2013-14	54	82.5	46.4	52.2	5.8
2014-15	46	83.5	59.9	63.4	3.5

Adoption of SRI situation in Kachin State (source: Khin Maung Latt ,2015)

Year	FFS farmers	Farming acre	Yield per acre (basket)*		
			Before SRI	Current	Difference
2011-12		310.5	51.8	69.4	17.6
2012-13	60	515	58	76.4	18.4
2013-14	54	675.31	61.15	72.2	11.05
2014-15	46	501.59	57.31	74.53	17.22
	160	2002.4			

*One basket of rice = 20.86 Kg

SRI Rice Fields of Northern Shan State implemented by Metta



Adopted situation of SRI in Ayeyarwady Region (source: Khin Mg Latt, 2015)

Year	FFS farmers	Farming acre	Yield per acre (basket)*			Variety
			Before SRI	Current	Difference	
2009-10	66	1209				
2010-11	65	1386				
2011-12	60	1111				
2012-13	78	2204				
2013-14	90	2054.5				
Total	359	7964.5				
			40/45	60/65	20	Local 1
SRI			50/60	70/80	20	Local 2
			60/65	80/90	20/25	HYV

*One basket of rice = 20.86 Kg

SRI Rice Fields of Kachin State



SRI Rice Fields of Ayeyarwaddy, Delta



4.2.1(d) Continuation of SRI in Kachin State through Farmer Field Schools

As of 2013, SRI is being promoted through the first Farmer Field School set up in Loi Kaw in Kayah State by SWISSAID and local organization Aung Sett Kyar, with funding from the Livelihood and Food Security Trust Fund (LIFT), a major source of multi-donor funding in Myanmar. The pilot plot, less than half an acre, and the farmers' own fields are the classrooms. The five farmers who took up SRI in June 2013 were hopeful they could increase their yields from the usual yield of about 40 baskets to at least 70 baskets.

In attempt to adapt SRI to upland conditions through the use of rake, drum seeder, and weeder in upland condition, Metta Development Foundation introduced a modification of SRI for the rain-fed areas of Shan State in 2011. The method includes a rake to make furrows in perfectly aligned rows, a drum seeder to drop seeds in the furrows at regular intervals and a rotary weeder designed for rain-fed conditions. This set of implements is giving farmers nearly 100% increase in yield over that with their traditional methods (1-1.5 tons/ha to 2-3 tons/ha), while reducing their production costs to a large extent, thereby greatly enhancing their net household incomes.

Among other NGOs working with SRI as of 2008 were: WHH (former German Agro-Action), in Wa Region and Ayeyarwady Region, and World Concern (Myanmar) in Kachin, Shan and Chin states. These are other NGOs promoting SRI are Karuna Myanmar Social Service (KMSS), Kachin Baptist Convention (KBC), Myanmar Baptist Convention (MBC), and Urban – Rural Mission (UBM), mostly related to the Catholic and Baptist based development organizations.

4.2.2 Case Study 1

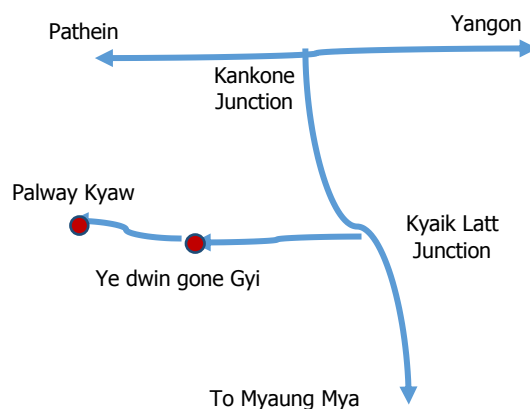
Metta Development Foundation supported the adoption of SRI in seed production through FFS in integrated sustainable rural development in the Ayeyarwady Delta Phase 2. For SRI practices contact person is U Saw Nay Blute Htoo, project coordinator of Metta Development Foundation. The farmers introduced 1-2 Young plant transplant in conventional practices (SRI) and rice seed producing and organic manure compost making.

Local level situation

U Kyaw Swar (Yedwingone gyi village) and U Myo Min Aung (Palway Kyaw village) who live in Yedwingone gyi village tract, Kangyidaunk township, Pathein district, Ayeyarwady region are core farmers for SRI. Their holding farm sizes are 25 acres and 17 acres. they grow their whole acreage under monsoon rice and only 8 to 10 acres for summer rice and black-gram. By Ayeyarwady standards, they are considered to be medium farmers. They use family labours and hired labours for land preparation, in cultivation, harvesting and transporting.

In monsoon they used –local rice varieties of Paw San Yin, Ayeyar Min, Ayeyarwady Paw San, Sin Thu kha, Hnan Gar varieties and in summer, Thee Htet Yin, Nga Kyaw, Pakhan Shwe War were used for seed-producing. Only Hnan Gar and Nga Kyaw are long maturing varieties and Pakhan Shwe War is short lived variety. Using SRI, young seedlings are transplanted for seed producing about 3 – 5 acres for sale and next season growing. Spacings are different by variety (8”x8”), (9”x9”) used. No Irrigation practices is applied since it depends on rain. Since 2011, Metta introduced this practice and conduct training by FFS & FLE projects especially SRI practice used in seed producing. About 100 people involved in this practice.

AE LAND LOCATION AND TRANSACT LANDSCAPE



Ye Dwin Gonegyi Village, Kyaik Latt Vilage Tract, Kangyi Daunk Township, Ayeyarwady Regional Division.

Direction: KanKone junction is 10 miles far from Pathein, Kyaik Latt Junction is 7.5 miles far from KanKone junction.

Ye Dwin Gonegyi is far from about 0.8 mile west from Kyaik Latt Junction. It has about 400 Households and nearly 1800 acres of rice fields

seeder using and seed production practices in 2010-2011. SRI is prescribed to use young seedlings for transplanting (8–15days old) in order to ensure the full tillering potential of individual plants. But local varieties such as Paw San seedlings are too weak to use young seedlings. Some varieties such as Sin Thu Kha, Sin Thwe Latt, Manaw Thu Kha plants are hardy and strong and young

seedlings could be used at transplanting time. SRI recommends a wider than conventional plant spacing of at least 10” x 10” but farmers preferred SRI with transplantation of young single seedlings spacing at 8”x8” or 9”x9” since flood is occurring frequently in their fields. Such seedlings are still younger than those used in conventional rice systems, but since they are past the early growth stages they are less vulnerable to damage from heavy rainfall and flooding. One seedling is transplanted per hill if it is healthy or two if they are less vigorous. Effective or advantages are gained by farmers who could apply low costs and more own labour input in their fields.

Metta is supporting it technically and financially to get high yield and good quality seed production need their living status. Some inputs such as seed, technical aids, managements and funds were obtained from Metta and rest of labour and other related works are own use in their farms. In seed production business, farmers could follow the SRI. Seed production business itself requires the transplanting rice by individual plant in wide spacing.

. Not all of SRI components have been adopted by farmers. SRI practice is constrained by labour availability and the geographic conditions. SRI with respect to labour intensive practice could be overcome by labour saving practices such as direct seedling by drum seeder. It was demonstrated by Metta.

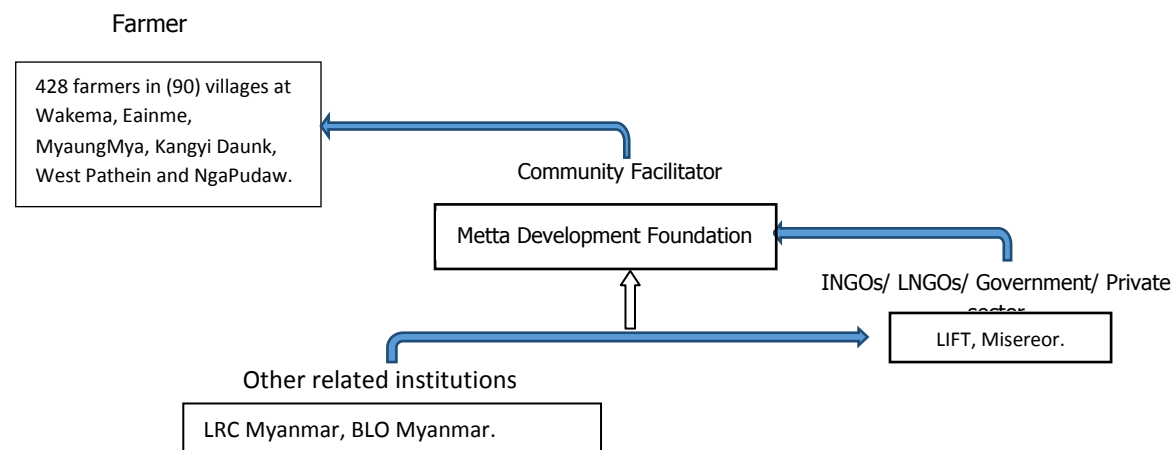
SRI technology acceptance situation report in Ayeyarwady Region

No	Township	No. of village	# of farmer practice SRI	# of cultivated acre in rainy season
1.	Kan Gyi Dauk	49	258	1916
2.	Myung Mya	12	36	90
3.	Ngapu Taw	5	50	150
4.	Eimme	6	30	158
5.	WakeMa	12	24	68
6.	Pathein	6	30	125
total		90	428	2507

Source: Own survey, 2105

Currently, the practice has been accepted in 90 villages of the townships of Wakema, Eainme, Myaung Mya, Kangyi Daunk, West Pathein and NgaPudaw by the adaptive effort of Metta and 428 farmers in 6 townships under 2 districts are adopting this practice on 2507 acres. Farmers admired the system but all farmers do not follow it due to scarcity of labour and flood hazard.

Network information of SRI practices



BLO = Better Life Organization; LRC = Local Resource Center

MISEREOR = Non-profit sustainable agriculture- based organization based in Germany

LIFT = Livelihoods and Food Security Trust Fund

4.2.3 Case Study 2 (Collecting Farmers' Perception)

Name - Farmer U Soe Win

Location - Khayaungkwin village, Kangyidaunk township

U Soe Win had attended FFS and practised SRI since monsoon of 2010. In yearly rice cultivation, he grows monsoon rice by SRI techniques for 6 acres out of own- holding 10 acres. He said about implementing SRI up to now that getting more tillers and more yield with yield advantage of 10 to 20 baskets over conventional practices. Moreover saving rice seeds and fertilizer inputs, less lodging, resistance to pests & diseases and good quality rice seed are major benefit. In coming years, he will follow through SRI to his rice farms.

Name - Mann Dongae, Karen ethnic farmer

Location - Songpong village, Kangyidaunk township, Ayeyarwady Region

Although he does not join in FFS but he has studied SRI practice from others and he applied this method for 15 acres of his farms every monsoon rice growing season since 2013. According to his reply using 1 basket of rice seed is equivalent to cover for 3 acres cultivation, and he could save rice seeds.

In conventional practice, only male worker can pull rice seedlings since strength is required in beating the seedlings against the legs. But in SRI, female workers not only pulling seedlings but also transplanting that can be reducing labour costs and easy to hire labour for early transplanting. He follows SRI and he can reduce to half of fertilizer inputs, reducing area of seedling bed, save seedling plants and earlier to recover from transplanting shock. Also he said he will continue SRI and neighbour of farm believed it now and will involve in the next season.

Name - U Myint Aung

Location - Migyaungthike village, Kangyidaunk township

U Myint Aung had learnt SRI techniques from FFS in monsoon of 2011 and adopted this practice to 20 acres of his farm in both dry season and wet season since 2011 monsoon.

Farmer's reasons for applying these techniques are: saving rice seed to sow, easy to remove off-varieties, stability of yield, buyers' preference for rice seed quality for selling by growing SRI. Rice grown under SRI fully ripened and the grain filling was full and buyers prefer the well ripened grain of SRI. Farmers prefer rice seed for next season cultivation. In delta, regular sowing rate is above six to eight baskets (126 to 168 kg) resulting in high fertilizer demand. Seed input of SRI is less and fertilizer requires less.

Name - U Thant Zin Oo

Location - Phayar chaung village, Pathein township, Ayeyarwady Region

U Thant Zin Oo involved and learnt SRI in FFS training in 2011 dry season and implemented SRI practice in dry season and wet season on 5 acres of his 17 acres paddy farms since 2011 summer rice growing. Other paddy farms work in deep water land and they can grow rice with only conventional practice.

He said that implementation will be continued since it can save seed for sowing, and yield advantage of additional 10 to 20 basket per acre and more profit in this practice, Cause of free pests and diseases, no need for pesticides, reducing chemical fertilizers, less refilling to dead seedling plants and save the cost of pulling seedlings are other reasons he gave. In earlier time, some dislike it but now they had accepted and followed this way and to continue in adaptable farm lands.

4.3 Conservation Agriculture (CA)

4.3.1 Country Level Overview

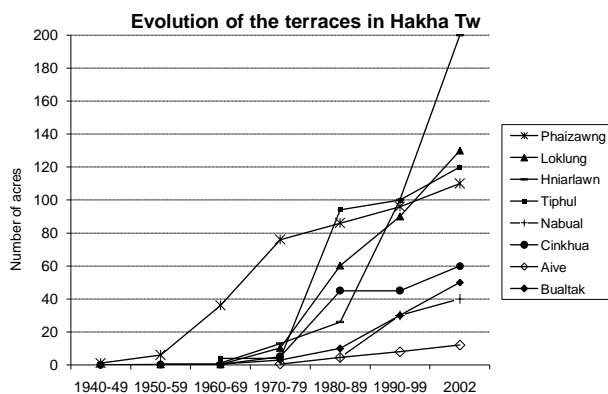
Natural resource management and conservation agriculture in Myanmar focused on improved slopping land tillage practices via mulching, hedgerows and contour bunds, sloping agriculture land technology (SALT) upland slopping land and permaculture techniques, conservation and biodynamic agriculture, etc.



