

Myanmar
Dry Zone Development Programme
Scoping Mission

Annex 2
Seeds, Crops and Livestock Development



**Food and Agriculture Organization
of the United Nations**

THE REPUBLIC OF THE UNION OF MYANMAR
IN THE
DRY ZONE DEVELOPMENT PROGRAMME (DZP)
ANNEX 2: SEEDS, CROPS AND LIVESTOCK DEVELOPMENT

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CURRENCY EQUIVALENTS

(As of February 2014)

Currency	Equivalent
US\$ 1.00	= Kyat 980
Euro 1.00	= Kyat 1340

FISCAL YEAR

April 1 – March 31

WEIGHTS AND MEASURES

1 acre (ac)	=	0.405 hectare (ha)
1 hectare	=	2.471 acres
1 kilogram (kg)	=	2.200 pounds (lb)
1 000 kg	=	1 metric tonne (t)
1 kilometre (km)	=	0.62 mile (mi)
1 metre (m)	=	1.09 yards (yd) or 3.28 feet (ft)
1 square metre (m ²)	=	10.76 square feet (ft ²)
1 acre (ac)	=	0.405 hectare
1 hectare (ha)	=	2.47 acres
1 millimetre (mm)	=	0.03937 inch (“)

TABLE OF CONVERSIONS AND LOCAL UNITS

1 hectare	=	2.471 acres
1 kg	=	0.61 viss
1 viss (a measure of weight).	=	1.64 kg
60 tickles	=	1 kg
100 tickles	=	1 viss
16 pyi (a measure of volume)	=	1 basket
1 basket (a measure of volume) of:		
• Paddy	=	17 kg
• Yellow gram (husked)	=	78.2 kg
• Yellow gram (unhusked)	=	31.4 kg
• Green gram	=	68.4 kg
• Groundnuts (unhusked)	=	25.2 kg
• Sesame	=	24.5 kg
• Pigeon pea	=	33 kg
• Wheat	=	72 kg
• Sunflower	=	13.1 kg
• Red bean	=	72 kg
• Soyabean	=	32.7 kg

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
ADP	Agriculture Development Programme
ACIAR	Australian Centre for International Agricultural Research
ADRA	Adventist Development and Relief Agency
AED	Agriculture Education Division
AHD	Animal Health and Development
AMD	Agriculture Mechanization Department
CARI	Central Agricultural Research Institute
CARTC	Central Agricultural Research and Development and Training Centre
CBM	Central Bank of Myanmar
CBO	Community Based Organization
CDZ	Central Dry Zone
CIRDAP	Centre for Integrated Rural Development for Asia and the Pacific
CSO	Central Statistical Office
DOA	Department of Agriculture
DANIDA	Danish International Development Agency
DAP	Department of Agricultural Planning
DAR	Department of Agricultural Research
DICD	Department of Industrial Crops Development
EIA	Environmental Impact Assessment
ESCAP	Economic and Social Commission for Asia and the Pacific
EU	European Union
FAO	Food and Agricultural Organization
FDI	Foreign Direct Investment
FFS	Farmers' Field School
FMD	Foot and Mouth Disease
FSATG	Food Security and Agriculture Thematic Group
FSWG	Food Security Working Group
GAD	General Administration Department
GDP	Gross Domestic Product
GOM	Government of Myanmar
GRET	Group de Recherche et d'Echanges Technologiques
HDI	Human Development Initiative
HIES	Household Integrated Economic Survey
HS	Haemorrhagic Septicaemia
ICDP	Integrated Community Development Project
ICRISAT	International Crops Research Institute for Semi-arid Tropics
ID	Irrigation Department
IFPRI	International Food Policy Research Institute
INGO	International Non-Government organization
IPM	Integrated Pest Management
IPR	Intellectual Property Rights
IRRI	International Rice Research Institute
JICA	Japan International Cooperation Agency
LBVD	Livestock Breeding and Veterinary Department
LIFT	Livelihoods and Food Security Trust Fund
LUD	Land Use Division
MADB	Myanmar Agriculture Development Bank
MAS	Myanmar Agriculture Service
masl	metres above sea level
M&E	Monitoring & Evaluation

MDG	Millennium Development Goal
MFI	Micro-Finance Institution
MICDE	Myanmar Industrial Crop Development Enterprise
MIS	Management Information System
MLFDB	Myanmar Livestock and Fisheries Development Bank
MOAI	Ministry of Agriculture and Irrigation
MOLFRD	Ministry of Livestock Fisheries and Rural Development
NGO	Non-Governmental Organisation
NSC	National Seed Committee
NSP	National Seed Policy
O&M	Operation and Maintenance
PACT	Private Agencies Collaborating Together
PPP	Public Private Partnership
PVP	Plant Variety Protection
SLRD	Settlement and Land Records Department
TCP	Technical Cooperation Programme
TGFSA	Thematic Group for Food Security and Agriculture
TSC	Technical Seed Committee
UPOV	International Union for the Protection of New Varieties of Plants
UNDP	United Nations Development Programme
UNEP-GEF	United Nations Environment Programme – Global Environmental Facility
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development
VDC	Village Development Committee
WB	World Bank
WRUD	Water Resources Utilisation Department
WDC	Water Distribution Committee
WFP	World Food Programme
WRUD	Water Resources Utilization Department
YAU	Yezin Agricultural University

MAP OF CENTRAL DRY ZONE



EXECUTIVE SUMMARY

1. The UNOPS Livelihoods and Food Security Trust Fund (LIFT), has commissioned the FAO Investment Centre to undertake the formulation of a five year programme to Support Agricultural and Livelihood Development in the Central Dry Zone (CDZ) of Myanmar. This scoping report by the Agricultural Production Specialist focuses on the crops and livestock aspects of the programme design and builds on the findings of the inception mission and forms a part of the scoping stage with the aim to define in detail the scope, specific activities and likely costs and benefits of the proposed programme. This report outlines the proposed scope for a four year project (period 2015-2018) entitled the Dry Zone Project (DZP) which is to be implemented in six Townships of CDZ, namely: Magway Region – Yesagyoo and Pakkoku Townships, and Mandalay Region – Myingyan, Natogyi, Thaingthar, and Mahlaing Townships.

Status and Situation Analysis

2. The farming/livelihood systems in the CDZ areas which are not dependant of paddy production and located in the non-irrigated rainfed areas, are characterised by a mixed farming system in which crops and livestock are closely integrated and interdependent. Cropping is the main livelihood activity where the major crops grown are pulses (pigeon pea, grams, and chickpea), oilseeds (groundnut, sesame and small areas of sunflower), cereals (sorghum for fodder and maize), with small localised areas of cash crops (tobacco and cotton in particular). There are also small areas in the villages with fruit trees, palm sugar and the occasional forestry plots in the community lands. Livestock are a central component of the farming systems where cattle (mainly oxen for draught power), goats and sheep are the predominant species, with also some pigs and chickens. The main income generating animals are small ruminants followed by pigs and where chickens are mainly used for household consumption. Livestock particularly the cattle are heavily reliant on crop residues from the pulses and cereal crop in mainly. Stall feeding is common again for the cattle, and also the goats/sheep, but in general most of the fodder comes from the rainfed lands.

3. The main issues for the communities living in the CDZ are based around the fact that it is a very challenging agro-ecological and socio-economic environment where communities are primarily adverse to risk. This situation is being further exacerbated by climate change. The main constraint is that communities both farming and landless households are stuck in poverty trap in which they are highly vulnerable to impact of climate and social factors.

4. The key entities which have a direct bearing on the DZP are the Government of Myanmar (GOM) Ministry of Agriculture and Irrigation (MOAI) and Ministry of Livestock Fisheries and Rural Development (MOLFRD), development agencies – LIFT, FAO, UNDP, IFAD, ACIAR, EU, DFID, DANIDA and USAID, international research organisations – ICRISAT, IRRI, and IWMI, and a large number of international and national NGO's. There is collectively a large body of expertise and experience both in respect to community development, farming/livelihood development, and climate change adaptation and mitigation, which can be utilised by the project to expedite the range of interventions which are planned.

5. Government policy as they related to the CDZ focus on the following: (a) policy and regulatory support especially with regards to access to land, (b) agricultural crop production, land productivity and income, (c) access to agricultural inputs, (d) livestock production, (e) forestry and greening of dry zone, and (f) access to credit. Policy development is ongoing with further clarification of issues related to the seed sector (especially private sector involvement), land tenure and livestock sector required.

Key Constraints and Opportunities

6. Some of the key factors which contribute to this lack of security including importantly food insecurity can be listed as follows: (a) water scarcity and climate change; (b) poor natural resource base (sandy soils, low rainfall, high ET, erosion) which is progressively being degraded; (c) low crop yields – traditional crop varieties and low input use; (d) predominantly rainfed agriculture with very limited irrigation; (e) cash/commodity crop based economy with little subsistence staple food production; (f) mixed farming systems where livestock play an important part (farm power and IGA) where fodder and feed resources are a major constraint; (g) livestock health, nutrition and breeding are important constraints; (h) timing of land preparation and hence time of planting crops is critical; and (i) lack of affordable credit.

7. The six major opportunities as regards agriculture and related livelihoods to assist the rural communities in the six target CDZ Townships are as follows: (i) provision of credit to communities for livelihood development, (ii) access to seed of improved crop varieties, (iii) amelioration of the natural resource base through conservation agriculture, (iv) livestock management, health and nutrition, (v) livestock production and enterprise support, and (vi) enhanced vegetable production to improve human nutrition and generate income.

Development Concept and Objectives

8. A strong poverty focus of the proposed LIFT Dry Zone Programme is encapsulated in the proposed objective of the programme as presented in the supporting documentation provided by LIFT of the design of the DZP: *to improve food security and income for landless and marginal farmers*. The geographical focus, identification and design of activities selected for programme intervention should be determined to ensure a significant and cost-effective contribution to this objective. Distributive considerations are a key concern in the LIFT strategy.

9. LIFT's paramount goal is to contribute to poverty alleviation. Hence, impact on poverty, defined in relation to food security and income in the proposed programme objective, will be the key guiding principle in the design of the DZP. It is important to note that a holistic approach to village development with the main focus to ensure that the communities in the target villages will all benefit, with the understanding that the poorer households will benefit in particular, through direct action and the symbiotic effect with support to the more affluent in the villages who have better access to resources, with land, crop and livestock holdings and finance, that can contribute to assisting the poor through improved on-farm income generating activities and possibly post-harvest operations. In this respect the strengthening and establishment of viable and sustainable Village Development Committees and appropriate funding for enterprise development of a range of income generating activities, will be key to the success of all the ventures supported by the DZP.

10. Given these challenges outlined above an attempt has been made to identify 'entry points' in this project to address these constraints in a holistic and integrated manner. The project will strengthen the capacity of households in the CDZ at the local level in rural areas to cope with the shocks and stresses that they regularly experience in an effort to enhance their livelihoods, sustain the environment and ensure greater human security. The approach adopted in this proposal is to encourage sustainable development through sound management of natural resources and the restoration of the livelihoods for both landless households and small farmers through addressing the underlying causes of poverty and environmental degradation.

11. As identified in the preceding sections of this report the programme will finance a Seed, Crops and Livestock Development Component, where interventions will focus on activities that will not only ensure improvements to food security and income generation, but have a high

possibility of success during the lifespan of the project. The component will in supporting village community and household development has as its main objective the following: *to ensure the sustainable and equitable development of resource poor village communities through support for improved seed supply, conservation farming, livestock development and household food supply and income generation.*

12. To attain this objective the Component will focus on four key areas which are considered to have an equitable spread of benefits, these being: (1) improved seed supply – through improved availability of suitable, adapted, quality and high yielding varieties of the major field crops grown in the CDZ; (2) conservation agriculture – with the introduction of climate smart agriculture (CSA) technologies to enhance the cropping and fodder production systems on a sustainable basis, and contribute to the mitigation of climate change; (3) livestock production – aimed to enhance the current livestock systems common to the CDZ through support to appropriate viable income generating activities and improved support for animal health and nutrition; and (4) enhance vegetable production – focusing on two important areas of improved human nutrition and the establishment of small scale group vegetable production enterprises targeting in particular the landless poor and women, especially the deprived female headed households with young children.

Major Activities and Phasing

13. The details of the proposed content and activities of the four Sub-Components for improved seed supply, conservation agriculture, livestock production and enhanced vegetable production are presented in the main report. Included are a mix of interventions which focus on the following: (a) capacity building and training for all the major stakeholders, more especially the target village communities, (b) provision of loans through village based funding mechanisms with the support of the Village Development Committees, (c) technical and resource support to specialist GOM entities, particularly with regards to seed and livestock production improvements, (d) business development through farmer and community groups, and (e) improvements to human wellbeing and nutrition with actions focused on improved vegetable and fruit production and livestock enterprises.

