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CASE STUDY

Assessment of Stakeholder Interventions for Sustainable Agriculture in Myanmar's Dry Zone

Funded by

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Livelihoods and Food Security Trust Fund
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Assessment of Stakeholder Interventions for Sustainable Agriculture in Myanmar's Dry Zone

Developed as part of the project:

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Contents

Tables

Figures

Appendices

Abbreviations

ACS	Agape Community Service
ADB	Asian Development Bank
ADRA	Adventist Development and Relief Agency
ASEAN	Association of Southeast Asian Nations
AVSI	Association of Volunteers in International Service
CAPSA	Centre for Alleviation of Poverty through Sustainable Agriculture
CBO	community-based organization
CSO	Central Statistical Organization
DAR	Department of Agricultural Research
DoA	Department of Agriculture
DoF	Department of Forestry
DoP	Department of Planning
DRD	Department of Rural Development
EWS	East West Seed
FAO	Food and Agriculture Organization of the United Nations
FAS	farm advisory service
FGD	focus group discussion
FRDO	Farmer Rights and Development Organization
FSWG	Food Security Working Group
FYM	farmyard manure
GIS	Geographical Information System
GPS	Global Positioning System
GRET	Groupe de Recherche et d'Echanges Technologiques
GVD	Green Village Development
HAI	HelpAge International
HH	household
I/LNGOs	International/Local Non-Government Organizations
IRRI	International Rice Research Institute
ISO	International Organization for Standardization
IWUMD	Irrigation and Water Utilization Management Department
JICA	Japan International Cooperation Agency
KII	key informant interview
KOICA	Korean International Cooperation Agency

LBVD	Livestock Breeding Veterinary Department
LIFT	Livelihoods and Food Security Trust Fund
MADB	Myanmar Agricultural Development Bank
MIMU	Myanmar Information Management Unit
MLFRD	Ministry of Livestock, Fisheries and Rural Development
MNREC	Ministry of Natural Resources and Environmental Conservation
MoECAF	Ministry of Environmental Conservation and Forestry
MoAI	Ministry of Agriculture and Irrigation
MoALI	Ministry of Agriculture, Livestock and Irrigation
NAG	Network Activities Group
NGO	non-governmental organization
SARA	Sustainable Action for Rural Advancement
SMM	Shan Maw Myay Company Limited
SWOT	strengths, weaknesses, opportunities and threats
TDH	Terre des Hommes
UNDP	United Nations Development Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
USAID	United States Agency for International Development
USD	United States Dollar
WF	WorldFish
WFP	World Food Programme
WV	World Vision
YAU	Yezin Agricultural University

Foreword

The Dry Zone of Myanmar suffers from high levels of poverty and food insecurity. Agriculture is an important source of livelihood but rainfall is concentrated in a few months of the rainy season with erratic duration and wide deviation in annual precipitation. This meteorological character makes the Dry Zone especially vulnerable to the impacts of climate change. Climate change is also aggravating the adverse effects of land and environmental degradation leading to poor and fragile soils. The most severely affected are poor, rural families who depend on agriculture for food, nutrition as well as livelihood. Strengthening the sustainability and climate-resilience of agriculture in the Dry Zone, with a focus on smallholders and other vulnerable communities, is thus of critical importance for ensuring food security and income stability.

The development of appropriate policies is of paramount significance for the sustainable development and improvement of livelihoods in the Dry Zone. Policymaking and implementation, however, is a complex and incremental process that requires continuous interaction between the state and civil society, including the private sector. It requires knowledge of the stakeholders involved and activities that they are implementing on the ground as well as an understanding of the strengths and weaknesses of existing policies, institutions and policy formulation and implementation processes so that technical and capacity- building gaps that need to be addressed can be identified.

This report is a part of a series of case studies produced by the United Nations Economic and Social Commission for Asia and the Pacific to undertake mapping of relevant stakeholders and assessment of their interventions in the Dry Zone as well as analyse policies, institutions and processes for areas that are important for the sustainable development of the Dry Zone. Based on multi-stakeholder consultations conducted in Myanmar, the case studies have focussed their attention on the following areas:

(i) Value chains for seed development for pulses, legumes and oil crops
(ii) Agricultural mechanization development
(iii) Sustainable agriculture for poverty reduction

We sincerely hope that the case studies will serve as valuable knowledge resources for practitioners and decision makers in government, civil society and the private sector in Myanmar and support their efforts to promote sustainable and climate-resilient agriculture in the Dry Zone.

Masakazu Ichimura
Director
Centre for Alleviation of Poverty through Sustainable Agriculture
United Nations Economic and Social Commission for Asia and the Pacific

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Executive Summary

The purpose of this case study, 'Assessment of Stakeholder Interventions for Sustainable Agriculture in Myanmar's Dry Zone', is to contribute towards better knowledge management and efficient resource utilization for climate-resilient agriculture and rural development in the Dry Zone of Myanmar. Among its specific objectives is to identify key stakeholders and assess the strengths and weaknesses of their interventions for sustainable agriculture; assess existing opportunities for knowledge-sharing between stakeholders and identify bottlenecks that constrain them; formulate recommendations for improving programme impact and stakeholder partnerships; and put forth proposals for concrete follow-up action. The study employed qualitative methods including desk review, focus group discussions, key informant interviews and site visits.

The central Dry Zone is spread over three divisions of Myanmar, namely Magway, Mandalay and Sagaing, and is home to 16 million people or approximately one-third of the country's population. The World Food Programme (WFP) has classified 17 per cent of households in the Dry Zone as severely food insecure and a further 24 per cent as moderately food insecure. Food insecurity is particularly evident among young children, with wasting estimated at almost 14 per cent and stunting at over 30 per cent in 2013. High rainfall variability and its concentration within 6-7 months of the year (May to November) leads to seasonal water shortages, which are a constraint to the viability of rural livelihoods in the Dry Zone. The failure of rains and/or seasonal water scarcity poses challenges for coping strategies and can lock households into a cycle of poverty and vulnerability. These climatic and water resource constraints are compounded by the existence of shallow soils with low natural fertility and a landscape that is undulating and has poor vegetative cover, resulting in soil erosion and land degradation.

A wide range of stakeholders working to promote sustainable and climate-resilient agriculture in the Dry Zone were identified in this study. These included several ministries concerned with agriculture, natural resource management and rural development. The Ministry of Planning and Finance, Ministry of Agriculture, Livestock and Irrigation (MoALI), the Ministry of Natural Resources and Environmental Conservation and the Ministry of Social Welfare, Relief and Resettlement have important roles and responsibilities for agriculture and rural development in the Dry Zone. Multilateral organizations such as the United Nations Development Programme (UNDP) Myanmar, UN Habitat, the Food and Agriculture Organization of the United Nations, WFP, CAPSA-UNESCAP, Asian Development Bank, the World Bank, the European Union and International Rice Research Institute are some of the key stakeholders. Bilateral organizations involved in agriculture and rural development programmes in the Dry Zone include USAID, the Japan International Cooperation Agency and Korean Organization for International Cooperation and Assistance. Among international

non-government organizations (INGOs), local non-government organizations (LNGOs) and multilateral/bilateral organizations, a total of 19 organizations are identified as implementing field projects in the agriculture sector in the Dry Zone, while 5 international/local non-governmental organizations (I/LNGOs) are implementing 15 environmental projects that also affect agriculture. The number of such organizations (I/LNGOs and multi/bilateral organizations) implementing field projects in the agriculture sector is relatively higher in Magway division than in Sagaing or Mandalay divisions. Even when projects are categorized by subsector, Magway division has the densest concentration of interventions in terms of the number of organizations and the types of interventions, compared with Sagaing and Mandalay divisions. Among subsectors, while there are numerous projects being implemented in the agricultural water resource subsector, the coverage is very limited in the case of agricultural alternative development and agro-industry subsectors, and there are no projects in the agricultural assessment subsector, thus indicating existing gaps.

Analysis of the activities of government institutions indicated that the main weaknesses are lack of coordination among one another, as well as with international organizations. Farms of the Department of Horticulture (within the Department of Agriculture) in the Dry Zone are constrained by a lack of capacity for vegetable production, even though vegetable production could make an important contribution towards agricultural sustainability and climate resilience. Moreover, MoALI's views on certain aspects of the work of international organizations, including United Nations entities, have been a constraint on closer collaboration. MoALI would like to see better alignment between the projects implemented by non-governmental organization (NGOs) and the government's policies and priorities. The Department of Rural Development (DRD) (formerly under the Ministry of Livestock, Fisheries and Rural Development or MLFRD and now under MoALI) has a large number of partner organizations including United Nations agencies, multilateral and bilateral organizations, and INGOs. It receives funds from those organizations for numerous projects as well as from the Union Government for Green Village Development projects. From the point of view of the agriculture sector, the main constraint of DRD's projects is that they mainly focus on infrastructure development and thus affect agricultural sustainability only indirectly.

Among **government institutions at the regional level**, the Department of Agriculture's (DoA's) main programmes reflect local needs (e.g. distribution of improved seeds and research on drought and salt-tolerant varieties, etc.), but their efficiency and effectiveness need to be better evaluated. On its part, DRD has been implementing the development of rural roads, water supply and electricity networks, which indirectly helps market development for agricultural products, food safety and alternative income generation.

The study analysed the views and activities of a cross section of **I/NGOs, community-based organizations (CBOs) and farmer groups** in the Dry Zone. The major constraints for agriculture and rural development in the Dry Zone area are climate change, lack of access to improved seeds and suitable varieties, scarcity of water for irrigation, shortage of labour, increasing input costs leading to low affordability, weaknesses in respect of agricultural technologies used, lack of capital/credit, and lack of market access.

A number of I/LNGOs have been implementing interventions addressing the lack of good quality seeds, lack of irrigation water, availability and affordability of inputs, and provision of capital/credit, among other critical issues. However, it has been challenging to achieve

sustainability of the interventions after funding ends. CBOs and farmer groups are acting as local implementing partners for I/LNGOs, as well as providing important links with other stakeholders. Women's participation in NGOs' interventions, assessed in terms of membership of local decision-making committees and/or proportion of beneficiaries in the Dry Zone, has been high. Overall, I/LNGOs, CBOs and farmer groups were found to be making useful contributions towards achieving the goal of agricultural sustainability in the Dry Zone. It is also encouraging to note that undue overlap in terms of similar projects being implemented by I/LNGOs, CBOs and farmer groups at the same location has been largely avoided.

Analysis of activities of **multi/bilateral organizations** indicated that these organizations have rich expertise in useful or improved agricultural technologies and they provide support both to government institutions and I/LNGOs. However, their focus is often limited to specific crops, such as rice.

Analysis of activities of **private sector** players revealed a key constraint in popularizing the use of organic fertilizers and pesticides among farmers, namely that the impact of such organic products generally occurs over a longer term than chemical products and this makes them less attractive to farmers. However, as specific cases, organic products produced by the Shan Maw Myay Company were reported to be showing good results in terms of soil improvement and pest control. Seeds produced by East West Seed Company (e.g. for vegetables) are also attractive for Dry Zone farming, although the company does not currently produce seeds for the main crops grown in the Dry Zone, such as groundnut and sesame. Other examples include agro-chemical companies, such as Armoe and Myanma Awba, which have collaborated with farmers to support the collective buying of fertilizers. Farmers Development Committees (village level) and Farmers Development Associations (township level) coordinate the demand for fertilizers and buy products from these companies on 6-monthly instalments, resulting in reduced transportation charges and interest on loans. On the other hand, there is a trust gap between companies and some farmers groups, CBOs and LNGOs, who perceive that the agro-chemical companies facilitate workshops only to launch and promote their new products rather than to transfer technologies.

Analysis of existing **knowledge-sharing** efforts among stakeholders revealed a number of weaknesses, a major one being that there is no single, common knowledge-sharing platform where all stakeholders can access necessary information with ease. DoA staff in regional offices, CBOs and farmers have low familiarity with information technology (IT) making it difficult for them to access information online. Moreover, there is no ready mechanism for sharing information and knowledge between government institutions and NGOs. Nonetheless, the Food Security Working Group's (FSWG) Resource Centre is playing a vital role in enabling knowledge-sharing in the Dry Zone in Magway region. Social media platforms, such as Facebook and Viber, are also gaining in popularity among the public and, thus, can be used as information sources wherever IT expertise is available.

The **key recommendations** emerging from this study are as follows:

- **Technological issues** – With the onset of climate change, farmers should be provided with easy access to improved seeds of suitable varieties. They also need information on better techniques to overcome crop damage due to climate impacts, as

well as technical support for improving traditional good farming practices. Well-functioning mechanisms should be put in place to make expert advice available, allowing them to solve the problems encountered, especially during the growing season.

- **Capacity-building –** Efforts should be made to build capacities of extension workers and farmers in coping with emerging challenges in all aspects of sustainable and climate-resilient agriculture, including technical issues, management practices and social dimensions (e.g. ensuring gender equity). International organizations can be approached to provide support in terms of expertise, as well as funding for training, particularly for government staff in areas such as food value chains, vegetable seed production and value-adding processes. Another requirement is to enable effective management of DoA-produced seeds to fill the existing gaps in the seed sector. Moreover, relaxing restrictive processes for applying for funding and building the capacities of small CBOs for preparation of funding proposals can better equip them to avail of funding opportunities and establish broader partnerships.

- **Improved coordination and knowledge-sharing** – The current situation could be improved in numerous ways. These include greater engagement of stakeholders with the private sector; engendering a closer working relationship between the DoA and NGOs; enhancing coordination between Yezin Agricultural University, the DoA, the Department of Agricultural Research and international organizations to mobilize more technical and financial resources; and building greater understanding between government institutions (especially the Department of Planning (DoP) of MoALI) and international organizations including United Nations agencies. Utilizing the merger of MLFRD with the Ministry of Agriculture and Irrigation (MoAI), adequate coordination between DoA and DRD should be established to enable greater sharing of information and expertise. Apart from this, there is a need for a common knowledge-sharing platform where all stakeholders can access and share relevant information with ease.

- **Programme and policy formation** – The range of recommended programme and policy measures include expanding facilities and supporting infrastructure for irrigation water; amending the policy which restricts distribution of irrigation water only to paddy fields; promoting reforestation as part of a holistic strategy; implementing more livelihood projects to expand job opportunities, particularly in the off season; encouraging the government agricultural development bank to provide sufficient and more easily accessible loans to farmers at sowing time; promoting development of agro-industry; prioritizing enforcement of industrial waste management laws; establishing stronger linkages with international markets for price stability; and amending the Land Law to better regulate the conversion of agricultural land to other uses. Another key recommendation is for agricultural policies to be formulated with the inclusive participation of farmers using a problem-solving approach. It is recommended that measures be taken to bridge the trust deficit between agro-chemical dealers and local farming communities, including through strengthening the technical capacities of sales staff.

Some of the main **follow-up actions** suggested through this study are establishing a model farm for integrated farming systems covering both agriculture and livestock production;

initiating a regional Farm Advisory Service comprising experts from DoA, NGOs and private sector companies; initiating regional-level newspapers or newsletters (online and offline) to showcase activities of local and international organizations as well as regional government bodies; establishing a fund for supporting farmers' seed banks; adopting a change in strategy for future development projects in favour of providing holistic support covering inputs, technologies, market access, etc.; formulating enabling policies to establish a viable crop insurance platform; and promoting crop price stability at harvest time through government or third-party purchases.

1

Introduction and Study Objectives

The central Dry Zone is located in the central part of the Union of Myanmar, situated at about 500 km north from Yangon. The Dry Zone area is located between two elevated regions: the Shan Highlands to the east, and the Rakhine Yoma and Chin Hills to the west. It is comprised of 57 townships and 13 districts, and is home to 16 million people (one-third of the total population of Myanmar). The Zone has only 700-1,000 mm annual precipitation, since the southwesterly monsoon blown from the Bay of Bengal is intercepted by the mountain range of Rakhine at the western border of Myanmar. Rainfall is concentrated in a few months of rainy season with erratic duration and a wide annual variation in annual precipitation. These meteorological characteristics often bring about droughts, with crop failures, and intense showers during the mid-rainy season, which result in floods. Such climatic factors impose severe limitations on agriculture as a main source of livelihood for the population in the Dry Zone compared to other parts of Myanmar.

A report from the Asian Development Bank (ADB, 2009) suggests that South-East Asia is likely to suffer more from climate change than the global average, with exacerbated water shortages, constrained agricultural production, threats to food security and increased health risks. Myanmar's Dry Zone is especially vulnerable to changes in climatic patterns, particularly the reductions in rainfall level and frequency that have been witnessed in recent years. People are facing the challenge of adapting to climate change and need support in terms of access to resources and technologies. The situation in the Dry Zone has been aggravated by other unfavourable factors, such as the pressure of an increasing population versus outmigration of human resources in the form of seasonal outflow of the workforce in search of jobs, as well as deterioration of natural resources.

In this context, the purpose of this case study on 'Assessment of Stakeholder Interventions for Sustainable Agriculture in Myanmar's Dry Zone' is to contribute towards better knowledge management and efficient resource utilization for climate-resilient agriculture and rural development in the Dry Zone. The specific objectives are to:

(iv) Identify key stakeholders and assess the strengths and weaknesses of their interventions for sustainable agriculture in the Dry Zone.

(v) Assess existing opportunities for knowledge-sharing between stakeholders and identify bottlenecks that constrain it.

(vi) Formulate recommendations for improving overall coordination, resource deployment, knowledge-sharing and partnerships.
(vii) Suggest proposals for concrete, action-oriented follow-up activities to put the recommendations into practice.