Land and soil conservation measures had been initiated in Myanmar particularly in the ecologically fragile upland areas since early 1960s. Natural resource management is a major issue in the ecologically deteriorating Dry Zone Region. Likewise shifting cultivation had been and is still the major livelihood of people on the steep slopping land in Chin State and the community had received and is still needing the important intervention by the Government agencies, UNDP, INGOs such as GRET and several other local organizations. Terrace building in paddy fields was first established in 1960s by local elites. Gradually terracing and contour bunds were developed by small farmers with the

assistance of UNDP and INGOs under the Food for Work Programme of World Food Programme (WFP). During the military regime, the Department of Agricultural Mechanization started launching contour bund making activities by heavy machineries. The department has helped farmers developing the terracing and contour bunds over 900 acres of farmers' slopping fields.

Overall adoption rate is however slow. The adoption rate is shown to be rapid after 1990-99 in selected villages of Hakha township in Chin State. (Figure below).



Yearly increase in acreage of terrace farms developed by villages in four townships of Northern Chin (compiled by Murielle Morrison, Project Manager, Gret Chin, 2012) Cited by San Thein (2012) Study on the evolution of the farming systems and livelihoods dynamics in Northern Chin State, GRET-LIFT.

Terracing job involves long man-days. One poor farmer could not spend all his time and labour in doing this job. He will have to work in his regular field or somewhere else to feed his family. If by chance he could harvest a good crop in one out of three or four years, he could save a certain amount of money for terracing and devote his time and labour that could otherwise be used up in his regular livelihood activities. Thus the changing process by poor farms becomes a slow motion. It is in the present decade changing swiftly due to the project intervention of the INGOs.

4.3.2 State/Regional and Local Level

CORAD

Chin Organization for Rural and Agricultural Development (CORAD) is the first regional organization established from 2008 in Chin State in the field of agriculture and natural resources management. Involving farmer groups and local staffs who have worked for nearly ten years within the GRET project framework, CORAD has a long-standing experience with the communities and a relevant understanding of the food security and NRM issues in Northern Chin State. It covered 105 villages of 4 townships (Hakha, Falam, Tedim and Thantlang) in Northern Chin state, Myanmar. GRET has been entrusted to support the institution- building of CORAD and is building their capacities to set up their organizational framework and systems (financial, human resources, reporting, monitoring), to overview the suitable legal frameworks and to seek for funding. CORAD is working under GRET umbrella. To respond to the emerging demand, the program has focused on building the capacities of the farmer groups on participatory approaches and self-reliant processes.

CORAD has supported 105 farmer groups in four townships of Northern Chin through the provision of technical & organizational services and the financial support to land development projects (terrace, irrigation), breeding (cow, goat), fish pond, grape plantation, coffee, agro-forestry etc..through WFP,OGB (Oxfam Great Britain),Norwegian People's Aid (NPA), British Embassy, LIFT Donors funding agencies.

CORAD's Partners

GRET, project partner, has supported CORAD with different expertise that have been identified together with CORAD based on their own capacity assessment and based on the expertise required for developing the next activities. Other partners are International Center for Integrated Mountain Development (ICIMOD) for technical expertise on mountainous development issues such as soil and water conservation, livelihood opportunities and economic integration, women empowerment, and CRS and KMSS are jointly

Summary of CAP (Collective Action plan Project) achievement (2011-2015) funded by LIFT with emphasis on conservation agriculture.

Sr. No	Description	Township	Village	Household	Plants/ Heads	Effected Area (Acres)
1	Terrace	4 township (Hakha, Falam, Tedim and Thantlang)	53	1604		655.72
2	Irrigation	4 township (Hakha, Falam, Tedim and Thantlang)	60	161897		1077.05
3	Agro-forestry plot	4 Tsp (Hakha, Falam Tedim & Thantlang),	4	358		53.41

Terrace : 53 villages in 4 township (Hakha, Falam, Tedim and Thantlang), 655.72 acres for 1604 households.

4.3.3 Conservation Agriculture Driven by Rehabilitation of Inle Lake

Inle Lake Rehabilitation is the country level important task and with the Norwegian government aid, conservation agriculture development is one of several measures implemented by development agencies and local NGOs in participatory efforts of local farmers and civil society associations in the upstream areas of Inle Lake in Southern Shan State.

Farm Business Development Technical Group (FBD) involved in the project activities supporting the local farmers in conservation agricultural practices. FBD is a non-profit, non-government and technical group working for the resource poor rural families / communities with the aim of reducing poverty and developing sustainable rural livelihood primarily in the following areas of;

- ◆ Climate Change Mitigation and Adaptation to Climate Change
- ◆ Agriculture, Agricultural Extension and Conservation Agriculture
- ◆ Soil Conservation, Water harvesting, and Small scale irrigation
- ◆ Agro-forestry, Community forestry, and Rural energy

FBD is headed by Land management expert, U Nay Wun Paw who has about 20 years experiences in natural resources management and environment friendly food security / community development activities under UNDP and FAO projects. Some of the conservation agriculture aspects of the FBD activities are; soil and water conservation (SWC) such as –

- SWC Field Work for INLE lake Conservation and Rehabilitation project, UNDP Myanmar, 2012
- SWC Field Implementation for INLE lake Conservation and Rehabilitation project, UNDP Myanmar, 2013
- SWC Field Implementation for INLE lake Conservation and Rehabilitation project, UNDP Myanmar, 2014
- Provision of various technical trainings to members of CBOs, CSOs, INGOs and LNGOs, and District Land Use officers of DoA, 2010 to 2015.

These field activities have been carried out with participatory approach in the communities

of Dry zone, Delta, Shan South, and Shan North. The intervention includes conservation practices such as No-till, Terrace, Mulching, Contour bund and Siltation bunds (different types).

UNDP-HDI project intervention attempted the conservation farming and natural resource management in the dry zone, Shan State, Chin State and other environmentally deteriorated areas for over a decade since 2002. During the UNDP-HDI project in the dry zone, the barren and eroded lands rehabilitation had been rigorously carried out by introducing various soil and water conservation measures. It promoted rain harvesting through siltation bunds. It obviously prevents soil erosion and promotes soil and water conservation. The following photo record shows changing scenario from desertification trend to the greening stage in Magwae Region of Dry Zone.

One of UNDP-assisted combating desertification by UNDP in dry zone, from initial phase: 2001 to greening stage in 2011 (Photo credit: Min Htun Yin, UNDP)

Combating desertification by UNDP in dry zone,
Initial phase:2001 (source: Min Htun Yin, UNDP)



Photo credit: U Min Htun Yin (Formerly UNDP)

Sedimentation storage pits in initial year; Silt was deposited and water was stored after one year; Green vegetation becomes established over 9 years of soil and water conservation. Greening stage restored over 9 years.

GRET- Monywa of Dry Zone project office supported the farmers in three townships (Monywa, Yinmabin and Budalin) in conserving the soil in barren lands, land rehabilitation and development in various land categories (gully, forest land, grazing land and cultivated farmland)

Conservation agriculture adopted in three villages of Dry Zone, GRET (as of January, 2015)

TSP	Village	Type of soil conservation measure	Treated acre	Land use type (acre)				
				cultivated land	Grazing land	Forest land	Gully	Total
MNY	Nyaung Pin Thar	Sediment storage bund	17	17		-		17
		Sediment storage dam	0.5				0.5	0.5
		Contour bund	24.5	24.5		-		24.5
		Stone bund	0.8	0.8		-		0.8
		Stone weir	1.45	-	-	-	1.45	1.45
		Trenches	0.75		0.75	-		0.75
			45				45	
YMB	Si Laung	Sediment storage bund	6.3	6.3	-	-	-	6.3
		Contour bund	1.5	1.5	-	-	-	1.5
		Check dam	0.7		-	-	0.7	0.7
		Stone bund	21	21	-	-		21
		Stone weir	0.4		-	-	0.4	0.4
		Trenches	0.1	-	0.1	-	-	0.1
							30	
Budalin		Sediment storage bund	13.1	13.1	-	-	-	13.1
		Contour bund	55.37	55.37	-	-	-	55.37
		Check dam	3.75	3.75	-	-	-	3.75
		Stone bund	0.6	0.6	-	-	-	0.6
		Stone weir	0.35				0.35	0.35
							73.17	
Total treated acre								148.17

Source: U Pe Than, GRET Dry Zone Project Manager, Monywa.

Farmers could reclaim the fallow barren land into productive land over three years. The following changes observed in farmers' fields have been reported by GRET as follow.

1. Protect soil erosion immediately
2. Improve soil fertility year after year
3. Filling the depression area with sediment year after year
4. Change of cropping pattern due to trapping sedimentation
5. More production of late monsoon crop due to soil moisture conservation
6. Reclaim fallow land to productive land
7. Rising up water aquifer at the downstream side (Evident: Natural spring well is always full of water / recharge immediately after used at the downstream side of treated area)_

4.3.4 Approach of “No Till, No Burn and Mulching” in Northern Shan State

The motivator of no till agriculture as supported by WHH community workers is U Thein Su in Lashio office. His team facilitated local upland farmers in adopting the approach of “No Till, No Burn and Mulching in farming. No-till planting without setting fire to the trees were delivered to the local farmers for over four years until 2014. Maize is their commercial crops and corn stalks were covered on the harvested field over the dry season. When the season starts, seeds are dibbled under mulch. Corn yield was found to be the same as that for tilled plots. The practice was initiated in 2008. Welthungerhilfe has funded the project. Targeted beneficiaries were Wa

people dwelling in 55 villages in Wa Self-Administered Region and ethnic minorities (Palaung, Shan, Lahu, Kachin) dwelling in 26 villages of Townships of Lashio, Theinni, Namtu, and Kutkai. The project covered nearly 2500 households. The programme had been supportive to this sustainable agriculture programme until the end of 2014. Upon demand of the community, the project team considered to support implementing it.

4.3.5 Local Level Situation

Several cases could be observed in the country where conservation agriculture is being practiced by indigenous people in their locality without any external influence. One example is forest frontier- based livelihood of Karen ethnic people in Hi Yu village, Minhla township, Bago Region. The people are dwelling in the forest at the foot hill of the Bago Yoma Range in the boundary of Minhla township, West Bago Region. Farmers are growing crops in the deforested land. The farmland in the forest –periphery and within forest land is fertile with high content of humus and the indigenous practice is no-till /planting of green gram crops under mulching. The crop looks healthy and vigorous with thick stand. Karen people in eastern part of Hlaing Bwe township, Kayin State adopt no-tilled planting of maize. These Karen ethnic villages are Maet Taw Lae, In Kyin Myaing, Min Let Pan, Pha Lu, Shwe Kok Ko, and Wait Shan. Their farm landscape and topography assumes the dome-like (upper shell of turtle) surface and the community keeps minimum tillage to prevent accelerated soil erosion. When the contract farming is introduced in the area from Thailand side, people started using fertilizers and hybrid seeds but they still continued no-tilled planting of maize. Further investigation is necessary.

4.3.6 Case Study (conducted by U Nyo Maung for Community Resource Management)

Myanmar Traditional Environmental Conservation Ethic (Naung-Taw Natural Forest under Safeguard of the ethnic Community).

Naung-taw village is located in Naung-cho Township, Northern Shan State in Myanmar. It is 5 kilometres away from Naung-cho. One of Myanmar ethnic group-Danu tribes are dwelling in this village and its cluster villages. Approximate population is 2100 from 420 households. Elevation is 4000 ft above sea level.

The unique feature in Naung-cho Township is the limestone habitat. The biodiversity of limestone has important direct and indirect economic benefits as well as cultural and aesthetic value. The swiftest and bats dwelling in limestone cave contributes to economic wellbeing of the surrounding farm lands by supplying "organic fertilizer" (i.e. their feaces). They consume thousands of kilograms of insects daily, thus assisting in pest control near agriculture land. Limestone reservoirs provide hundreds of millions of people with clean drinking water.

The elevation of the mountain ranges along Dod ta waddy River and its catchment area is 1000 meters in height. The south eastern valley where the Naung-taw village lies, is lower than 900 meter and becomes the major agriculture land of Naung-cho Township. Naung-taw village lies in this south-eastern portion near Dod ta waddy river and its tributary. The unique feature is the presence of springs everywhere in the area. Sometimes reappeared spring becomes wide enough to be seen as a lake. The typical example is the Naung-taw spring which is transformed into reservoir and become the main source of drinking water, household water and irrigated water for farm lands. This reservoir is 1.5 to 2.0 hectare wide (Nyo Maung *et al.* 2014).

There are four community protected forests.

	Length	width
1) Pha-yar Forest	= 3.0 mile	x 1½ mile
2) Inn-yar Forest	= 1½ mile	x 1½ mile
3) Lwin-ku Forest	= 1.0 mile	x 1.0 mile
4) Baw-de-yae	= 1.0 mile	x 1.0 mile

The largest one, Pha-yar Forest is located along the side of Naung-cho to Naung-taw motor car road close to the village. There are farm lands surrounding the forest. The Naung-taw spring is located in the Inn-yar Forest.