14. The project is phased to ensure that maximum benefit is attained during the relatively short four year project time span. Common to all Sub-Components there will be an Inception period of six months to ensure that the necessary staffing, resources and processes are in place. This will be followed by an 18 month period, where staff trainings and capacity building, across all Sub-Components and where appropriate, will be for the most part completed. Farmer and community training through farmer field schools (FFS) and other approaches will be ongoing throughout the life of the project. The modalities and establishment of Village Development Funds will also be completed during the first two years of implementation. It is important to note that under Sub-Component 3 – Livestock Production, the DZP will add value to the activities of the LIFT/FAO Livestock Project through provision of funds for the Livestock Productivity Fund.

Significant Assumptions and Risks

15. The key assumptions must include the continued focus of GOM, more particularly the MOAI and MOLFRD on following on its strategic commitment to the development of the CDZ. This must include addressing the low productivity of the existing farming systems where crop and livestock production needs to be enhanced in a sustainable and economically viable manner. The NR base which is currently declining through population pressure and climate change needs to be improved through a range of inter-linked initiatives where land management, cropping and livestock systems are to be stabilised and enhanced. These are all difficult challenges which required the concerted effort of all major stakeholders, more particularly government technical

departments, and regional and Township administrations. Support from the donor community and civil society will be essential to bring about the changes required through technical and financial support.

16. While the project would have no direct control over many of the potential risks (especially the social and political risks), these include: (a) political instability, (b) weak governance, (c) economic disorder, (d) uncertainty of land tenure, (e) climate change risks, including extreme drought, (f) weak technical and financial management performance due to the need for adequately trained and qualified project management professionals, (g) weak institutional and technical support and capabilities of the key collaborating and implementing GOM entities, and (h) potential delays in procurement and delivery of agricultural inputs and other services.

Indicative Costs and Benefits for Phase 1

17. The total cost of the Component 2 under the DZP phase 1, including all the required investments costs, is USD 6.257 million. The breakdown of costs by Sub-Component is as follows: (1) Improved seed production – USD 2.187 million (mn), (2) Conservation Agriculture – USD 1.231 mn, (3) Improved livestock production – USD 2.179 mn, and (4) Enhanced vegetable production – USD 0.660 mn.

18. The project will be implemented over a 4 year period. The project is designed at this stage to target a total of 240 villages across all the six Townships (40 villages per Township), which with an assumption that there are 100 households on average per village with a household size of 5 persons, would benefit directly or indirectly a total of 24,000 households or 120,000 people. In the main report indicative beneficiaries from the activities of the seed and livestock interventions in particular is presented. Furthermore, it is expected that additional communities outside the target villages/Townships in the CDZ will also benefit from the support and services provided by the DZP and the FAO Livestock Project (in the case of livestock productivity improvements). The Seed, Crops and Livestock Component has been developed so that a significant proportion of the target beneficiaries, more particularly the resource poor, female headed households and the landless, will benefit from the wide and diverse range of interventions proposed under the Component. Some of the Sub-Components are more pro-poor than others, namely improved livestock production and enhanced vegetable production, for small scale livelihood interventions.

Outstanding Tasks for Design Mission

19. The final design mission due to take place in May 2014 will need to focus in the short time allocated in the field for the assignment to ensure that the key stakeholders are met and their views sought. The important entities where follow-up will required are listed in the main report. The information that has been used in this Scoping Report needs to be further validated particularly as the detailed activities to be implemented under this Component are finalised. For this a range of sources will be used, most important of which will be government sources and from donor entities which have implemented or designed similar project interventions. The key information requirements will be for the cost tables where output data will be needed in order to assess net project benefits and financial and economic returns. A number of studies and research activities have been identified in the report relating to seed, climate smart agriculture (CSA), farming systems, and livestock, which will be further expanded upon in the final project design.

A. INTRODUCTION

1. The Livelihoods and Food Security Trust Fund (LIFT) of the UNOPS, has commissioned the FAO Investment Centre to undertake the formulation of a five year programme to support agricultural and livelihood development in the central dry zone of Myanmar. The formulation process includes three primary stages of analysis and formulation including, scoping, concept and design. An initial inception mission was conducted in October 2013 which has identified geographical and thematic areas for the proposed programme. This report by the Agricultural Production Specialist focuses on the crops and livestock aspects of the programme design and builds on the findings of the inception mission and forms a part of the scoping stage with the aim to define in detail the scope, specific activities and likely costs and benefits of the proposed programme. A third design mission is planned for May 2014 and will define an initial four year project which will comprise the first segment of this programme.

2. The terms of reference for the Agricultural Production Specialist are as follows: (a) assess the existing activities and status of production activities related to both crops and livestock within the programme area and describe the technological, natural resource and other factors currently limiting increased levels of output; (b) in collaboration with the Value Chain/Marketing Specialist identify existing and potential production activities which may have potential for expansion with the support of the programme; (c) in collaboration with the Soils and Water Specialist, determine the types of measures which might lead to improved levels of sustainable output from existing and potential activities; and (d) prepare a draft technical annex containing the findings, recommendations and M&E requirements related to improved agricultural production, and the need for related institutional/capacity building, including the estimated timing, costs and benefits of such activities.

3. During the course of the scoping mission a range of meetings and focus group discussion were held with a range of key stakeholders, including government entities, donor community, NGO's, private sector and the farming communities in the six Townships in the Central Dry Zone (CDZ) selected for the programme, namely: Magway Region – Yesagyo and Pakkoku Townships, and Mandalay Region – Myingyan, Natogyi, Thaingthar, and Mahlaing Townships. The findings of these interactions together with a detailed review of the available literature on policies, programmes/ projects in Myanmar and more especially the CDZ have been used in the preparation of this Technical Annex 2 on Seeds, Crops and Livestock. The references used in the compiling this report, are listed in Appendix 1.

B. STATUS AND SITUATION ANALYSIS

B.1 Current Situation and Trends

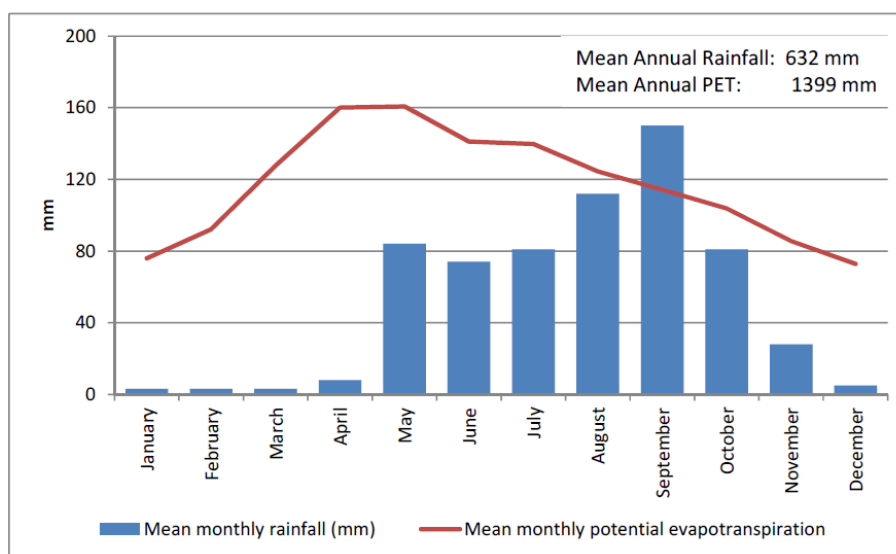
4. Myanmar ranked 149 out of 186 countries in the 2012 Human Development Index and is lagging behind its neighbours in most socio-economic indicators. It is the second poorest country in South-East Asia in terms of GDP per capita and it is estimated that around one third of the population lives below the poverty line. Despite on-going democratic reforms and the recent opening of the country, the living conditions of vulnerable populations in Myanmar, and their access to basic services remain extremely challenging. This is particularly the case in the CDZ.

5. The CDZ comprising much of Magway, Mandalay and lower Sagaing divisions, is one of the most food insecure areas in the country. The zone covers 17% of the country with a total area of 677,000 km². The population of the CDZ is 27% of the country with some 11 million people.

In the DZP area of six Townships the total population is 1.41 million of which 1.17 million live in the rural areas (Appendix 3). Irregular and scarce rainfall leads to extreme water shortages and is a constant threat to the viability of rural livelihoods. As water is the primary driver of income generation in the agricultural communities that dominate the rural CDZ, the failure of rains or seasonal scarcity stretches coping strategies and lock households into a cycle of poverty and vulnerability.

6. Myanmar’s climate is tropical monsoonal. Rainfall is highly seasonal, being concentrated in the hot humid months of the southwest monsoon (May-October) and with significant regional variations associated with the intensity of the rains. Mean annual rainfall is estimated at 2,340 mm but in the CDZ it averages 960 mm (range 760-1270 mm, declining from west to east). 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. They thus reflect the pattern of rainfall with about 80% occurring during the monsoon season (May-October) and 20% in the dry season (November-April) as presented in Figure 1. Average rainfall patterns for the central and northern parts of the CDZ are bimodal with a pronounced dip in the middle of the rainy season around July. Although these monthly values of effective rainfall are still considered reasonably valid, there are pronounced variations within the months and the start of the monsoon season can be very uncertain.

Figure 1: Monthly Rainfall and Evapotranspiration – Pakkoku



7. Droughts frequently occur in the “dry zone” region of central Myanmar, i.e. southern parts of Sagaing Division, all of Magway and Mandalay Divisions and western parts of South Shan State (Appendix 4 – Agro-ecological map of CDZ). The CDZ is a difficult environment for farmers and rural households to survive. The biophysical and socio-economic conditions are severe. Its chronic food deficit is aggravated by weak infrastructure, harsh climate, shortages of water, inadequate farming inputs and lack of access to land. The area is semi-arid and in some locations even arid with low annual rainfall and a rainfall pattern throughout the season that is highly variable and with an uneven distribution. As a result dry spells and droughts are becoming more frequent. The climatic constraints are compounded by the presence of shallow soils with low natural soil fertility and the landscape is undulating with poor vegetative cover. The combined effect of these factors results in severe soil erosion and land degradation. As a result land holding size is constantly being reduced. In one township, for example, some 22 percent of the households have less than 0.8 hectares of land while the minimum size of holding needed to sustain a household within a normal rainfall year has been estimated at around 2 hectares (5

acres). In this and other townships, over one third of the village households are landless. The landless and small scale farmers do not have sufficient land to sustain their households and as a result migrate to other areas of the country for up to six months in a year in search of employment.

8. The farming/livelihood systems in the CDZ areas which are not dependant on paddy production and located in the non-irrigated rainfed areas, are characterised by a mixed farming system in which crops and livestock are closely integrated and interdependent.

9. Cropping is the main livelihood activity where the major crops grown are pulses (pigeon pea, grams, and chickpea), oilseeds (groundnut, sesame and small areas of sunflower), cereals (sorghum for fodder and maize), with small localised areas of cash crops (tobacco and cotton in particular). There are also small areas in the villages with fruit trees, palm sugar and the occasional forestry plots in the community lands. Yields of all crops grown are low, more especially in drought years when total crop failure is common. Magway and Mandalay Divisions are classified as rice deficit regions, relying on rice transported from the Irrawaddy Delta and Shwebo respectively. Oilseeds are an important crop, with the CDZ accounting for 89% of Myanmar's sesame production, 69% of Myanmar's groundnut production, and 70% of the country's sunflower production. Pulses, largely for export to India, are also grown in the Zone, accounting for 92% of the pigeon pea production, 97% of the chickpea production, and 52% of the green gram production of the country. Pigeon pea and chickpea production has steadily grown over time, partly due to the introduction of varieties with a shorter growing season. With the exception of onions, few vegetables are grown in the area. Cotton is a major crop, with 95% of the cotton produced in Myanmar originating in the CDZ. Fruit tree crops include mango, banana and guava which are normally grown around the household dwelling. The seasonal crop calendar for Pakkoku as an example is presented below in Figure 2. The main hunger seasons are severest during the months of June and July and again in February each year.

Figure 2: Seasonal Crop Calendar – Pakkoku

Activities	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	
Seasons	Summer	Small Rains		More Rains		Small Rains				Winter		Summer	
Summer Paddy	Growing Season		Harvest							Land Preparation		Sowing	
Pigeon Pea (Pesingone)		Sowing	Growing Season						Harvest			Land Preparation	
Green Gram (Pedisane)		Sowing	Growing Season			Harvest						Land Preparation	
Sesame (Hnanlyin)		Sowing	Growing Season	Harvest								Land Preparation	
Sesame (Hnangyi)				Land Preparation	Sowing	Growing Season			Harvest				
Groundnut (Pinhtaung)		Sowing	Growing Season			Harvest						Land Preparation	
Groundnut (Pinpyant)		Sowing	Growing Season				Harvest					Land Preparation	
Tobacco	Processing				Nursery & Land Preparation	Sowing	Growing Season			Harvest & Processing			
Vegetables						Land Preparation	Growing Season & Harvest						
Toddy Palm Sugar	Toddy season	Peak Production Season				Toddy Season							
Labor Availability			Less labor demand for Agricultural Laborers			Less labor demand for Toddy Workers				Less labor demand for Casual laborers			
Rice Price					↑	↑	↑	↓	↓	↓			
Festivals	✕	✕		✕	✕		✕	✕			✕	✕	
Hunger Season	**	**	***	***	**	**	**	*			***	**	

10. Data on livestock holdings for the six project Townships are presented in Appendix 3, where cattle (mainly for oxen for draught power), goats, sheep pigs and chickens. The average livestock holding per household is 2.5 cattle, 2.7 goats and sheep, 1.2 pigs and 16.7 chickens. The main income generating animals are small ruminants followed by pigs and the occasional chicken, but mainly the latter are used for household consumption. Livestock particularly the cattle are heavily reliant on crop residues from the pulses and cereal crops. Stall feeding is

common for the cattle, and also the goats/sheep, but most of the fodder comes from the rainfed lands.