Chapter 2 of this study outlines the study design, study questions and the data-collection method. **Chapter 3** identifies the key stakeholder groups concerned with promotion of sustainable and climate-resilient agriculture in the Dry Zone, and maps the field projects being implemented (particularly by non-government organizations) based on the region and subsector of implementation. **Chapter 4** provides an analysis of the findings, including a strengths, weaknesses, opportunities and threats (SWOT) analysis of stakeholders' programmes, as well as knowledge-sharing efforts. **Chapter 5** concludes the study by outlining lessons learned and recommendations emerging from the analysis, and suggests specific actions to implement key recommendations.

2

Study Design

This chapter describes the data-collection method used for this study. It explains how and why particular methods and tools were selected. It also explains some of the specific challenges involved in undertaking the study.

2.1 The study questions and criteria

The study employed qualitative methods such as focus group discussions (FGDs), key informant interviews (KIIs), site visits and document review.

In order to meet the study objectives, the following specific questions were addressed: What are the activities of different stakeholders in the area of sustainable and climate-resilient agriculture in the Dry Zone of Myanmar? What are the outcomes and impacts of those activities? What are the strengths, weaknesses, opportunities and limitations for the stakeholders? This knowledge can be further used to improve interventions for the same target areas/populations and/or similar target areas/populations in the future. The primary audience for the study included farmer groups, community-based organizations (CBOs), international and local NGOs (I/LNGOs), government institutions (regional and national level), multilateral and bilateral organizations, and the private sector. To maximize involvement of the primary audience in the planning, data-collection and utilization stages of the study, a protocol for the study was drafted and finalized (Patton, 1997). This protocol was subsequently utilized to develop the study report.

2.2 Data-collection method

2.2.1 Desk review, key informant interviews, focus group discussion and site visits

This study involved various data-collection methods covering the following:

- **Desk review** – This involved general research on important issues facing agriculture and rural development in the Dry Zone. These included current agricultural situation (soil, water, crops, weather), the key problems being faced, etc. Documents were reviewed from both online and offline sources, including programme/project documents produced by government agencies, NGOs, research institutions and the

private sector; survey, evaluation and impact assessment reports; publications of United Nations, World Bank, and multi- and bilateral organizations; relevant academic publications and journal articles.

- **Key informant interviews (KII)** – Interviews were conducted with individuals to obtain an overview of sustainable and climate-resilient agriculture in the Dry Zone, identify stakeholders and their activities, overlaps and gaps in the interventions, impact of interventions on sustainable and climate-resilient agriculture, possible remedies for soil–water–environment deterioration, suitable future interventions, etc. These areas were explored using semi-structured questionnaires that obtained qualitative information from key stakeholders. The questionnaires are included in Appendix I for reference.

- **Focus group discussion (FGD)** – Semi-structured questionnaires were used in FGDs to address the situation of farmers in the Dry Zone area, their problems, options and requirements to cope with those problems, how they are struggling to overcome negative impacts of climate change, what kind of interventions they want, etc.

- **Site visits** – Two selected townships of the Dry Zone were visited to help corroborate the findings from the desk review. Moreover, this provided a better understanding of the real situation in the Dry Zone, the role of key stakeholders, and their ability to cope with and overcome emerging problems with respect to sustainable and climate-resilient agriculture.

2.2.2 Sample size, sampling strategies and recruitment for qualitative methods

As a first step, KIIs in Yangon were completed, followed by visits to Magway and Wundwin (Meikhtila district) townships as well as government establishments in Naypyitaw. A total of 12 interviews (11 KIIs and 1 FGD) were conducted in Magway, 1 interview (KII) in Natmauk, and 7 interviews (6 KIIs and 1 FGD) in Wundwin. In Naypyitaw, 6 KIIs were conducted. The list of targeted interviewees and actual interviewees are presented in Table 2.1

Table 2.1 List of interviewees (targeted and actual)

Site	Interviewed organization	Category	Date	Remark
Magway	Green Network	Community-based organization	14/9/15	
	Food Security Working Group's (FSWG) Resource Centre	International and local NGO	14/9/15	
	Sustainable Action for Rural Advancement (SARA)	Community-based organization	14/9/15	
	Progetto Continenti Myanmar/Dear Myanmar	International and local NGO	14/9/15	
	Yezin Agricultural University (Magway Campus)	Government institutions	15/9/15	
	Terre des Hommes Italia (TDH)	International NGO	15/9/15	
	Network Activity Group	Local NGO	15/9/15	
	Danish Church Aid/Eco. Dev.	International and local NGO	15/9/15	
	Farmer Rights and Development Organization (FRDO)	Community-based organization	16/9/15	
	Shan Maw Myae Co., Ltd	Private sector	16/9/15	
	Department of Agriculture (DoA)	Government institutions	16/9/15	
	Farmers Group–Farmers Development Association	Farmers	16/9/15	
	Swanyee Devt Foundation (Action Aid)	International and local NGO		Not met
	Ratana Metta Organization (AA)	Local NGO		Not met
	Welt Hunger Hilfe	International NGO		Not in Magway
	Action Aid	International NGO		Not met
	Consortium Dutch NGOs	International NGO		Project was a pilot test, terminated a while ago
	Food and Agriculture Organization (FAO)	Bilateral organization		Not in Magway
Wundwin-Meikhtila	FAO-Meikhtila	Multi/Bilateral organization	18/9/15	
	Department of Rural Development, Meikhtila	Government institutions	18/9/15	
	Farmers from Htee Hlaing village	Farmers	18/9/15	
	Department of Agriculture, Wundwin	Government institutions	18/9/15	
	Department of Rural Development, Wundwin	Government institutions	19/9/15	
	Social Vision Service-Wundwin	Local NGO	19/9/15	
	Department of Agriculture, Meikhtila District	Government institutions	19/9/15	
	Research Farm	Government institutions		Unavailable
	Women Group/Cooperative	Community-based organization		Not met
	IDE/Proximity Designs	International NGO		Not met
	Oxfam GB	International NGO		Not in Wundwin
	Agricultural Company	Private sector		Not met
	International Rice Research Institute, Meikhtila	Bilateral organization		Spokesperson was unavailable

Site	Interviewed Organization	Category	Date	Remark
Naypyitaw	Department of Agricultural Research	Government institutions	21/9/15	National level
	Yezin Agricultural University	Government institutions	21/9/15	Pro-rector
			21/9/15	Professor
	Department of Agriculture Planning	Government institutions	22/9/15	National level
	Department of Rural Development	Government institutions	22/9/15	National level
	Department of Agriculture	Government institutions	22/9/15	National level
Yangon	LIFT	Funding organization	10/9/15	Programme officer
	IRRI	Multi/bilateral organization	10/9/15	Postdoctoral researcher
	NAG	Local NGO		Interviewed at site visit
	FSWG	Local NGO		Interviewed at site visit
	FAO	Multi/bilateral organization		NAPA-Project coordinator

2.3 Data management and analysis

Field notes were taken of salient points expressed by the respondents. The main questions to be addressed by the study were used to identify themes. After that, categories and subcategories were synthesized and causes, consequences and relationships among categories and subcategories were analysed.

2.4 Measures to address ethical concerns

Privacy, anonymity and confidentiality are major ethical issues relevant to this study. Appropriate measures were undertaken to mitigate violations of ethical conduct during the study.

The 'Plain Language Statement' was developed and read to study respondents. This statement outlined the objectives of and risks involved in the study, type of information sought and reasons for seeking such information, and where and to whom participants could report ethical misconduct and seek more information. To minimize potential compromise of anonymity and confidentiality through participants of FGDs, the facilitator explained the importance of keeping information confidential and requested that participants help ensure confidentiality. Names and addresses of FGD participants were not sought and participants were not followed up after their interviews. Field notes and transcripts were kept under secure conditions by the consultant.

2.5 Study limitations

This study was constrained by several limitations with regard to the qualitative methods used and the availability of interviewees.

A total of 23 key informants and 7 farmers in 2 FGDs, participated in the study for primary data collection. It is possible that findings from the KIIs and FGDs might not be reflective of the situation in the areas around the sites visited that were not included in the study.

However, the stakeholders to be interviewed were selected based on the results of the desk review in order to maximize chances of the sample being representative.

Some of the key informants, such as the Food Security Working Group (FSWG) and the Food and Agriculture Organization of the United Nations (FAO), to be interviewed in Yangon were unavailable and could not be interviewed. However, where possible, alternative staff were interviewed during the site visits. In addition, stakeholders identified for interview in Wundwin (IDE Proximity Design and Oxfam GB) could not be met as their interventions had already ended. A similar situation was encountered at Magway in respect of the Swanyee Development Foundation.

3

Key Stakeholders for Dry Zone Agriculture

This chapter presents the overall context of the Dry Zone, and provides an overview of the different types of stakeholders working in the area of sustainable and climate-resilient agriculture. This is followed by an exercise to map the field projects/interventions being implemented by stakeholders based on the region and subsector of implementation in order to further identify gaps. Given the limitations of available data sources and the time frame for completing this study, the mapping exercise focuses on field projects of non-government stakeholders, particularly INGOs and multi-/bilateral organizations.

3.1 General context of Dry Zone

Land area, population and population density

The central Dry Zone is spread over three divisions, namely Mandalay, Sagaing and Magway. Table 3.1 shows the land area and population of these three divisions and the study area, in contrast to the rest of Myanmar. The three divisions account for 26 per cent of the total area of Myanmar and 34 per cent of the national population.

Table 3.1 Land area, population and population density of the Dry Zone area

Division/state	Area, sq.km	Area ag/ Union, %	Population '000 in 2003	Pop. ag/ Union, %	Pop. density per sq.km
Sagaing Division	94 582	14	5 777	11	61
Mandalay Division	37 008	5	7 407	14	200
Magway Division	44 801	7	4 976	9	111
Total of 3 Divisions	**176 391**	**26**	**18 160**	**34**	**103**
Kachin State	89 003	13	1 393	3	16
Kayah State	11 728	2	301	**1**	26
Kayin State	30 370	4	1 607	3	53
Chin State	36 004	5	502	1	14
Tanintharyi Division	43 328	6	1 490	3	34
Bago Division	39 387	6	5 420	10	**138**
Mon State	12 292	2	2 735	5	**223**

Division/state	Area, sq.km	Area ag/ Union, %	Population '000 in 2003	Pop. ag/ Union, %	Pop. density per sq.km
Rakhine State	36 762	5	2 968	6	81
Yangon Division	10 167	2	6 188	12	**609**
Shan State	155 734	23	5 142	10	33
Ayeyarwady Division	35 123	5	7 318	14	**208**
Union	**676 288**	**100**	**53 224**	**100**	**79**

Source: Myanmar, CSO and Department of Agricultural Planning (2006); Myanmar, CSO, Ministry of National Planning and Economic Development (2004)

The figures show that the three divisions have a higher average population density than other divisions in the Union (except as compared to Ayeyarwady, Bago and Yangon divisions, and Mon state).

Poverty status

Poverty levels within the Dry Zone, as indicated in a 2010 Japan International Cooperation Agency (JICA) study were 33 per cent for farm households, but 55 per cent for rural landless households. The World Food Programme (Save the Children and World Food Programme, 2014) classified 17 per cent of households as severely food insecure and a further 24 per cent as moderately food insecure. Food insecurity is particularly evident among young children, with wasting estimated at almost 14 per cent and stunting at over 30 per cent in 2013. Baseline surveys sponsored by the Livelihoods and Food Security Trust Fund (LIFT) show that although crop production was cited by almost 58 per cent of households as an income source, casual labour was almost as high, at 55 per cent (LIFT, 2012).

Low incomes and low income diversity make food insecurity a primary constraint for Dry Zone communities. Household debt is high and 35 per cent of loans are reportedly used to buy food, the highest proportion for any of Myanmar's main agroecological zones (LIFT, 2013). WFP (2014) data demonstrates that 18 per cent of households are classified as food insecure, with food insecurity being most pronounced among wage labourers and smallholder farmers (<2 acres landholding). Households report purchasing food from markets up to 2 hours away and journey times lengthen in the rainy season. There is little availability of fresh vegetables in many villages.

Rainfall and water management

High rainfall variability and concentration across 6 to 7 months of the year (May to November) leads to seasonal water shortages, which is a constraint to the viability of rural livelihoods. There has been a significant reduction in rainfall amounts in June in recent years and high variability in the onset date of the wet season (International Water Management Institute, 2013). This impacts agricultural production by increasing the risk of drought at the beginning of the rain-fed crop cycle. This risk is particularly high in the central part of the Dry Zone where the LIFT-supported activities for the Dry Zone are focused. River flows are directly influenced by the main monsoon season in the upper catchments and water levels rise in June and decline from September onwards.

Consequently, access to safe and reliable water, for both agriculture and livestock, as well as for domestic use, is a key constraint to livelihoods and well-being. The failure of rains

and/or seasonal scarcity stretches coping strategies and can lock households into a cycle of poverty and vulnerability. Many farmers manage the weather risk by reducing agricultural inputs and using less labour-intensive cultivation methods to minimize losses when crops fail.

These climatic and water resource constraints are compounded by the presence of shallow soils with low natural soil fertility, as well as a landscape that is undulating with poor vegetative cover. Current agricultural techniques also keep the soil surface uncovered for much of the year. These factors combine to result in soil erosion and land degradation.

Access to land

More than 60 per cent of households (HHs) have access to land in the Dry Zone. WFP 2008 assessment carried out in collaboration with the Government of Myanmar showed that 61 per cent of sampled HHs had access to land, whereas the LIFT HH survey (2013) showed 63 per cent of sample HHs owned land. A baseline assessment of Thazi conducted by Oxfam GB in June 2010 found that 38 per cent of the local population is landless and 76 per cent of the sample households do not have sufficient access to water needed for crop production. Apart from this, landholding size varies substantially across the Dry Zone. For instance, in Thazi, Oxfam GB and NAG (2010) found that average landholding in this area is 10.19 acres, while the LIFT HH survey 2013 reported that average landholding for the Dry Zone as a whole is 3.8 acres. The LIFT HH survey also reported that only 7.6 per cent of sampled HHs irrigated their lands and the average area of irrigated land is 2.4 acres per HH. The average income of 55 per cent of landowners ranges from 50,000 to 100,000 Kyats (approx. USD 50 – USD 100) per month.

Crops

According to the LIFT household survey 2013 report, 60.95 per cent of sampled households grew annual crops. Although rice is the staple foods crop in Myanmar it is not the primary choice of crop for farmers in the Dry Zone. Soil type and rainfall pattern are not conducive to rice cultivation, and instead peas, beans, sesame and groundnuts are the most commonly grown crops in the Dry Zone. In the WFP (2008) study, peas were most commonly cited by households that grew only one crop, i.e. 18 per cent of landowners. Of farming households, 35 per cent reported the cultivation of four or more crops. The LIFT household survey revealed that the major share of income for 46.3 per cent of sampled households came from selling of pulses and groundnut.

Climate change and its impact

Climate change projections for the Dry Zone predict a general increase in temperature, an increase in rainfall variability during the rainy season, an increase in the risk of flooding resulting from a late onset and early withdrawal of monsoon rains, and an increase in the occurrence and intensity of extreme weather events, including cyclones/strong winds, flood, intense rains, extreme high temperatures and drought (Bates, 2014). Increasingly erratic rainfall and temperature will complicate already low water availability (International Water Management Institute, 2013).

These effects of climate change, together with the impact of extractive farming practices, is accelerating the degradation of soils and the loss of vegetative cover. If ignored, the result could be significant desertification of the central Dry Zone. Any intervention aiming to provide

the conditions for sustainable and inclusive economic growth within the Dry Zone must take into account the need for animal husbandry and pasture management practices, as well as genetic materials that are appropriate for the prevailing environmental conditions and those anticipated in the medium term.

Climate and environmental stress are also drivers of migration for employment. Internal migration is a coping strategy and there is substantial off-season migration by the landless to Shan state to work as agricultural labourers.[1] Many from the Dry Zone also go to work on construction sites in Yangon and Mandalay (World Bank/LIFT, 2014, p. 31).

Access to credit and market

The main crops in the Dry Zone are pulses, beans and oilseeds, which are produced for local and export markets. The marketing of these crops is widely prevalent, even among those households holding less than an acre of land. According to the LIFT surveys, 70 per cent of this group sold at least part of their output, and rates are higher for households with more land. However, nearly 90 per cent of all households sold their crop within 1 month of harvest and only around 10 per cent participate in group marketing activities. The need to repay loans and the lack of storage capacity at farm and village level puts high pressure on farmers to sell their produce at or close to harvest. Waiting for the better prices, common later in the season, is not an option.

The use of credit is also widespread; 83 per cent of respondents in the LIFT baseline survey had taken a loan in the last 12 months. However, the cost and utilization of such loans varies widely by source. Crop loans from the Myanmar Agricultural Development Bank (MADB) are heavily subsidized, at 0.7 per cent per month, but fewer than one in five households who wanted to borrow had obtained one[2]. MADB loans are almost entirely limited to agricultural production – thus excluding the landless. The maximum amount lent under current MADB policies (approximately USD 20/acre for non-rice crops) is well below input costs.

By contrast, 70 per cent of borrowers had taken loans from moneylenders or shopkeepers, who charge interest rates of 5-10 per cent per month or more. The need to borrow at such high cost, plus the recurring crop failures and low crop yields, increases the prospect of indebtedness. While the coverage of microfinance institutions is wider in the Dry Zone than elsewhere in the country, penetration is still limited making affordable finance inaccessible for many.