Naung Taw Forest I & II (Evergreen Forest) (Photo credit: U Nyo Maung et al., 2015)



The main reason for protecting forest is to maintain the "spring". U Aye Phae, 81 years old villager, who was first initiative member of the "Naung-taw forest protecting committee" said "This spring is essential for our village as a heart. It supplies households fresh water for drinking and irrigation water for our farmland. Forests surrounding our village regulate the stability and sustainability of the spring. Because of these forests the spring is alive. The forests keep and store water so that the spring supplies water constantly for us. That is why we protect our forests.

Naung-taw forest protecting committee was organized in 1977 led by the monk of Naung-taw-ywar-u monastery. The title (name) of the monk is U Nar Ra Da. The Monk told us that three successive monks including him had led the forest protection. The age of the first monk was 75 years, the second 65 and the present is at 55 years old. In 1978 and 1980, M-khe Reservoir was built by the "Fund" collected by villagers, to store the water from the spring. The height of the reservoir is 9.0 feet and the length is 550 feet. At present, the Naung-taw forest protecting committees have been organized one member from each five village ward and the monk of Naung-taw-ywar-u monastery acts as patron. The Buddhist monks handed over this task one after another over three generations. The committee constantly monitors the forests. The one, who cuts the tree for his own use, had been punished. The punishment is to replant the tree and to pay for compensation. The one, who informs the new of tree cutting or burning, had been given bonus. But the case happens very rarely. The present village chief name is U Aung Nyein, Danu ethnic.

Water security of Naung-taw village is the prime interest. The other benefits are irrigation water supply to the fields. The next added benefit are provision of varieties of edible mushrooms and medicinal plants such as edible globular fungi (locally called In-u), *Aristolochia tagala* Cham., *Amaranthus spinosus* L., *Ageratum conyzoides* L., *Boerhavia diffusa* L., *Croton oblongifolius* Roxb., and *Holarrhena pubescens* Wall. ex G. Don from the conserved forests.

Close to the forest, farmers grow mustard, corn, niger and sugarcane. Villagers could grow vegetables in the household compounds year round from the benefit of soil moisture availability. People believed that the forest surrounding the village maintains the high level of underground water table.

Myanmar traditional conservation ethic have been developed based on the experiences and practices of their great, great grand fathers and inherited through generation to generation. The evidence is in the Myanmar proverbs;

“If there is a large tree, thousands and thousands of birds can dwell on it”

There is no donor nor assistance from outside but strength and spirit of conservation are generated from within the community by traditional ways. Source of traditional authority comes from the Buddhist monks who lead conservation and safeguard of the forests. Over long years, sense of ownership becomes rooted in the community. Two forests become evergreen forest while the remaining two in secondary forest class over 50 years of natural resources protection.

4.4 Agro-forestry

4.4.1 Country Level Overview



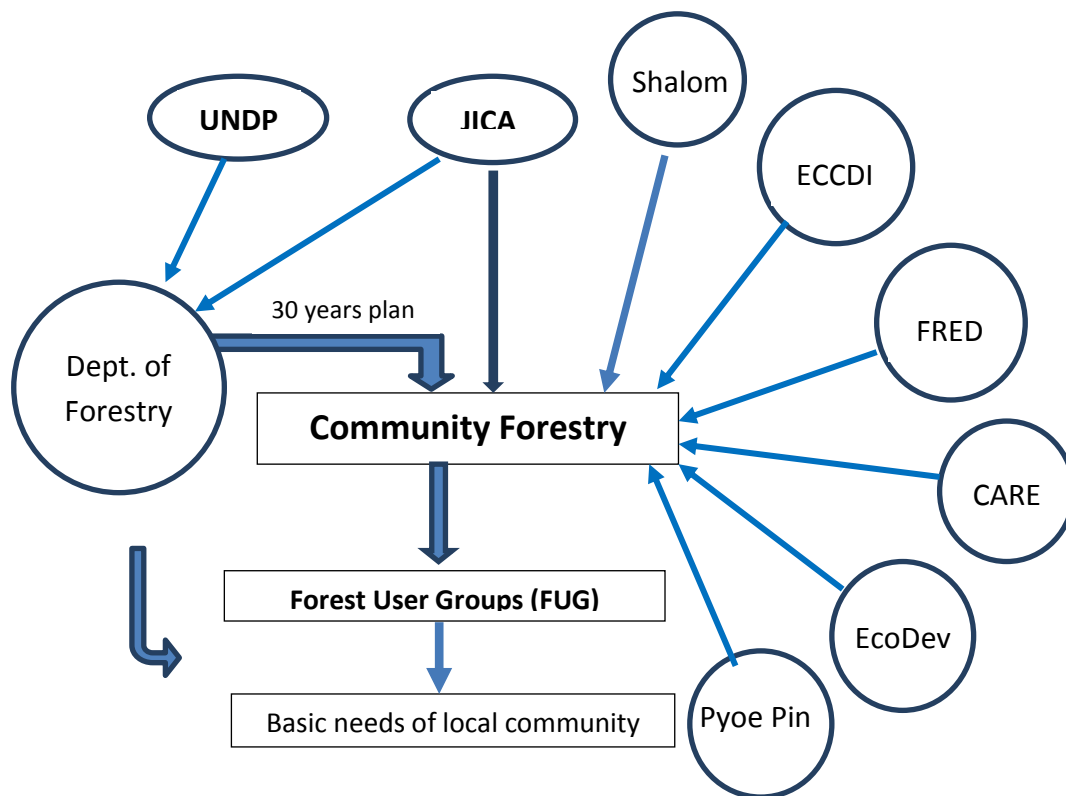
Nowadays Myanmar has been brought to attention that sustainable forest garden/agro-forest production regimens and productive gardens can reduce land degradation, conserve water resources, and increase household incomes and nutrition through a diverse array of perennial and annual crops, medicinal, Non-timber forest products (NTFPs) and timber. Agro-forestry dominated with trees increase permanent soil cover and crop diversity with local species and high value niche products, promote climate resilience, serve as ideal buffers connecting and protecting native forests, improve access to forage, fuel wood and local building materials, and reduce pressure on adjacent upland forests.

4.4.2 The Role of Forest Department, MoECaF

The Forest Department issued the Community Forestry Instruction (CFI) in 1995, and initiated the promotion of Community Forestry in Myanmar. National Working Group has been formed at the Department of Forestry and there is CF Units at Union level, Region and State level and District level. The CF Unit at the Head Office is affiliated with Extension Division and placed under the Director level officer.

Regarding the status of Community Forestry (CF) establishment from its inception stage to February, 2015, total CF area is 201,832 acres. Total number of CF user groups (CF UG) is 828 in the whole country. The area of CF established in protected forest estate is 143,400 acres while outside protected area, CF area covers 58,567 acres according to the Planning and Statistics Division of Forest Department. Implementation progress has been highest in Shan, Rakhine, Magway and Mandalay, most of which have been under UNDP project support.

Implementation of the CFI was promoted by international donor projects (e.g. UNDP / Japan International Corporation Agency (JICA)/UK, Dept. for International Development (DFID) as well as through Forest Department promotion, and in some cases self-organization by communities. Implementation received a major boost through the Forestry Master Plan (2001) which mandated that 2.27 mil. acres (1.36% of the country) be handed over to CF-UGs by 2030-31.



4.4.3 Stakeholder Mapping in CF

The Forest Department issued the CFI and is the main institution responsible for its implementation. Apart from the major institutions mentioned, a number of NGOs, namely;

ECCDI (Ecosystem Conservation and Community Development Initiative), FREDA (Forest Resource Environment Development and Conservation Association) and Eco Dev (Economically progressive and Ecological Development) have also been establishing Community Forestry. Moreover CARE Myanmar (INGO) has been promoting Community Forestry under household-level rural livelihood security project in Northern Rakhine State since the mid 1990s.

Donor for Community Forestry Implementation (Before 2010)

Donor	Duration		Area (acres)	Funding level	No. of FUGs formed	Regions
	From	To				
UNDP programmes	1995	2001	72.221	NA	NA	Southern Shan State Dry Zone, Ayeyarwady
JICA* (COMFORT Project)	2003	2006	12.728	NA	117 FUGs with 6985 members	Dry Zone
Pyoe Pin	-	2011	28.944	US\$ 1 m	NA	Kachin
FREDA**	1999	2010	7.892	NA	Going on 2014	Ayeyarwady Delta

* = JICA in cooperation with Forest Department had implemented a 3 years (COMFORT) project
 ** = Forest Resource Environment Development and Conservation Association(FREDA) has been implementing Mangrove Reforestation project.

Role of Development Agencies and INGOs and Local NGO in CF and Agro-forestry
 ECCDI encouraged the CF establishment as supported by Pyoe Pin programme of FCO/DFID.
 List of recognized Community Forestry of ECCDI is presented below.

State/ Region	Township	Community Forestry
Kachin	Waing Maw	Wuyan, Gweyutan
Mandalay	Nyaung U	Myay Thin Twin, Let Pan De
	Pyin Oo Lwin	Pa De Thar Myothit, Sin Gaung Lay
Shan (south)	Pindaya	Mine In, Pway Hla
	Nyaung Shwe	Nar Daung Hla, Lwei Nyeint
	Pinlaung	Kone Shine, Taung Kya-1
Ayeyarwady	Laputta	Byant Gyi Gon, Nyaung Ta Bin
	Phyarpon	Te Bin Seik, War Gon
Total : 4 S/R	8 townships	16 Community Forests

Carried –over activities and on-going ECCDI projects related to CF and conservation are shown in the map below.

4.4.4 Carried –over Activities and on-going projects of ECCDI

ECCDI Project map

a. Establishing Community Forest plantations

In five different townships (Taikkyi and Kawhmu in Yangon Division, Kyaukpadaung in Mandalay Division, Mawlamyainggyun and Latputta in Ayeyarwaddy Division).

b. Establishing and running a 500 acre Forest Plantation in magari (Taikkyi Township, Yangon Division). Already 200 acres is planted. The forest plantation should become a demonstration site for suitable forest management.

c. Supporting Nargis-Cyclone affected communities

By providing training related to Agriculture, Livestock, Forestry & Environment and Micro & Small Business Development. In total 55 training Sessions where conducted reaching 2,070 persons 20 villages (Mawlamyinegyun, Bogalay, Latputta And Kyaitlat Townships, Ayeyarwaddy Division).

d. Ensuring the integration of climate change concerns in programs and compiling the final draft of the report to UNFCCC.

e. Restoration of mangrove forest (Gwa Township, Rakhine State).

f. Conservation and rehabilitation activities around Inle lake (four townships in Shan State).

g. Preparing for a community forest-based enterprise In 6 villages (Ywangan Tsp, Shan State).



In

On-going projects of ECCDI, Donor Support and CF project Locations

SN	Project Title	Donor/ Partner	Contributed Amount	Location	Project Duration
1	Establishing and Strengthening CF Enterprises in Southern Shan State	FFF/FAO	USD 60,000	Ywangan, Pindaya Pinlaung, Kalaw, Nyaung Shwe Township, Southern Shan State	February, 2015 To November, 2015, (2 Years)
2	Establishment of Regional-level Community Forest Products Producer Assoc.	FFF/FAO/ RCA	USD 40,000	Gwa Township, Kyein Ta Li Sub-township, Southern Rakhine State	February, 2015 To Nov. 2015 (9 Months)
3	Agro-Forestry: An Alternative to Shifting Cultivation in Upland, Myanmar	TCRAF, U OF/LIFT	?	Lone Kae Vil, Pinlaung Tsp, Southern Shan State	August, 2015 to May, 2016

4.4.5 Myanmar Environment Rehabilitation-conservation Network (MERN)

Myanmar Environment Rehabilitation-conservation Network (MERN), a local environmental NGO, is working for environmental rehabilitation and conservation activities linking with the development of local communities for their livelihood and food security. It consists of 16 local environmental NGOs in which some has strong experience in forestry and environment, some in community development, capacity building and social mobilization, some in agriculture, livestock & fishery, and social infrastructure, etc.



The Implementing member organizations: BANCA, BDA, ECCDI, Eco Dev, RCA, SDF and Donor LIFT Fund Myanmar. Project area covers 62 villages of Gwa Township. Project period is from 1.7.2011 to 30.6.2014 (3 Years) and project budget is USD 3 million (approx.). Project activities are agriculture, livestock, fishery, mangrove conservation and rehabilitation, capacity building, awareness raising, advocacy.

The developers for CF have pointed out the possible costs and benefits of CF to the individual households, community and the environment as a whole.

4.4.6 Costs and benefits to households from Community Forestry

Factor	Possible costs(-)	Possible benefits (+)
Land use	Loss of previous land use forestry (especially grazing, fallows and cultivation) Obstructed access routes through forest.	Most sustainably productive use of land than open access. Legitimate access to forest, either collective or individual plots.
Forest product flows	Restrictions of forest product extraction	Products for own use and sale. Products for community development (e.g. timber for school building) Job opportunities from enterprise development
Cash	Investment expense for plantation etc. Loss of revenues where forest products sale becomes restricted.	Incomes from product sale
Ecosystem services	Loss of water sources due to high water demand from fast growing exotics. (esp. dry zone)	Range of local ecosystem services, (e.g. water supply improvement, soil conservation and nutrient cycling) Extreme weather event protection.
Social 'capital'/ cohesion	Exclusion from FUG Social conflict between FUG members and non-members including neighbours and outsiders.	Improve social cohesion. Development of community development planning and management skills. Conflict resolution skills.

4.4.7 Agro-forestry as Part of Community Forestry

Agro-forestry category is also placed under Community Forestry. Group of users could apply for and adopt the Community Forestry. After CF permit has been granted, user group could adopt CF with pure trees or Agro-forestry with mixture of crops and forest trees. Agro-forestry could be set up by individual also whereas CF is to be set up by group of users according to the CF Instruction.