11. These agro-ecological and farming conditions have direct implications on the livelihoods and human security of the CDZ population. The effect of these constraints and the threat of climate change exacerbates the poverty cycle. Increasing population pressure leads to increased demand for fuel wood and food. The fragmentation of land holdings and the cultivation of more marginal and less fertile soils results in decreasing agricultural productivity. These factors combine with the fragile biophysical environment and results in lower crop yields and diminished supplies of fuel wood. As this resource becomes scarce, it is often substituted by plant residues which in turn lead to a diminished use of organic matter to maintain soil fertility. The vicious cycle continues to spiral leading to an increased environmental disequilibrium where water sources dry up, the production of fodder is constrained and the number of draft animals that can be carried through the dry season is reduced. These factors compel farmers to expand their cultivation on to marginal areas; another loop in the poverty cycle. The poverty/environment degradation process is reinforced by low farm-gate prices as sales are predominantly at harvest time when prices are lowest. Commonly, the level of indebtedness is high particularly among the landless. The combination of low income, low investment capital, limited availability of inputs and materials and restricted market access reduce the potential for enterprise development in the rural areas.

12. The main issues for the communities living in the CDZ are based around the fact that it is a very challenging agro-ecological and socio-economic environment where communities are primarily adverse to risk. The main constraint is that communities both farming and landless households are stuck in a poverty trap in which they are highly vulnerable to impact of climate and social factors.

B.2 Key Stakeholders and Institutions

13. The key entities which have a direct bearing on the DZP are the GOM Ministry of Agriculture and Irrigation (MOAI) and Ministry of Livestock Fisheries and Rural Development (MOLFRD), and as regards to development agencies – LIFT, FAO, UNDP, IFAD, ACIAR, EU, DFID, DANIDA and USAID; international research organisations – ICRISAT, IRRI, and IWMI, and a large number of international and national NGO's (e.g., Save the Children, Red Cross, ADRA, Mercy Corp, etc.). There is collectively a large body of expertise both in respect to community development, farming/livelihood development, and climate change adaptation and mitigation, which can be utilised by the project to expedite the range of interventions which are planned.

14. The MOAI is responsible for all aspects of agriculture and irrigation as well as water resources with the mission to develop agriculture and irrigation nationally. At State/Regional level, agriculture is organised under a State/Regional Minister for Agriculture who reports directly to MOAI at Union level in Nay Pyi Taw where the majority of budget decisions are currently made at. The main objective of MOAI is stated as being to increase crop production. Among several strategies identified by MOAI for meeting agriculture sector objectives are: (a) the provision of irrigation, (b) the application of modern agro-technologies including improved seed, (c) fertiliser and crop protection, (d) the development and utilisation of new crop varieties, (e) the adoption of cropping patterns that fit the local agro-ecology, and (f) the development of new agricultural land. The major crops that are being promoted include paddy, long staple cotton, groundnut, sunflower, the grams (yellow, green and black), sugarcane, pigeon pea, and maize. The MOAI comprises of the following key departments which have a direct bearing on the DZP, these being: the Department of Agriculture (DOA) which was formerly the Myanmar Agriculture Services (MAS), Department of Agricultural Research (DAR), Department of Agriculture

Planning, Irrigation Department, Agriculture Mechanisation Department, Water resources Utilisation Department, Myanmar Agriculture Development Bank (MADB), Yezin Agriculture University, and Department of Industrial Crops Development.

15. The DOA is responsible for coordination of farm advisory services and research across the country, for agricultural education and for the delivery of farm inputs including seeds and farm advisory services. It employs a total staff countrywide of about 13,000 but the relatively low salaries and uncertainty of the future has resulted in a loss of more experienced staff to alternative employment with agricultural resellers and NGOs. The scope of the services was directed mainly at the government model farms which meant that many other farmers received limited to no services, such as the provision of information and certified seeds. However, with the rearrangement into the DOA, extension of agricultural advice is virtually non-existent with farmers depending heavily on each other, private suppliers of inputs and wholesale purchasers.

16. The Department of Agricultural Research (DAR) has seven Crop Research Centres and 17 Satellite Farms. The mission of DAR is “to systematically conduct research activities that would suit to the needs of all stakeholders which include producers, distributors and consumers in developing and dissemination of regionally adapted crop varieties and crop production technologies”. Although DAR is carrying out suitable research, particularly with new varieties, there still remains the problem of applying this to the farmers’ fields and the adequate connection of this knowledge with extension to the farmers.

17. There are seven State Agricultural Institutes involved in agriculture extension training and research with the Yezin Agricultural University (YAU) at the apex, plus several agricultural research institutes that provide specialised training for farm advisers. YAU is composed of 9 major departments comprising agronomy, agricultural Botany, agricultural chemistry (responsible for irrigation and water management), entomology, plant pathology, horticulture, agricultural economics, animal science and agricultural engineering. The connections with the other services supporting the professionals, technicians and farmers at field level is very weak and results in the knowledge and information developed at the higher levels failing to trickle down to the grass root levels. The situation is complicated as all actions are subjected to the final approval by MOAI, the Central Academic Council and the Central Administrative Council of the Universities and Colleges of the whole country. The situation is exacerbated as the agricultural education institutions that are meant to underpin the extension services with specialised crop advisers and research staff, have seen inadequate budgets over a number of years and struggle to produce suitably qualified staff in the required numbers.

18. There is a range of institutional actors are involved in governance of various parts of the livestock supply chain, including: (i) the Livestock Breeding and Veterinary Department (LBVD) of the Ministry of Livestock Fisheries and Rural Development (MOLFRD) is the key sector agency with responsibility for the Animal Production and Health Law; (ii) City development committees, and local authorities play important roles in regulating traders and slaughterhouses; (iii) Food and Drug Administration of the Ministry of Health is responsible for quality of food for human consumption; (iv) The Myanmar Livestock Federation acts as a grouping for private sector actors; (v) the Myanmar Veterinary Council oversees key issues in the specific area of veterinary science; and (vi) the Myanmar Veterinary Association is a grouping of graduate veterinarians.

19. The LBVD has traditionally focused primarily on vaccination programs for cattle and buffalo for smallholder mixed crop-livestock farmers. This was driven primarily by the need to secure the draft power population for rice and other crops. In some areas, LBVD supports networks of community animal health workers who provide frontline services at village and household level. The LBVD area of involvement has increased in recent years: (a) in poultry, due

to emergence of HPAI as a serious problem in 2006; (b) in pigs, due to the emergence of pandemic H1N1 virus in 2009 followed by Porcine Respiratory and Reproductive Syndrome (PRRS) in 2011; (c) in sheep and goats due to its role in poverty reduction in the dry zone; (d) in dairy cattle, due to its role in income generation and import substitution.; and (e) interest in zoonoses, partly due to experience of working with human health services on HPAI.

20. Disease control remains the core competence and mandate of the LBVD. There is no government livestock extension service that provides advice to farmers on production issues such as feeding, management and marketing; nor is there any substantive livestock research capacity. The University of Veterinary Science under MOLFRD is the major institution providing degree-level graduates to work in the livestock sector.

B.3 Policies and Programs

21. **Policy and Regulatory Support:** An important policy issue in the CDZ is access to land. To improve the viability of rural livelihoods, farmers need secured land use rights, including access to common property such as fallow land, forest land and grazing areas. The GOM has identified its own policy priorities in this area, which are to safeguard farmers' land rights and expand the area of land under cultivation. It is encouraging a cluster approach to farm management to boost production. The Government is also seeking to encourage the participation of the private sector in the commercial production of seasonal and perennial crops, and distribution of farm machineries and other inputs. Community forest regulations provide for land allocation to meet the needs of the community for firewood, timber and non-wood forestry products. In this area, development agencies are advocating for secured property rights for both farmers and other rural workers, helping communities understand government rules on property rights and raising awareness in communities about the process of leasing land from the Forest Department. It is also helping to secure land rights for farmers by obtaining access to maps and official certificates from the Forest Department and Settlement and Land Records Department.

22. **Agricultural Crop Production, Land Productivity and Income:** The challenge in the CDZ is to increase the land area under cultivation. Although much of the land under cultivation gets two or three cycles, the total area that farmers in the region can cultivate is limited due to lack of access to capital/finance, water and agricultural inputs. These difficulties are further aggravated by low yields in the area. Key ways to increase productivity are by improving soil fertility, using improved seed varieties, mitigating erosion, using water resources efficiently and introducing resource efficient crops. At the same time, the Government has prioritized the production of crops in which the CDZ has a comparative advantage. These include pigeon pea and other grain legumes, sesame, groundnut, and sugarcane, cotton and other industrial crops. Another priority is the promotion of toddy palm trees and other underutilized plant species.

23. In order to boost productivity, the GOM is encouraging farmers to expand new agricultural land by allocating new plots and to diversify by introducing multiple income generating farms - for example, fruit trees, forestry and livestock and is promoting crop rotation. Diversification is an important means to reduce risk, in case of the failure of one crop. The Government has prioritized irrigation for paddy cultivation and the improvement of water storage by renovating dams, diverting water from streams and creeks, lifting water from rivers with pumps and efficient utilization of ground water. Donor agencies and NGOs with expertise in water management can support efforts to improve irrigation, rain water harvesting, small village dams and sand dams.

24. To support the Government's efforts to increase agricultural productivity, humanitarian agencies and the donor community can bring expertise in soil and water conservation, and other land and crop management practices. Assistance organizations can also help to boost crop

production through the identification and distribution to farmers of the most appropriate high yield seed varieties, as well as drought-tolerant and disease-resistant seed varieties.

25. Access to Agricultural Inputs: The main issues are access to improved seeds, fertilizer, pesticides and pest control and mechanization. The GOM aims to introduce high-yield, drought resistant crop varieties and the use of efficient fertilizers. It has also prioritized community-based compost production, integrated pest and disease management, support for agricultural mechanization, the provision of farm tools and training for repairing farm machinery.

26. The development community has brought expertise to these areas, and is well positioned to scale up support for seed multiplication farms to create drought-tolerant and disease-resistant seed varieties and guidance on organic and green manure production and pest control. Agencies have considerable expertise in water management and can provide inputs such as pumps, pipes and fuel for water pumping, as well as draught animals together with capacity development support. In more general terms, development agencies aim to increase knowledge among farmers about improving land preparation, planting techniques, use of fertilizer and compost and managing the land post-harvest. This should in turn increase agricultural yield and crop quality in the CDZ and enable farmers to make a higher return on their investments.

27. Livestock Production: The Government is seeking to develop traditional to commercial goat and sheep farming and increase local investment and foreign direct investment in the livestock sector. It has also prioritized the creation of water points in the CDZ, increasing fodder production and promoting dry fodder processing techniques. It also plans to expand its pool of health workers to control animal diseases such as Avian Influenza and improve the provision of vaccines. In the livestock industry, humanitarian organizations are seeking to establish links with public companies and private firms. The assistance community also has the expertise to promote dry fodder processing techniques and assist with vaccination programmes, as well as introducing new dairy processing and dry meat-processing techniques. However, Government policy development and management on village animal health services and production extension needs to improve. Many aspects of animal health services and disease control at village level rely on planning and resources from government. While farmers readily pay for treatment of sick animals, government support is required for vaccination programs; and public investment is required for the establishment, training and support systems for Community Animal Health Workers (CAHW). Policies that guide these investments encompass human resource development, as well as vaccine production and distribution, and on use of medicines. The Livestock Breeding and Veterinary Department (LBVD) is the primary agency responsible for the sector, but faces weaknesses in planning systems, in disease control strategy implementation, and in key skill areas such as data management and epidemiology.

28. Forestry and Greening of the Central Dry Zone: Two government projects, the National Forest Master Plan (NFMP) for the conservation of forest resources over a 30-year period, and the Greening of Arid Areas in Central Myanmar aim to green and rehabilitate the Dry Zone through a number of measures, including establishing forest and bamboo plantations for local supply and greening, conserving remaining natural forests, promoting fuel wood substitution and developing other energy supplies such as solar and biomass. UN agencies and NGOs can bring expertise in community forestry, natural forest management, private forest management and agro-forestry. They can introduce soil conservation and water harvesting techniques.

29. Access to Credit: Small-scale farmers and the landless poor in the CDZ lack access to credit (in terms of adequacy and affordability of terms and conditions of loans) to invest in agricultural inputs, as well as credit to invest in small income generating activities. Lack of access to credit and micro-finance at affordable rates is creating a problem of growing indebtedness as the rural population must resort to credit from local money lenders and traders. This problem

requires innovative interventions, including targeted cash interventions, the provision of in-kind agricultural inputs and supporting a sustainable microfinance sector in the Zone to provide small credit to farmers and landless labourers at affordable rates. The Government has set as a priority the establishment of loan programmes through public sector development banks, including the Myanmar Livestock and Fisheries Development Bank (MLFDB) and the Myanmar Agricultural Development Bank (MADB) in all states and divisions. Supportive government policies could open the door to new service providers and should encourage donors to expand microfinance operations.