3.2 Key stakeholders in the agriculture sector of the Dry Zone

The key stakeholders associated with initiatives for the agriculture sector in the Dry Zone include national and regional government institutions, INGOs and LNGOs, CBOs, farmer groups, multilateral and bilateral organizations and the private sector. An overview of each stakeholder group is presented below.

[1] World Bank and LIFT (2014) estimates that 81% of migrants from Mandalay engage in seasonal migration.

[2] Only farmers with registered land are eligible for the MADB loans. As the rate of land registration increases so will the proportion of farmers taking MADB loans to take advantage of the comparatively cheap credit.

National government institutions

There are several ministries involved in agriculture, natural resources and rural development. The Ministry of Planning and Finance is tasked with the overall planning and development of all national economic sectors, including the agriculture sector with its crop, livestock, fishery and forestry subsectors (Food and Agriculture Organization and the Republic of the Union of Myanmar, 2012).

The Ministry of Agriculture, Livestock and Irrigation (MoALI) is responsible for overall development of the crop subsector, including: (i) extension; (ii) research and development; (iii) irrigation; (iv) agricultural mechanization; (v) formulation of agricultural plans and policies; (vi) higher education in agriculture; (vii) agricultural microcredit and loans; (viii) agricultural land reclamation; (ix) land development and land reform; (x) biodiversity; (xi) land surveying and mapping; and (xii) coordination with key concerned agencies. Apart from this, the Irrigation and Water Utilization Management Department (IWUMD) has been supporting better utilization of water resources for agriculture. In the Dry Zone, IWUMD is implementing river-water pumping projects, promoting utilization of groundwater through drilling of tube wells and undertaking other water supply projects, in addition to promoting formation of water-user groups.

The Ministry of Livestock, Fisheries, and Rural Development (MLFRD), recently merged with MoALI, took the lead role in the overall development of the livestock subsector, with the Livestock Breeding Veterinary Department (LBVD) as the executing arm. Important existing programmes are Highly Pathogenic Avian Influenza Control, Native Chicken Development, the Livestock Development Bank (chickens and pigs), Development of Mythum Breeding, Livestock Breeding Loans, Establishment of Livestock Zones, Vaccination of Chicken and Pasture Development. These programmes aim to expand the current level of livestock production to satisfy ever-increasing domestic demand and improve the nutritional status and quality of the food. Bee production is also under the responsibility of LBVD.

The Department of Fisheries (DoF), formerly under MLFRD and now under MoALI, is the lead national agency in policy development for fisheries in Myanmar. The DoF is the sole institution and competent authority responsible for the management and sustainable development of the fisheries subsector. Its main functions are promoting the effective use of fishery resources, support for fish food security, integration of fishery livelihoods for poverty alleviation, implementing research and extension activities, and capacity-building of all stakeholders.

The Department of Rural Development has now also been reorganized as a department under MoALI and mainly focuses on rural infrastructures, such as road, bridges, electricity, etc.

The Ministry of Natural Resources and Environmental Conservation or MNREC (formerly the Ministry of Environmental Conservation and Forestry or MoECAF) is responsible for sustainable management of forest resources, national parks, wildlife and plant conservation. When the National Commission for Environmental Affairs was terminated, the MoECAF took over its responsibilities to oversee and manage all matters related to the environment and climate change. The ministry is also the official Myanmar focal point for the Global Environment Facility.

The Ministry of Cooperatives, now merged with MoALI, was responsible for the development of cooperative societies in Myanmar and regulation of their activities in order to support the improvement in socioeconomic conditions at the grass-roots level. The ministry was responsible for organizing at least one cooperative society in every village of the country. Recently, the Cooperative Department has supported short- and medium-term recovery plans to assist farmer cooperatives in the Dry Zone to recover from the devastating floods in 2015 by providing loans to cooperatives for farming activities and equipment.

The Ministry of Social Welfare, Relief and Resettlement handles affairs related to social services, protection, relief and rehabilitation including support for disadvantaged groups of people, such as the disabled and elderly.

Yezin Agricultural University (YAU) has a main campus and seven branch campuses. The main campus is located in Naypyitaw-Yezin and the branches are located around the country. Two YAU branch campuses are located in the Dry Zone area, in Magway and Lungyaw. Among its programmes, YAU's main campus has been implementing an integrated research programme entitled 'Increasing productivity of legume-based farming systems in the central Dry Zone of Myanmar'. Three major departments of YAU, namely the Department of Soil and Water Science, Department of Agronomy and Department of Plant Pathology are involved in this programme. Branch campuses such as the YAU Magway campus, together with NGOs (e.g. FSWG), facilitate training programmes, use the university's fields as demonstration plots and deliver extension services to the villages. Trainers teach about pest and diseases, water management, conservation agriculture, etc.

Regional government institutions

Regional government institutions are mainly responsible for implementing mandates of their respective ministries. They have well-trained and experienced staff, who are expected to maintain contact with farmers, although they face a number of challenges in this task. Regional government institutions include state- and division-level institutions, district- and township-level institutions, and village-track and village-level institutions.

MoALI operates multiple extension services through the Department of Agriculture (DoA) and a series of specialized units serving the areas of rural development as well as cotton, sugar cane and other cash crops. About 75 per cent of MoALI's extension personnel are focusing primarily on paddy production with DoA (Michigan State University and the Myanmar Development Resource Institute's Center for Economic and Social Development, 2013). DoA's tasks include providing farmers with improved seeds and transferring technologies. In order to provide improved seeds, DoA is establishing local seed banks (for rice, green gram, sunflower, pigeon pea and groundnut) where DoA-collected certified seeds are stored. DoA also has seed multiplication farms where registered seeds are produced and distributed to contact farmers.

DRD has been implementing the development of rural roads, water supply and electricity networks. One of the projects being implemented in the Dry Zone is the 'Green Village Development' (GVD) project, which provides for roads, water and electricity, as well as home gardening and livestock production. At the township level, there is a GVD Working Committee of which the Regional Development Supporting Committee, cooperatives and Department of General Administration are members, with DRD taking a leading role.

International/local NGOs

The Union Government has prioritized community-based farm management in the Dry Zone areas including organic manure production, integrated pest and disease management, support for agricultural mechanization, provision of farm tools and training in repairing farm machinery. I/LNGOs have brought in expertise in these areas, and are well positioned to support and provide guidance, particularly on organic and green manure production, pest control and water management, as well as in capacity development.

Many I/LNGOs are working to increase farmers' knowledge about good farming practices, which can in turn increase agricultural yield and crop quality in the Dry Zone and enable farmers to obtain higher returns on their investment. A number of them also have the required technical and management capacity to help provide the poor with access to credit through small capital contributions and capacity-building support for savings and loan groups and livelihood groups.

The I/LNGOs who are currently or have in the recent past worked in the Dry Zone include Action Aid Myanmar, IDE/Proximity Designs, Cesvi Foundation, Progetto Continenti Myanmar, HelpAge International, Mercy Corps, Groupe de Recherche et d'Echanges Technologiques (GRET), Adventist Development & Relief Agency (ADRA), Danish Church Aid, Solidarites International, TDH, Swanyee Development Foundation, Association of Volunteers in International Service (AVSI) Foundation, World Vision Myanmar, Agape Community Service, Partners Myanmar, Metta Development Foundation, Network Activity Group (NAG), EcoDev and Social Vision Service. This is, however, not an exhaustive list.

Community-based organizations and farmer groups

Small-scale farmers lack power in the marketplace, and are often undermined by other more influential interests. They have limited bargaining strength to negotiate or set prices. Farmers in the Dry Zone are also encountering not only increased competition from imported products, but degradation of soil and water resources resulting from prolonged drought and climate change. In this context, CBOs and farmer groups are key actors in conveying the voice of small-scale farmers to policymakers. Moreover, they provide a platform to share knowledge among peer farmers as well as with other stakeholders, such as international/local development organizations, government extension staff and multi- and bilateral organizations.

Key activities of CBOs and farmer groups in the Dry Zone include: (i) mobilizing farmers for training provided by government extension services, international/local development organizations, and multi- and bilateral organizations; (ii) sharing knowledge and technologies regarding Dry Zone agriculture such as water management, water saving technologies, production of natural and organic fertilizers, composting, handling of microfinance etc.; (iii) strengthening the bargaining power of small-scale farmers in the market through collective selling and buying practices with the help of other development organizations; (iv) organizing and/or initiating conservation of severely damaged and degraded ecosystems (including soil, water and forest resources); (v) reflecting farmers' voice and rights in policy formulation, especially in context of problematic land tenure issues etc.

Some of the CBOs interviewed during the course of research for this case study include the Green Network, Sustainable Action for Rural Advancement (SARA) and Farmer Rights Development Organization (FRDO).

Multilateral organizations

Multilateral organizations which have a role in promoting sustainable agriculture and rural development in the Dry Zone include United Nations agencies, international financial institutions, such as the World Bank and ADB, the European Union, the International Rice Research Institute (IRRI) and WorldFish (WF), among others. They can make an important contribution to technical expertise as well as funding for initiatives to support the development of the agriculture sector and promotion of sustainable practices. They also have a role in strengthening capacities of local stakeholders.

The United Nations entities working in Myanmar include UNDP Myanmar, United Nations Human Settlements Programme (UN Habitat), FAO, WFP, United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and United Nations Office for Project Services (UNOPS-Myanmar). The United Nations country team is coordinated by the United Nations Resident Coordinator in Myanmar. It has three United Nations Thematic Working Groups, of which FAO chairs the Thematic Working Group on Food Security and Agriculture.

ADB's medium-term goal in Myanmar is to assist the government in promoting sustainable and inclusive economic development and job creation in support of poverty reduction. It emphasizes three programme areas, namely building human and institutional capacity, promoting an enabling economic environment, and creating access and connectivity for rural livelihoods and infrastructure development.

The World Bank's activities focus on policy advice and capacity-building, as well as technical assistance and investment to support the development of domestic institutions. Myanmar qualifies for exceptional reengagement allocations from the International Development Association. The World Bank Group has built close relationships with key development partners in Myanmar such as ADB, IMF, LIFT and the Association of Southeast Asian Nations (ASEAN), and bilateral development partners from Australia and the UK.

IRRI has been implementing a LIFT-supported project entitled 'Reducing risks and improving livelihoods in the rice environment of Myanmar through better targeting of management options' in the Dry Zone. The project aims to establish common approaches to support the fast-track delivery of appropriate management options and rice varieties to farming communities.

Bilateral organizations

The bilateral organizations involved in agriculture and rural development programmes in the Dry Zone include USAID, JICA and Korean International Cooperation Agency (KOICA). USAID's agriculture and food security investments aim to reduce poverty and hunger through broad-based agricultural growth. These investments seek to deliver improved and innovative technologies, finance and critical extension services to smallholder farmers. USAID also works to empower smallholder farmers and small and medium enterprises engaged in agriculture value chains by increasing access to markets, inputs and knowledge.

JICA has recently implemented, and is currently implementing, projects in the Dry Zone. These include rural water supply technology in central Dry Zone, development study on sustainable agriculture and rural development for poverty reduction programme in the central Dry Zone, a project for small-scale aquaculture extension for promotion of livelihood of rural communities in central Dry Zone, and the provision of equipment for rural water supply project in the central Dry Zone.

Agriculture and rural development are the main areas of KOICA's work in Myanmar. It recently supported a project for the development of water purifying systems and support for food-processing technology at the Post-harvest Technology Training Centre, in Htone-bo, Mandalay. KOICA has also established similar post-harvest technology centres in Hlegu and Thonekhwa. KOICA is supporting implementation of the 'Saemaul Undong' ('New Village Movement') project for rural development in Myanmar.

Private sector

Private companies' are key stakeholders in the area of sustainable agriculture in Myanmar, particularly from the point of view of commercializing and scaling up products and technologies. However, their investments in the agriculture sector are currently mostly going into agro-chemical businesses, rather than production and food processing. In the Dry Zone, retail shops purchase their agro-chemicals (such as pesticides and fertilizers) from Mandalay or Yangon, and most of these shops allow purchase of products on credit. Sales by some entities are, at times, even illegal and outside any existing system of control. Retail shops create incentives for their customers, such as awards for the farmer who makes the highest purchase. Wholesale shops in Yangon and Mandalay sell mostly on credit, and many wholesalers have extension workers and salesmen in rural areas. However, extension services are typically aimed at penetrating new markets. Wholesalers also create incentives not only for farmers but also for their customer retailers through means such as the bestseller award, occasional recreation events and tours to foreign countries.

Input suppliers such as agro-chemical dealers and seed producer companies, at times, tend to dominate profitable markets given their stronger financial position compared to small-scale farmers, which leaves small-scale farmers to cater to the local market segment for low-quality products. In order for private sector investment into agriculture to benefit small-scale farmers, it is important to integrate these farmers into supply chains. Industry associations such as the Myanmar Rice Federation and the Myanmar Pulses, Bean and Sesame Seed Merchant Association, which are important for trade and marketing of produce, can play an important role in this regard.

3.3 Mapping of field projects per region and subsector

Since this case study aims to assess stakeholder interventions for sustainable and climate-resilient agriculture, stakeholders implementing field projects in the agriculture sector as well as the environment sector (which closely affects the agriculture sector) are identified in this section and mapped according to the region and subsector in which they work. This mapping exercise is intended to enable further identification of gaps in terms of project locations and project types. **As noted earlier, due to limitations in data availability and the time frame of this study, the focus of this section is on field projects of non-government stakeholders in the Dry Zone, particularly INGOs and multi-/bilateral organizations**.

The key source of data for this section is Myanmar Information Management Unit or MIMU (2015c). MIMU's 3W (*Who does What Where*) database is a tool which tracks the implementation of humanitarian and development projects to support coordination, planning and efficient use of resources. The database is compiled by MIMU every six months.

3.3.1 Comparison of stakeholders in all sectors

This section quantifies the number of multilateral organizations (including United Nations agencies), INGOs and LNGOs working on field projects in the agricultural sector in the Dry Zone, and analyses the types of project intervention. The section starts by presenting data for Myanmar as a whole. Subsequently, data and analysis for the agriculture sector and the environment sector is presented.

Table 3.2, shows that a total of 205 organizations have implemented projects in the whole of Myanmar. Among them, 57 organizations have implemented agricultural projects. These agricultural projects cover 4,363 Village Tracks (32 per cent of total Village Tracks) of Myanmar.

Table 3.2 Number and type of organizations implementing projects in Myanmar

Org. Type	INGO	NNGO	United Nations	Red Cross	CBO	Donor	Embassy	BBO	Total
All Sectors	89	60	16	9	2	1	1	27	205
Agriculture	32	18	3	0	1	0	0	3	57

Source: Myanmar Information Management Unit (2015b)

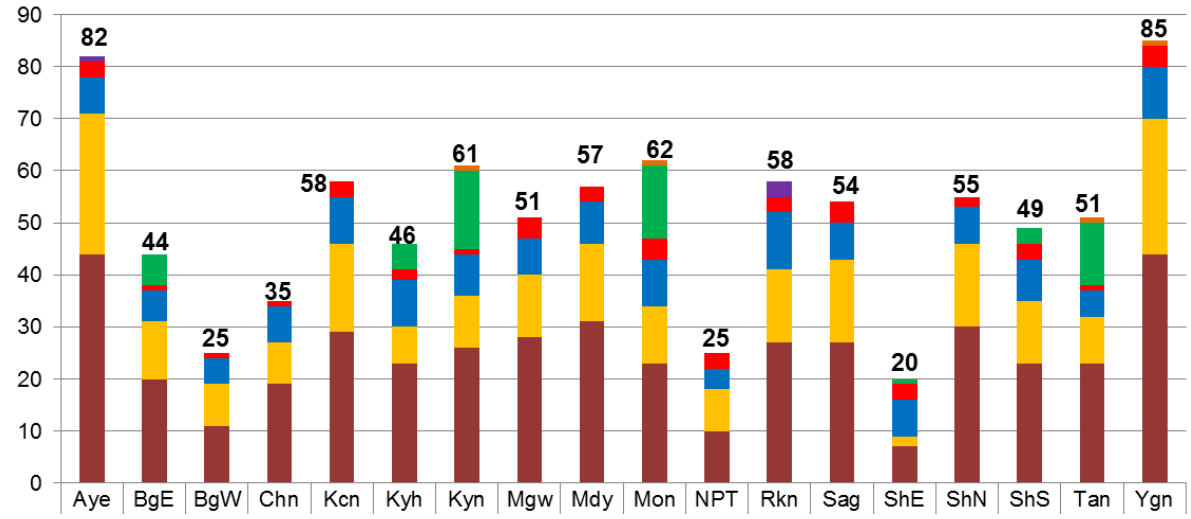
NNGO = National non-government organization

BBO = Border-based organization

CBO = Community-based organization

As is evident from Figure 3.1, Yangon and Ayeyarwady had the largest concentration of organizations. These were followed by Mon, Kayin, Rakhine and Kachin, Mandalay and Shan North states/divisions. The lowest organization presence was observed in Shan East, Bago West and Naypyitaw. The blue colour represents United Nations agencies, whereas brown and yellow represent INGOs and LNGOs, respectively. A total of 51, 57 and 54 organizations have implemented interventions in Magway, Mandalay and Sagaing divisions of the Dry Zone, respectively.