Local Level Activities

4.4.8 Case Study 1



Agro-forestry establishment activities, Pwe Hla Village Tract, Pindaya Township, Southern Shan State

Location: Pwe Hla Village tract, Pindaya township, Southern Shan State, Myanmar. (Pwe Hla to Aung Ban market center – 15 miles (24 Km) ; Pwe Hla to Pindaya town – 8 miles (13 Km)

East longitude: between 96⁰ 37 ‘and 96⁰ 39‘ ; North Latitude between 21⁰ 14’ and 21⁰ 16’ ; 4400 feet above sea level;

Pwe Hla village is agriculturally intensive area. Drought hit the area in 2010. Cabbage, tomato, and egg plants grown in pre-monsoon and mid monsoon were severely damaged. Water dried up in the village lake. The

community was alarmed by the real climate change and the young villagers initiated the organization “Pwe Hla Environmental Conservation and Development Organization (PHECAD) in 2010 with the aims of conserving the water spring, protecting the forest near the water resources, safeguarding the illegal logging and rehabilitating the forest and lake. They set the fund by collecting the donating money from the villagers. The Chairman of the village had asked the UNDP personals for further assistance.

With the implementation of Inle Lake Rehabilitation Project primarily funded by Norwegian government, young people of Pwe Hla village started to organize the agro-forestry establishments around their village. The chairman is the village chief, U Than Aung and the secretary is Farmer U Khin Mg Oo. The Forest Department (FD) of Environmental Conservation and Forestry (MoECaF) provided the forest seedlings and the villagers set up the nursery shed in the area given by the Watershed Conservation Division of the FD. The committee members linked with the Village administration Committee for enforcing the regulation not to cut the trees in designated areas. PHECAD established agro-forestry on 100 acres, wind break trees on 60 acres and grow high value trees on 120 acres. The nearby villages such as Shauk Pin, Pwint Lan and Set Kyar Kone villages joined in the activities by establishing agro-forestry on 200, 60 and 23 acres respectively. The land of the CF belongs to the village community and to be officially designated, the villages applied for the permit of Community Forestry (CF) to the FD to get the certificate.

Ecosystem Conservation and Community Development Initiative (ECCDI), Yangon – based association has provided financial and technical assistance to PHECAD for most of the activities in Pwe Hla village. ASEAN Forest Cooperation Organization (AFCO _ASEAN), Kyaik Lat –based NGO, Sympathy Hands Farmers Business Development (funded by UNDP) are linked to PHECAD as partnership. Under PHECAD, there are 16 affiliated villages. PHECAD has registered at DANU Special Administrative Zone (SAZ) for legal status in 2014 and it was approved in January 2015.

Affiliated 15 villages are: Wartayar, Shauk Pin, Pwint lan, Kan Daunt, Set Kyar Kone, Pwe Hla, Nan Kone Upstream, Nan Kone downstream, Pin Sein, Pin sein Pin, Nan Kone Way, Nyaung Kone, Kyar Kone, Ti Pin Paw, Tin Pin Down, Pha Yar White, and Paw San Bi.

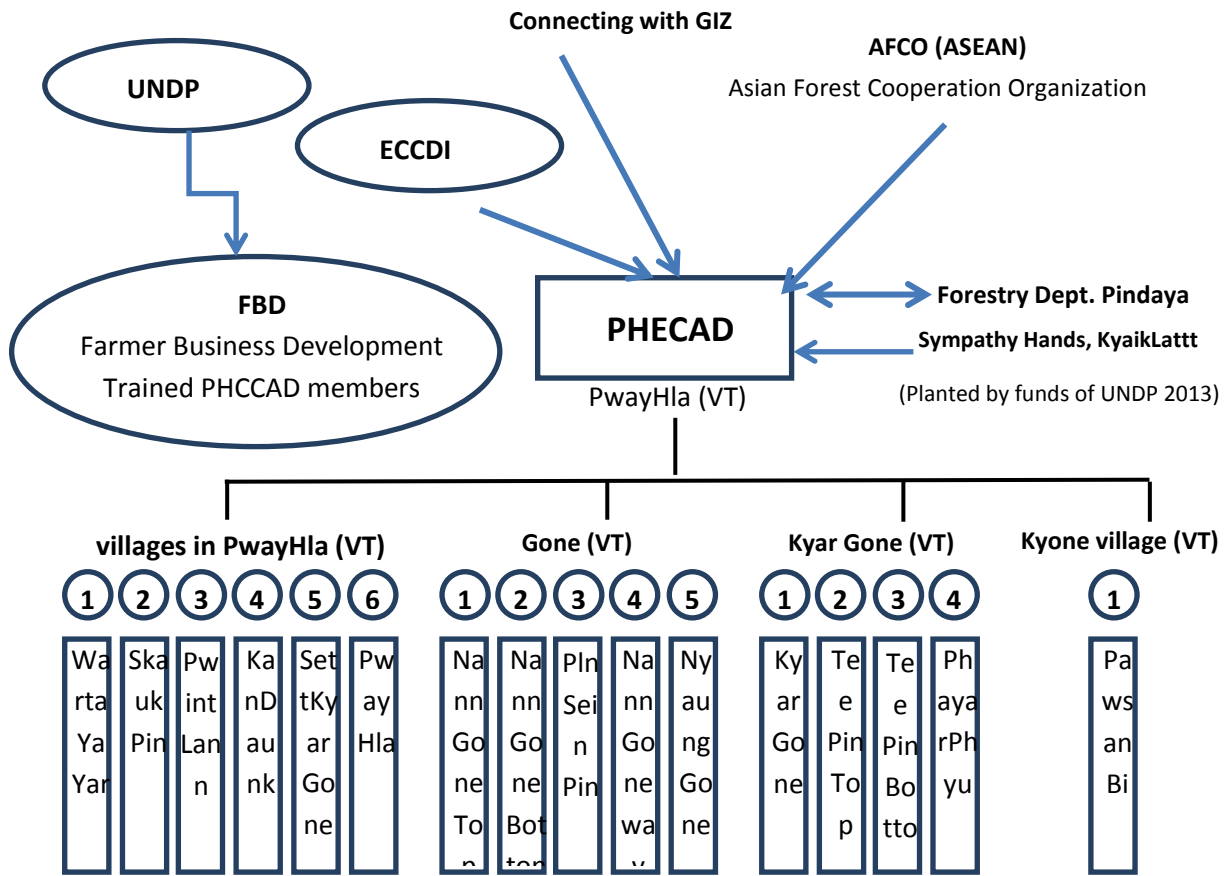


Figure . PHECAD and affiliated villages linked with partners and funding support organizations.

In Pwint Lan village, community forest was established on 3 acre and about 600 pine trees were planted in 2012. Shaik Pin villagers also grow high value forest trees on 100 acres. The 15 villages from four village tracts collectively grow forest trees on 70 acres near the water spring in 2013. About 50,000 tree seedlings were provided by the village nursery shed of PHECAD with fund provided by UNDP. With the funding provided by one donor from Switzerland, PHECAD had grown 6500 forest trees on 11 acres in the village common virgin land in September 2013. By the funding support from Inle Lake Rehabilitation project of UNDP and Norwegian government, PHECAD and Nan Kone villages in cooperation with Sympathy Hands grown 17,000 forest trees near the water spring sources in July 2014.

Individual farmers were encouraged to set up agro-forestry plots. Danu ethnic woman named Daw Htin Me Than established 2 acre plot of agro-forestry by planting various kinds of trees: sweet wood, Alligator pear, *Duabanga graudiflora* (Roxb), and silver oak. These trees are found to be successfully grown since all are adapted to locality. The Andaman red wood, exotic tree is not grown well. Rice bean is sown in the trees of Agro-forestry plot. Daw Htin Me Than’s plot is located on the way from Pwe Hla to Nan Kone village (about 4 furlongs).

Farmer, U Aung Kyaw Nyein grew 100 trees of alligator pear in the slopping side of his plot and cabbage is grown in the downstream. The plot size is 2 acres. Alligator pear bears the avocado fruits which are now sold out for good price. Peer villagers also started growing alligator pears in their field plots. Farmer, U Thaung Win established agro-forestry plots on 5 acres of his farmland in 2012. It took six months to establish. Planning took two months, pit making and planting two months and replanting the missing hills two months. Danu woman Daw Pyone established agro-forestry plots on 2.5 acres and trees are mixed with sour cherry, holy basil, bead

tree, beef wood, alligator pear. In Pwe Hla village only, there are 30 farmers establishing agro-forestry. Failure rate is too low. It is said to be 65 % success.

Water spring sources are locating on the hills, named as Tat Kone, Ye Ka Nein, Set Kyar Kone Taw, Nyan Phu taw, hill of the west side of the lake, etc. PHECAD in association with the Buddhist monks protect and safeguard the forest lots which in turn conserve spring water resource.

Pwe Hla village lake serves as the sedimentation lake for Inle Lake since Pwe Hla lake is on the way from the Thar Mine Khan stream flowing into the Inle Lake. Conservation of Pwe Hla Lake is part of PHECAD activities. In the upstream of the lake, Farmers Business Development (FDB) established sedimentation bunds with funding by UNDP. FDB provided training to members of PHECAD. PHECAD also conserves the indigenous fish “Nga Phane” in the Pwe Hla lake. Indigenous fish “Nga Phane” is the symbol of the Inle ethnic group called Inthar people. Nga Phane fish population is dwindling due to over fishing in Inle Lake. PHECAD therefore attempts to conserve this species in their village lake. Department of Fishery used this lake as hatchery for the Nga Phane fish species and the fry is yearly delivered into the Inle Lake. PHECAD prohibited fishing in Pwe Hla village lake but sometimes it occurs. PHECAD looks forward to rule of law to be enforced by the township administration council.

In the east side of agro-forestry plot of farmer, U Than Win, located two hills, Pan Taung and Ye Ka Nainwhere PHECAD is protecting peacock birds. PHECAD members said that there are about 50 birds. PHECAD served water for the bird in summer time. The birds sometimes came down to farmers’ peanut fields and picked the seeds. PHECAD could not identify the suitable fruit trees that could feed the birds. If the appropriate species could be searched and identified, PHECAD is ready to plant such trees on the hills.

PHECAD conducted training and community awareness activates for its member villagers with the assistance of Yangon-based development organizations. It is shown in the following table.

Training topics	Delivered by	Period	Location
Water shed area conservation	ECCDI	2012	Nyaung Shwe
EM Bokashi processing training	Myanmar Agro Action	2012	Nyaung Shwe
Beneficiary identification, Social mobilization, Community Development group Formation and Gender Development Workshop	UNDP	2013	Nyaung Shwe
Land law workshop	ECODev	2013	Aung Ban
TOT On Land Law Awareness	MercyCorp & KMSS	2014	Kalaw
Awareness and Knowledge Sharing on Election and Voting	PHECAD	2015	Pwe Hla

Based on the observation in the trip, preliminary assessment could be made as follows;

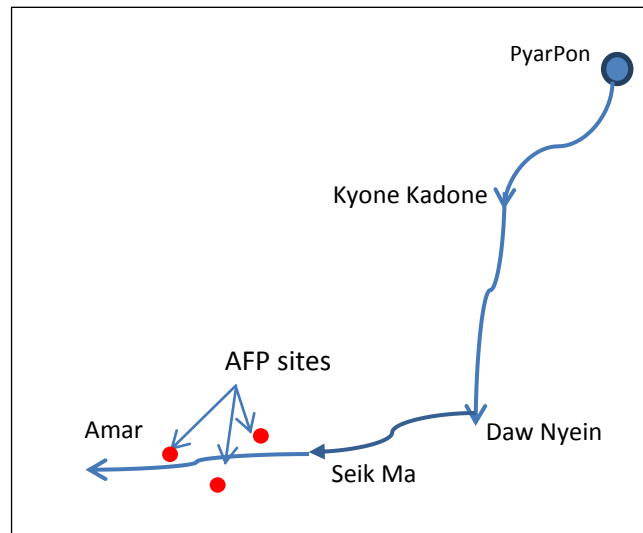
- a) The agro-forestry practice of PHECAD is environmental friendly.
- b) Agro-forestry trees are still young, about three to four only, not attaining the productive stage. We could not assess this point yet. When trees are young, farmers still have chance to grow crops between the tree rows. Farmers planted trees on the farm boundary only and grow crops as usual.
- c) It is socially equitable. Small farmers adopted the agro-forestry by planting high value trees in the farm boundary or in their own household compounds.
- d) Mountains, forest and cash crops are part of the life of the local ethnic Danu people in Phwe Hla village tract. People well respect the Buddhist monks. The village monks cooperate with PHECAD members for the safeguard of the community agro-forestry and spring water protective forests area.
- e) In appropriately designed planting of agro-forestry plots, high value trees will become profitable and the production share of seasonal cash crops will be dwindling in the long term. Actual outcome will be increased farmland value.
- f) Rule of law is essential aspect of enabling environment in the project.

4.4.9 Case Study 2 (Agro-Silvo Fishery Project activities)

After Nargis cyclone affected in 2008, Metta Foundation introduced AFP (Agro-Silvo Fishery Project) activities in the Ayeyarwady delta area including Phyar Pon - Thaleikki for about 2 years. Forest Resource Environment Development and Conservation Association (FREDA) started the activities in 2013, to carry out Environmental Education Project (EEP) and AFP- based on forestry maintenance plan in 18 villages in this areas. In 2013, FREDA established EEP with 24 farmers. Later, Dr. Mg Mg Than, Country Programme Coordinator of RECOFTC (The Centre for People and Forests) continued the on-going activities and upgraded the activities in Kanyin Kone, Hkar Chin, Tel Pin Seik and Yoe Gone villages including 13 farmers as members. Adoption of cropping pattern is based upon available period of fresh water sources. Usually paddy and betel leaf vine are grown as food and cash crop as well.