30. To address indebtedness, the development community would need to encourage communities to form self-help or self-reliance groups to be the recipients of seed capital. These groups could then provide cash grants to their members coming from poor and most vulnerable households and create a social fund to provide credit at favourable rates for emergencies such as medical fees, to stop families falling into debt. There is also a need to support new service providers in micro-finance, such as agro-industries and traders in agricultural produce, to expand their credit operations. Innovative social protection and safety net mechanisms need to be introduced and adapted to the local socio-economic system. Such measures could include crop insurance, farmer pension schemes, cash transfer for meeting conditional criteria or long-term cash hand-outs.

31. **Market Access and Physical Infrastructure:** Improving access to markets should include reducing “transaction costs” so that farmers make more profits and consumers pay less. Transaction costs include transport, storage, processing, marketing, port charges and unofficial fees to enforcement agencies to ease movement of goods. Concurrently through market mapping and value chain analysis, opportunities for value addition could be identified. Other measures for market access could include development of new markets including secondary markets at the village tract level, women’s access to markets, introduction and cultivation of high value crops. The GOM aims to give price assurance to farmers, improve access to markets, and expand infrastructure such as farmers markets, farm roads, rural electrification, cold storage and agricultural mechanization. Development agencies and NGOs can assist in this area by strengthening links between farmers and traders, providing storage facilities and preservation methods to reduce post harvest losses, renovating rural roads and promoting other small infrastructural projects to aid market access.

C. KEY CONSTRAINTS AND OPPORTUNITIES

32. Some of the key factors which contribute to this lack of security including importantly food insecurity can be listed as follows: (a) water scarcity and climate change; (b) poor natural resource base (sandy soils, low rainfall, high ET, erosion) which is progressively degrading; (c) low crop yields – traditional crop varieties and low input use; (d) predominantly rainfed with very limited irrigation; (e) cash/commodity crop based economy; (f) mixed farming systems where livestock play an important part (farm power and IGA) where fodder and feed resources are a major constraint; (g) livestock health, nutrition and breeding important constraints; (h) timing of land preparation and hence time of planting crops is critical; and (i) lack of affordable credit.

33. The major opportunities as regards agriculture and related livelihoods to assist the rural communities in the six target CDZ Townships are as follows:

- **Provision of credit to communities for livelihood development:** it is important to note that the farming/livelihood system is primarily a cash economy where no significant subsistence crops exist (project is not located in rice cultivation areas of CDZ) and where almost all crops (pulses and oilseeds) are sold immediately at harvest to pay off debt. The majority of

households are in a permanent, or at least a semi-permanent, situation of indebtedness either from money lenders (with very high rates of interest) or from government micro-finance entities (Myanmar Agriculture Development Bank - MADB), or other non-government MFI's (e.g., Private Agencies Collaborating Together – PACT). It is important to note that while the amount that MADB lends is completely inadequate for farmer needs (Kyat 20,000/acre for up to a maximum of 10 acres for non-rice crops), it is a major source of finance, where nationally it lends more money than PACT. Invariably the cash return from the sale of crops is low, especially in a drought year (one year in three is prone to drought in CDZ if not more often), because of the low yields and poor farm gate prices. Input use for crops is based on low risk hence use of purchased input is uncommon, with farmers only using traditional crop varieties and some FYM. The use of inputs such as fertiliser and pesticides is mainly on irrigated high value crops (vegetables and cotton) which are rarely grown. With this scenario it is paramount for the DZP to provide access to credit at affordable rates.

- **Access to seed of improved crop varieties:** There appears to be significant potential to increase the crop yields of the traditional grown crops: pulses – pigeon pea, green gram, chick pea; oilseeds – sesame and groundnut (possibly sunflower); and minor cereals for fodder – sorghum) through the introduction of improved varieties – hence seed multiplication is a major concern and a potential intervention area. Improved crop varieties already exist and are available through Government; however availability is a major issue for the farmers.
- **Amelioration of the natural resource base through conservation agriculture:** The impact of climate change is having a serious effect on the farming systems in the CDZ, which is being exacerbated by a rising human and livestock population. It is therefore important that this issue is addressed through the introduction of conservation farming and more specifically climate smart agriculture (CSA) techniques. This will involve the introduction to the communities in the project area of a wide range of integrated techniques to stabilise both the cropped lands and where feasible the community grazing and forest lands.
- **Livestock management, health and nutrition:** Livestock care and general husbandry is of a reasonable standard for the large ruminants with stall feeding of pre-prepared fodder of cattle especially the oxen; however the quality of care for the small ruminants (goats and sheep) is generally poor. The quality of feed and fodder is variable and generally of lower quality towards the end of the dry season. The potential to improve livestock nutrition is therefore a high priority and where availability of quality fodder is critical. While the incidence of animal disease is generally low for all species, any losses that do occur can be catastrophic for a household, particularly where oxen and goats are concerned.
- **Livestock production and enterprise support:** The main income generator for a significant number of households is from livestock more particularly goats and sheep; and while it is considered important to support this venture it will be essential to ensure that there is sufficient fodder to address the negative impact that overgrazing by these animals can have on the environment. It is also considered important to provide assistance in augmenting the production of other livestock, namely pigs and poultry. Improved feeding practices and use of fodder shrubs also warrant increased attention.
- **Enhanced vegetable production to improve human nutrition and generate income:** The cultivation of vegetables is only in some villages and mainly for cash sale and not subsistence, and where water is less of a constraint. There are indications of malnutrition among some children and hence homestead gardening (where sufficient water is available) and community vegetable plots for both cash sale and household consumption, would go a long way in alleviating this problem. Support to local schools in the establishment of school vegetable gardens would also go a long way in educating children on the benefits of vegetables nutritionally.

D. DEVELOPMENT CONCEPT AND OBJECTIVES

D.1 Development Concept

34. A strong poverty focus of the proposed LIFT Dry Zone Programme is encapsulated in the proposed objective of the programme as presented in the supporting documentation provided by LIFT of the design of the Dry Zone Project (DZP):

- *to improve food security and income for landless and marginal farmers*

35. The geographical focus, identification and design of activities selected for programme intervention should be determined to ensure a significant and cost-effective contribution to this objective. Distributive considerations are a key concern in the LIFT strategy. LIFT's paramount goal is to contribute to poverty alleviation. Hence, impact on poverty, defined in relation to food security and income in the proposed programme objective, will be the key guiding principle in the design of the DZP. It is important to note that a holistic approach to village development with the main focus to ensure that the communities in the target villages will all benefit, with the understanding that the poorer households will benefit in particular, through direct action and the symbiotic effect with support to the more affluent in the villages who have better access to resources, with land, crop and livestock holdings and finance, that can contribute to assisting the poor through improved on-farm income generating activities and possibly post-harvest operations. In this respect the strengthening and establishment of viable and sustainable Village Development Committees and appropriate funding for enterprise development of a range of income generating activities, will be key to the success of all the ventures supported by the DZP.

36. Given these challenges outlined above an attempt has been made to identify 'entry points' in this project to address these constraints in a holistic and integrated manner. The project will strengthen the capacity of households in the CDZ at the local level in rural areas to cope with the shocks and stresses that they regularly experience in an effort to enhance their livelihoods, sustain the environment and ensure greater human security. The approach adopted in this proposal is to encourage sustainable development through sound management of natural resources and the restoration of the livelihoods for both landless households and small farmers through addressing the underlying causes of poverty and environmental degradation.

37. As identified in the preceding sections of this report the programme will finance a Seed, Crops and Livestock Development Component, where interventions will focus on activities that will not only ensure improvements to food security and income generation, but have a high possibility of success during the lifespan of the project.

D.2 Component Objectives

38. The component will in supporting village community and household development has as its main objective the following aim:

- *to ensure the sustainable and equitable development of resource poor village communities through support for improved seed supply, conservation farming, livestock development and household food supply and income generation*

39. To attain this objective the Component will focus on four key areas which are considered to have an equitable spread of benefits, these being: (1) improved seed supply – through improved availability of suitable, adapted, quality and high yielding varieties of the major field crops grown in the CDZ; (2) conservation agriculture – with the introduction of climate smart agriculture (CSA) technologies to enhance the cropping and fodder production systems on a sustainable basis, and contribute to the mitigation of climate change; (3) livestock production – aimed to enhance the current livestock systems common to the CDZ through support to appropriate viable income generating activities and improved support for animal health and nutrition; and (4) enhance vegetable production – focusing on two important areas of improved human nutrition and the establishment of small scale group vegetable production enterprises targeting in particular the landless poor and women, especially the deprived female headed households with young children.

E. MAJOR ACTIVITIES AND PHASING

E.1 Major Sub-Components and Activities

40. The details of the proposed content and activities of the four Sub-Components for improved seed supply, conservation agriculture, livestock production and enhanced vegetable production are presented below.

Sub-Component 1 – Improved Seed Production and Supply

41. This Sub-Component would focus on increasing the availability of improved high quality seed for pulses (pigeon pea, green gram, and chickpea), oilseeds (groundnut and sesame, possibly sunflower), and improved minor cereals crops (sorghum) mainly for fodder. Current availability of improved seed to farmers is almost negligible and there is a reticence from farmers about changing from their traditionally grown varieties, many of which have been grown for long periods without even basic purity checks with a commensurate decline in yield and vigour. Furthermore, climate change has impacted on the performance of the local varieties necessitating their replacement with improved shorter duration and drought tolerant cultivars.

42. The current low use of improved certified seed is a reflection of the demand and supply perspectives, where on the supply side the issues are: (a) under-funded research, (b) under-funded extension, (c) problems with infrastructure, production, processing and storage, (d) the relatively low capacity of growers, technicians and researchers, and (e) the lack of incentives for growers and companies (private sector, PPP). On the demand side the important issues are: lack of awareness and knowledge, (b) price and affordability, (c) limited market availability, (d) inadequate quality assurance, and (e) the need to show clear benefits from use of improved seed from a sceptical farming community.

43. Currently through the work of the GOM with development agency support a significant amount of progress has already been made to breed, identify and initiate a seed multiplication system, more particularly for the major crops grown in the CDZ. Furthermore, the MOAI through the Department of Agriculture Research (DAR), Yezin Agricultural University (YAU) and Department of Agriculture (DA) has been working with the donor community particularly ACIAR, FAO, IFAD, IRRI and ICRISAT, to develop a range of new improved varieties for a range of crops grown in the CDZ, and these cultivars are now being multiplied by government using their seed farms and seed multiplication personnel. However, current levels of seed production for the crops important to the CDZ are completely inadequate to meet even the smallest demand for improved seed.

44. It is proposed therefore that the DZP will support the MOAI, through its Divisional Seed Production Unit in Mandalay and its two Seed Farms namely Mahlaing and Saikhtain, located in Mahlaing and Kyaukpada Townships respectively, for the preliminary levels of seed multiplication (for production of registered seed, obtaining foundation seed from DAR) with further support through contract outgrower schemes to farmers in the CDZ. At the seed supply level the input supply system will be supported with assistance to agro-input retailers, proper packaging and the potential use of seed banks at the village level for local seed supply. The final seed delivery system will be developed during program/project design as will the provision of seed processing and packaging. Support will also be needed for the main Seed Laboratory under the Seed Unit in Mandalay to ensure seed purity and viability and that the Certified Seed meets the exacting standards required. The Sub-Component will endeavour to improve farmer awareness of the benefits of the improved seed with the provision for farmer training (FFS), staff training and the use of demonstrations. Furthermore, credit through the Finance and Marketing Component will be made available for seed purchase will also be an integral part of Sub-Component activities.

45. It is difficult at this stage in the project design to specify accurately the output of improved seed from the support provided by DZP, as a guide the rough estimate would be that the two Seed Farms would produce around 10 tons of Registered Seed, which when further multiplied by the Certified Seed growers would produce 700-1000 tons (multiplication rate of 70-100). This would be sufficient to provide improved seed to around 34,000 households; sufficient for the 15% of the rural households in the six target Townships under DZP. More importantly, it is envisaged that the seed would also benefit farming households outside the project area in other Townships in CDZ.

46. The detailed activities for the implementation of this Sub-Component with particular reference to the provision of improved Certified Seed for the major pulses and oilseed crops grown on CDZ are as follows: (1.1) support to quality control of the seed sector; (1.2) support to the seed farms in the multiplication of quality registered seed; (1.3) expansion of the production of Certified Seed through support to specialist contract farmer seed production groups; (1.4) improvement of post-harvest operations through improved processing, packaging and marketing involving where possible the private sector; (1.5) farmer training in the use and benefits of improved seed; (1.6) establishment of a system to enable farmers to purchase seed; and (1.7) study on seed sector development in the CDZ:

47. **Activity 1.1 – Support to quality control of the seed sector:** Under this activity the main seed laboratory under the DOA Seed Unit in Mandalay will be supported by the project through the provision of additional seed testing equipment and other essential inputs, to ensure that it's better able to process and test a larger number of seed sent through for testing from the DOA Seed Stations and the contract seed growers. The staff of the seed testing laboratory will also benefit from further training in related seed quality control techniques and associated laboratory technologies.