Figure 3.1 Number of organizations contributing to ongoing activities by state/division



Source: Myanmar Information Management Unit (2015b)

The sectors in which those organizations operate in the Dry Zone are shown in Table 3.3. The sector where organizations are the most concentrated is health, followed by protection, education, livelihood and agricultural sectors. In the agriculture sector, a total of 19 organizations (excluding their local partners) are implementing projects (in Table 3.3, this is shown as 28 organizations, but some organizations are replicated in all three divisions). These are Action Aid Myanmar, IDE/Proximity Designs, Cesvi Foundation, Progetto Continenti Myanmar, HelpAge International, Mercy Corps, GRET, ADRA, Danish Church Aid, Solidarites International, TDH, World Vision Myanmar (WV), Agape Community Service (ACS), Partners Myanmar, AVSI Foundation, FAO, WF, Metta Development Foundation, Swanyee Development Foundation. The distribution of the number of organizations implementing agricultural projects is relatively higher in Magway, compared to the other two divisions of the Dry Zone.

Table 3.3 Number of organizations by sector and states in the Dry Zone

State/ Region	Agriculture	CCCM	Coordination	Disaster risk reduction	Education	Environment	Food	Governance	Health	Mini action	Non-agriculture livelihoods/infrastructure	Non-food items	Nutrition	Peacebuilding/ conflict prevention	Private sector development	Protection	Shelter	WASH	S/R Total
Magway	11		1	4	11	2	11	8	26		9	1	4		1	12		8	51
Mandalay	7		2	4	10	4	2	8	29		12		2	3		11		6	57
Sagaing	10		1	3	11	4	2	5	22		11		4		1	9		9	54

Source: Myanmar Information Management Unit (2015d)

3.3.2 Stakeholders implementing field projects in the agriculture sector

Among the 15 subsectors which constitute the agriculture sector, organizations have mainly focused on capacity-building, agricultural development, plant production, agricultural inputs and agricultural extension. On the other hand, according to the MIMU 3W countrywide overview (2015b), in terms of coverage of townships, the agriculture water resources subsector is the most widespread, as shown in Table 3.4. It has been implemented in 165 townships by six organizations in the whole of Myanmar. The agro-industry subsector has received the least attention with only one organization implementing a project in a single township.

Table 3.4 Type of agriculture activities by subsectors in the whole country

No.	Subsector	No. of towns	No. of projects	No. of org.
1	Agriculture water resources	165	6	6
2	Agricultural inputs	92	24	13
3	Agricultural extension	56	18	13
4	Agriculture development	56	25	17
5	Plant production	55	18	16
6	Capacity-building (agricultural livelihood)	52	21	18
7	Forestry	32	12	11
8	Livestock and poultry	31	18	11
9	Fisheries	17	16	9
10	Agricultural alternative	11	9	6
11	Provision of paddy plantation and cultivation	11	7	7
12	Agricultural research	8	4	4
13	Pest / disease control	6	2	2
14	Agricultural assessment	4	3	3
15	Agro-industry	1	1	1

Source: Myanmar Information Management Unit (2015d)

With respect to the **agricultural water resource** subsector, only 5 organizations and 2 implementing partners were observed to be implementing projects in the Dry Zone according to MIMU (2015d). These organizations are Action Aid Myanmar, Cesvi Foundation, IDE/Proximity Designs, Progetto Continenti Myanmar (SARA) and FAO. The organizations and project sites are presented in the Table 3.5a and b. IDE/Proximity Designs has implemented projects in other states and divisions. However, only Dry Zone projects are described here. When comparing project locations, 23, 20 and 22 townships in Magway, Mandalay and Sagaing divisions, respectively, were observed as project areas. Projects are more or less equally distributed in the three Dry Zone divisions.

Table 3.5 (a) Organizations implementing (or who have recently completed) agricultural water resource projects by township in the Dry Zone

Organization	Division/state	Township	Project title/theme	Project status
Action Aid Myanmar	Magway	Myaing	Community Led Development Programme (4)	Under Implementation
		Pakokku	Community Led Development Programme (4)	Planned
IDE/Proximity Design	Magway	Aunglan	Irrigation	Completed
		Chauk	Irrigation	Completed
		Gangaw	Irrigation	Completed
		Kamma	Irrigation	Completed
		Magway	Irrigation	Completed
		Minbu	Irrigation	Completed
		Minhla	Irrigation	Completed
		Myaing	Irrigation	Completed
		Myothit	Irrigation	Completed
		Natmauk	Irrigation	Completed
		Ngape	Irrigation	Completed
		Pakokku	Irrigation	Completed
		Pauk	Irrigation	Completed
		Pointphyu	Irrigation	Completed
		Salin	Irrigation	Completed
		Seikphyu	Irrigation	Completed
		Sidoktaya	Irrigation	Completed
		Sinbaungwe	Irrigation	Completed
		Taungdwingyi	Irrigation	Completed
		Thayet	Irrigation	Completed
		Tilin	Irrigation	Completed
		Yesagyo	Irrigation	Completed
	Mandalay	Amarapura	Irrigation	Completed
		Kyaukpadaung	Irrigation	Completed
		Kyaukse	Irrigation	Completed
		Madaya	Irrigation	Completed
		Mahlaing	Irrigation	Completed
		Meiktila	Irrigation	Completed
		Myingyan	Irrigation	Completed
		Myittha	Irrigation	Completed
		Natogyi	Irrigation	Completed
		Ngazun	Irrigation	Completed
		Nyaung-U	Irrigation	Completed
		Patheingyi	Irrigation	Completed
		Pyawbwe	Irrigation	Completed
		Pyinoolwin	Irrigation	Completed
		Sintgaing	Irrigation	Completed
		Tada-U	Irrigation	Completed
		Taungtha	Irrigation	Completed
		Thazi	Irrigation	Completed
		Wundwin	Irrigation	Completed
		Yamethin	Irrigation	Completed

Source: Myanmar Information Management Unit (2015d)

Table 3.5 (b) Organizations implementing (or who have recently completed) agricultural water resource projects by township in the Dry Zone

Organization	Division/state	Township	Project title/Theme	Project status
IDE/Proximity Design	Sagaing	Ayadaw	Irrigation	Completed
		Budalin	Irrigation	Completed
		Chaung-U	Irrigation	Completed
		Homalin	Irrigation	Completed
		Kalewa	Irrigation	Completed
		Kanbalu	Irrigation	Completed
		Kani	Irrigation	Completed
		Katha	Irrigation	Completed
		Kawlin	Irrigation	Completed
		Khin-U	Irrigation	Completed
		Monywa	Irrigation	Completed
		Myaung	Irrigation	Completed
		Myinmu	Irrigation	Completed
		Pale	Irrigation	Completed
		Sagaing	Irrigation	Completed
		Salingyi	Irrigation	Completed
		Shwebo	Irrigation	Completed
		Tabayin	Irrigation	Completed
		Taze	Irrigation	Completed
		Wetlet	Irrigation	Completed
		Ye-U	Irrigation	Completed
		Yinmabin	Irrigation	Completed
Cesvi foundation	Magway	Magway	Shae Thot	Completed
		Salin	Shae Thot	Planned
		Seikphyu	Shae Thot	Planned
		Yenangyaung	Shae Thot	Planned
	Mandalay	Meiktila	Shae Thot	Planned
	Sagaing	Pale	Shae Thot	Planned
FAO (WRUD)	Mandalay	Meiktila	Support to Special Rice Production	Under Implementation
		Thazi	Support to Special Rice Production	Under Implementation
		Yamethin	Support to Special Rice Production	Under Implementation
Progetto Continenti Myanmar (SARA)	Magway	Taungdwingyi	SESAMUM (Funded by FAI)	Under Implementation

Source: Myanmar Information Management Unit (2015d)
WRUD = Water Resource Utilization Department
SARA = Sustainable Action for Rural Advancement
SESAMUM = Sustainable Economic Set up of Agriculture in Magway in Union of Myanmar
FAI = Foundational Assistance International

Table 3.5a and b shows that IDE/Proximity Designs has recently implemented the largest number of agricultural water resource projects among the five organizations in the Dry Zone area of Magway, Mandalay and Sagaing divisions. Total number of townships where IDE/Proximity Designs has implemented projects is 64.

In the case of the **agricultural inputs** subsector where financial, technical and material support for agriculture are provided, 6 organizations have been conducting 6 projects in 22

townships of Dry Zone areas (Magway, Mandalay and Sagaing divisions). As can be seen in Table 3.6, 8 townships in Magway, 10 in Mandalay and 4 townships in Sagaing division were covered.

Table 3.6 Organizations implementing agricultural inputs subsector projects by township

Organization	Implementing partner	Division/ state	Township	Project title	Project status	Remark
Action Aid Myanmar	Swanyee Development Foundation National Ecumenical Church Fund Myanmar Baptist Convention National Ecumenical Church Fund Myanmar Baptist Convention Ratana Metta Organization Thadar Consortium	Magway	Aunglan Magway Pakokku Sidoktaya	The Civil Society Led Community-Based Livelihood Resources Development in Dry Zone	Under implementation	
FAO	AVSI Foundation	Mandalay	Meiktila Pyawbwe Thazi Yamethin	Support to Special Rice Production	Under implementation	In some villages project is completed
HelpAge International		Mandalay	Patheingyi	Building Community Organization to Reduce Poverty and Vulnerability among Older People their Families in Myanmar	Under implementation	Also implemented in Pyinoo lwin (not in Dry Zone) where project is completed
IDE/Proximity Designs		Magway	Aunglan Magway Minbu Myothit Natmauk Pakokku Yesagyo	Proximity Finances	Under implementation	
		Mandalay	Meiktila Myingyan Myittha Natogyi Pyawbwe Taungtha Thazi (Wundwin)			During site visit, it was found the project has already been shifted from Wundwin
IDE/Proximity Designs		Sagaing	Pale Shwebo Wetlet Yinmabin			
Mercy Corps	Community Development Association	Mandalay	Pyawbwe	Building Community Resilience for Food Security	Completed	

Organization	Implementing partner	Division/ state	Township	Project title	Project status	Remark
Swanyee Development Foundation		Magway	Aunglan	Initiating the track of sustainable development through building up the capacity of CBO based community in improving livelihood and food security	Under implementation	

Source: Myanmar Information Management Unit (2015d)

Seven organizations are implementing projects on **agricultural extension** in Magway, Mandalay and Sagaing divisions of the Dry Zone. Projects areas and titles can be seen in Table 3.7. Although this project type is implemented in 56 townships in the whole country, only 19 of these townships are in the Dry Zone (10 in Magway, 4 in Mandalay and 5 in Sagaing division). The coverage of townships is higher in Magway division. Projects implemented by AVSI in 4 townships (Meiktila, Pyawbwe, Thazi and Yamethin) and by Mercy Corps in Pyawbwe township in Mandalay division have been completed resulting in no projects currently being implemented in Mandalay division, except for the Shae Thot project of Cesvi in Meiktila.

Table 3.7 Organizations implementing agricultural extension projects in the Dry Zone by township

Organization	Implementing partner	Division/ state	Township	Project title	Project status
Action Aid Myanmar	Swanyee Development Foundation National Ecumenical Church Fund Myanmar Baptist Convention National Ecumenical Church Fund Ratana Metta Organization Thadar Consortium	Magway	Aunglan Magway Pakokku Sidoktaya	The Civil Society Led Community-Based Livelihood Resources Development in Dry Zone	Under implementation
AVSI Foundation		Mandalay	Meiktila Pyawbwe Thazi Yamethin	Support to Special Rice Production	Completed
Cesvi Foundation		Magway Mandalay Sagaing	Magway Salin Seikphyu Yenangyaung Meiktila Pale	Shae Thot	Under implementation
Groupe de Recherche et d'Echanges Technologiques		Sagaing	Budalin Monywa Yinmabin	Myanmar Farmers Innovation for Rural Development and Environmental Restoration	Under implementation
Mercy Corps	Community Development Association	Mandalay	Pyawbwe	Building Community Resilience for Food Security	Completed
Metta Development Foundation		Sagaing	Indaw	FFS	Under implementation

Organization	Implementing partner	Division/ state	Township	Project title	Project status
Progetto Continenti Myanmar	DEAR Myanmar	Magway	Magway Minbu Taungdwingyi Thayet	Sesamum	Planned

Source: Myanmar Information Management Unit (2015d)

Agricultural development projects, which mainly focus on the crop value chain, ranging from inputs to marketing, have been implemented by 8 organizations in 13 townships of the Dry Zone region (Table 3.8). This project type has been implemented in 56 townships in the whole country but in the Dry Zone, it can be found in 8, 2 and 3 townships in Magway, Mandalay and Sagaing divisions respectively. The Shae Thot project implemented by the Cesvi Foundation had the same project title as in the agricultural extension subsector, suggesting that one project covered both sub-sectors. Two projects implemented by Mercy Corps and Partners Myanmar had been completed.

Table 3.8 Organizations and their partners implementing projects regarding agricultural development in Dry Zone by township

Organization	Implementing partner	Division/ state	Township	Project title	Project status
Action Aid Myanmar		Mandalay	Meiktila	Community Led Development Programme (2)	Under implementation
ADRA		Magway	Gangaw	Poverty Reduction Initiative through Community Empowerment	Under implementation
Cesvi Foundation		Magway	Magway Salin Seikphyu Yenangyaung Meiktila Pale	Shae Thot	Under implementation
FAO	Department of Agriculture, Department of Forestry	Magway	Seikphyu	Sustainable cropland and forest management in priority agroecosystems of Myanmar	Under implementation
Groupe de Recherche et d'Echanges Technologiques		Sagaing	Budalin Monywa Yinmabin	Myanmar Farmers Innovation for Rural Development and Environmental Restoration Project	Under implementation
Mercy Corps	Community Development Association	Mandalay	Pyawbwe	Building Community Resilience for Food Security	Completed
Partners Myanmar		Magway	Chauk	Enhance education capacity & community livelihood assets to food insecure people through food distribution	Completed
Swanyee Development Foundation		Magway	Aunglan	Initiating the track of sustainable development through building up the capacity of CBO based community in improving livelihood and food security	Under implementation

Source: Myanmar Information Management Unit (2015d)

In the **plant production** subsector, 8 organizations were implementing projects in 23 townships of Dry Zone region as shown in Table 3.9. Three projects implemented by Cesvi in Magway, Danish Church Aid in Myaung and the Mercy Corps in Pyawbwe have recently been completed. When locations of intervention areas are categorized by states, 10 townships in Magway, 6 townships in Mandalay and 7 townships in Sagaing Divisions are covered. Again, the coverage of townships is higher in Magway division.

Table 3.9 Organizations implementing projects on plant production in the Dry Zone by township

Organization	Implementing partner	Division/ state	Township	Project title	Project status
Action Aid Myanmar	National Ecumenical Church Fund	Magway	Aunglan Magway Pakokku Sidoktaya	The Civil Society Led Community-Based Livelihood Resources Development in Dry Zone	Under implementation
Cesvi Foundation		Magway	Magway Salin Seikphyu Yenangyaung	Shae Thot	Completed Under implementation
		Mandalay	Meiktila		
		Sagaing	Pale		
Danish Church Aid	Shwe Nya Myay	Sagaing	Myaung	Dry Zone 5-village Food Security, Livelihood and Women's Empowerment Project	Completed
FAO	Department of Agriculture, Myanmar Fruits Flowers Vegetables Producer and Exporter association	Mandalay	Kyaukse Sintgaing	Production of Certified Fruit and Vegetable for Export from Lao PDR and Myanmar through Integrated Supply Chain Management (MTF/RAS/242/CFC)	Under implementation
		Sagaing	Sagaing		
Groupe de Recherche et d'Echanges Technologiques		Sagaing	Budalin Monywa Yinmabin	Myanmar Farmers Innovation for Rural Development and Environmental Restoration Project	Under implementation
Mercy Corps		Mandalay	Pyawbwe	Building Community Resilience for Food Security	Completed
Solidarites International		Magway Sagaing	Yesagyo Monywa Yinmabin	Integrated assistance to the vulnerable populations in two areas of Myanmar: Dry Zone and Chin State	Under implementation
Terre des Hommes Italia		Magway	Natmauk Yenangyaung	SOW-IT	Under implementation
		Mandalay	Myingyan Taungtha		

Source: Myanmar Information Management Unit (2015d)

Details of other subsectors of agricultural projects can be accessed at: http://themimu.info/3w-maps-and-reports.

3.3.3 Stakeholders implementing agriculture field projects in the Dry Zone categorized by division and by subsector

Organizations implementing agriculture projects were categorized by subsector and are presented in Table 3.10a and b. Magway division was found to have a higher density of interventions than Sagaing and Mandalay divisions. Action Aid Myanmar and Cesvi

implement more projects than the other organizations. Among subsectors, agricultural assessment has not been covered by any organization in any of the three divisions of the Dry Zone (Table 3.10a). Moreover, only HelpAge International (HAI) with NAG, and Progetto Continenti Myanmar are working in the agricultural alternative and agro-industry subsectors, respectively (Table 3.10a).