Location: The locations is about 12 miles (19 Km) east side from Amar, situating on Phyar Pon - Amar road. Member villages are Kanyin Kone, Khar Chin, Yoe Kone and Telpin seik village in Amar township, Pyapon district, Ayeyarwady Region. The villages are locating close to the sea, about three miles away in summer season.

AE LAND LOCATION AND TRANSACT LANDSCAPE



Under EEP, U Lin Htein (Community Facilitators) and U Win Win (Team Leader of EEP) are leading farmers of income generation group in villages of Amar township for Agro-Silvo Fishery Project (AFP). In Myanmar language, it is called အဂြိုဟေဗျာဏ် အမျိုးအစား အမျိုးအစား အမျိုးအစား အမျိုးအစား and the member villages are Kanyin Kone, Khar Chin, Yoe Kone and Telpin seik village in Amar township. Farm holding size of individual member farmer varies from 0.5 to 5.0 acres. Few farmers have 5 -10 acres of paddy fields and some possess up to 30 acres. Salt water problem affected all their lands. All member farmers can work only on 0.03 to 0.5 acre of private plot for growing.

Land category falls into waste lands (like jungle area) adaptable to home garden and ornamental tree growing. They used not only family labour but also hired labour for labour peak period such as land preparation, cultivation, and harvesting their products. Most farmers apply manual labour. Home garden as cash crops were cultivated in small scale land, and also fruit trees (Banana, Guava and Mango, etc.) were grown for local market. If fresh-water is made available in year round, this farming can be scaled-up for food –sufficiency and income generation of local families.

Later four villages were screened (KanyinKone, Khar Chin, YoeKone and TelpinSeik) and selected for adoption of agro-forestry including cash crop growing and fisheries in year round aiming to generate 3 – 12 lakhs MMK (250 to 960 USD) income per household family.

Conventional farm economy is based on monsoon paddy, betel-leaves vines and seasonal cash crops growing. Many areas were remained as waste land intruded by salt water. In this coastal regions, monsoon rain water is a dependent factor for cropping and fisheries income during rainy season, only scarce fresh water is available and stored.

During FREDA project period, about 4 trainings for AFP/EEP to communities were conducted for two years period within the limit of funds received. The activities and status of Agro-Silvo Fishery Project (AFP) income generation group are as follow:

Agro-Aqua-Forestry Project (Income generation for 2013-2014) was initiated in 2013 in Te Pin Seik village. Villages under EEP project joined the group.

Villagers were sent for exposure trips and fishery specialist and agronomist offered training and built up skill to the village members. Memberships are organized and upon verification of their eligibility, the groups were formed. Loans were disbursed. Plots were developed. Farm implements were distributed.

Fish fry, eel, crabs and forest and crops seedlings were raised. Then Agro-Silvo-Fishery (AFP) Project Income Generation Group (IGG) was formed. In 2014, AFP steering committee members started relaxing the project management and delegated the duties and functions to the village members to run the project under their own management. AFP project could have disbursed the loans at the interest rate of 2 percent to members of 24 AFP plots. Loan amount varied from 100,000 MMK to 300,000 MMK (81 to 243 USD) in accordance with the type of the work. If all repayments could be collected, revolving fund will be four million MMK (3225 USD). For a sustainable group, all members decided to apply for registration of the group. Three more trainings will be offered for (i) accountant training, (ii) leadership training and (iii) environmental conservation awareness.

This practice was well-accepted in these communities and may be widely adopted in this area. There are many potential of waste lands that draw attention of farmers. If someone provide fresh water supply systems, Sorjan growing and home gardening will be developed.(In wet land area, alternate rows of trench and bed are formed to enable planting of paddy in the trench and dry land crops on the beds. This layout system is called sorjan.). And if more funds are generated, fisheries and integrated farming will be scaling up.

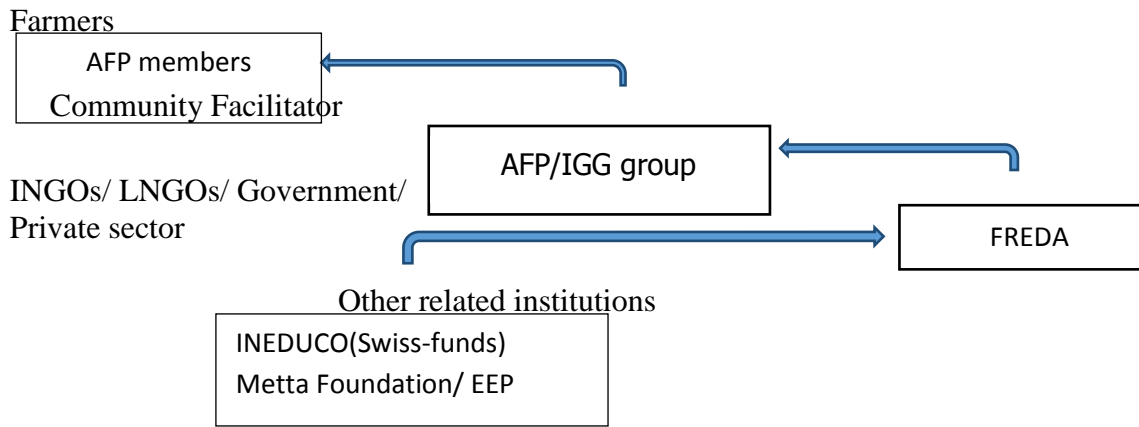
The practices farmers adopted were as following:

Agro-forestry + Seasonal cash crop	= 21 beneficiaries involved
Agro-forestry + Sorjan growing	= 6-- ditto ---
Seasonal cash crop + Fisheries (Crabs, Eel, Fish)	= 16-- ditto ---
Agro-forestry + husbandry (Hens, Ducks &Pigs)	= 11--- ditto ---
Seasonal cash crop + husbandry + fisheries	=14--- ditto ---

They are more like integrated farming following AE principle. There are synergetic activities between fish, duck, pigs and agricultural crops and use of recycled farm waste to other components. Sorjan design permits the growing of seasonal crops on the beds and raising of ducks and crabs in the ditches. Each farmer's average area was 0.3 to 0.5 acre in Agro-forestry, 0.1 to 0.3 acre in seasonal cash crop and 0.2 to 0.5 acre in fisheries. It was started in 2013.

It is promising to be environmental friendly. It can be profitable for farmers and farming communities from multiple sources of income. Problem encountered were nothing except thieves. This practice implementation faces inadequate fresh-water resources and investment funds. The practices were agronomic ally appropriate if more fresh-water is available and enough funds will be more generated over the long-term as sustainable activities. Drilling tube wells in school compound and cyclone shelter compound shows to be able to tap fresh water. There needs more investigation in this aspect. Also it is in need of technical aids and in social aspect, at least 3 years project plan should be considered as motivation periods followed by independent pursuit with a sense of ownership.

Network information of Agro-Silvo Fishery Project (AFP) income generation group



INEDUCO = Foundation for Income Generation Educational and Community Development project

4.5 Integrated Pest Management (IPM)

4.5.1 Country Level Overview



The dissemination of Integrated Pests Management (IPM) to Myanmar was noted to be around 1984-85 initiated by a workshop organized by FAO. The Neem natural pesticide (Azadirachtin) extracting factory was established in 1987 with the technical assistance of GTZ (Germany). Daily about 0.4 to 1 tonne of neem was produced (an annual capacity of 2.5 - 7 t Neemazal F).



Neem pesticides (Azadirachtin)

It is extracted from Neem seed (from the neem trees) growing widely in the dry zone. Neem natural pesticide (0.75 % aza w/v) was produced and packed in 1.2 liter bottle and distributed to the farmers through the channels of respective township extension offices to farmers. Since it has no knock down effect as does synthetic chemical pesticides, farmers were slow to respond the neem pesticides.

Plant Protection Division of Agricultural Department started trials and demonstrations for the effect of neem pesticides on chafer beetle on groundnut and pests on cabbage. Agricultural Research Institute (ARI), Yezin verified the effect of neem pesticide on the storage pests in corn and other crops. The technology was transferred to the extension division through the technology

transfer meetings annually. Farmers Field School (FFS) model was introduced by FAO/UNDP in 1999 to disseminate the IPM technology to farmers.

Pest control method compatible to IPM strategy has been emphasized in Myanmar since 1980s to support sustainable development in agriculture. Farmers are encouraged to use pesticides judiciously as a last resort in IPM strategy. Many IPM supporting activities are being carried out by Plant Protection Department of Myanmar Agriculture Service (now the name changed to Department of Agriculture, DOA) for diffusion of IPM technology to farmers. After the FFS model was introduced, the pioneer plant protection officials such as Daw Heather Morris and co-workers in the country started disseminating IPM technology to farmers by opening the FFS. Their team carried out the IPM Practice with strong emphasis on biological control works also as a part of IPM program in contact farmers' fields

At the University level, IPM-specific course work was introduced after 1987 in the undergraduate classes. In most parts of the country, extension agents introduced awareness of the farmers about the natural enemies of pests and disseminated the wall sheets and pamphlets differentiating crop pests and beneficial insects. Farmers were educated how to follow the pesticide spray schedules in accordance with the insect incidence threshold level.

Farmers Field School approach was applied by FAO/UNDP assisted programme and INGO-supported programme. Under pressure of the government's drive to achieve the physical target (yield increase) by top-down approach, the Agriculture Department could not pursue the FFS model. What they could do at most is the set up the demonstration trials and exhibitions and a large mass of farmers are invited and large scale information delivery was attempted in one central area. The government institutions have attempted over years following this style and yet a large gap still remains between extension (R 4 D) and farmers.

After Daw Heather Morris had left the department she joined the UNDP and INGOs projects and continued the IPM promotion in the assigned project sites. The cases of farmers supported by INGOs/LNGOs for IPM followed different way. During the project period, farmers accepted and practiced the IPM in full or partial package. But after the project has been terminated and the facilitators left the community, the farmers retreated to their own way. Motivated by the incentives or credit sale by the sale promotion of agro-chemical companies, farmers happen to convert their chemical free -fields into deposit of pesticides residues. All the media, FM radio and TV shows are full of agro-chemical advertisements almost every day. Agro-chemical posters are nailed to the tree trunks by the side of every road access to all villages in the whole country

The beneficial effects of sustainable agriculture and IPM could be visualized over a medium term of consistent practices, say only after 5 years. But the project period of NGOs is shorter than this essential time span. Foot prints of the IPM did not remain in farmers' fields after project left.

In the case of IPM, there is no supply chain linked with the private sector. In one private sugar industry of Thailand, biology control agents (predator insect) was reared at the factory laboratory and the factory extension unit delivered it to the farmers at prescribed quantity and frequency so that farmers could release it to their sugarcane fields to let control the sugarcane stem borers. In Myanmar, there is only one small insect rearing room at Paleik (location near Paleik neem pesticide factory) operated by the Plant Protection Division of Dept. of Agriculture. It could not serve the purpose of delivering insect predator to farmers in required scale.

The Department of Agriculture established three neem pesticide factories during the socialist regime and it produced the best quality product. But due to failure of marketing and low access to farmers' demand, the factories faced financial loss and these are currently leased to the private entrepreneurs. It appeared that the entrepreneurs are planning to export the neem products to Republic of Korea, China or other western countries.

4.5.2 Local Level Situation

A young lady, Daw Ni Lar Maung, staff officer of Plant Protection Division of Dept. of Agriculture has long been pursued the IPM technology and attempted to disseminate it to farmers. The cabbage farmers of New Yit village, Tatfone township with the assistance of entomologists (Daw Nilar Maung & other) have used the pheromone trap to differentiate pests and beneficial insects. There are 15 pheromone traps in each one acre of cabbage field. Predators were obtained from the predator rearing laboratory of PaLaik Biological Control Laboratory and predators such as sucking bugs, *Eocanthecona furcellata* were released to the farmers cabbage fields. According to the monitoring tour of the entomologists, larvae parasitoid *Microplitis manila* was occurring on the caterpillar and larvae parasitoid *Cotesia plutellae* was occurring on the diamond back moth pest in the cabbage fields. In 2014 December, farmers were cooperating in such biological measures in extended 10 acre cabbage fields. In some fields, farmers applied neem pesticides instead of synthetic chemical pesticides.

In 2015, the same activities were noted in cabbage farmers of San Dun Kone (Well Win) village, Pyun Da Sar, Nyaung Lay Bin township. Farmers released the predators such as sucking bugs, *Eocanthecona furcellata* in the fields. Pheromone traps were posted in the fields. Pest attracting posts with stickers were attached. Farmers are interested more in the traps because moiré pests were found in traps. Extension entomologists displayed them the samples of pests and beneficial insects so that farmers are able to differentiate the beneficial insects and they reduced the frequency of the pesticide sprays in the fields.

Farmers let the host plants with white nectar flowers grow in the boundary of the cabbage fields so that beneficial insects could stay and increase in number. According to the monitoring record of the entomologists in the nearby extension department, the ratio of larvae of caterpillar to larvae parasitoid was said to be about 55-65 percent.