48. **Activity 1.2 – Support to seed farms in the multiplication of quality registered seed:** Funds will be provided to enable two Seed Farms in Mandalay Region, and located in the CDZ with responsibility for the seed multiplication of oilseeds and pulses. These seeds farms are Mahlaing (located in Mahlaing TS) responsible for the multiplication of sesame, sunflower and pulses, and Saikhtain (located in Kyaukpada TS, just south of the project area) and responsible for the production of groundnut, sesame and pulses. The needs of these two seed stations will need to be reviewed in more detail during the design stage of the DZP, but it is envisaged that improved seed processing and handling facilities will need to be upgraded, as will production equipment. Support to staff through capacity building will be provided to ensure that they are

better able to undertake their duties on the Seed Station and furthermore, undertake the field inspection of the certified seed being produced by the contract farmers.

49. Activity 1.3 – Expansion of the production of certified seed through support to specialist contract farmer seed production groups: It is envisaged that the project will facilitate with the DOA Seed Division and the Township agriculture extension staff the establishment of contract seed growers responsible for the multiplication of certified seed. While at this stage in the project design process it is difficult to estimate the actual numbers of contract grower groups, it is envisaged that each Seed Farm would link to around 10 groups. It should be noted that these groups may not be from the resource poor villages targeted under the DZP but have the capability to produce through improved production techniques high quality Certified Seed. The groups would be supported through a Seed Multiplication Production Fund provided by the project to enable them to purchase the registered seed from the seed farms, cultivate the crops with supervision and oversight from the Seed Certification Technicians. These farmers would be supported with training through FFS conducted by the Seed Unit staff. Once produced the seed would be passed on to the private sector entity responsible for the post-harvest operations, processing, packaging and sale.

50. Activity 1.4 – Improvement of post-harvest operations through improved processing, packaging and marketing: The aim with this activity is to involve as much as possible the private sector in the processing, packaging and marketing of the certified seed produced by the contract growers. It is important to note that because of the GOM accounting regulations it is not able to buy back the Certified Seed from the contract growers as there is no provision for a revolving fund. The options are therefore that a private sector entity (e.g., a Township based Commodity Trading Exchange) gets involved in these post-harvest operations or the contract farm group does its own processing and packaging with onward sale to other farmers and/or agro-input sales outlets in the major towns and Township administrative centres. To facilitate this, funds would be provided on the basis of a business plan prepared by the entity to enable the establishment of a seed processing/packaging unit. This funding would have a partial grant component, and would include the necessary financing for equipment, training and short term support. The final modalities of this project support will be developed during the detailed design stage of the project. The present budget allows for the establishment of two post-harvest seed processing and marketing units, servicing the seed produced by each of the two MOAI Seed Farms and their associated outgrower farmer groups.

51. Activity 1.5 – Farmer training in the use and benefits of improved seed: The key to the success of this Sub-Component will be the creation of the demand from the farming community for the improved seed varieties of their commonly grown field crops. This will be facilitated by two actions to be conducted by trained DOA field staff from the Seed Farms/Unit, and field extension personnel, these being the use of demonstration plots and farmer training through FFS's and other training modalities. The aim would be to target six villages per Township starting from Year 2 of the project, with six villages per each Township for Year 3, and Year 4.

52. Activity 1.6 – Establishment of a system to enable farmers to purchase seed: Traditionally farmers in the CDZ do not purchase improved seed, especially for the major oilseeds and pulses. In addition therefore to the creation of demand under Activity 1.5, it will be essential to ensure that farmers have the finance to purchase the seed. This will be ensured through access to credit under the Finance and Marketing Component.

53. Activity 1.7 – Study on seed sector development in the CDZ: This study will entail a detailed analysis of the seed sector as it pertains to the CDZ, more especially with regards to the streamlining of the supply of seed for pulse and oilseed crops and the need to improve farmer uptake. An important part of this study would be the development of implementation modalities

for greater involvement of the private sector in seed multiplication and marketing. It is estimated that this comprehensive study will require TA consultancy input of USD 30,000 for an international and national consultancy team.

54. It should be noted that this Sub-Component on seed production will be a complex and demanding intervention under the project, requiring expert supervision at least in the early years of implementation, furthermore training at all levels through staff training and FFS's and business development will be required. Hence there has been a provision made in the budget for TA to support these activities. It should be noted that FAO has had in the recent past considerable experience in the development of the seed sector in Myanmar, and is one of the lead organisations with regards to the implementations of FFS's.

Sub-Component 2 – Conservation Agriculture

55. There is an important need to try to stabilise the environment and farming systems in the DZP target Townships, where as a result of climate change and increasing population pressure (human and livestock) the natural resource base is at risk with high levels of soil degradation and erosion. Dry land farming systems are adopted in areas where rainfall and water to support crop cultivation is limited. In the CDZ there is limited rainfall, soil infertility, inadequate agricultural inputs as well as poor farming practices which have led to low agricultural productivity and income. The Zone is also an area of high levels of soil erosion, mostly due to a lack of soil conservation measures in the past, causing a loss of organic matter and a low infiltration rate of water. In addition, the vegetation cover in the area is highly vulnerable to erosion due to limited amount of rainfall and widespread grazing. It is important therefore to maximize available resources to support crop cultivation and stabilise the village lands.

56. Measures likely to improve fertility and increase productivity include basic principles of crop management such as good and timely land preparation, correct planting techniques and maintaining a fine surface tilth or mulch to protect the natural moisture from evaporation. The development community, including FAO with its initiative on CSA, can bring expertise in this area, and to support other important measures to promote cultivation techniques that improve fertility such as mixed cropping, management practices to minimize soil erosion (for example leaving land fallow during the summer in alternate years), the use of both artificial and organic based products – fertilizer and compost – to increase yields, and enhancing varietal development and germplasm screening for high fertilizer efficiency. There is a need to develop capacity in sloping agricultural land technology (SALT), rapid compost production, Integrated Plant Nutrient System (IPNS) and vermiculture.

57. In addition, agro-forestry has potential in the CDZ; for example the development of the plum tree or Thanut Kha and other underutilized plant species. Integrated farming systems with an emphasis on food-feed-fibre-fuel production have the potential to improve the sustainability of livelihoods in the Dry Zone. Development agencies (FAO) and NGOs (e.g., GRET) can bring technical assistance in these fields. Close links to the DZP Soil and Water Management Component 1 will be important in this respect.

58. To achieve this, the DZP needs to scale up training and awareness raising on adaptive practices via Farmer Field Schools (FFS) and through regular extension services to communities. These will include farm practices mentioned already such as seed selection and multiplication (covered under Sub-Component 1), soil fertility, pests and disease control, and water management. In addition, dissemination of a farmers' guidebook regarding farming knowledge and methods to cope with severe weather conditions and variability will need to be incorporated in the programme support strategy in order to maintain dry land food security. Collaboration with

relevant departments of MOAI and MOLFRD, and research and development agencies (ICRISAT and FAO) will be essential for accessing research and development information.

59. It is therefore proposed through the project that a climate smart agriculture (CSA) approach to conservation agriculture is extended through the DOA and appropriate service providers (NGO's with experience in NR management) to the farming communities. As mentioned a range of technologies already exist which would be appropriate these include: introduction of new drought tolerant cultivars for cash, food and fodder crops; minimum tillage, improved rotations and cropping patterns, improved composting, the use of rhizobium for legumes, improved farm implements, and other INM and IPM technologies. The project would support the introduction of these technologies to selected villages through the use of FFS to train farmers, noting firstly that it will be essential that DOA extension staff is trained. The provision of credit will also need to be considered to ensure the financing, community involvement and sustainability of the new conservation agriculture technologies.

60. The detailed activities for the implementation of the Sub-Component with regards to conservation agriculture in the CDZ are as follows: (2.1) preparation of sourcebook and technical recommendations on conservation agriculture and CSA; (2.2) training of GOM staff and other service providers in CSA techniques; (2.3) training of farmers and village communities on CSA; (2.4) funding support to farmers and community groups on CSA; and (2.5) studies on farming systems and conservation agriculture in CDZ:

61. **Activity 2.1 – Preparation of sourcebook and technical recommendations on conservation agriculture and CSA:** The initial task for the implementation of this Sub-Component will be the preparation of technical guidelines and other training materials for use with the training programs for the government staff, other concerned persons involved in capacity building, and farmers/village communities. Funds will be provided under the DZP to engage a specialist TA consultant to prepare these materials, which will be produced in both English and Burmese. Furthermore, these documents, videos and other training materials will be mass produced and circulated to the communities in the six target Townships and more generally throughout the CDZ. Additional funds will be provided for workshops and meetings to extend and inform stakeholders in conservation agriculture and CSA. This activity will be initiated and completed within the first year of the project.

62. **Activity 2.2 – Training of GOM staff and other service providers in CSA techniques:** Staff from the technical departments involved in the provision of technical support to the farmers, including importantly those from the DA and LBVD, plus those in the Forestry Department (under the Ministry of Forests and Environmental Protection) will be trained in the whole range of conservation agriculture techniques. It is quite possible that other stakeholders involved in natural resource management, agriculture and community development will also be trained under this activity of the project. These trainings will start in project Year 2 and commence for the remaining two years during Year 3 and Year 4. These trainings will be conducted by specialist trainers who have been trained with specialist TA support, using the technical training materials produced under Activity 2.1.

63. **Activity 2.3 – Training of farmers and village communities on CSA:** Starting in project Year 2 and continuing until the end of the project, farmers and village communities will be trained using a range of training modalities including FFS's, in how to better manage their farmlands and community lands using the whole range of options appropriate to their particular village circumstance. The key to this type of training will be to ensure that the "one size fits all" approach is not utilised, but farmers/communities are engaged in learning about and subsequently developing conservation agriculture plans for their own farms and village lands. In this way the communities will be involved in the holistic planning and learning process with a better change of

sustainability. In this regard to Village Development Committee will be closely involved and encouraged to take an active part in the development of the conservation plans.

64. **Activity 2.4 – Funding support to farmers and community groups on CSA:** As follow-on from Activity 2.3 farmer groups and village communities, with the active support of the Village Development Committee, will be supported more substantively in the implementation of a whole range of measures and techniques for conservation agriculture. Funding for these interventions will it is proposed, be provided either through microfinance services (see Component 3) or, in the case of vulnerable groups or community interventions, through grants from the Village Development Fund.

65. **Activity 2.5 – Studies on farming systems and conservation agriculture in CDZ:** An important constraint to the development of the rural livelihood systems in the CDZ is the lack of detailed information on the farming systems in the area, hence it is proposed that a study is undertaken to address this issue; estimated cost for this study would be USD 20,000. Furthermore, a focused study is also required on how to properly operationalise conservation agriculture in the CDZ, one which incorporates the technologies associated with CSA and also addresses the issues of dryland farming/minimum tillage options. It is estimated that this second study will require TA consultancy input of USD 30,000.

Sub-Component 3 – Improved Livestock Production

66. As identified above, livestock health, nutrition and productivity is an area of concern for all categories of large and small livestock common to the farming systems in the CDZ. As background it is important to note that FAO is currently formulating, with LIFT support, a Livestock Project proposal to be submitted to the LIFT board in March 2014 and expected to be implemented in the latter half of 2014. The project will be targeted to all of the six Townships to be targeted by the CDZ program, and will pilot and develop systems, technologies and supportive policies to direct public and private investments to improve livestock productivity. It is essential that the design of the livestock Sub-Component of the DZP will be informed by the FAO Livestock Project and that a high level of collaboration is assured during implementation of both projects.

67. The core township mechanism expected to be piloted in the Livestock Project is a Livestock Productivity Fund (LPF), that will be available to fund sub-projects of two main types: (a) strengthening of animal health services through township LBVD and networks of Community Animal Health Workers (CAHWs), and private sector input suppliers of some vaccines and medicines, (b) livestock productivity sub-projects across all species (cattle, sheep/goats, pigs, chickens), that incorporate husbandry, health, nutrition, and breed improvement, to be coordinated through CAHWs who have received additional training, to become “livestock productivity service providers”, utilising farmer-field school principles. The livestock productivity sub-projects will be based on proposals based on clear business plans, will link actors along the supply chain, and will be processed through a Livestock Productivity Committee (LPC) using criteria that assesses the use of project funds to improve the livelihoods of the project target households.

68. The CAHW sub-projects will largely protect the cattle population, but also the pig and to a lesser extent, the sheep/goat population from infectious diseases. The livestock productivity sub-projects will focus on cattle, sheep and goat and pig productivity, especially through improved reproductive management, management of late pregnant and lactating females, early weaning strategies, improved breeds, and flock structure. Chickens will also be the subject of sub-projects. However the LPF process will be flexible to address identified priorities which can vary from area to area; new plant species that can be used to feed cattle, sheep and goats and pigs.