Table 3.10 (a) Organizations implementing projects by subsectors in Magway, Mandalay and Sagaing divisions

State/ region	State/ region pcode	Agricultural alternative development	Agricultural assessment	Agricultural extension	Agricultural inputs	Agricultural research	Agriculture development	Agriculture water resources	Agro-industry
Magway	MMR009			AAM (ECLOF)	AAM (ECLOF)	AAM (ECLOF)	ADRA	AAM	Progetto Continenti Myanmar
				AAM (MBC)	AAM (MBC)	AAM (MBC)	Cesvi	IDE/ Proximity	
				AAM (RMO)	AAM (RMO)	AAM (RMO)	FAO(DoA, DoForestry)	PCM (SARuAdv)	
				AAM (Swanyee)	AAM (Swanyee)		Swanyee)		
				Cesvi	IDE/ Proximity				
					Swanyee				
Mandalay	MMR010			Cesvi	FAO (AVSI)		AAM	FAO (WRUD)	
					HAI		Cesvi	IDE/ Proximity	
					IDE/ Proximity				
Sagaing	MMR005	HAI (NAG)		Cesvi	IDE/ Proximity		Cesvi	IDE/ Proximity	
				GRET			GRET		
				Metta					

Source: Myanmar Information Management Unit (2015d)

Table 3.10 (b) Organizations implementing projects by subsectors in Magway, Mandalay and Sagaing divisions

State/ Region	Capacity-building (Agricultural livelihood)	Fisheries	Forestry	Livestock and poultry	Pest/disease control	Plant production	Provision of paddy plantation & cultivation
Magway	AAM (ECLOF)	WF (DoFisheries)	AAM (ECLOF)	AAM (ECLOF)	Cesvi	AAM (ECLOF)	
	AAM (MBC)	WF (NAG)	AAM (MBC)	AAM (MBC)		AAM (MBC)	
	AAM (RMO)		AAM (RMO)	AAM RMO)		AAM (RMO)	
	AAM (Swanyee)		FAO (DoA, DoForestry)	AAM (Swanyee)		Cesvi	
	Cesvi			Cesvi		Solidarites	
	Swanyee			Swanyee		TDH Italia	
	WV						

State/ region	Capacity-building (agricultural livelihood)	Fisheries	Forestry	Livestock and poultry	Pest/disease control	Plant production	Provision of paddy plantation & cultivation
Mandalay	Cesvi	WF (DoFisheries)		Cesvi	Cesvi	Cesvi	Mercy Corps
	HAI (YMCA)					FAO (DoA, MFFVPEA)	
						TDH Italia	
Sagaing	ACS	WF (DoFisheries)		Cesvi	Cesvi	Cesvi	Danish Church Aid (Shwe Nya Myay)
	Cesvi	WF (MFiF)		GRET		FAO (DoA, MFFVPEA)	
	GRET					GRET	
	HAI (NAG)					Solidarites	
	ACS						

Source: Myanmar Information Management Unit (2015d)

3.3.4 Stakeholders implementing field projects in the area of environment

Stakeholder data from MIMU (2015d) indicated that there are 5 organizations implementing 15 environmental projects in the central Dry Zone in Magway, Mandalay and Sagaing divisions. These organizations are shown in Table 3.11. There are more organizations in Sagaing and Mandalay divisions than Magway division. Most of the environment projects are in the subsectors of firewood substitution, agroforestry and community forest, which are directly relevant to agriculture and are hence included in this mapping exercise.

Table 3.11 Organizations implementing environmental projects in different townships in the Dry Zone as of 25 March 2015

State/region	State/region place codes in MIMU database	Organization
Magway	MMR009	DCA (Eco Dev)
		IDE/Proximity
Mandalay	MMR010	IDE/Proximity
		MC
		MERN
		WCS
Sagaing	MMR005	DCA (Eco Dev)
		IDE/Proximity
		MERN
		WCS

Source: Myanmar Information Management Unit (2015a)
MERN = Myanmar Environment Rehabilitation-conservation Network
WCS = Wildlife Conservation Society
DCA = Danish Church Aid
MC = Mercy Corps

In Wundwin and Magway where site visits were undertaken, IDE/Proximity Designs and Danish Church Aid have implemented projects as shown in Table 3.12. However, IDE/Proximity Designs had completed its project in Wundwin at the time of the site visit (18 September 2015).

Table 3.12 Projects and implementing organizations in Wundwin and Magway as described in MIMU

Township	Organization	Project title/theme
Wundwin	IDE/Proximity Designs	Energy
Magway	Danish Church Aid	Upbringing resource governance and empowerment for sustainable livelihood (URGEs)

Source: Myanmar Information Management Unit (2015a)

Also, according to key informants interviewed, IDE/Proximity Designs is not implementing project in Magway but in a nearby area (exact location was not known to the key informants). Therefore, although MIMU data are up to date (data referred to was created on 9 April 2015), some differ from the actual situation on the ground. The difference is because MIMU collects information on projects which are planned, under implementation or recently completed at the time of data collection. The 3W data file displays all project data from these three project stages, whereas the 3W maps and table include only projects under implementation. This implies that those who are searching for running projects have to look at 3W maps and tables. Table 3.11 and 3.12 are extracted from the 3W excel data sheet. The 3W map (Figure 3.2) was examined to try to confirm the reason for the difference. Unfortunately, it gave the same information (two organizations in Magway and one in Wundwin for environmental projects) as shown in the Table 3.12. Therefore, it is concluded that the project was still under implementation at the time of MIMU's data collection (25 March 2015) but finished at some time between March and September 2015.

Figure 3.2 MIMU 3W map showing 1 organization in Wundwin and 2 organizations in Magway implementing environmental projects. The data are for 25 March 2015.

Source: Myanmar Information Management Unit (2015d)

This also implies that care must be taken when obtaining information from MIMU because it could have changed during the previous 6 months (i.e. in the duration between successive updates). However, it is usually difficult for those searching for this kind of data to access any data sources more reliable than MIMU. So far, MIMU provides the most reliable and complete data source for development projects in Myanmar among those available. For lack of a better alternative, therefore, the stakeholder field projects mapping exercise was primarily based on information provided by the MIMU as of March 2015.

An analysis of the findings of Section 3.3 (Stakeholder Mapping) is provided in Section 4.2 of this study.

4

Analysis of Stakeholder Interventions

This chapter examines the overall findings from desk research, site visits and stakeholder interactions (including all KIIs and FGDs) conducted for this case study. It undertakes an analysis of the SWOT of the programmes and activities of different stakeholders for sustainable and climate-resilient agriculture in the Dry Zone. The results of the mapping exercise for field projects are similarly analysed. In addition, this section presents a SWOT analysis of the knowledge-sharing efforts of the stakeholders.

4.1 SWOT analysis of stakeholders' activities and outcomes

Section 3.2 highlighted the various stakeholder groups working to promote sustainable and climate-resilient agriculture in the Dry Zone. The interventions of a cross section of these stakeholders, including national government institutions, regional government entities, I/LNGOs, CBOs, farmer groups, multilateral and bilateral organizations, and private sector institutions was assessed, and the perspectives obtained through observations and stakeholder interactions were analysed. Based on the results, some **salient points** are captured below.

(Note: Detailed outcomes from interviews with individual organizations can be made available upon request.)

1. In the context of a controlled economy, **national and regional government institutions** have had a primary role in development of the agricultural sector in Myanmar. The mandates of these institutions clearly support the goals of sustainability and climate resilience in the sector (including for the Dry Zone), and a range of policy and programmatic initiatives have been undertaken. While there are instances of positive outcomes and successful interventions, overall achievement has been quite limited when placed in context of the enormity of the task. Among the constraining factors have been capacity limitations in some specific areas, budget limitations to optimize the use of existing capacities, lack of coordination and a largely top-down approach for planning and execution.

2. **I/LNGOs** are making important programmatic contributions towards sustainable and climate-resilient agriculture in the Dry Zone covering various subsectors. They have brought in significant additional resources and their interventions have addressed some of the critical constraints such as harnessing of water resources, enabling

access to inputs, improved technologies and microfinance and providing training. However, scaling up the positive results, ensuring sustainability and coordinating with other stakeholders have been challenging.

3. **CBOs and farmer groups** in the Dry Zone have provided a key bridge between the rural community and other stakeholders, such as government and I/LNGOs. They suffer from capacity and resource constraints but will be important partners in the process of introducing a more inclusive and bottom-up approach to policy and programme formulation for agricultural development.

4. **Multilateral and bilateral organizations** have mandates well aligned to supporting agricultural and rural development. They have provided a source of financial resources, technical expertise and good practices. However, bottlenecks exist in coordination with government institutions, particularly MoALI.

5. The **private sector** has a vital role in introducing and scaling up sustainable agricultural products and practices in the Dry Zone based on a demand-driven model. Private retailers also frequently serve as the primary source of information for farmers. While products of companies such as Shan Maw Myae have supported sustainable agriculture in the Dry Zone, the priority of the private sector is often perceived as marketing and sales, leading to a trust gap.

6. Some of the **constraints** to sustainable and climate-resilient agriculture in the Dry Zone that were repeatedly highlighted by the stakeholders consulted:
   - Climate change and changing weather patterns impacting the frequency of droughts and floods, and resulting crop failures
   - Inadequate availability of irrigation water, inadequate availability and affordability of inputs, such as good quality seeds and fertilizers, and a lack of improved technologies
   - Lack of a holistic approach that takes into account the entire agricultural value chain as well as local needs
   - Conversion of agricultural land due to urbanization and industrialization
   - Lack of market access and availability of adequate credit on suitable terms
   - Outmigration of labour leading to labour shortages, particularly at harvest time
   - Lack of coordination among stakeholders and inadequate knowledge-sharing.

7. A number of **required changes** were highlighted by stakeholders to promote sustainable and climate-resilient agriculture in the Dry Zone. These include ensuring better management of water and other natural resources, alternative crop management practices and integrated farming, promotion of suitable local crop varieties and traditional farming systems, identification of new markets, ensuring greater availability of meteorological data to farmers and promoting home-based and cottage industries.

8. There were very few cases of the same project types being implemented in the same location in the areas visited. So, judging from this sample, overlaps in interventions are not found to be a serious concern. However, there is strong need for a common

and institutionalized platform for effective **knowledge-sharing** among all stakeholders to tap synergies, ensure better coordination and optimize resource investments.

In addition to the above, analyses of the SWOT for programmes of specific stakeholder groups are presented below.

4.1.1 Government institutions – national level

In this section, an analysis of findings relating to a cross section of four national-level institutions from the Ministry of Agriculture and Irrigation (Department of Agricultural Research (DAR), DoA, Department of Planning (DoP)) and YAU is presented. Findings relating to the Department of Rural Development (DRD), which was until recently under the separate MLFRD, are also presented.

4.1.1.1 DAR, DoA, DoP and YAU

MoALI has a mandate that is strongly supportive of sustainable and climate-resilient agriculture and a large network of offices at the national and regional/township level to enable government policy and programme implementation. However, the main weaknesses of DAR, DoA, DoP and YAU are inadequate coordination with each other, as well as with international organizations. Farms of the Department of Horticulture of DoA in the Dry Zone lack capacity for vegetable production which, if adequately addressed, could be a strategy to promote agricultural sustainability and climate resilience in the Dry Zone. Moreover, MoALI's views of certain aspects of the work of international organizations and NGOs have been a constraint on closer collaboration between them. Therefore, there is a need for greater consultation and mutual understanding, particularly in terms of 'how to do' as well as ways of aligning the work of international organizations with government priorities. A brief SWOT analysis for programmes of national-level government institutions is presented in Table 4.1.

Table 4.1 Strengths, weaknesses, opportunities and threats for programmes of national-level government institutions in the Dry Zone context

Strengths	Weaknesses
■ Mandates of government ministries and departments are strongly supportive of sustainable and climate-resilient agriculture. ■ A large network of government departments and offices exists at the national and regional/township level to enable government policy and programme implementation. ■ Because of the government's nine Districts Green Programme and UNDP's Dry Zone programmes, Kyaukpataung and Poppa region have become green and springs have been replenished. Such initiatives can be replicated more widely. ■ Projects for distribution of fuel-efficient stoves have prevented woodcutting to an extent.	■ Government departments often suffer from limited budgets and need capacity-building in specific areas such as food value chains. ■ The government's policy in favour of promoting specific crops, such as rice, even though they may not be suitable for cultivation in a given area has been an important constraint in the agriculture sector. ■ There is a lack of distribution channels in irrigation systems. ■ Quality of vegetable seeds produced in Myanmar is not of international standard. ■ Farms under Department of Horticulture of DoA do not grow vegetables.

Strengths	Weaknesses
■ There is a wide range of stakeholders including I/LNGOs, CBOs, farmer organizations, multilateral and bilateral organizations and private sector available to complement and support government efforts to promote sustainable and climate-resilient agriculture in the Dry Zone.	■ There is a lack of adequate coordination among government institutions (e.g. DRD and MoAI in the earlier institutional arrangement where DRD was under MLFRD), while YAU has limitations on undertaking projects outside its campuses. ■ Coordination between government institutions, and international organizations as well as NGOs, is weak. Some government institutions perceive lack of alignment between NGO and international organizations' work and government priorities. ■ Inadequate public awareness, local behavioural patterns and limitations on market access make sustainable agriculture a challenging goal. ■ Some areas in the Dry Zone have weak infrastructure which constrains the agricultural sector.
Opportunities	**Threats**
■ Except for scarcity of irrigation water and salinity problems in some places, the Dry Zone has significant potential for modern agriculture (e.g. abundant sunshine, low humidity, which discourages pest infestation and disease, etc.). This can be tapped through appropriate policy and programme interventions. ■ Providing appropriate incentives for crop substitution of annual crops with perennial crops in the Dry Zone will likely be profitable and could help farmers cope with drought situations.	■ In certain areas, increasing crude oil drilling area, urbanization and acquisition of land by government are jeopardizing agricultural land through changes in land use. ■ There are no substitute options widely available for firewood, which makes it difficult to prevent woodcutting for firewood purposes and leads to deforestation.

4.1.1.2 DRD

The major strength of DRD (which has recently been merged with MoALI) is that it has a large number of partner organizations including United Nations agencies, bi/multilateral organizations and INGOs. It received funds from those organizations for numerous projects, as well as from the Union Government for GVD projects. DRD's projects mainly focus on rural infrastructure development and, thus, influence agricultural sustainability only indirectly. The SWOT analysis for DRD programmes is presented in Table 4.2.

Table 4.2 Strengths, weaknesses, opportunities and threats for programmes of DRD in the Dry Zone agriculture context

Strengths	Weaknesses
■ DRD has been receiving a relatively high number of loans and grants for a large number of projects. ■ DRD's systems are perceived by certain other development stakeholders as being more flexible. ■ DRD's approach to the programmes is similar to that of many international organizations, making it easier for them to cooperate. ■ A Rural Development and Poverty Reduction Committee has been formed. It is led by the vice-president with representation from other key ministries. ■ DRD received broad government support for the GVD project, a key initiative of the department. ■ DRD tends to take into account gender empowerment in their projects.	■ DRD targets 3,000 project villages per year. This is a large number of villages for DRD (a relatively new department) to handle. ■ The Rural Development and Poverty Reduction Committee is currently inactive. ■ Although DRD is now under MoALI, previously there was limited coordination between DRD and MoAI, which resulted in DRD encountering difficulties in agricultural projects.
Opportunities	**Threats**
■ A large number of villages in the Dry Zone are close to the national gridline and could easily access an electricity supply, which could facilitate agricultural and rural development. ■ The situation with regard to roads, water availability, and electricity supply in the Dry Zone is better than in many other regions and this could promote other (non-farm) activities for income generation, alleviating some of the pressure on agriculture as a source of rural livelihoods. ■ Solar power is available in many places as a sustainable and climate-friendly energy source; it is being used in some locations for water pumps.	■ Better communication infrastructure (telephone, Internet) is vital for rural development. At the same time, it promotes outmigration by sharing information about job opportunities in neighbouring countries, which in turn leads to labour scarcity. This requires that the root cause of outmigration should be addressed, i.e. lack of alternative livelihood opportunities. ■ Increasing use of farmland for other purposes could affect agricultural production.

4.1.2 Government institutions – regional level

DoA and DRD

This study analysed the work of two government institutions at the regional level, namely DoA and DRD. The key strength of DoA is that it has well-trained extension staff, whereas a major weakness is inefficient use of capacity of the staff, mainly due to lack of budget. The main programmes of DoA do reflect local needs (e.g. distribution of improved seeds, research on drought- and salt-tolerant varieties, etc.), but their efficiency and effectiveness need to be further evaluated. DRD, on its part, has been implementing development of rural roads, water supply and electricity network, which is indirectly helping market development, food safety and alternative income generation. A summary of the results of the SWOT analysis are presented in Table 4.3.

Table 4.3 Strengths, weaknesses, opportunities and threats for DoA and DRD programmes (regional level) in the Dry Zone agriculture context

Strengths	Weaknesses
■ DoA provides improved seeds, agricultural technologies and other services relevant to local needs. ■ DoA is undertaking research on drought- and salt-resistant rice, groundnut, sesame and pulses varieties. ■ DoA has well-developed seed production processes. In principle, seed farms and contact farmers can produce enough seeds. ■ DoA has well-trained staff; most of whom are graduates from YAU or State Agricultural Institutes. They serve as an important source of technical information for farmers. ■ A greater number of irrigation water projects are being implemented.	■ Process of technology transfer is not very effective. ■ Government-provided funds for extension services are inadequate. ■ Marketing strategy for seeds is weak because contact farmers sell seeds as grain in order to get immediate income, even though peer farmers need the seeds. ■ Farmers cannot afford seeds if the seed price is higher than grain price. ■ Farmers are not able to easily adopt technologies provided by DoA due to cost and labour constraints. ■ There is little existing collaboration between DoA and NGOs.
Opportunities	**Threats**
■ DRD is constructing rural roads, water supply and electricity networks, which are important for sustainable and climate-resilient agriculture. ■ An increasing number of development projects are being implemented in the Dry Zone, making more resources available, including for areas addressed by DRD. ■ Some government policies are focusing more strongly on problem solving. For example, key programmes of DoA such as distribution of improved seeds and research on drought- and salt-tolerant varieties address local needs, although their efficiency and effectiveness need to be better evaluated. There is also recognition among staff in some water-scarce areas of the need to replace rice with other upland crops and deliver irrigation water for these crops. ■ In some areas, such as Wundwin/Thazi, alternative livelihoods, such as the textile industry, help to exert a check on outmigration of workers. ■ An alternative perennial crop (*Sterculia* gum) resistant to climate change is available; this could bring many benefits if adopted widely. However, the returns only materialize over the medium to long term.	■ Farmers in some areas are changing their profession due to occurrence of drought, posing a potential threat to agricultural production. ■ Industrial waste enters irrigation channels threatening agricultural sustainability. ■ Law enforcement for environmental conservation is weak.