List of Neem pesticide commonly applied by farmers in different localities for different crops

Location Township/village	crops	Target pests
Sint kaing/ Inyar village	Cabbage/cauliflower/ mustard/ chick pea	Diamond black moth, pod borer/ army worm
Sint Kaing/ Se Sone village	ditto	Ditto
Pyin Oo Lwin/ Moe Cho Pyit village	Asparagus/ cabbage/cauliflower	Ditto
Tada Oo/Tha Nge Taw village	Green gram/ mungbean	Army worm
Tada Oo/ Saka Inn village	chickpea	Pod borer
Pathein township/Kyauk Me village	Vegetables all sorts	Leaf eating insect

Ayardaw, Chaung oo townships	Black gram	Army worm
Seik Phyu township/Magwae township	groundnut	Leaf miner

Source: Daw Yi Yi Mon, Palaik Neem Factory (2014), personal communication

Other IPM specialists in Plant Protection Division (IPM) are Dr. Kyin Kyin Win and Daw Ni Ni Htain working in rice stem borer control and corn borer control respectively by biology control agents. Participatory activities with local farmers are actively carried out at the present time. The activities are carried out under the project “Rice IPM in the Greater Mekong Subregion” by Europe Aid (DCI-Food/2010/230-238. Project partners are IPP-CASS, Beijing China, CABI Switzerland, Plant Protection Station, Xingan, Guangxi, Plant Protection Quarantine Station, Dehong, Yunnan. The focal person for IPM (PPD), DOA is Dr. Kyin Kyin Win.

UNDP/FAO projects and INGOs project such as CESVI Foundation (CESVI) contacted The Extension Division of Agricultural Department, bought neem pesticides and distributed it to farmers. CESVI distributed the neem pesticide to its beneficiaries’ sites locating in Magwae, Yenanchaung, Seik Phyu, Sa Lin, Meikhtila, and Pale townships. About 2300 liters of the neem pesticide was distributed to the farmers in all these townships.

Peak production of neem pesticides was recorded to be 42416 liter a year from Paleik factory in 2000-2001. Thereafter the production declined to 6980 liter in 2011-12. During the period from 1999 to 2015, neem products were exported to several foreign companies (Thai Neem Co. Ltd., Mister Neem Co. (Thai), Rong Hoa Trading Co., Neem Handle Co. Ltd., Chen Du Green Gold Co. Ltd. (China), FMC Co. Ltd. (Korea), Yunana Xin Xing Co. Ltd. (China), Green Focus Co. Ltd. (Korea), and domestic companies such as Bio Green Co. (reexport to Korea) , etc.

On the contrary, there is shortage of neem pesticides in the farmers’ local market. Farmers complained that the selling price is above the regular price. The set price of the neem pesticide is kyats 3000 per 500 cc bottle. (1 USD = 1280 kyats). The local price is increased to kyats 5500 per bottle. It is no wonder that farmers are weak in adoption IPM.

Situation of Farmer Field School implemented by PPD, DOA in State/Region (2015-2016)

Sr	State/Region	Crop	Location	Period	Attend ed person
1	Kachin	Monsoon rice	MoeNyin District, Moe Nyin Tsp, Myitkyina District, Myitkyina Tsp,	16.7.15 to 14.10.15 19.8.15 to 27.11.15	30 30
2	Katah	Vegetable	LinPonLay village, Loikaw Tsp.	18.11.15	55
3	Kayin				
4	Chin		Non-		
5	Mon	Monsoon rice Monsoon rice	Taungsun village, Chaung Sone Tsp. Gadoe village, Mawlamyaing Tsp.	22.8.15 to 29.8.15 15.10.15 to 30.10.15	35 35
6	Rakhine	Pulses	Than Shin village, Minbya Tsp.	27.11.15 to	35
7	Shan(South)				
8	Shan (North)				
9	Shan(East)				
10	Sagaing	Monsoon rice Monsoon rice	Shardaw village, Shwebo Tsp. Bintegone village, Wetlet Tsp.	19.9.15 to 17.11.15 20.9.15 to 18.11.15	30 30
11	TanintharYi	Monsoon rice Monsoon rice Monsoon rice	Hmaw gyaung village, Pulaw Tsp. Nali farm, Khamaukkyi Tsp. Sunalpa line, Kawthaung Tsp.	16.9.15 to 19.9.15	26 50 50
12	Bago	Monsoon rice	Alalshin camp, Kyaukdagar Tsp. Padaukkhin village,	27.8.15 to 15.10.15	30

		Monsoon rice	Kyettet Nyaungpin Village Tract, Okktwin Tsp.	31.8.15 to 19.10.15	30
13	Magway	Monsoon rice	Inngone Village, Aunglan Tsp.	11.7.15 to 3.11.15	78
		Monsoon rice	Myoma camp, Taungdwingyi Tsp.	22.7.15 to 29.9.15	71
		Monsoon rice	Htangauk village, Kanma Tsp.	12.7.15 to 25.10.15	73
		Monsoon rice	Myaynigone(1), Saytottaya Tsp..	15.8.15 to 19.10.15	74
		Monsoon rice	Nyaungpin village, Pwintphyu Tsp.	25.7.15 to 1.11.15	72
		Monsoon Sesame	Htangauk village, Kanma Tsp.	5.7.15 to 25.9.15	71
14	Mandalay				
15	Yangon				
16	Ayeyarwady	Monsoon rice	Tarpan(west) village, MaUbin Tsp.	22.7.15 to 30.10.15	30
17	Naypyidaw				
			Total		935

Source: Plant Protection Division, DoA, 2015

In areas with difficult access to the market, farmers in Myanmar use tobacco leaves (indigenous varieties), basil, onion, neem seed cake, Bordeaux (Bordo) Mixture (lime and copper sulphate), etc.

Yezin University had campaigned the application of Bordo Mixture in grape vine yard and peanut fields in the central parts of Myanmar during the period of 1990. Growers of grape and peanut farmers still apply the Bordo Mixture in their fields. In Pyaw Bwe, Mandalay Region there had been service provider to apply Bordo to grape growers. Farmers in delta area raised ducks and keep grazing the birds in their rice fields infested with pests. Time of duck grazing is often after one month old of rice plants. Neem is widely known to farmers to use as natural insect repellent.

4.5.3 Attempt of Mango Export by Private Sector

“Sein Ta Lone” mango variety is popular in export market. Japanese traders are enthusiastic in helping Myanmar Department of Agriculture (Biological Control Unit in particular) to streamline the mango export by upgrading the research and technical support capacities in controlling mango fruit flies by biological control methods. The Biological Control Unit in Yangon is now actively undertaking rigorous research and rearing techniques at the present time. The Japanese side are expecting that it will take at least five years to meet the standard of export quality and norms with proper biology control in place.

Fruit flies



Asia F2F and Myanmar Fruit, Flower, and Vegetable Producer and Exporter Association (MFFVPEA), the branch of Southern Shan State, are seeking a tropical fruit expert to conduct training on Integrated Pest Management (IPM) for MFFVPEA fruit farmer groups to educate them on how best to identify, control, treat, and prevent tropical pests and diseases affecting their fruit trees. Presently MFFVPEA provided IPM training to mango farmers in Southern Shan State in cooperation with the Plant Protection Department of DOA and GIZ (a German international development organization), but the training was not able to address all tropical crops. Due to the market potential, farmers have increased commercial production and are in need of IPM trainings to help them better understand sustainable pest management and soil improvement practices.

4.6 Integrated farming (Rice-Fish Farming)

4.6.1 Country Level Overview

The Department of Fishery, Ministry of Livestock, Fisheries and Rural Development (MLFRD) is responsible agency for the development of the rice-fish culture among other fisheries sector development agendas. The MLFRD has drafted the Rural Development Law and in its third draft law, Section 9 prescribes the formation of Agricultural production support committee and Livestock and fishery production support committee. Section 11 (a-6) of the draft law states that Agricultural production support committee shall set up the model integrated farming system of small holder to help generate the secondary income for the farmers in addition to their primary farm income. The committee is assigned the function of selecting the proper location and organizing the farmers for adoption of rice –fish farming and conducting the training (Section 10 (b) b-1 (vii)). Likewise, the Livestock and fishery production support committee is assigned for the similar functions to promote the rice –fish farming and integrated farming (Section 10 (b) b-2 (ii) 10 (b) b-3 (iv)). The law drafting is still in process.

JICA-SAEP Project sites in upper Myanmar



4.6.2 Support from Fishery Department

The Fisheries Department, Ministry of Livestock, Fisheries and Rural Development yearly distributes hatched fry to rural farmers. So farmers could produce sufficient fish in their rice-sowing land. The Department distributes 250 small sized fry (1.5 to 2 inches) for one farmer and totally 2.75 million seeds to State and Region wise areas. Scheme of distributed fish species and amount in 2012-13 for States and Region is presented in the following Table. Twan Tay township in Yangon Region is found to be the best performing township for both aquaculture and rice-fish culture.

Distribution of fry by Fishery Department to Different Regions/States in 2012-14

Sr.	State/ Region	Area (acre)	Amount/ 1 acre	Common carp	Telapia	Silver carb	Cat fish	Total number
1	Yangon	3000	250	300000	150000	150000	150000	750000
2	Ayeyarwaddy	3000	250	300000	150000	150000	150000	750000
3	Bago	2000	250	200000	100000	100000	100000	500000
4	Mandalay	1000	250	100000	50000	50000	50000	250000
5	Sagaing	1000	250	100000	50000	50000	50000	250000
6	Mon	500	250	5000	25000	25000	25000	125000
7	Kayin	500	250	5000	25000	25000	25000	125000
	Total	11000		110000	550000	550000	550000	2750000

Source:2013-2014 Rice –Fish Plan, Fisheries Dept., MLFRD, Naypyitaw.

Twantay township Fisheries Dept. recorded the delivery of fry and fingerlings to rice-fish farmers in Htaw Tho village tract of Twantay township in 2015 and the fish output of farmers individually. It could be summarized as follows;

Total number of farmers practicing rice-fish farming – 102

Total acres of rice-fish farms in Htaw Tho township = 700

Average holding size of rice-fish farming by each farmer= 6.8 acres

Fish species delivered by the FD to farmers = Tilapia and Silver carb

Average number of fry that farmer released into each rice field = 500 fry per acre

Average number of grown fish in rice field = 165 per acre

Average fish catch per rice –fish field = 15.4 Kg

Average fish harvest per farmers involved in rice –fish farming = 105.4 Kg

Average wild fish catch per acre = 16.99 kg per acre

Average wild fish harvest per farmers = 116. 67 Kg

Wild fish caught = climbing perch, banded snake head, and cat fish

Note: Data show that harvest of wild fish is slightly higher than the cultured fish.

Release of cultured fry into the rice fields promoted the population and growth of wild fish and based on this ecological principle, farmers yearly receive the fry from the Fishery Department.

4.6.3 The Role of JICA in Rice –Fish Farming Development

Japan International Cooperation Agency (JICA) has launched Small- scale Aquaculture Extension Project (SAEP) for promotion of livelihood of rural communities in Myanmar in June 2009. The objective of the project is to extend appropriate small scale aquaculture practice to farmers for their income and nutrition level. SAEP Project extended from June 2009 to January

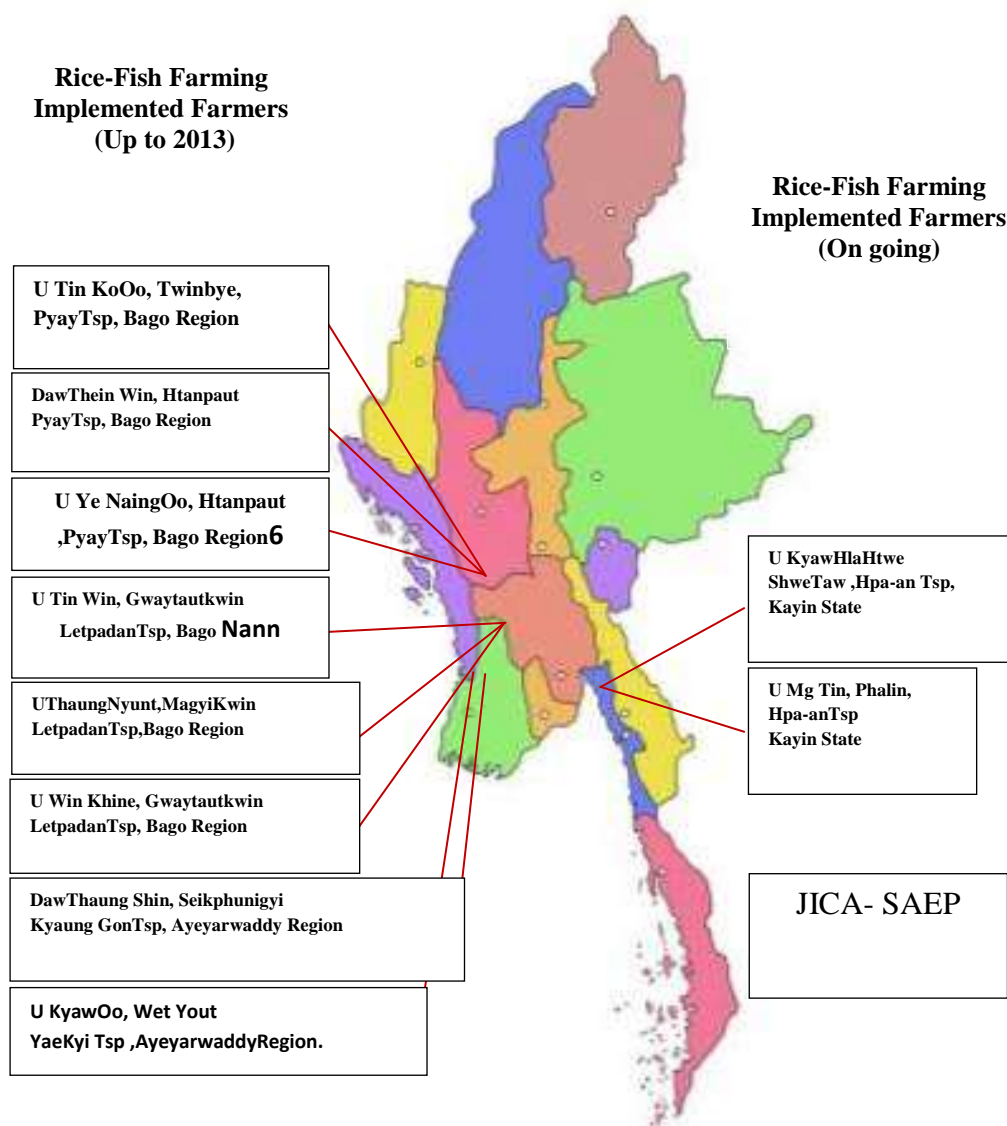
2013 in lower Myanmar. (Save the Children has first come to some villages of Kayin state and formed rice –fish farming activities in 2008).JICA has started SAEP Project in Central Dry Zone (CDZ) Mandalay, Sagaing and Magway Regions from June 2015.