In the case that the LPF and the sub-projects its funds are found to be successful, the DZP will contribute funds to the LPF to fund livestock productivity sub-projects, on the assumption that the Livestock Project has completed the CAHW strengthening sub-projects across all target townships, and has begun the process of developing the CAHWs into “livestock productivity service providers”. In summary the Livestock Project would build the capacity, pilot implementation, and then the CDZ brings in more funds for the livestock productivity sub-projects.

69. The proposed workplan for the Livestock Project is therefore as follows:

- Inception period of 6 months;
- Year 1: establish LPF and LPCs mechanisms in 6 Townships; establish CAHW training teams and train CAHWs as health providers and train up as productivity sub-project field coordinators; implement a Basic Animal Health (BAH) Service sub-project (vaccination and promoting CAHW work) in 6 Townships; and implement a few "start-up" productivity sub-projects as on-the-job training for CAHWs and to test technologies/processes.
- Year 2: continue BAH sub-projects; expand "start-up" productivity sub-projects; CAHWs would be well trained by now in basic animal health and productivity sub-project coordination; and LPC/LPF should be functioning.
- Year 3 and Year 4: continue BAH sub-projects; and expand productivity sub-projects, some may take on a more "second-generation nature", as systems evolve with lessons learned etc.

70. The Livestock Project processes are noted as follows: BAH sub-project is widespread, with simple messages, vaccination, and treatment, with follow-up technical support on disease investigations. Productivity sub-projects are more FFS oriented, expensive on a per farmer basis, but aimed to get early adopters up and running. As to content for this project, BAH will have a strong emphasis on cattle and pigs, some on sheep/goats. Productivity sub-projects on cattle, sheep/goats and pigs. Chickens also, but the absolute gains in chickens are pretty small. Pigs: data shows that there are about 278,000 pigs in the 6 Townships, so about 27,000 sows, and rest growers: good short cycle income earners. Sheep/goats: heavy emphasis on reproductive rate, late pregnant early lactation females, and going for high % breeding female and early turnoff of males. Cattle: the aim is to try to decrease the inter-calving period (early weaning). Breed improvements in cattle, pigs, sheep/goats also very important to get moving.

71. The scope of the Livestock Project is currently planned in Yr 2, 3, and 4 for one broad BAH and five productivity sub-projects per Township per year, which would absorb 30% of the CAHW manpower and reach about 75% of rural households with the BAH sub-projects and about one of 16% of rural households with the productivity sub-projects. The Livestock Project will also take an active part in the further development of policies and strategy development working closely with the MOLFRD and the private sector to ensure that the constraints in the livestock value chains are properly addressed.

72. The DZP would build on the piloting work of the Livestock Project, building on the learning's from sub-project pilots, with the provision of supplementary funding for BAH in all 6 Townships starting in Year 2 through to Year 4. More importantly the LPCs would administer another 10 productivity sub-projects per Township per year starting in DZP Year 2 with funding through the Livestock Productivity Fund (LPF). Total funding for DZP in the region of USD 2.08 million over a three year period for these two activities.

73. Furthermore, it is expected that the DZP design will be informed by the evolving shape of the Livestock Project, and during implementation, the DZP will be able to build on, and expand

the systems, township capacities and village-level activities, possibly in terms of both breadth (geographical coverage) and depth (adapting pilots to different areas). Hence in this respect the DZP will be a process project which will build on the learning's of the Livestock Project. In support of this the DZP design will include provision for TA on livestock nutrition with the emphasis on fodder and conservation. This aspect is critical and will link closely to the work proposed for Sub-Component 2 – Conservation Agriculture, and also Component 1 – Soil and Water Conservation. With the broader focus of the DZP, including an integrated approach to crops and livestock, conservation issues fit more in the remit of DZP than the Livestock Project. It would be good however if the latter project does more on the grazing pressure aspects.

74. In addition to the above the DZP would include the provision for support to deprived households in the target village communities through potential of the poultry intervention to directly impact on human nutrition at the producer community level. For this it is proposed to target households with pregnant and lactating women (PLW) or children under 2, and is designed explicitly for these groups with the objective of increasing consumption of households and communities. It is a group activity which is managed (or at least as prominent involvement of mothers) and involves poultry which can be killed potentially at community level, as well as sold, and the eggs can also be consumed and sold. It is combined with a strong food and nutrition promotion/education activity and is viable from the livestock point of view in terms of linking up with animal health etc., as outlined above.

75. The detailed activities for the implementation of the improved livestock development Sub-Component in the CDZ are as follows: (3.1) provision of supplementary funding for BAH care to increase the coverage initiated under the Livestock Project; (3.2) provision of funding for the livestock productivity sub-projects; (3.3) support to improved nutrition of vulnerable females through small-scale poultry enterprises; and (3.4) study on fodder production in the CDZ:

76. **Activity 3.1 – Provision of supplementary funding for basic animal health care services:** The aim of this activity as mentioned above is to increase the coverage initiated under the Livestock Project for BAH, basically the DZP provides additional support to the FAO project to expand on its program. This funding would it is planned start in Project Year 2 and continue until the end of the four year project. For this a lump sum has been budgeted to be administered by the Livestock Project. Provision is also made under this activity for TA support for international and national livestock nutrition experts to assist in the implementation and training of the DZP programme of activities working in liaison with the Livestock Project.

77. **Activity 3.2 - Provision of funding for the livestock productivity sub-projects:** The DZP will support the funding of the livestock productivity sub-projects through the provision of grant funds to the Livestock Productivity Fund (LPF) administered by the Livestock Productivity Committee (LPC), with the assistance from Community Animal Health Worker (CAHW). The LPC would be an integral part of the Village Development Committee which has oversight for all community development activities in the village. Particularly in regards to DZP it is anticipated that the LPF will focus on viable sub-projects which will assist the poor, female headed households and landless to improve their livelihoods. In this regards the livestock would mainly be small ruminants (goats and sheep), pigs and chickens. In all cases business plans will have to be prepared and vetted, before of any fund approval. There will need to be a clear identification of what the contributions from the groups/individuals are, and what will be the future benefits. In all sub-projects the enterprises must follow a high level of basic health care, to ensure that there are no significant losses due especially to disease. It is anticipated that over a three year period (project Year 2 to Year 4) a total of 30 sub-projects would be funded by the DZP.

78. **Activity 3.3 - Support to improved nutrition of vulnerable females through small-scale poultry enterprises:** The project will support lactating females and women with young children

through an intervention to improve nutrition and wellbeing. The main focus of this activity would be on the provision to groups of women with the necessary inputs to initiate micro/small-scale chicken enterprises in order that the output could be used both to produce meat and eggs for human consumption and sale. To undertake this activity, funds from the project would be provided to the target women beneficiary groups through the Village Development Committee accessing a Village Development Fund. A grant facility would permit vulnerable households to access the basic essentials to establish a micro/small scale poultry venture (housing, initial poultry birds and feed). Prior to the provision of such assistance the beneficiary groups would be trained in the benefits of better human nutrition, namely a strong food and nutrition promotion/education activity. It is planned that in this way a total of 180 groups would be involved across the six project Townships over the entire project period of four years (rate of 60 groups per year starting project Year 2 onwards; roughly 10 groups per Township per year).

79. Activity 3.4 – Study on fodder production in the CDZ: A study is urgently needed to rationalise the key area of fodder production in order to better integrate the mandates and activities of MOAI and MOLFRD, with the emphasis on improved fodder and forage options and grazing management, and its impact on livestock nutrition and productivity for the CDZ. This will also have serious implication for other regions in Myanmar where livestock are important. The estimated cost of this large and comprehensive study is USD 40,000 for a team of international and national consultants.

Sub-Component 4 – Enhanced Vegetable Production

80. This Sub-Component will have primarily the objective to improve the nutrition of the village communities through the introduction of a range of vegetable and fruit crops. Of particular importance in this regard is the nutrition of children to reduce malnutrition and stunting. There are three aspects to this intervention, firstly to provide support for household vegetable production through simple homestead garden plots, secondly the establishment of larger scale community run vegetable plots located near a perennial water source in which a women's group would share the production workload and output. In this latter case there could also be some element of cash sale as well as production of vegetables for subsistence purposes. The third possible intervention could be the support to the establishment of school vegetable gardens to ensure that children are involved and exposed to the benefits of vegetable production and the health benefits of vegetables.

81. In regards to the homestead gardens where water availability is an issue, there a number of technologies which can be used, namely a keyhole garden and a vertical garden. A keyhole garden is a waist height garden bed surrounded by rocks and stones, with a walkway ('keyhole') to allow easy access. The bed is comprised of layers of various organic materials that add nutrients and retain moisture. A vertical garden is made from a bag or other vessel, filled with a mixture of soil, ash and compost. Leafy greens are cultivated in holes, cut in the side of the bag, and on top. Some designs include a gravel column at the centre of the bag to allow filtration of grey water.

82. It is important to note that vegetables can be grown in both the monsoon and the dry seasons; hence production can be all year round. The project would support the provision of vegetable starter kits to the households and community groups, with training and facilitation provided to these groups in improved vegetable production; various methods would be used including where appropriate FFS's. School curricula could also include vegetable production and nutrition elements where the project could support. A number of NGOs working the CDZ have already got experience in this type of activity and will be core to the success of these interventions; as will the close involvement of the DOA extension staff that will also be provided with training and involved in implementation. It is important to note that dry season vegetable

production especially at the household level with the poor is challenging so careful thought will be needed in the design and implementation to ensure sustainability.

83. The detailed activities for the implementation of the enhanced vegetable production Sub-Component in the CDZ are as follows: (4.1) staff and key facilitator training in vegetable and fruit production and marketing; (4.2) household and community awareness creation and training in vegetable/fruit production; (4.3) establishment of micro/small-scale household gardens; (4.4) establishment of small to medium size commercial vegetable production enterprises; (4.5) establishment of village school vegetable and fruit gardens.

84. **Activity 4.1 – Staff and key facilitator training in vegetable and fruit production and marketing:** This first activity under this Sub-Component is to provide the basis for the implementation of the various development activities focusing on enterprise establishment and household awareness of the benefits of vegetable and fruit production. This to focus on the training of various technical staff and NGO personnel who would be involved in expediting the activities. Training through a range of modalities would be in informing the training service providers in the production techniques for vegetable and fruit, human nutrition related to these crops, value chain development (VCD) including post-harvest operation and marketing, horticultural enterprise business development. It is anticipated that around 120 field workers (20 for each Township) from the extension service of DA would be trained over the first year of project implementation. The project would not only support the training but also the production of highly focused good quality training materials which would be produced in English and Burmese, and especially focused on the technologies and methodologies required for the production and other aspects for the CDZ, taking into account the peculiarities of the agro-ecology and social characteristics found in that zone.

85. **Activity 4.2 – Household and community awareness creation and training in vegetable/fruit production:** Following on from the first activity in this Sub-Component will be the all important need to create awareness among the village communities of the benefits of the cultivation of vegetables and fruit not only from a human nutrition standpoint but also from the potential that the cultivation and subsequent marketing of these crops have as cash crops. It is therefore aimed that from project Year 2 onwards that a total of 4,000 households (40 villages total in the project area would be covered over the project period with on average 100 households per village) would be trained; roughly at the rate of 12-14 villages per year. The methods for training would include FFS's for group learning, targeted short term trainings for specific sub-project development groups and other suitable modalities. It is expected that the training would be conducted by DA staff using the extension technicians trained under Activity 4.1, and supported where possible by NGO's with previous expertise in this type of training.

86. **Activity 4.3 – Establishment of micro/small-scale household gardens:** A significant number of households in the target villages of the DZP area are poor and landless, so the aim of this activity will be to assist these vulnerable households to develop sustainable homestead gardens to augment their meagre food needs. This is particularly important with resource poor female headed households where nutrition of the children is paramount. To expedite this, funds from the project would be provided to needy households through the Village Development Committee accessing the Village Development Fund. A grant facility would provide resources to permit households to purchase a small starter kit of tools, materials and seeds. Prior to the provision of such assistance the households would have to demonstrate their commitment to this support, through a simple plan prepared by themselves with technical support from a service provider. It is planned that in this way a total of 600 households would be involved across the six project Townships over the entire project period of four years (rate of 200 households per year starting project Year 2 onwards).

87. **Activity 4.4 – Establishment of small to medium size commercial vegetable and fruit production enterprises:** The objective of this activity is to support groups comprising of deprived women and the landless in particular, plus women farmers with adequate suitable land, to form viable small to medium scale vegetable and fruit production enterprises. The benefits would not only be from the availability of vegetables all year round to the village but to also to grow and market the surplus for cash and livelihood improvement. Subsequent to group formation a business plan would have to be prepared and submitted for approval of the Village Development Committee in order that they are able to access financing; this could be either through loans under Component 3 or grants for vulnerable groups, using the Village Development Fund. It is anticipated that a total of 6 vegetable enterprise groups per Township would be established in Year 2, followed by 12 per Township in each of Year 3 and Year 4. It is proposed that groups could also be involved in the establishment of community based fruit tree (and other trees of economic importance – fuelwood, fodder species) nursery ventures, which would supply for cash sale quality seedlings for the surrounding villages; links with the DOA and Forestry Department will be important for this activity and also links to Sub-Component 2 – Conservation Agriculture. Groups would be encouraged to develop close links with Township buyers and auction houses to ensure the produce meets the exacting demands of the vegetable trade. The project would endeavour to facilitate the linkages between the producer groups and the traders.