4.1.3 I/LNGOs, CBOs and farmer groups

As noted previously, major weaknesses in Dry Zone agriculture include lack of good quality seeds, lack of irrigation water, availability and affordability of inputs, and provision of capital/credit. I/LNGOs have been implementing interventions addressing these critical issues in the Dry Zone. However, the sustainability of the interventions after funding ends is

challenging to achieve. On their part, CBOs and farmer groups are acting as local implementing partners of I/LNGOs, as well as providing links to other stakeholders. Table 4.4 provides a SWOT analysis based on the activities of a cross section of I/LNGOs, CBOs and farmer groups, which include Progetto Continenti Myanmar/Dear Myanmar, Terre des Hommes Italia (TDH), Danish Church Aid/Eco. Dev., the Food Security Working Group Resource Centre, NAG, Social Vision Service and two farmer groups in the Dry Zone.

Table 4.4 Strengths, weaknesses, opportunities and threats for programmes and activities of I/LNGOs, CBOs and farmer groups in context of Dry Zone agriculture

Strengths	Weaknesses
■ Women's participation in recent or current interventions is relatively high. ■ Overlap of project types is not observed (except in the case of microfinance projects) although cases of two or more projects (of different types) in the same location are observed. ■ Support for providing loans is high among various interventions being implemented in the Dry Zone. Provision of loans is a vital input, which favourably influences success of other I/LNGO and CBO interventions including those relating to agriculture. ■ Farmers are generally aware of advantages and disadvantages of using chemical inputs.	■ Peoples' perception of development projects has been negatively impacted by interventions that focus on achievement of narrow project or programme goals rather than on local needs. ■ Sustainability of interventions after funding ends is challenging to achieve. ■ There are insufficient environmental conservation projects that concurrently support sustainable agriculture (e.g. reforestation). ■ There is insufficient support for applying technologies to overcome climate change. It is frequently difficult for farmers to consult experts on technical problems leading to dependence on retailers/dealers for advice.
Opportunities	**Threats**
■ Some of farmers' traditional cultural practices are already climate resilient and environment friendly, which can facilitate I/LNGO and CBO efforts to promote sustainable agriculture. ■ River-water pumping systems have already been set up in the Dry Zone and electricity is also available in remote areas to run the systems. This has the potential to support interventions for sustainable and climate-resilient agriculture (although related technical and management issues particularly on user and water allocation need to be resolved). ■ There is increasing awareness of the importance of off-farm income, which is the focus of many I/LNGO and CBO interventions. Businesses, such as textiles, also provide an alternative source of livelihoods in areas like Wundwin.	■ Agriculture in the Dry Zone depends mostly on rain; irrigation facilities are not adequate. Dependence on rain continues to be a key threat for I/LNGO and CBO efforts to promote sustainable and climate-resilient agriculture. ■ Crop yields are low and prices are often unstable. ■ Outmigration of farm labour is continuing, as labourers search for alternative job opportunities. ■ The Seed Law can potentially put local crop varieties at risk. The Land Law may also, in some cases, favour certain stakeholders (e.g. companies) as opposed to farmers and farmer groups. ■ Government policy for agricultural loans favours wetland farmers, thus putting those in other areas at a disadvantage.

4.1.4 Multilateral and bilateral organizations

This study examined the work of various multilateral and bilateral organizations working to promote climate-resilient and sustainable agriculture in the Dry Zone. The interventions of two organizations, namely IRRI and FAO, were examined in particular detail.

IRRI has improved agricultural technologies that support not only the work of government institutions but also NGOs. However, IRRI's main focus is rice, which is not suitable for growing in many parts of the Dry Zone. FAO and its partner AVSI are training farmers in growing rice and sunflowers from sowing to harvesting and storage. A summary of the SWOT analysis of their interventions is presented in Table 4.5.

Table 4.5 Strengths, weaknesses, opportunities and threats for programmes of multi/bilateral organizations in the Dry Zone agriculture context

Strengths	Weaknesses
■ Organizations such as IRRI provide knowledge and skills for both government and NGO staff. ■ IRRI's research is largely in line with rice farmers' needs. ■ Information developed by IRRI (e.g. agriculture maps, GIS data, soil and water data) can also be used for developing other agriculture projects. ■ Programmes such as the FAO and AVSI programme are encouraging women's participation. ■ Nutrition classes for women, which are part of the FAO and AVSI programme, contribute to overall family health.	■ A holistic approach with support from all stakeholders is necessary but currently largely lacking. For instance, technologies supported by IRRI require funding support from other stakeholders to address the high reliance of farmers on subsidies. ■ In accordance with its mandate, IRRI's main focus is rice. However, similar R&D support to develop new varieties is lacking in case of many other crops important for the Dry Zone. ■ Information provided by IRRI, such as training on Geographical Information System (GIS) and Global Positioning System (GPS), are at times difficult for the farmers to utilize.
Opportunities	**Threats**
■ There are examples of close coordination among bilateral organizations, government institutions and I/LNOGOs. These can be further replicated (e.g. IRRI, Mercy Corps and DAR; FAO, AVSI and DoA). ■ FAO's programmes particularly focus on rice and sunflower, which are not cash crops in the Dry Zone. Greater support for the main cash crops holds significant potential benefit for farmers.	■ At times there is a gap between perspectives of government institutions (esp. departments of MoALI) and those of international organizations; this needs to be addressed. ■ Some of IRRI's rice varieties are imported varieties, which can inadvertently introduce new pests and diseases, since Myanmar's quarantine system is weak. In addition, introduction of new varieties could pose a potential threat to local varieties and biodiversity.

4.1.5 Private sector

Apart from other sources of research, the interventions of a cross section of private entities were examined during this study, including Shan Maw Myay Company Limited (SMM), East West Seed Company (EWS), Armoe and Myanma Awba.

The effect of organic fertilizers and/or pesticides are not as immediate as those of the chemical fertilizers and pesticides that are more commonly marketed by the private sector. This reduces the attractiveness of organic products to farmers. However, SMM's organic products were reported to be showing good results in terms of improvement of soil and pest control. Seeds produced by EWS are very attractive for Dry Zone farming, but they are not currently produced for the main crops grown in the Dry Zone, such as groundnut and sesame. Some of the agro-chemical companies, such as Armoe and Myanma Awba have collaborated with farmers to support collective buying of fertilizers. Farmers Development

Committees (village level) and Farmers Development Associations (township level) coordinate the demand for fertilizers and buy products from these companies on 6-monthly instalments, resulting in reduced transportation charges and interest on loans.

However, there is a trust gap between agro-chemical companies and farmer groups, CBOs and LNGOs, who perceive that the agro-chemical companies facilitate workshops only to launch and promote their new products rather than to transfer technologies or share knowledge. Moreover, it is perceived that the quality of the products sold are often low or uncertain, potentially resulting in higher costs but lower benefits for crop production. There is also a view that sales promoters of the companies have little or no knowledge of Dry Zone agriculture, and that their selling techniques (for instance, selling a series of pesticide, tonic/hormone, and then fungicide), can also harm farming systems. Some farmer groups stated that dealers are, at times, not able to provide correct guidelines for control measures for pests and diseases.

A brief analysis of SWOT is presented in Table 4.6.

Table 4.6 Strengths, weaknesses, opportunities and threats regarding role of the private sector in the Dry Zone agriculture context

Strengths	Weaknesses
■ Sustainable and climate-resilient agriculture is among the areas of focus for the private sector. ■ Company products and technologies can make tangible contributions towards sustainable agriculture. For example, products of Shan Maw Myay Co. Ltd. (SMM) were reported to reduce environmental pollution while those of East West Seed (EWS) focus on climate resilience. Technologies transferred by EWS were reported to be locally adaptable and affordable for farmers. ■ Some companies have made farmers aware of the advantages of using organic products and improved seeds. ■ The private sector can help fill human resource gaps by supporting extension services. Both SMM and EWS have their own farmer extension service teams. ■ A well-functioning business model requires due attention to quality which serves to promote customer interests. For instance, EWS has obtained ESPA certification and ISO standard, which is helpful for quality assurance. Companies such as EWS already have experience of collaborating with NGOs.	■ From a technological perspective, organic agriculture can be a complex approach. ■ Impact of the use of organic products can only be observed after a lag, which makes it harder to demonstrate its benefits. ■ Companies such as EWS do not produce improved seeds for field crops and it takes at least 3 to 5 years to produce a new variety of seed. ■ While seed companies can promote growing vegetables that are important for nutritional security and farmers' economic benefit, growing vegetable crops requires irrigation water, which is scarce in the Dry Zone. ■ There is a shortage of good quality seeds in the Dry Zone, and the private sector faces difficulty in addressing this shortage. For instance, EWS does not buy seeds from other sources and thus, they cannot act as a third party to buy seeds and distribute them in the next season. ■ The level of trust between dealers and local communities is low.

Opportunities	Threats
■ The private sector can support bringing in new services and innovation. For instance, it was reported that Swiss Re, an insurance company, is in discussions with local banks and government to start a crop insurance system in Myanmar (*Myanmar Business Today*, 11 August 2015). ■ Greater ASEAN free trade could result in an increase in foreign investment in agriculture in Myanmar.	■ Some agricultural products enter into Myanmar from neighbouring countries (e.g. rice and fruits may be reaching border areas from Thailand through unofficial channels). However, the trade competitiveness of the Myanmar agriculture sector is still weak among ASEAN countries. ■ Both government and farmers were reported to be lending their lands to foreign companies (e.g. from China), who bring their own workers to Myanmar, thus resulting in loss of potential job opportunities for local workers.

4.2 SWOT analysis of field projects

In Sections 3.2 and 3.3, stakeholders involved in agricultural and relevant environmental projects were identified and their field projects mapped based on the region and subsector of implementation. We focused on field projects of non-government stakeholders in the Dry Zone, particularly I/LNGOs and multilateral/bilateral organizations. An analysis of the findings is presented below.

1. In the Dry Zone, a total of 19 organizations are working in the agricultural sector with more in Magway division than Mandalay and Sagaing divisions. Only five organizations are working in the environment sector in the Dry Zone, mostly in the subsectors of firewood substitution, agroforestry and community forest, with relatively more organizations in Sagaing and Mandalay divisions than in Magway division.
2. When agriculture sector projects are categorized by subsector, Magway division is the densest intervention area in terms of the number of organizations and the types of interventions, compared to Sagaing and Mandalay divisions in the Dry Zone.
3. Among subsectors, when we consider the number of lead organizations, implementing partners and divisions of implementation, it emerges that there are many projects being implemented in the agricultural water resource subsector. On the other hand, the coverage is very limited or non-existent for the agricultural alternative development, agro-industry and agricultural assessment subsectors.
4. In case of the agricultural inputs subsector, there are fewer project interventions in Sagaing division. In the case of agricultural development projects, very few are observed in Mandalay and Sagaing divisions. Moreover, there are currently no projects on agricultural extension in Mandalay division.

The above points are elaborated on in the form of a SWOT table (Table 4.7), which analyses the strengths, weaknesses, opportunities and threats regarding the location and types of interventions in the Dry Zone.

Table 4.7 Strengths, weaknesses, opportunities and threats of location and type of interventions

Strengths	Weaknesses
■ The Dry Zone has attracted resources for agricultural development projects, with 19 organizations working in the agricultural sector. ■ Most projects are on the agricultural water resources subsector, which is a priority in the Dry Zone.	■ Even though environmental projects are important for addressing climate change and thus for sustainable agriculture, only five organizations are working on such projects in the Dry Zone. ■ In the agricultural sector, interventions of the analysed subsectors are densest in Magway division compared to Mandalay and Sagaing divisions, indicating a potential need for better distribution of resources. ■ Coverage of projects is limited in the agricultural alternative development and agro-industry subsectors, with no project being implemented in the agricultural assessment subsector, thus indicating existing gaps.
Opportunities	**Threats**
■ LIFT has allocated USD 52 million for Dry Zone development in 2015, representing a substantial investment of development funding.	■ There is lack of skilled labour in the agro-industry subsector which could pose a challenge to future investments in this subsector.

4.3 SWOT analysis of knowledge-sharing efforts

Although information exchange is cited as an essential component in many development interventions, a better understanding of the opportunities and constraints is needed to ensure that stakeholders obtain the information that they need and that they make available their own information and knowledge for the benefit of others. Knowledge-sharing is increasingly important to ensure that practice and policy are based on sound evidence and that gaps among research, practice and policy are effectively bridged. Knowledge-sharing is thus a tool that can be used to promote evidence-based practice and decision-making, and also to promote exchange and dialogue among stakeholders.

Knowledge-sharing efforts undertaken by a cross section of stakeholders, including government institutions (DoA, Yezin Agricultural University, DRD), I/LNGOs (FSWG, Progetto Continenti Myanmar, TDH, NAG, Social Vision Service), CBOs (Green Network and SARA), farmer groups (one each in Magway and Wundwin) and private sector (Shan Maw Myay Co. Ltd. and EWS Company) were examined to assess the extent of knowledge-sharing taking place and information resources that are available. Some of the **salient findings** are presented below.

1. Tracking existing flows of information and knowledge highlights many gaps and barriers, both in dissemination and in accessibility of knowledge and information for promoting sustainable and climate-resilient agriculture in Myanmar's Dry Zone.
2. Sharing of knowledge is very limited, not only among different types of stakeholders but even within organizations in the same stakeholder group. A significant proportion of knowledge-sharing happens through informal channels.
3. FSWG Resource Centre and Myanmar Agriculture Network (a part of Grow Asia) are two of the existing platforms for organizing knowledge-sharing activities. MIMU is an

important web-based source of information, providing a record of which organizations (United Nations agencies, INGOs, LNGOs, CBOs) are doing what and where, although detailed activities of the interventions cannot be accessed here.

4. There is no common, institutionalized knowledge-sharing platform where all the stakeholders can access necessary information easily. This is a critical gap in promoting and synergizing efforts of diverse stakeholders to develop sustainable and climate-resilient agriculture. This gap has also led to increased use of social media tools, such as Facebook and Viber, as knowledge- and information-sharing platforms.

Further analysis is presented in the form of a SWOT table (Table 4.8), which presents the strengths, weaknesses, opportunities and threats for knowledge-sharing efforts for sustainable and climate-resilient agriculture in the Dry Zone.

Table 4.8 Strengths, weaknesses, opportunities and threats in knowledge-sharing efforts

Strengths	Weaknesses
■ Farmers can access information on agricultural technologies at training sessions provided through a variety of sources, e.g. DoA, CBOs and NGOs. ■ Meteorological information can be received from the TV and radio. ■ There are some forums available for local knowledge-sharing. For instance, many stakeholders in Magway share knowledge and information at FSWG's coordination meetings. ■ MIMU provides a valuable source of information, particularly regarding NGOs' activities.	■ There is no hotline offered by DoA for technical assistance and advice to farmers. ■ Due to budget limitations, DoA staff are unable to undertake regular field trips to address farmers' needs over a wide area. ■ Farmers frequently consult on pest and disease problems with pesticide dealers who are not well trained for providing this information. ■ Many pesticide dealers mainly focus on selling their products instead of sharing knowledge. ■ There is no regular mechanism for government institutions and NGOs to share knowledge and information with each other. ■ CBOs, DoA regional staff and farmers are mostly not familiar with information technology tools.
Opportunities	**Threats**
■ Social media tools, such as Facebook and Viber, have become popular among the public and thus can be used as important information channels. ■ Telecommunication services and an Internet network are being developed across the whole country and will also benefit the Dry Zone. ■ There is interest among newspapers in publishing information on the developmental activities of NGOs.	■ As knowledge of information technology varies among different types of stakeholders, this makes it difficult to establish a common knowledge-sharing platform. ■ The number of unknown and unreliable information sources on social media is increasing. Validity of information on social media is often difficult to ascertain. ■ Governmental information sources (TV, radio and newspapers) may at times reflect their own policies rather than the relevant technologies.

The next chapter builds further on the above analyses to identify lessons and recommendations for the way forward.

5

Recommendations and Implications for Future Programmes

A number of lessons can be learned and recommendations made based on the findings and analyses in this study. These address the areas of technology, capacity-building, coordination and knowledge-sharing, and policy and programme formulation. Most of the recommendations require action from not just a single stakeholder but different types of stakeholders working together in a synergistic way. This chapter presents these lessons and recommendations, and outlines implications for future programmes, suggesting specific actions for the way forward.

5.1 Lessons learned and recommendations

5.1.1 Technological issues

1. Enhance farmers' access to improved seeds of suitable varieties for coping with climate change.

Farmers are not able to produce seeds by themselves, whereas seeds from either government seed farms or their contact farmers (the latter tend to sell their seeds as grain as soon as they are harvested) are not easily accessible at sowing time. Moreover, farmers' impressions of the quality of those seeds is, at times, not positive. In addition, some existing varieties of crops that are usually grown in the Dry Zone (e.g. sesame, groundnut) are not tolerant to climate change. These varieties need to be developed to adapt to changing conditions in the region, including the occurrence of droughts and floods. Crops should be climate resistant and have short life spans.

2. Provide farmers with better agricultural techniques and extend support for improving the application of farmers' traditional good farming practices.