The project covers total 5 townships of Ayeyarwady, Bago and Kayin States in the First Phase and target villages for on-farm pilot activities are as follow:

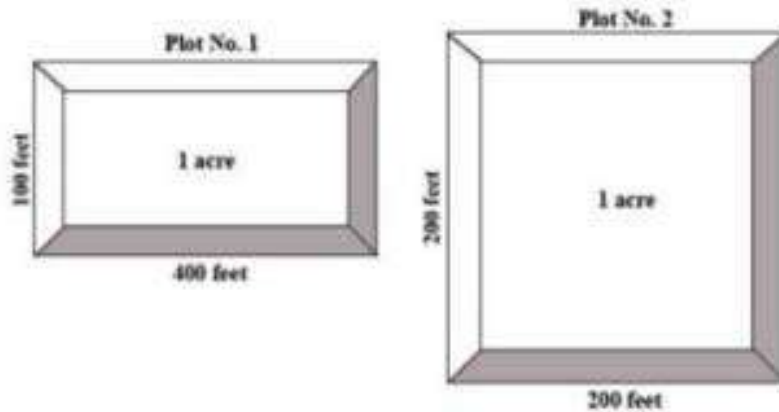
- (1) Yaekyi township, Ayeyarwady Region (Wet yoat village)
 - (2) Kyaung-gone township, Ayeyarwady Region (Seikphunigy village)
 - (3) Letpadan township, Bago Region (Gway Taut Kwin village*, Thikewar Chaung village, Magyi Kwin village*)
 - (4) Pyay township, Bago Region (Pauk Taw village, Htan Paut village)
 - (5) Hpa-an township, Kayin State (Shwe Taw village and Pharlin village)
- (* are paddy-cum fish culture implemented and rests are Pond culture (Community, School and Private) and Fish seed production

In our follow up survey, we attempted to differentiate the activities that ceased after the withdrawal of the project support and the activities still remain on-going. It is illustrated in the following map.

JICA-SAEP Project sites implemented in previous three years



Design Aspect of the Rice –Fish Culture to Overcome Policy Restriction



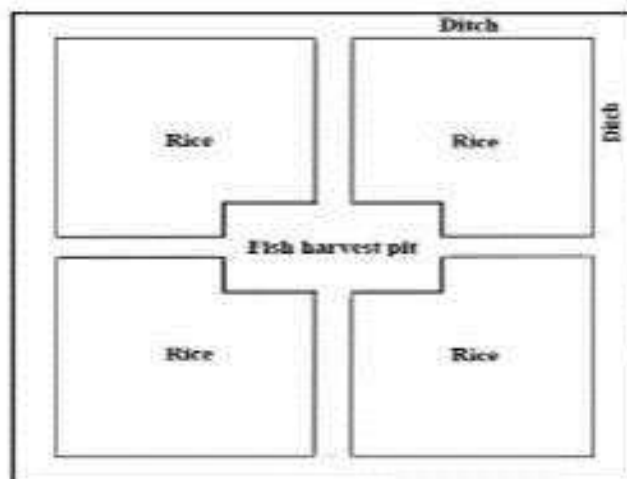
Plot No.1 Length around the periphery of rice plot = 1000 feet

Plot No.2 Length around the periphery of rice plot = 800 feet

Plot no. 1 = 1000 ft. X 2 ft. = 2000 sq.ft = 4.5 % of one acre

Plot no. 2 = 800 ft. X 2 ft. = 1600 sq. ft. = 3.6 % of one acre

Some variation of the design for rice-fish culture practised.



In paddy-cum fish culture practice, paddy was modified by constructing ditches each 2 feet wide and 2 ft. deep and deeper ditch was made at a corner of paddy-field. The deeper corner ditch is functional for fish to stay during the time of low water level and also serves as refuge when water temperature becomes high in low water level. After rice seedlings are transplanted, fish seeds are released to the paddy field. This practice can be implemented in both monsoon paddy and irrigated paddy. The suggest design is not to exceed the limit of fish culture area more than 0.5 % of total rice cultivated area. Farmland Law, 2012 restricts the conversion of paddy field into other uses and the following rice –fish paddy field design is suggested to overcome the restriction of farmland Law.

In order to avoid the restriction by the Farmland Law, fish culture area should not exceed 5 per cent of one acre. The above designs of plot no. 1 and 2 could overcome the restriction since the total water surface area of the ditches are measured to be 4.5 % and 3.6 % respectively,

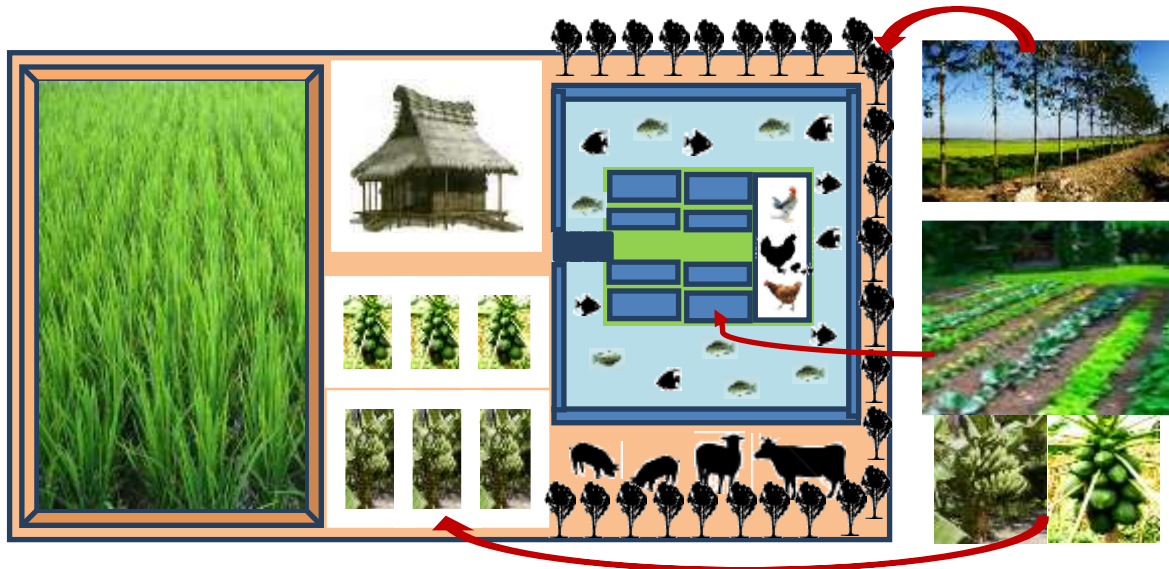
Present design of JICA-SAEP



When the project in Lower Myanmar ended in 2013, the beneficiaries discontinued rice-fish farming practices in most sites except Pha-an township for the following conditions according to the response of the project beneficiaries during the interview.

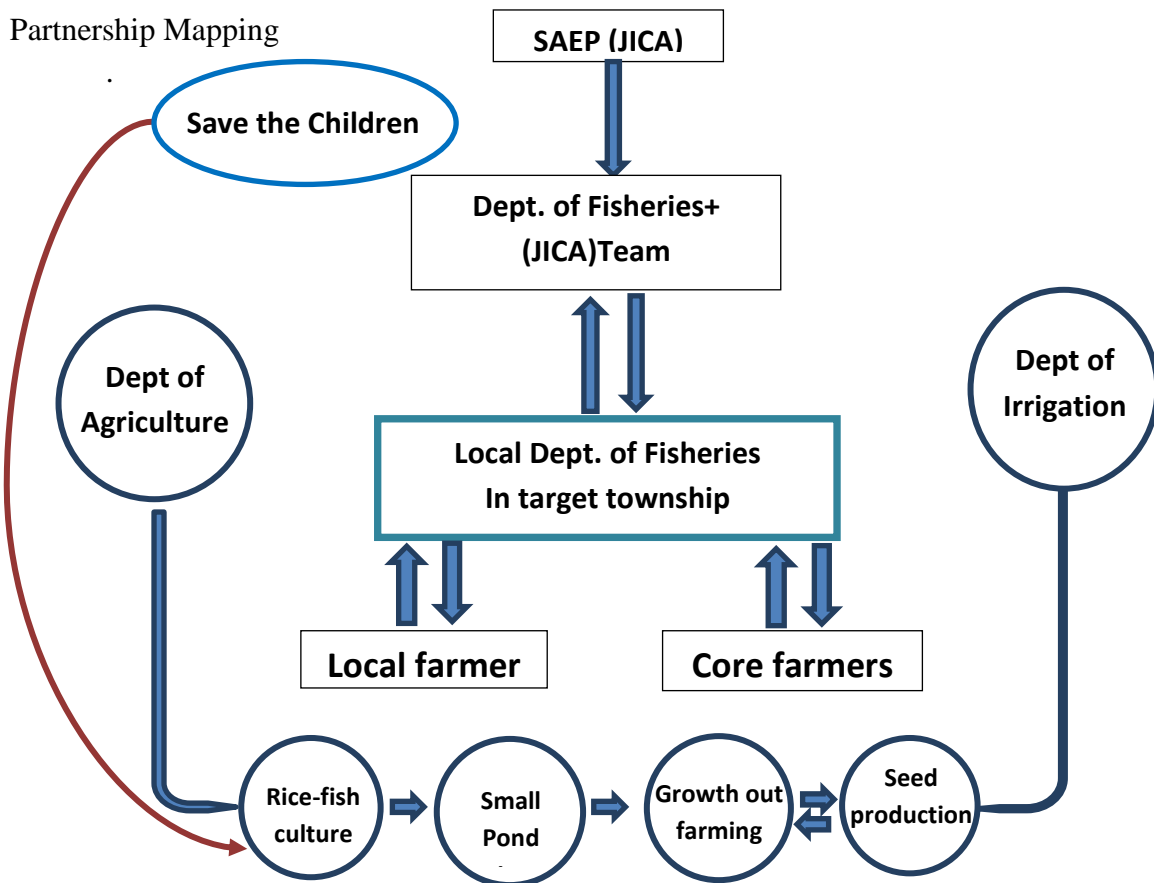
- (1) When chemical fertilizer was applied at rice field, it diffused to fish-ditches .
- (2) Pesticide sprayed to rice stem-borer spread into the fish-ditch affecting mortality of fish.
- (3) Ditch was constructed along side the rice fields, making difficult access to the rice fields. Cattles and farm implements are not easily mobilize from the outside through the ditches into the rice fields.
- (4) In rice –fish farm of Pyae township, due to siltation in stream and drainage ditches around the rice-fish farm, there occurred flood across the rice-fish field and fishes come out in the monsoon season. Flooding hazard threatens rice-fish culture.
- (5) The ditch surrounding the rice field becomes filled up with silt and sand deposit from the tillage of the rice field during the land preparation for rice growing and after three years, there is need to dig again and reclaim the former condition. Since farmers could not expect any support from the project, the rice –fish farming discontinued.
- (6) Farmers of rice –fish farming faces the problem of illegal use of fishing gear operated by battery shock. Farmers could not guard the rice –fish farm all the time. Authorities do not allow farm homestead in the field for security reason since the time of early military government. Farmers suffer loss due to theft.
- (7) The major constraint is policy restriction for the farm land use conversion of paddy land in the other uses. In order to overcome this land use restrictions, rice-fish farm layout is designed as follow;

Proper design (But policy restriction needs to be overcome by proper channel application)



Core farmers were organized by JICA with administrative arrangements with Agriculture Dept., Irrigation Dept. and Fisheries Dept for paddy-cum fish culture in its project activities..

Partnership Mapping



4.6.4 Interview Record 1.(Small scale Aquaculture, Pyay township)

Small scale aquaculture was carried out by U Tin KoOo in his rice field in 2009. U Tin KoOo is an outstanding farmer of Pyay Township. He got technical and financial assistance from JICA to conduct small scale aquaculture in his rice field of two acres. U Tin KoOo possesses 10

acres of rice field, two acres are used for aquaculture. In his rice fish farm he made 2 feet wide and 2 feet depth ditches around the periphery of rice plot. U Tin Ko Oo's rice field located by the side of Pyay-Paukkaung rail way, 3 miles far from Pyay.