88. **Activity 4.5 – Establishment of village school vegetable and fruit gardens:** Many of the project target villages have at least a primary school and some even a secondary school, and these are prime centres for teaching children the benefits of both consuming vegetable and fruit, but the skills on the production of these highly nutritious food items. It is therefore anticipate through the project that during the lifetime of the DZP that around 6 schools per Township (total 36 schools for whole project area) would be assisted in this way. The project will aim not only to support in the provision of technical advice but also provide through a grant (via the Village Development Committee) from Village Development Fund the necessary seed, inputs, tools and other equipment required. The project would also assist in ensuring that the information and materials prepared under Activity 4.1 are adapted for use in Burmese and incorporated into the school curriculum.

89. In summary this will be an ambitious and challenging Sub-Component and to ensure that it attains its objectives it will be important to illicit the professional support for the development of the training materials, oversee the trainings through FFS's and other methods, and provide assistance to the more demanding establishment of viable and sustainable vegetable and fruit production enterprises. A provision is therefore made in the budget for appropriate TA support.

E.2 Phasing of Component Activities

90. The project is phased to ensure that maximum benefit is attained during the relatively short four year project time span. Common to all Sub-Components there will be an Inception period of six months to ensure that the necessary staffing, resources and processes are in place. This will be followed by an 18 month period, where staff trainings and capacity building, across all Sub-Components and where appropriate, will be for the most part completed. Farmer and community training through FFS and other approaches will be ongoing throughout the life of the project. The modalities and establishment of the Village Development Funds will also be completed during the first two years of implementation. As outlined above under Sub-Component 3 – Improved Livestock Production, the associated LIFT/FAO Livestock Project which is to be implemented in the same six Townships as the DZP, will initiate implementation a good six months prior to the start of DZP, and it will be important that the two project collaborate closely and that the learning's from the pilots in the former project are gainfully utilised. Where applicable any planned Technical Assistance (TA) support will be undertaken mostly during the first two years

of implementation so that the expertise and technical support provided can be consolidated and utilised by the various beneficiaries during the remaining life of the project.

F. SIGNIFICANT ASSUMPTIONS AND RISKS

F.1 Assumptions

91. The project is expected to lead to improved food and income security and, therefore, better livelihoods through increased crop and livestock production. Furthermore, it is anticipated that the planned conservation agriculture practices will go towards in some way mitigation of the impacts of climate change. Through its contribution to the financing of this project, LIFT aims to respond to an emerging and critical situation where the agriculture productivity of the CDZ is no longer able to sustain the communities that live there. It is therefore of a paramount importance to work towards a rapid reversal of the current decline in the natural resource base and focus on the strengthening of the farming and livelihood systems.

92. The key assumptions must include the continued focus of GOM, more particularly the MOAI and MOLFRD on following on its strategic commitment to the development of the CDZ. This must include addressing the low productivity of the existing farming systems where crop and livestock production needs to be enhanced in a sustainable and economically viable manner. The NR base which is currently declining through population pressure and climate change needs to be improved through a range of inter-linked initiatives where land management, cropping and livestock systems are to be stabilised and enhanced. These are all difficult challenges which required the concerted effort of all major stakeholders, more particularly government technical departments, and regional and Township administrations. Support from the donor community and civil society will be essential to bring about the changes required through technical and financial support.

F.2 Risk Analysis

93. The situation remains very fragile in the CDZ despite progress made on all fronts by a range of development initiatives; however a lot more needs to be done to reverse the current downward trend. Although the DZP design is relatively simple, the project is risky due to the nature of the country and the CDZ in particular. In addition, this will be the first LIFT intervention in the CDZ which addresses in a comprehensive and integrated manner the critical constraints facing the rural communities in the Zone. Therefore, additional work will be needed at the last stage of the project design to further understand the risk profile. While the project would have no direct control over many of the potential risks (especially the social and political risks), these include: (a) political instability, (b) weak governance, (c) economic disorder, (d) uncertainty of land tenure, (e) climate change risks, including extreme drought, (f) weak technical and financial management performance due to the need for adequately trained and qualified project management professionals, (g) weak institutional and technical support and capabilities of the key collaborating and implementing GOM entities, and (h) potential delays in procurement and delivery of agricultural inputs and other services.

G. INDICATIVE COSTS AND BENEFITS FOR PHASE 1

G.1 Indicative Costs for Component

94. The total cost of the Component 2 under the DZP phase 1, including all the required investments costs, is USD 6.257 million. The project will be implemented over a 4 year period. A

summary of costs by Sub-Component, based on Myanmar prices for February 2014, is provided in the Table 1 below and in detail in Appendix 2.

Table 1: Project Costs by Sub-Component

Sub-Component	Total Cost (USD million)
1. Improved seed production	2.187
2. Conservation agriculture	1.231
3. Improved livestock production	2.179
4. Enhanced vegetable production	0.660
Total Component	6.257

G.2 Benefits

95. The project is designed at this stage to target a total of 240 villages across all the six Townships (40 villages per Township), which with an assumption that there are 100 households on average per village with a household size of 5 persons, would benefit directly or indirectly a total of 24,000 households or 120,000 people.

96. While it is at this stage in the design process it is difficult to determine categorically the actual number of beneficiaries, there are two interventions that will have quantifiable benefits, namely seed production and livestock productivity. As regards the benefits from increased availability of improved seed (which are shown to increase yields of around 20-30% over traditional crop varieties) it is conservatively estimated that the additional improved seed produced could benefit around 34,000 households, sufficient for 15% of the rural households in the six target Townships under DZP or 2% of all the households in the CDZ. Most importantly it can be seen that the improvements to the production and availability of improved seed of pulses and oilseeds will extend far beyond the project area with a significant impact on additional beneficiaries in the rural areas of the CDZ. As regards to the impact of the livestock Sub-Component, other beneficiaries could also be expected to arise from the results of the strengthening of livestock services at Township level (which would presumably benefit non-target communities within the Township). While these benefits can be seen as deriving primarily from the FAO Livestock Project, it is important to mention that there will be ‘external’ benefits from the additional support provided by DZP, which as the project progresses will be quite substantial. Reference should be made to the Livestock Project design documentation for more detailed information on beneficiaries, however data presented in Appendix 3 indicates the beneficiaries by sub-project where a total of 240,800 farmers would benefit, of which 200,000 would be from the vaccination program and 40,800 livestock farmers or households from productivity interventions.

97. The Seed, Crops and Livestock Component has been designed so that a significant proportion of the target beneficiaries, more particularly the resource poor, female headed households and the landless, will benefit from the wide and diverse range of interventions proposed under the Component. Some of the Sub-Components are more pro-poor than others, namely improved livestock production and enhanced vegetable production, as regards small scale livelihood interventions. It is important to note however, that in order to bring about significant improvements to the food security, wellbeing and livelihoods of the project communities that a holistic approach has been taken in order that the close involvement of the Village Development Committees in project activities will ensure sustainable and long term development. It is only with a participatory and collaborative approach to community development, that positive changes will be made not only to household incomes and food security, but also to the more complex and important issues of natural resource management and the mitigation against climate change.

H. OUTSTANDING TASKS FOR DESIGN MISSION

H.1 Proposed Stakeholder Consultations

98. The final design mission will need to focus in the short time allocated in the field for the assignment to ensure that the key stakeholders are met and their views sought. The important entities where follow-up will required are listed below by Sub-Component:

- **Improved seed production:** Government entities involved in seed sector will need to be closely involved, namely: MOAI Seed Division (Yangon and Nay Pyi Taw), Mandalay Seed Unit and Seed Laboratory, DOA seed stations in Mahlaing and Saikhtain, DAR and YAU; donor and development agencies involved in the seed sector, namely ACIAR, FAO, IFAD, ICRISAT; private sector seed companies and NGO's with experience in seed related activities and farmer run seed banks.
- **Conservation agriculture:** this Sub-Component is a cross cutting intervention by the project which involves a range of stakeholders. As regards GOM the important entities are MOAI (DOA – Extension Division, Land Use Division, Plant Protection Division, and Horticulture Division), MOLFRD for information on fodder, Ministry of Forest and Environmental Protection for all matters related to agroforestry, community forestry, environment and climate change; for the donor community the important contacts are FAO for CSA and FFS, UNEP and NGO's.
- **Improved livestock production:** Because of the close links between the DZP and the FAO/LIFT Livestock Project, it will be essential to link to FAO to fine tune the design, further linkages and discussions will be made with the concerned departments in the MOLFRD, especially with regards to farmer group based livestock enterprises. In order to further develop the proposed Livestock Development Funds dialogue will be held with NGO's and other development entities with firsthand experience in the development and management of similar types of community based livestock enterprises, particularly in the CDZ.
- **Enhanced vegetable production:** This will involved the stakeholders in GOM more particularly the MOAI – Horticulture Division and Extension Division, DAR and YAU, and for curricula development including schools it would be necessary to meet with the Ministry of Education or its representatives at Regional or Township level in Mandalay. A number of NGO's have experience with small scale homestead gardens and school gardens and these will be contacted.

H.2 Information and Data Requirements

99. The information that has been used in this Scoping Report needs to be further validated particularly as the detailed activities to be implemented under this Component are finalised. For this a range of sources will be used, most important of which will be government sources and from donor entities which have implemented or designed similar project interventions. The key information requirements will be for the cost tables where output data will be needed in order to assess net project benefits and IRR.

APPENDICES

APPENDIX 1: REFERENCES

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APPENDIX 2: COMPONENT COST TABLES

MYANMAR - DRY ZONE PROJECT (LIFT/UNOPS)											
Base costs											
COMPONENT 2 - SEEDS, CROPS AND LIVESTOCK	Unit	Base Cost USD	Quantity				USD				Total USD
			Yr1	Yr2	Yr3	Yr4	Yr1	Yr2	Yr3	Yr4	
<i>Investment costs</i>											
Improved seed production											
1) Support to DAR and DOA seed Unit											
Equipment for seed laboratory (x1)	lumpsum	150,000					150,000	0	0	0	150,000
Equipment for seed stations (x2)	lumpsum	175,000					350,000	0	0	0	350,000
Vehicles 4-w drive	no.	15,000	4	0	0	0	60,000	0	0	0	60,000
Truck	no.	35,000	2	0	0	0	70,000	0	0	0	70,000
2) Training for staff & outgrowers											
Training for seed lab staff 10 staff	wshp/trn.	2,000	2	0	0	0	4,000	0	0	0	4,000
Training for seed station staff 20 staff	wshp/trn.	1,000	3	3	0	0	3,000	3,000	0	0	6,000
Training for seed certification staff 40 staff	wshp/trn.	1,000	3	3	0	0	3,000	3,000	0	0	6,000
Training and Workshops (250 outgrowers)	wshp/trn.	1,500	5	5	0	0	7,500	7,500	0	0	15,000
International seed specialist (1)	prs mth	10,000	2	1	1	1	20,000	10,000	10,000	10,000	50,000
National seed specialist (1)	prs mth	1,500	3	2	1	1	4,500	3,000	1,500	1,500	10,500
3) Fund for seed purchasing (Village Development Fund)											
	lumpsum	500,000					0	500,000	0	0	500,000
4) Post-harvest operations (packaging-labelling)											
	lumpsum	240,000					0	240,000	0	0	240,000
5) Study tours (30 persons)											
	tour	1500	0	50	50	50	0	75,000	75,000	75,000	225,000
6) On-farm demonstrations & FFSs (villages)											
	wshp/trn.	5,000	0	20	40	40	0	100,000	200,000	200,000	500,000
Subtotal											2,186,500
Conservation Agriculture (climate smart agriculture)											
1) Preparation of CSA sourcebook & training materials											
Workshops/meetings (200 participants)	wshp/trn.	1,500	5	5	0	0	7,500	7,500	0	0	15,000
International CSA expert (1)	prs mth	10,000	3	1	0		30,000	10,000	0		40,000
National expert (1)	prs mth	1,500	3	2	1		4,500	3,000	1,500		9,000
2) Training DOA staff in CSA (100 staff)											
	wshp/trn	1,000	0	6	6	6	0	6,000	6,000	6,000	18,000
3) Training farmers in CSA - FFS (120 villages)											
Demonstration materials and equipment	lumpsum	24,000					0	4,000	10,000	10,000	24,000
4) Fund for CSA (Village Development Fund)											
	lumpsum	500,000					0	100,000	200,000	200,000	500,000
Subtotal											1,231,000