The uncertainty engendered by persistent drought conditions makes farmers hesitate in undertaking farming operations. Some farmers use techniques that they feel can help overcome drought, such as adding silt loam and/or farmyard manure (FYM) to sandy soil while ploughing and harrowing soil during drought to conserve water. Farmers may also construct contour bends to conserve rainwater and change cropping patterns in response to climate change, particularly the more frequent occurrence and intensity of droughts. However, these techniques cannot be applied widely due to cost and labour problems. Farmers need to be made aware of new and improved techniques and should also be provided with support for more effective application of traditional farming practices.

3. Promote integrated farming systems covering both agriculture and livestock that can serve as a profitable option for farmers.

Due to scarce, uneven and limited rainfall and lack of irrigation water, the crops most suited to the Dry Zone include cereals such as sorghum, millet, oat and rye. These cereals are resistant to stress and can be easily grown in Dry Zone conditions. On the other hand, there is always shortage of animal feed, especially in summer. Therefore, growing these cereals for human consumption and utilizing the crop residues for animal feed will result in a secure food supply and cheaper inputs, and thus higher profit from livestock production. Waste (FYM) from the animals can also be used as soil organic matter. The process chain will be: cereals → humans/animals → FYM → soil → cereals. Thus, development of integrated farming systems needs to be encouraged.

4. Enable provision of expert advice to farmers to solve the problems encountered during the growing season.

While government staff from DoA have budget limitations for visiting the field, there are also no access points for farmers to enquire about or discuss the technical problems they are encountering during the growing season. Therefore, most farmers go to input suppliers (pesticide/fertilizer dealers) and ask for help. However, the dealers are often not able to give accurate guidelines to solve the problems. Sometimes, companies may sell three or four pesticides to control existing pests and diseases, since the focus for many companies is on product sales rather than technology transfer. Objective expert advice needs to be made available, through easily accessible channels, to farmers in rural areas such as via telephone.

5.1.2 Capacity-building

5. Enable good management of DoA-produced seeds to fill the gaps in seed sector.

Seeds produced by DoA farms and its contact farmers are at times sold as grain due to lack of buyers at harvest time because farmers tend to buy seeds at sowing time (when conversely there are no seeds available to buy). Thus, there is a gap in seed demand between harvest and sowing time. Recently established seed banks are actually grain banks where grains paid back for DoA-provided seeds are stored. If DoA and local traders are not able to adequately fill the gap, it would be worthwhile to leverage NGOs to do so. By providing management and other relevant skills to NGOs and strengthening their capacities, this problem can be better addressed.

6. Promote changes in both technology and management practices to reduce farmers' risk of crop failure.

Risk of crop failure for farmers is present even when using improved crop varieties. Building their cumulative capacities to adopt alternative practices, such as growing new crops, and implementing new technologies, cropping systems and cultural practices can help reduce farmers' risk of crop failure. Another measure to reduce the risk of crop failure could be to provide crop insurance, which, in turn, requires awareness-raising among farmers about the benefits of such services and scaling up of pilot demonstrations of crop insurance.

7. International organizations to provide technical and financial support for capacity-building of government staff, particularly for vegetable production.

Since changes in soil, water and climate conditions of the Dry Zone may necessitate changes in cropping systems, vegetable cultivation becomes an important option for Dry Zone farmers in attaining economic and nutritional benefits and moving further towards agricultural sustainability. Vegetables also have higher potential for export. However, the capacities of MoALI staff in respect of food value chains, vegetable seed production and value-adding processes is in need of strengthening. International organizations can provide support in building capacity, which will be helpful in promoting vegetable cultivation in the Dry Zone.

8. Relax restrictive processes for small CBOs to apply for funding opportunities and support their capacity-building for preparation of funding applications.

Many CBOs are reliant on INGOs/LNGOs to get necessary funds for their activities. In such cases, CBOs need to abide by the mandates and processes of their partners who are usually acting in accordance with their own priorities. This results in weak advocacy of some sensitive needs or areas that the CBOs may be aware of. CBOs, such as Green Network and FRDO, who are working in sensitive areas need their own funds so that they can work in accordance with their own mandates and better address local requirements. However, they are often not able to apply for funds by themselves due to both technical and language barriers. They need capacity-building and relaxation of restrictive requirements or processes for applying for funding.

5.1.3 Improved coordination and knowledge-sharing

9. Promote greater coordination among YAU, DAR, DoA and international organizations, including United Nations agencies, to strengthen technical and financial resources to combat climate change.

YAU, DAR and multilateral/bilateral organizations, such as IRRI and JICA, have both expertise and research facilities, whereas DoA farms are not well equipped for research (although DoA does have farms in the Dry Zone). If international organizations and government institutions coordinate and share resources and farm facilities, synergies can be tapped to support measures to combat climate change in agriculture.

10. Undertake trust building between government institutions (esp. DoP, MoALI) and international organizations, including United Nations agencies, which can benefit both sides in terms of establishing an effective coordination mechanism.

Due to MoALI's negative view of certain aspects of the work of international organizations and United Nations agencies, there are challenges to establishing an effective coordination mechanism between these stakeholders. However, these challenges can be overcome through closer consultation and enhanced mutual understanding.

11. Enable adequate coordination between relevant departments of MoALI to promote implementation of rural development programmes.

While MLFRD has now been merged with MoALI, it was observed that in the earlier institutional arrangement, there was insufficient coordination between MoAI (DoA) and MLFRD (DRD). As a result, DRD encountered problems when assessing agricultural

development projects because of a lack of agricultural expertise. Following the merger of MLFRD with MoAI, adequate coordination between DoA and DRD should be encouraged to enable sharing of information and expertise.

12. Ensure greater coordination with private sector companies to bring benefits to Dry Zone farmers.

The private sector can provide a source of capital, products, experience and technologies that farmers often cannot access. Such resources are especially needed in the Dry Zone, where options for technical consultations and seeking initial capital are scarce. For instance, since some companies, such as EWS, have plans to promote vegetable cultivation in the Dry Zone, there will be opportunities to coordinate partnerships with them that can support implementation of home gardening for alternative income or change of cropping systems/crops.

13. Create a common knowledge-sharing platform where the concerned stakeholders can access necessary information easily.

Although the MIMU website provides information on interventions/projects of many of the stakeholders in the area of sustainable and climate-resilient agriculture in the Dry Zone (although not for government institutions), some stakeholders, such as farmers and CBOs, are not able to access this information due to technology limitations. Moreover, MIMU does not provide details of the activities of the interventions. In addition, regional coordination meetings are not held, other than those at the FSWG Resource Centre, and government institutions do not usually participate in NGOs' coordination meetings. Therefore, establishment of a common knowledge-sharing platform is essential for stakeholders to access information easily (see specific actions recommended in next section).

5.1.4 Programme and policy formulation and execution

14. Ensure that interventions provide holistic support ('soft' and 'hard') for sustainable development.

Sometimes NGOs implementing interventions may focus only on achieving pre-determined targets (e.g. number of villages covered; number of beneficiaries reached, etc.). This can lead to a lack of lasting improvements in the target area after termination of the interventions. For instance, even after implementation of a microfinance project focused on farmers in the Dry Zone, farmers might still not be able to afford the necessary capital for growing crops, thus undermining the effectiveness of the project. This should not be taken to imply that such projects should be terminated; loans are something that farmers critically need. However, the strategy employed by the projects should be reviewed. In other words, interventions should adopt a holistic, flexible and balanced approach (addressing both 'soft' needs, such as skills and capacity, as well as 'hard' needs, such as infrastructure) to addressing the needs of the targeted beneficiaries. A parallel of such an approach can be observed in the successful 'Saemaul Undong' movement in the Republic of Korea, where the government developed improved crop varieties and provided advanced agricultural technologies to farmers, while constructing necessary infrastructure, such as roads and irrigation facilities and promoting banking services.

15. Take measures to enhance availability of irrigation water in the Dry Zone, as this is essential for agricultural sustainability and climate resilience.

To enable sustainable agriculture in the Dry Zone, facilities and supporting infrastructure for irrigation water should be expanded so that farmers do not depend entirely on rains, which often come late. Both water management and water harvesting should be promoted. To support better utilization of dams, laterals and channels, projects to develop distributary channels should be adopted.

16. Amend policy for distribution of irrigation water only to paddy fields to provide enough irrigation for dry-land crops.

The government policy of promoting rice in agriculture adversely affects famers in times of persistent drought. Water delivered from river-water pumping projects is distributed to paddy fields, even if there are only very few paddy farmers in the area. Dry-land farms, which irrigation channels cross, are not able to access the water. This indicates suboptimal use of precious water resources, as well as budgetary resources allocated to the projects based on prior projections of paddy area.

17. Promote reforestation as a critical measure for implementing sustainable and climate-resilient agriculture.

Because of the high incidence of logging, deforestation is a very serious problem, not only in the Dry Zone, but across the whole of Myanmar. Shifting cultivation and cutting wood to use for firewood are among the main causes of deforestation, which has contributed to Myanmar being one of the countries most vulnerable to climate change. This also makes it difficult for agriculture to achieve sustainability. It is thus essential to address deforestation in the Dry Zone as part of a holistic strategy both at the programme and policy levels to cope with climate change.

18. Amend policies of the MADB to make sufficient loans available to farmers at sowing time.

In the Dry Zone, where conditions for growing paddy are generally unfavourable, most of the farmers grow dry-land crops (*Yar*). However, government policy of giving priority to paddy in this region hinders farmers' access to loans from the government agricultural bank. Even if they can access loans, the amount of loan given for *Yar* (20,000 Kyats/acre) is not enough for farmers to buy necessary inputs and cultivate their preferred crops.

19. Implement more alternative livelihood projects to expand job opportunities, including during unfavourable or off-farm seasons.

During the off-farm season both farmers and landless workers are without employment because of limited job opportunities in the Dry Zone. Lessons can be taken from the Wundwin case, where the textile industry provides jobs to the farmers during prolonged drought and the outmigration of farm labour is thus checked. Therefore, development of alternative livelihoods effectively maintains farm labour sources that, in turn, help agricultural sustainability and should be promoted. Alternative income sources, such as cottage industries, home businesses and livestock production should be incorporated into project activities of all stakeholders in order to deal with crop failures caused by climate change.

20. Promote development of agro-industry for generating alternative job opportunities and higher income, stabilizing markets, controlling migration and building resilience to climate change impacts.

Establishment of agro-industry can create job opportunities both for farmers and landless workers, which can control outmigration. Moreover, having alternative income sources can reduce the adverse impact of crop failure caused by climate change on livelihoods. Since agro-industry is actually underdeveloped in the whole of Myanmar, the country can only sell fresh agriculture products, which obtain low prices. Developing this sector will create value-added products that can be sold at higher prices, resulting not only in higher income, but also a more stable crop market, which is key for the development of the agricultural sector.

21. Establish linkages with new international markets to promote price stability at both sowing and harvest times.

The foreign market for the Dry Zone's main agricultural products (sesame, groundnut, pulses, etc.) is dominated by one or two countries, and thus is not stable. Prices usually decrease at harvest when farmers have to sell their crops and increase when there are no crops left for farmers to sell. Collective selling systems of farmers alone cannot bring about this change, and it is important to tap new international markets. However, export of food products to profitable markets such as EU countries, Japan and the Republic of Korea requires compliance with stringent safety and quality standards for which certification, such as International Organization for Standardization (ISO) or Good Agricultural Practices, are needed at the farming level. In addition, certification, such as Hazard Analysis for Critical Control Point, is needed at the post-harvest handling level. To enable farmers (particularly smallholders) to overcome technical, capacity and financial constraints to accessing such certification, appropriate policy and programme interventions should be undertaken.

22. Address weak law enforcement on industrial waste management, which is threatening agricultural sustainability through environmental pollution.

Wastewater delivered into irrigation channels can pollute soil and water and cause damage to crops, threatening the whole downstream region. Agriculture cannot be sustainable in a polluted environment and, thus, the enforcement of relevant existing laws on industrial waste management needs to be prioritized by the government with the support of other stakeholders.

23. Revise Land Law in order to check conversion of agricultural farms to other uses.

In certain cases, government institutions as well as private sector players have converted virgin/fallow lands to other uses, such as establishing businesses, gas stations and military campuses. There is a perception that the Land Law often favours private sector players in applying for more land. For instance, the Law allows a private company to apply for up to 50,000 acres in each application, if the company's objectives fulfil government's policy of growing industrial crops. On the other hand, farmers are only able to apply for 10 to 50 acres at a time. Conversion of arable lands to other uses on a significant scale can negatively affect agricultural sustainability.

24. Formulate agricultural policies based on an inclusive and problem-solving approach involving participation of farmers.

Agricultural policies developed without adequate participation of farmers in the formulation process are unlikely to accurately reflect their needs and, thus, may be of limited relevance and benefit for solving their problems. Agricultural policies should focus on safeguarding the interests of marginal and resource-poor farmers. To achieve this, policymakers should obtain farmers' feedback, evaluate it and formulate policies accordingly. Farmer groups and CBOs can help serve as a bridge for obtaining farmers' feedback.

25. Build trust between agro-chemical dealers and local communities.

The trust deficit between local farming communities and agro-chemical dealers that has arisen due to the profit-oriented approach of dealers, high product prices and unreliable quality, and limited agricultural knowledge of salesmen, should be overcome. Models where companies focus on providing high quality products and transferring appropriate technologies and knowledge to farmers, and use this pathway to achieve greater profit in the medium to long run, should be promoted. Measures to strengthen capacities of sales staff to enable them to provide accurate information and advice to farmers should also be encouraged.

5.2 Implications of the findings for future programmes

In light of the lessons learned and recommendations identified in the previous section, the following **specific actions** are suggested in support of sustainable and climate-resilient agriculture in the Dry Zone.

5.2.1 Technological issues

1. To enhance the availability of irrigation water, river-water pumping through use of electrical equipment should be leveraged in areas where electricity is available, given that the use of electrical power for pumping water is much cheaper than use of the diesel generators that have been introduced by the Myanmar Government. Where feasible and safe from adverse ecological impacts, tube wells can be used to providing supplemental irrigation before the rain comes. If groundwater availability is low or the quality not suitable for agriculture, construction of more earth dams and ponds can provide supplementary irrigation water. Technologies for the efficient use of water should be promoted through training programmes.

2. A model farm showcasing an integrated farming system should be established covering both agriculture and livestock production, where drought-resistant cereals (sorghum, millet, etc.) are grown and used as animal feed.

3. While some bilateral organizations are collaborating with DoA, there are no NGOs collaborating with the department, thus signifying a missing link between DoA and an important stakeholder type in the agriculture sector. A regional Farm Advisory Service (FAS) where farmers can readily access necessary information and knowledge should be established. The FAS could comprise experts from DoA, NGOs and private sector companies. The mobility of government extension staff is limited by budget constraints. Moreover, the technical services they provide at times focus on policy-

related issues, such as encouraging cultivation of MoALI's policy crop, Parl Thwe rice, although the staff are well trained for promoting a wider set of technologies for agricultural development. The staff of NGOs and companies may have additional resources available for field visits and have a sharper focus on practical issues that support agricultural development. However, the staff might be trained in specific areas or for specific purposes only. By combining those groups within the mechanism of FAS, and sharing knowledge and technologies among them, it is possible to produce positive win-win outcomes to promoting farmers' development.

4. DoA should establish a hotline for farmers to call for technical advice. This can be promoted and managed with the involvement of NGOs and CBOs.

5.2.2 Capacity-building

5. Regular training for farmers, CBOs and NGOs should be given and programmes initiated for technology transfer, particularly in the areas of crop selection, crop management practices, conservation agriculture, cropping patterns and systems and post-harvest management. The training and technology transfer programmes should be designed through engaging multiple stakeholders who can complement each other's strengths and resources.

6. International organizations should help in building the capacity of government staff by implementing training programmes, workshops (internally for staff and externally involving other stakeholders), seminars, scholarship programmes and on-the-job training.

5.2.3 Improved coordination and knowledge-sharing

7. To leverage resources of the private sector for development projects in the Dry Zone, government and NGOs should hold regular coordination meetings with private companies and explore opportunities to sign Memorandums of Understanding. Regular forums, workshops and meetings between government institutions and international organizations should also be conducted to mitigate misperceptions among stakeholders and to build greater understanding.

8. Regional newspapers or newsletters (online and offline) that showcase activities of local and international organizations, as well as regional government bodies, should be initiated so that necessary information and knowledge can be accessed and the scope for synergy and partnerships identified more easily.

5.2.4 Programme and policy formulation

9. A fund for supporting farmers' seed banks (as opposed to grain banks) should be established so that farmers can buy improved seeds with guaranteed quality at a reasonable price from government seed farms and store their seeds until the next growing season. Provision of credit should also be made to support farmers with necessary inputs, such as seeds, fertilizers and labour, so that there is less pressure on them to take loans from moneylenders that need to be repaid at harvest time. This could better enable farmers to wait until they can get better prices for their produce.

Since most of the farmers have little or no access to storage facilities (because they sell the crops immediately after harvest), interventions should include improvement of storage and warehousing facilities.

10. For future development projects, a change of strategy should be incorporated in favour of providing holistic support covering input, technology, market access, etc., for a specific target area and moving to the next area once desired results for sustainable development have been achieved. Focusing on too wide a geographic area for only a few interventions may not produce the desired results. Moreover, project indicators should prioritize the quality of the intervention (effectiveness, efficiency and sustainability) instead of quantity, such as number of target villages or beneficiaries. Indicators currently used for assessing the sustainability of interventions (e.g. simply looking at interview responses) should also be reviewed.