JICA –SAEP Myanmar Project assisted U Tin KoOo's rice-fish field. Project duration is 3 years and it commenced from 2009. The hatched fry were put into the ditches of his rice-fish farm. Hatched fry were obtained from fish hatchery station, Imma, Thegon township run by fishery department with the assistance of JICA. In the first year of project 2009, the farmer got fish 30 viss(49Kg) worth MMK 80,000 (USD 645). He get rice 170 basket (3546 Kg) worth MMK 595,000 (USD 480). So farmer's income from rice and fishes were MMK675,000 (USD 544) totally. In the second years of project, rice field were flooded and fishes were running out. The nearby old creek was full of sediment and excess water due to heavy rain could not be drained out by the old creek and the whole area was flooded.

In the third year of project, farmer got MMK 30,000 by selling fishes. Later canals were damaged because of silt deposit and no maintenance measures. Nowadays, farmers including U Tin KoOo carried out fish farming in the burrows by the side of railway. Farmers got hatched fingerlings from fish hatchery station, Htan bauk village, that was also established by JICA aid. Farmer got 10 to 15 viss (16-25 Kg) of wild fish on railway side canal fish farming during monsoon rice period. Farmers faced difficulties on fish farming. Some persons illegally used at night the fishing gear attached with battery-shock switch. All small and medium sized fishes are killed and caught in farmers' fish farming area at night.

Drainage system of rice field is poor, so flooded occur every year. Farmers are not sure to get maximum rice yield and extra income from fish. The neighbouring farmers watched U Tin Ko Oo's activities in rice fish farming. Due to the constraint, neighbouring farmers are not drawing attention to rice fish farming. Mr.Tar Tar Ye and Mr. Furo Sarwar of JICA Project came to U Tin Ko Oo's rice-aquaculture farming plot and manage necessary supporting. U Myint Naing, U Kyaw Moe Aung, U Kyaw Soe and U Tin Htut of fishery department also visit to U Tin Ko Oo's rice aquaculture plot and support all needs of farmer. Their assistance is effective within the project boundary but flood hazard is beyond their capacity.

4.6.5 Interview Record 2.

U Kyaw Hla Htwe, Shwe Taw village, Hpa-an Township, Kayin State; His rice –fish farm is located road side, on the way from Hpa-an to Mawlamyaing.

Hpa-an Township

Hpa-an Township is located about 200 km in southeast of Yangon. The area was in dispute sporadically between Myanmar and ethnic rebels. In comparison, fish price is 2 to 3 times higher than the other areas. Fish and fisheries products in the area are still in short supply. The high price of fish is reaching to high profitability as well as to make easier for farmers to adopt wider feeding strategies from extensive culture by organic fertilization. However, acidity of land/water is relatively high that cause farmers to apply more liming to ponds to stabilize water conditions. The water level of pond starts reducing after the dry season set in November.

U Kyaw Hla Htwe, 56 years old, living at Shwe Taw village, Hpa-an Township is a farmer practicing an integrated farming with rice, livestock and aquaculture in working with the previous project of Save the Children. His family lives not only on farming but also on going to Thailand to work. His 56 years old wife Daw Mal Pwint also experienced works abroad as migrant worker. The earned money in abroad was sent back to Myanmar to expand farming lands and construct

fish ponds in his farm. Besides rice-fish farm, he works in his paddy land of 6 acres. With his earned money, he made 2 acres of fish pond. He applied and received the permit from Survey and Land Records Department for conversion to fish pond. He paid tax (@MMK 900 per acre) to the Fishery Department.

Rice, vegetables, chicken, egg, fish and pork are meal items of family diet. Among them, he and his wife takes animal proteins from fish and eggs in principal. They consume fish most about every other day. He received SAEP-JICA support in 2009. The project supported for three years plus one year extension. His situation last year is stated as follow.

Area: 0.23 acre (width of ditch is 7 ½ ft and depth is 3 ft in the boundary of his rice-fish farm.)

Rice variety: Manaw Thu Kha

Fish Species: Rohu and Tarpian. (Hatchery centre is near the Shwe tau village.).

Culture Period: 244 days (July to February)

Little dosage of rice bran feed supply daily.

Average Harvest Weight: 400 gm per fish; Total fish harvest – 20 viss (32 Kg)

Harvest of small fishes is made into fish paste (Nga Pi).

Survival Rate of delivered fingerlings: 100%

There is no problem of theft or illegal fishing.

Survey and Land Records Department did not object to his rice –fish farming.

The difficulty is insufficient water in the field at the time of rice plant ripening.

Making deeper ditch needs more money.

He is actively trying to improve his activity together with his wife. He is interested in seed production and expected to try in the next season using his fish species Tarpian.

After withdrawal of JICA- SAEP, he continued the rice –fishing but he switched to use of wild native fish (catch fish, banded snake head and *Clarius batrachus*) in his rice-fish farm and he cultured rohu and tarpian in his own fish pond. At the time of the visit (28 December, 2015), rice fields are about to harvest stage and fish have not been harvested yet.

4.6.6 Interview Record 3

(An illustrative case how land could be acquired by a farmer for rice –fish farming)

U Maung Tin and Daw Hla Htwe, Core Farmer of JICA –SEAP Community Fish pond and further attempts to pursue rice –fish farming, Phar Lin (1) village, Hpa-an Township, Karen State .Location: 2 miles from Hpa –an city and on the way between Htone Ain and Win Chan village.

U Maung Tin (56 years), Karen ethnic, is core farmer of JICA –SEAP and he is caretaker of the community fish pond. The pond size is 0.2 acre and he organized the group members and cultured the rohu and tarpian fish. He learned basic aquaculture skill and knowledge from the training course organized by local DOF and the project. The community pond was started from 2008-09. From this pond income, the villager group contributed the fund (MMK 150000) a year

for school feeding purpose. Other surplus income was donated to the monastery. The community pond was in some year submerged by flooding and the fish often came out.

After lesson learned, U Maung Tin has attempted to establish rice –fish farm by his own way. There had been a waste land area in depression site near his village. In rainy season it is flooded. It measures to be about 6 acres. He thought that the JICA-SAEP rice –fish pond ditch width is narrow. He wishes to have ditch with about 60 ft. width and 6 ft. depth so that fish could be caught by one swap of fish net. His expectation is that fish is primary livelihood and rice is secondary purpose to meet home consumption and donation to the monk. He has four children to work with. His wife could be a good working partner.

He started application for land use with the purpose of rice-fish farming. This waste land was serving open water body from which naturally occurring fish during monsoon season could be harvested for about 20 viss (32 Kg) a year. It has to be delivered to the village community. U Maung Tin explained the village administration committee that this waste land could be brought into rice-fish farm and fish harvest could be increased 50 times and from this expected income he could donate the village committee every year 200,000 MMK. He then applied for the use of the waste land for rice-fish farming to the Karen State government. He told us that some community members sent complaint to the SLRD office. The land administration office did not take any necessary action. But when the Minister for Agriculture, Livestock and Fishery of Karen State Government encouraged him to pursue rice –fish farm other relevant department took necessary action and finally he got the initial approval for the land use right of that waste land. In order to win the approval of his community, he invited the interested members to work with him in the farm but nobody responded. He approached the SLRD office for further verification of the plot size to follow up the land concession by the State government. The surveyor has not come yet at the time of our interview with him.

Note: The Vacant, Fallow and Virgin Land Law, 2012 has been enacted and the rule was also prescribed. Within this framework, the case of farmer U Maung Tin could be commented as follow;

Rule no. 30(a): If the small holder or farm family in a village applied for the land use right of the waste or virgin land with the endorsement of the village tract administration chief, the Land Committee of the respective Region/ State government shall grant the user right given that the State or Regional government approves the application documents and the land grant is no more than 10 acres at a time. If the satisfactory performance on the use of the approved land by 75 percent of the land use, the land grant shall be made up to a total of 50 acres with 10 acres at a time.

(For the large scale land concession to the agricultural business company, land grant of waste, virgin or vacant land could be made up to 50,000 acres with 5,000 acres at a time according to Rule no. 29 (a) (ii)).

U Maung Tin could get the approval for the land use right of the waste land for rice –fish farming if the village tract committee endorses the application process and the Land Administration Surveyor is willingly to verify the status and area of the waste land applied. The Karen State Government is willingly to grant the land use right upon the verification of all the application documents.

5. Conclusion

Myanmar agriculture sector is driven to the direction of crop yield intensification, export promotion, increased GDP with little emphasis on sustainable agriculture. Still Myanmar has not reached the level of crop yield intensification and its productivity level remains lower than those of Thailand, Vietnam, China, India and Indonesia. Yet Myanmar has suffered from the depletion of forest resources, flooding, sedimentation in all river and stream channels, climate change, drought, and several other consequences of environmental mismanagement. There is no safe food from agro-chemical dependent farming. Despite all these mis-guided forces, some development workers, donor agencies, civil society workers, academicians and research workers and farmers pursue the sustainable agriculture following the principles of agro ecology. Some of them are listed for each school of AE. Few examples are recorded as follows. These lists are not exhaustive due to the limited time frame of our study and several other allies and champions will be surveyed and listed in further study.

Champions and Allies for Organic Agriculture

Stakeholder/ Actors	Role/ Functions/ scale	Allies	Ground level actors/farmers
MOGPA	Promote safe food from safe farms Promote crop products with chemical free or organic std. Conduct organic farming training	MFFVPEA	Pyin Oo Lwin, Hmawbi, Htauk Kyant, Nyaung Done, YGN, etc.
Dr. Than Than Sein, Vice President of MFFVPEA	Conduct OA training and establish OA stds. for growers, Help set up organic market, National scale	MOGPA/MFFVPEA	
MOGA U Hnin Oo, Chairman	Promote OA Inspect and issues organic certificate for domestic market	FOSTA/MADA Agribusiness Companies (ABCs) Bio Supreme, Shan Maw Myae Co. Ltd. etc.	Consumers, market dealers, farmers
DoA, MOAI	Establish GAP guidelines, National scale	ASEAN/FAO	
OISCA, Japan Based in Yesagyo	Conducted hands-on vocational training on OA to young farmers of various parts of Myanmar annually	DoA	Young farmers , national scale
Mar Lar Myaing Co.	Set up Green Gold organic market (Private sector)	MOGA	Nyaung Hna Pin farm, YGN; Nwa Da Ma village growers, Nyaung Shwe township
City Mart	Super market chains, offer organic products shelf	ABCs	growers
SWISSAID Myanmar	Donor	CSOs, NGOs, Shwe Da Nu LNGO,	Local farmers, Pindaya,
CPA	Consumer right protection,	FDA, Consumer Div., MoC;	consumers

CMU	Consumer right protection, promote quality food production technology	Yangon Technology University, ASEAN-FIFTA;	Consumers,
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Champions and Allies for Conservation Agriculture

Stakeholder/ Actors	Role/ Functions/ scale	Allies	Ground level actors/farmers
GRET	Support/programme formulate/implement CA	CORAD/GRET in Northern Chin State	Farmers in taun Yar farms;
	Support and implement CA	GRET Dry Zone	Beneficiary farmers in Budalin, Monywa and Yinmabin
Welthungerhilfe (WHH)	Support CA	Lashio WHH office	Farmers in northern Shan State
Norwegian Govt.	Donor	UNDP/ affiliated LNGO such as FBD	Southern Shan State & Inle Lake rehabilitation
UNDP	Programming /support/implement CA	direct	Northern Chin State farmers
DOA, MOAI	Set up CA plots in farmers fields	Land Use Division, Focal : Daw War War Thein	Shan State/Dry Zone farmers
AMD, MOAI	Set up terracing in farmers fields	Upland Farm Division	Chin State & other uplands
Self supported village committees	Conserve local forests and water spring, conserve soil moisture for agriculture	Buddhist monks	villagers

Champions and Allies for CF/AF

Stakeholder/ Actors	Role/ Functions/ scale	Allies/ partners	Ground level actors/farmers
Forest Department	Establish guidelines for CF and authorize & support CF and then AF	Community Forestry National Working Group- CFNWG	User groups/ individual farmers
UNDP, LIFT, JICA, DEFID, SWISS AID, CARE Myanmar,	Donors	, FREDa, ECCDI, Eco DEV, BANCA, BDA, SDF, RCA, RECOFTC, Metta	User groups/ individual farmers
ECCDI	Support AF/ CF	PHECAD, AFP	Local CSOs, farmers
Metta	Support CF/AF	Local CSOs	Farmers/ user groups
INEDUCO// Metta	FREDa	AFP/IGG	User groups

Champions and Allies for SRI

Stakeholder/ Actors	Role/ Functions/ scale	Allies/ partners	Ground level actors/farmers
Metta Development Foundation	To promote and assist beneficiaries in adoption of	KMSS, URB, KBC, MBC	Farmers from Ayeyarwady, Shan,

	SRI		Kachin, Kayah
GRET	To promote and assist beneficiaries in adoption of SRI		Farmers from Ayeyarwady, Rakhine north,
LIFT	donor	Metta, GRET,	Farmers

Champions and Allies for IPM

Stakeholder/ Actors	Role/ Functions/ scale	Allies/ partners	Ground level actors/farmers
FAO/UNDP	Assist or implement IMP	DoA	Farmers
DoA	Assist or implement IPM	IPM Unit of PPD Focal: Dr. Kyin Kyin Win	Farmers from Tatkone, Nyaung Lae Pin, Lashio, Hlegu townships
CSOs such as Do Taung Thu	Implement IPM through FFS		Farmers from Inle lake villages, Nyaung Shwe

Champions and Allies for Integrated Farming (Rice –Fish Farming)

Stakeholder/ Actors	Role/ Functions/ scale	Allies/ partners	Ground level actors/farmers
JICA	Assist and implement rice –fish farming	DOF	Farmers from Bago, Magwae, Sagaing, Ayeyarwady, Mandalaly Regions
DOF	Assist and implement rice-fish farming		farmers

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