Improved Livestock Production											
1) Supplementary funding for BAH care	lumpsum	60,000					0	20,000	20,000	20,000	60,000
International expert livestock nutrition	prs mth	10,000	1	1	1		10,000	10,000	10,000	0	30,000
National expert livestock nutrition	prs mth	1,500	3	2	1		4,500	3,000	1,500	0	9,000
2) Livestock Productivity Fund (30 sub-projects)	lumpsum	1,800,000					0	600,000	600,000	600,000	1,800,000
Support for Village Livestock Productivity Committee	wksh/trn	1,000	0	60	60	60	0	60,000	60,000	60,000	180,000
3) Support to micro/small scale poultry (180 grps)	lumpsum	90,000		60	60	60	0	30,000	30,000	30,000	90,000
Food and nutrition promotion/education	wksh/trn	10,000	0	1	0	0	0	10,000	0	0	10,000
Subtotal											2,179,000
Enhanced Vegetable Production											
1) Preparation of vegetable production training materials	lumpsum	25,000					25,000	0	0	0	25,000
Training of Agriculture Staff (120)	training	1,000	12	12			12,000	12,000	0	0	24,000
National expert vegetable production	prs mth	1,500	3	2	1		4,500	3,000	1,500	0	9,000
2) HH & community training vegetable production	training	1,000	20	40	40		20,000	40,000	40,000	0	100,000
3) Support to HH to for small backyard gardens (600 HH)	lumpsum	60,000					0	20,000	20,000	20,000	60,000
4) Establishment small/medium vegetable production	lumpsum	180,000		36	72	72	0	36,000	72,000	72,000	180,000
Support for Village Vegetable Productivity Committee	wksh/trn	1,000	0	60	60	60	0	60,000	60,000	60,000	180,000
5) Establishment school gardens	lumpsum	72,000		12	12	12	0	24,000	24,000	24,000	72,000
School curriculum development - veg prod/nutrition	lumpsum	10,000	0	1	0	0	0	10,000	0	0	10,000
Subtotal											660,000
Component 2 Total											6,256,500

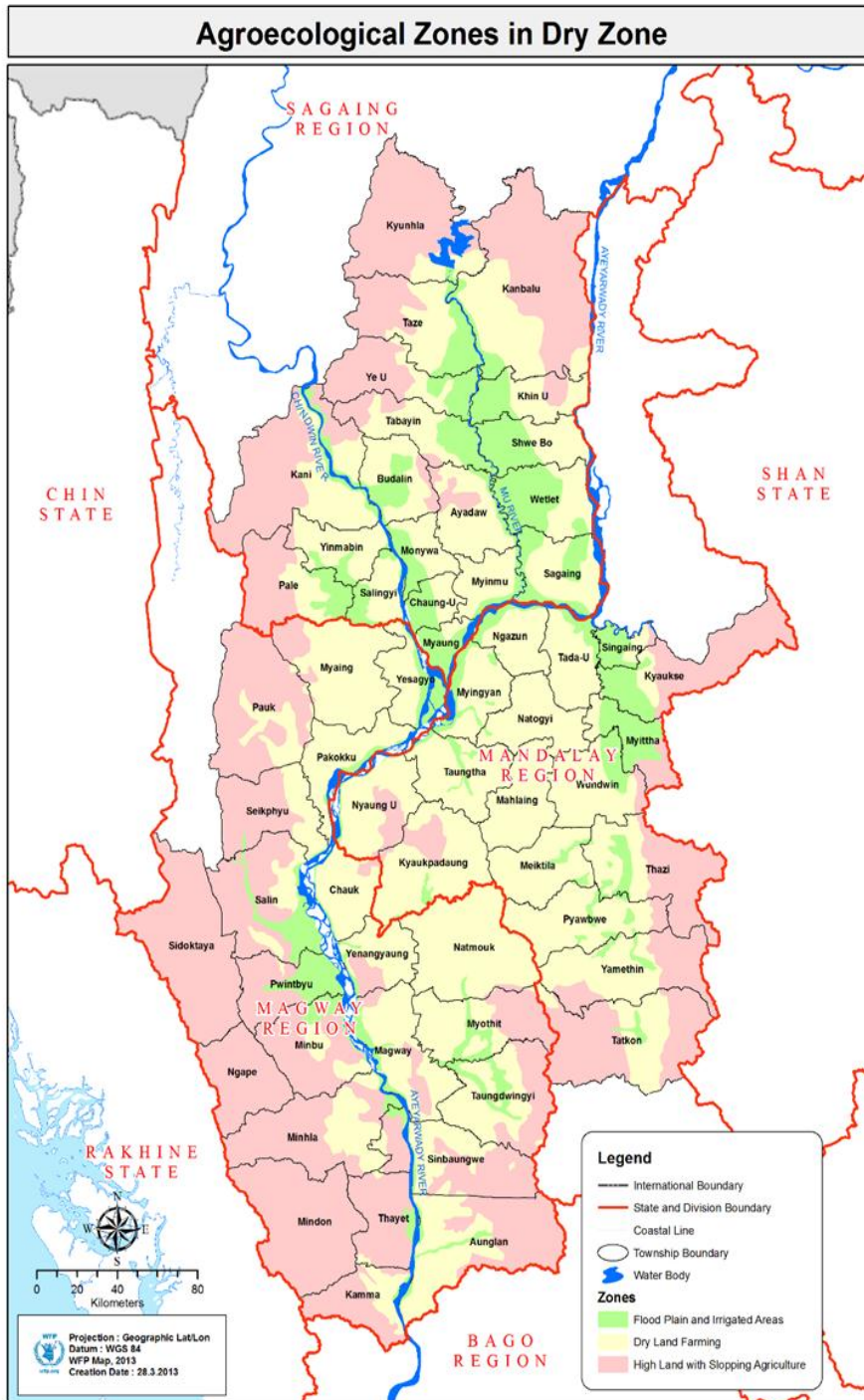
APPENDIX 3: POPULATION AND LIVESTOCK DATA FOR DZP TOWNSHIPS

Township	Area ID	Population (total)	Population (urban)	Population (rural)	Population (% rural)	Rural hh (5 per hh)	Cattle (head)	Buffalo (head)	Sheep/ Goat (head)	Pigs	Chickens	Duck	Cattle per Rural hh	Buffalo per Rural hh	Sheep/ Goat per Rural hh	Pigs per Rural hh	Chickens per Rural hh	Duck per Rural hh	No. hh with sheep/ goats (30/hh)	% rural hh with sheep/ goats
Myingyan	MMR01 0017	273,006	77,621	195,385	72%	39,077	100,354	1,056	49,560	27,703	497,514	11,502	2.6	0.0	1.3	0.7	12.7	0.3	1,652	4.2%
Natogyi	MMR01 0019	182,376	10,217	172,159	94%	34,432	106,297	203	54,307	16,941	249,845	110	3.1	0.0	1.6	0.5	7.3	0.0	1,810	5.3%
Taungtha	MMR01 0018	243,987	17,517	226,470	93%	45,294	89,245	2,150	99,984	21,007	467,902	1,187	2.0	0.0	2.2	0.5	10.3	0.0	3,333	7.4%
Mahlaing	MMR01 0029	154,860	14,078	140,782	91%	28,156	81,579	0	105,460	28,840	555,608	2,395	2.9	0.0	3.7	1.0	19.7	0.1	3,515	12.5%
Pakokku	MMR00 9018	298,676	94,457	204,219	68%	40,844	106,043	137	175,353	107,441	1,064,634	3,524	2.6	0.0	4.3	2.6	26.1	0.1	5,845	14.3%
Yesagyo	MMR00 9019	252,614	24,089	228,525	90%	45,705	101,427	269	141,681	76,547	1,072,640	2,568	2.2	0.0	3.1	1.7	23.5	0.1	4,723	10.3%
Total		1,405,519	237,979	1,167,540	5	233,508	584,945	3,815	626,345	278,479	3,908,143	21,286	2.5	0.0	2.7	1.2	16.7	0.1	20,878	9%
Average																				

Livestock – Target Farmers Summary

Sub-project title	Unit	Unit Cost (USD)	No. Units	Cost (USD)	Target population	Est. Total No farmers	No. farmers exposed	% total
CAHW Strengthening	sub-project	12,740	12	152,880	all farmers with cattle	220,000		
Vaccination Program	sub-project	8,050	12	96,600	all farmers with cattle	220,000	200,000	91%
Sheep/goat productivity	sub-project	11,990	24	287,760	all farmers with S/G	10,000	6,720	67%
Cattle productivity	sub-project	10,600	24	254,400	all farmers with cattle	220,000	11,520	5%
Sow productivity	sub-project	8,230	24	197,520	all farmers with sows	28,000	5,520	20%
Pig fattening productivity	sub-project	9,020	24	216,480	all farmers with fatteners	125,000	11,520	9%
Chicken productivity	sub-project	4,170	24	100,080	all farmers with chickens	220,000	5,520	3%
				1,305,720				

APPENDIX 4: Central Dry Zone Maps



AEZ No.	Agro-ecological Zone Name	Characteristics
1	Flood plains and irrigated areas	<ol style="list-style-type: none"> 1. Flood plain with good soil fertility 2. Irrigated land 3. Multi-cropping possibilities - year round
2	Dryland farming	<ol style="list-style-type: none"> 1. Low land, not flood prone, no irrigation 2. Suitable soil for cultivation 3. Only single or double cropping possibilities
3	High land with sloping agriculture	<ol style="list-style-type: none"> 1. High land (greater than 300 metres) 2. Soil suitable for orchards, plantations, forest 3. Sloping/shifting cultivation agriculture practiced

Typology of CDZ by Township

CDZ. Agriculture and Rural Development for Poverty Reduction

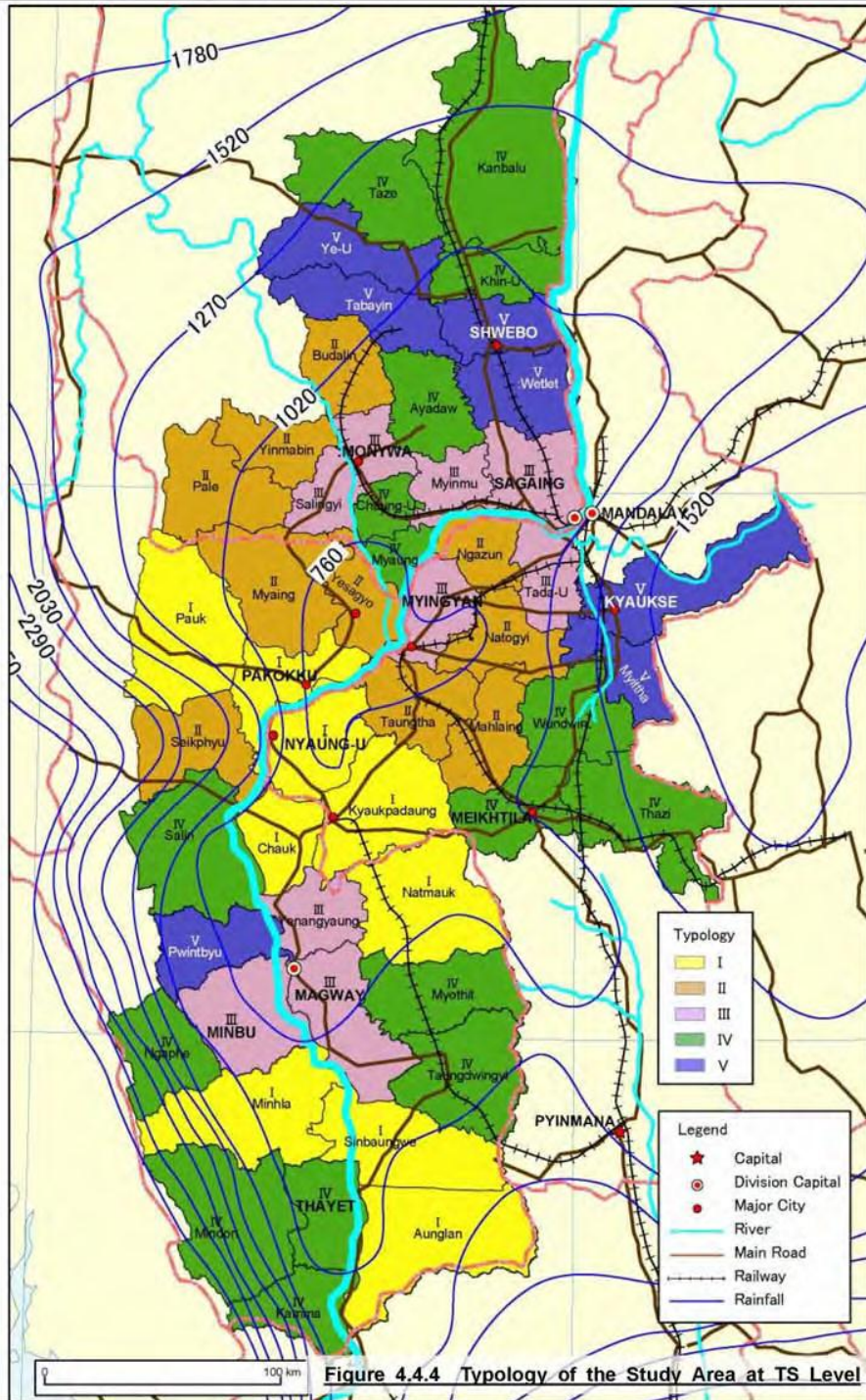


Figure 4.4.4 Typology of the Study Area at TS Level