11. Concerned government agencies should formulate enabling policies and negotiate with insurance companies to establish a viable crop insurance platform which can alleviate climate-related risks faced by farmers, after taking into account results of demonstration and pilot projects already implemented.

12. While enforcing the law to prevent logging, targeted reforestation programmes should be implemented to promote recovery of degraded ecosystems. These programmes should be complemented with efforts for firewood substitution and technology transfer to mitigate effects of shifting cultivation.

13. Authorities concerned should enforce laws regarding wastewater management while other stakeholders such as CBOs and NGOs should focus on building awareness and providing training to local people.

14. Stable crop prices at harvest time should be maintained, for instance, through government or third-party purchase of crops at a reasonable price that is at least above the farmers' production cost.

15. Agro-chemical dealers should employ well-trained and experienced agronomists, agricultural chemists or plant protection specialists in order to share knowledge that farmers need the most, while promoting their products.

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Questionnaires Used for KIIs and FGDs[3]

A. Guidelines for KII with national and subnational level government officials – DAR, DoP, DRD

What are some of the main problems facing agriculture and rural development in the Dry Zone?

Theme (1): Government programmes

Main open-ended question:

1. Could you please describe the programmes regarding sustainable and climate-resilient agriculture which your department (DAR, DRD, DoP) is implementing in the Dry Zone area?

Probing questions:

1.1 What are the objectives of the programme?
1.2 Who are your partners?
1.3 How and when was the programme started?
1.4 How and from where did you mobilize funding or receive financial assistance?
1.5 What are the outputs of the programme?
1.6 What are the success factors of the programme?
1.7 What do you think are the key constraints conducting the programme in the Dry Zone area?
1.8 What are the root causes and aggravating factors of those constraints?
1.9 How did you solve those problems?
1.10 Did your programme have any affects on sustainable and climate-resilient agriculture and how?
1.11 Apart from current programmes, which are the major programmes planned for the future?
1.12 Have you established any strong partnerships (bilateral, intergovernmental ministries, private sector) for these interventions with other stakeholders?
1.13 In your view, are there any avoidable duplications in interventions or resource investments in the Dry Zone?
1.14 Are there any major gaps where future interventions or resources should be directed?

[3] Detailed outcomes from interviews with individual organizations are available upon request.

Theme (2): The Effect of the programme on income and poverty status of farmers

Main open-ended question:

2. How does the programme affect farmers' income and poverty?

Probing questions:

2.1 How does the programme contribute generation of income or reduction of poverty over the long term?
2.2 How does the programme help farmers have control over crops and prices?
2.3 How does the programme support farm families' standard of living, including health care, education and food security?
2.4 How does the programme contribute to the quality of life – hobbies, social welfare – for farm families?
2.5 How does the programme minimize farmers' reliance on government subsidies?

Theme (3): The effect of the programme on water – availability, efficiency and practice

Main open-ended question:

3. How does the programme affect water – ground or surface – used for agricultural purpose?

Probing questions:

3.1 Does the programme help conserve water and how?
3.2 How does the programme contribute to efficient irrigation practice?
3.3 How does the programme affect the water-use efficiency of crop?
3.4 How does the programme affect crop water stress?
3.5 Does the programme promote quality of water and how?

Theme (4): The effect of the programme on soil

Main open-ended question:

4. How does the programme affect soil?

Probing questions:

4.1 Does the programme help conserve soil and how?
4.2 How does the programme contribute to soil conservation practices – reduced tillage, windbreaks, agroforestry, etc.?
4.3 Does the programme affect maintenance of soil organic matter and how?
4.4 How does the programme affect soil fertility?
4.5 How does the programme affect soil productivity?

Theme (5): The effect of the programme on the environment

Main open-ended question:

5. How does the programme affect the environment?

Probing questions:

5.1 How does the programme affect toxic chemical use?
5.2 How does the programme affect fertilizer use?
5.3 How does the programme affect pesticide use?
5.4 How does the programme affect air pollution?
5.5 How does the programme affect water pollution?

5.6 How does the programme affect chemical residues?
5.7 How does the programme affect management and use of farm resources?
5.8 How does the programme affect the use of non-renewable resources, such as fuels?
5.9 How does the programme affect biodiversity?
5.10 How does the programme affect agroecology?
5.11 How does the programme affect climate change?

Theme (6): The perception and attitude on sustainable and climate-resilient agriculture

Main open-ended question:

6. What are your views on sustainable and climate-resilient agriculture in the Dry Zone?

Probing questions:

6.1 Why is environmental sustainability important in agriculture?
6.2 How does it affect agriculture?
6.3 What would be the impact of environmental deterioration and climate change on agriculture?
6.4 What are the root causes of environmental deterioration and climate change?
6.5 How can we overcome those causes?
6.6 How do you think we can manipulate environment and climate change, and how?
6.7 What are the challenges in the area of sustainable and climate-resilient agriculture in the Dry Zone?
6.8 What are the opportunities that can help promote sustainable agriculture in the Dry Zone?

Theme (7): Source of information and status of knowledge-sharing

Main open-ended question:

7. How do you receive the information you need and how do you share knowledge?

Probing questions:

7.1 Where do you receive information about climate-resilient and/or sustainable agriculture (online, offline)?
7.2 How often do you receive that information?
7.3 Who shares that information with you – an organization (or) a person?
7.4 How do you know if the information you received is reliable?
7.5 What is your perception of the source of knowledge (reliability, easy to assess)?
7.6 How do you share the knowledge you gain with others (online, offline)?
7.7 How often do you share knowledge?
7.8 With whom do you share knowledge and why?
7.9 What do they think about the information you give them (do they think it is reliable, it is easy to access)?
7.10 What should be done to get easy access to reliable information and/or to share reliable information?

Theme (8): Effect of the intervention on good farming practices, good seeds and crop varieties, improved livestock or aquaculture or other area of sustainable and climate-resilient agriculture – only ask those whose work is relevant to the topic

Main open-ended question:

8. How does the intervention affect good farming practices, good seeds and crop varieties, improved livestock or aquaculture, or other areas of sustainable and climate-resilient agriculture?

Probing questions:

8.1 How does the intervention promote farming practices?
8.2 How does the intervention contribute to crop rotation system?
8.3 How does the intervention contribute to intercropping system?
8.4 How does the intervention contribute to mulching practices?
8.5 How does the intervention contribute to the use of minimum tillage?
8.6 How does the intervention contribute to access to improved seeds?
8.7 How does the intervention contribute to access to improved variety?
8.8 How does the intervention contribute to access to improved livestock?

B. Guidelines for key informant interviews – l/LNGOs – bilateral organizations – companies

What are some of the main problems facing agriculture and rural development in the Dry Zone?

Theme (1): The activities of the organization

Main open-ended question:

1. How does your organization intervene in the Dry Zone?

Probing questions:

1.1 What are the objectives of the intervention?
1.2 What type of intervention did you implement and where?
1.3 How and when did you start the intervention?
1.4 How did you allocate financial resources?
1.5 Who are your target beneficiaries and why do you target them?
1.6 How is women's participation included in the intervention?
1.7 What are the outputs of the intervention?
1.8 Did your organization achieve the objectives?
1.9 What are the success factors?
1.10 What are the key constraints conducting your project in the Dry Zone?
1.11 What are the root causes and aggravating factors of those constraints?
1.12 How did you solve those problems?
1.13 Did you achieve the intended solution and how?
1.14 Did the intervention have any affects on sustainable and climate-resilient agriculture and how?
1.15 Have you established any strong partnerships for these interventions with other stakeholders?
1.16 In your view, are there any avoidable duplications in interventions or resource investments in the Dry Zone?

1.17 Are there any major gaps where future interventions or resources should be directed?

Theme (2): The effect of the intervention on the income and poverty status of farmers

Main open-ended question:

2. How does the intervention affect farmers' income and poverty?

Probing questions:

2.1 How does the intervention contribute to generation of income or reduction of poverty over the long term?
2.2 How does the intervention help farmers have control over crops and prices?
2.3 How does the intervention support farm families' standard of living, including health care, education and food security?
2.4 How does the intervention contribute to the quality of life – hobbies, social welfare – for farm families?
2.5 How does the intervention minimize farmers' reliance on government subsidies?

Theme (3): The effect of the intervention on agricultural water – availability, efficiency and practice

Main open-ended question:

3. How does the intervention affect agricultural water?

Probing questions:

3.1 Does the intervention help conserve water and how?
3.2 How does the intervention contribute to efficient irrigation practices?
3.3 How does the intervention affect the water-use efficiency of the crop?
3.4 How does the intervention affect crop water stress?
3.5 Does the intervention promote quality of water and how?

Theme (4): The effect of the intervention on soil

Main open-ended question:

4. How does the intervention affect soil?

Probing questions:

4.1 Does the intervention help conserve soil and how?
4.2 How does the intervention contribute to soil conservation practices – reduced tillage, windbreaks, agroforestry, etc.?
4.3 Does the intervention affect maintenance of soil organic matter and how?
4.4 How does the intervention affect soil fertility?
4.5 How does the intervention affect soil productivity?

Theme (5): The effect of the intervention on the environment

Main open-ended question:

5. How does the intervention affect the environment?

Probing questions:

5.1 How does the intervention affect toxic chemical use?
5.2 How does the intervention affect fertilizer use?
5.3 How does the intervention affect pesticide use?

5.4 How does the intervention affect air pollution?
5.5 How does the intervention affect water pollution?
5.6 How does the intervention affect chemical residues?
5.7 How does the intervention affect management and use of farm resources?
5.8 How does the intervention affect the use of non-renewable resources, such as fuels?
5.9 How does the intervention affect biodiversity?
5.10 How does the intervention affect agroecology?
5.11 How does the intervention affect climate change?

Theme (6): The perception and attitude of sustainable and climate-resilient agriculture in the Dry Zone

Main open-ended question:

6. What are your views on sustainable and climate-resilient agriculture in the Dry Zone?

Probing questions:

6.1 Why is environmental sustainability important in agriculture in the Dry Zone?
6.2 How does it affect agriculture in the Dry Zone?
6.3 What would be the impact of environmental deterioration and climate change on agriculture in the Dry Zone?
6.4 What are the root causes of environmental deterioration and climate change?
6.5 How can we overcome those causes in the specific context of the Dry Zone?
6.6 What are the opportunities that can help promote sustainable and climate-resilient agriculture in the Dry Zone area?
6.7 What are the challenges for sustainable and climate-resilient agriculture in the Dry Zone?

Theme (7): Source of information and status of knowledge-sharing

Main open-ended question:

7. How do you receive and/or share knowledge about sustainable agriculture?

Probing questions:

7.1 Where do you receive information about agricultural practices, technologies, seeds, etc. (online, offline)?
7.2 How often do you receive that information?
7.3 Who shares that information with you – an organization (or) a person?
7.4 How do you know if the information you received is reliable?
7.5 What is your perception of the source of knowledge (reliability, easy to access)?
7.6 How do you share the knowledge you gain to others (online, offline)?
7.7 How often do you share knowledge?
7.8 To whom you share knowledge and why?
7.9 How do they think about the information from you (do they think it is reliable, it is easy to access)?
7.10 What should be done to get easy access to reliable information and/or to share reliable information?

Theme (8): Effect of the intervention on good farming practices, good seeds and crop varieties, improved livestock or aquaculture or other area of sustainable and climate-resilient agriculture – only ask those whose work is relevant to the topic

Main open-ended question:

8. How does the intervention affect good farming practices, good seeds and crop varieties, improved livestock or aquaculture, or other areas of sustainable and climate-resilient agriculture?

Probing questions:

8.1 How does the intervention promote farming practices?
8.2 How does the intervention contribute to the crop rotation system?
8.3 How does the intervention contribute to the intercropping system?
8.4 How does the intervention contribute to mulching practices?
8.5 How does the intervention contribute to the use of minimum tillage?
8.6 How does the intervention contribute to access to improved seeds?
8.7 How does the intervention contribute to access to improved varieties?
8.8 How does the intervention contribute to access to improved livestock?

C. Guidelines for KII/FGD – farmers (group) – community leaders

What are some of the main problems facing agriculture and rural development in the Dry Zone?

Theme (1): The intervention in the area

Main open-ended question:

1. How do you think about the interventions implementing in your area?

Probing questions:

1.1 What types of interventions are being implemented in your area?
1.2 What are the objectives of the interventions?
1.3 How and when was the intervention started?
1.4 How is the allocation of the intervention's financial resources?
1.5 How is women's participation in the intervention?
1.6 What are the outputs of the intervention?
1.7 What are the success factors of the intervention?
1.8 What do you think are the key constraints to conducting the project in your area?
1.9 What are the root causes and aggravating factors of those constraints?
1.10 How did the implementers solve those problems?
1.11 Did the intervention have any affects on sustainable and climate-resilient agriculture and how?
1.12 Have you established any strong partnerships for these interventions with other stakeholders?
1.13 In your view, are there any avoidable duplications in interventions or resource investments in the Dry Zone?
1.14 Are there any major gaps where future interventions or resources should be directed?

Theme (2): The effect of the intervention on income and poverty status of farmers

Main open-ended question:

2. How does the intervention affect farmers' incomes and poverty?

Probing questions:

2.1 How does the intervention contribute to generation of income or reduction of poverty over the long term?
2.2 How does the intervention help farmers have control over crops and prices?
2.3 How does the intervention support farm families' standard of living, including health care, education and food security?
2.4 How does the intervention contribute to the quality of life – hobbies, social welfare – for farm families?
2.5 How does the intervention minimize farmers' reliance on government subsidies?

Theme (3): The effect of the intervention on agricultural water – availability, efficiency and practice

Main open-ended question:

3. How does the intervention affect agricultural water?

Probing questions:

3.1 Does the intervention help conserve water and how?
3.2 How does the intervention contribute to efficient irrigation practice?
3.3 How does the intervention affect water-use efficiency of crops?
3.4 How does the intervention affect crop water stress?
3.5 Does the intervention promote quality of water and how?

Theme (4): The effect of the intervention on soil

Main open-ended question:

4. How does the intervention affect soil?

Probing questions:

4.1 Does the intervention help conserve soil and how?
4.2 How does the intervention contribute to soil conservation practices – reduced tillage, windbreaks, agroforestry, etc.?
4.3 Does the intervention affect maintenance of soil organic matter and how?
4.4 How does the intervention affect soil fertility?
4.5 How does the intervention affect soil productivity?

Theme (5): The effect of the intervention on the environment

Main open-ended question:

5. How does the intervention affect the environment?

Probing questions:

5.1 How does the intervention affect toxic chemical use?
5.2 How does the intervention affect fertilizer use?
5.3 How does the intervention affect pesticide use?
5.4 How does the intervention affect air pollution?
5.5 How does the intervention affect water pollution?

5.6 How does the intervention affect chemical residues?
5.7 How does the intervention affect management and use of farm resources?
5.8 How does the intervention affect the use of non-renewable resources, such as fuels?
5.9 How does the intervention affect biodiversity?
5.10 How does the intervention affect agroecology?
5.11 How does the intervention affect climate change?

Theme (6): The perception and attitude on sustainable and climate-resilient agriculture

Main open-ended question:

6. How do you perceive on sustainable and climate-resilient agriculture?

Probing questions:

6.1 Why environmental sustainability is important in agriculture?
6.2 How does it affect agriculture?
6.3 What would be the impact of environmental deterioration and climate change on agriculture?
6.4 What are the root causes of environmental deterioration and climate change?
6.5 How can we overcome those causes?
6.6 How do you think can we manipulate environment and climate change and how?
6.7 What are the opportunities that can help promote in the area of sustainable and climate-resilient agriculture in the Dry Zone area?
6.8 What are the challenges for sustainable and climate-resilient agriculture in the Dry Zone?

Theme (7): Source of information and status of knowledge-sharing

Main open-ended question:

7. How do you receive and/or share knowledge about sustainable agriculture?

Probing questions:

7.1 Where do you receive information about agricultural practices, technologies, seeds, etc. (online, offline)?
7.2 How often do you receive that information?
7.3 Who share that information to you – an organization (or) a person?
7.4 How do you know if the information you received is reliable?
7.5 What is your perception on the source of knowledge (reliability, easy to access)?
7.6 How do you share the knowledge you gain to others (online, offline)?
7.7 How often do you share knowledge?
7.8 To whom you share knowledge and why?
7.9 How do they think about the information from you (do they think it is reliable, it is easy to access)?
7.10 What should be done to get easy access to reliable information and/or to share reliable information?

Theme (8): Effect of the intervention on good farming practices, good seeds and crop varieties, improved livestock or aquaculture or other area of sustainable and climate-resilient agriculture – only ask those whose work is relevant to the topic

Main open-ended question:

8. How does the intervention affect good farming practices, good seed and crop varieties, improved livestock or aquaculture, or other areas of sustainable and climate resilient agriculture?

Probing questions:

8.1 How does the intervention promote farming practices?
8.2 How does the intervention contribute to the crop rotation system?
8.3 How does the intervention contribute to the intercropping system?
8.4 How does the intervention contribute to mulching practices?
8.5 How does the intervention contribute to the use of minimum tillage?
8.6 How does the intervention contribute to access to improved seeds?
8.7 How does the intervention contribute to access to improved varieties?
8.8 How does the intervention contribute to access to improved livestock?

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ESCAP
Economic and Social Commission for Asia and the Pacific

Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA-ESCAP)
Jl. Merdeka 145
Bogor 16111
Indonesia

P: +62 251 8343277
+62 251 8356813
F: +62 251 8336290
E: capsa@un.org

www.uncapsa.org

www.facebook.com/UNCAPSA
twitter.com/un_capsa