

IIRR Myanmar

An emerging Portfolio of Climate Smart Agriculture options in Htee Pu Village

**Nyaung U Township, Nyaung DistrictMandalay Division,
Central Dry Zones, Myanmar**

Chan Myae
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The Dry Zone in central Myanmar covers a total of 58 townships in Mandalay, Magway, and Sagaing Regions. Its area is over 54,000 km² covering approximately 13% of the country's total area and accounting for roughly 30% of Myanmar's total population. Nyaung U Township is situated in the Mandalay Division, one major part of Dry zones. HteePu village is under the administration of Nyaung U Township and 22 miles far from the Nyaung U town.

In general, the Dry Zone is a resource poor area with scarcity of water, thin vegetative cover and severe soil erosion. Nyaung U Township in Dry Zone has the highest temperature among all of the dry zone regions of Myanmar. Most of the local streams are dry for much of the year with water flow limited mainly to the rainy periods.



The majority of the population is dependent on agriculture-based income and other livelihoods include livestock production, industrial labor, remittance and petty trade. HteePu's agricultural production is largely dominated by pulses, especially groundnut, pigeon peas and lima beans and other minor legumes.

Although agriculture is the major subsistence livelihood, the harshness climate conditions (especially low and unpredictable annual rainfall) are the most serious limiting factor for HteePu village. Nyaung U has the lowest annual rainfall among dry zones of Myanmar. Fluctuation of annual rainfall is the major factor which makes agricultural production unstable for this region (majority of lands are occupied by rain fed uplands).



Observed Climate Change in HteePu Village

HteePu village has experienced temperatures and associated variation. More intense and erratic rainfall and strong for decades winds lead to high soil erosion and land degradation, failing crops and lower productivity.

At Focus Group Discussion undertaken by IIRR in 2017, the community explained that water availability because of lower rainfall. More frequent and longer duration of drought has occurred in the recent years. The community has to cope with an irregular rainfall pattern, especially during the harvesting time thus seriously resulting in production loss and poor quality of the products.

Another observation is the pattern of rains. Generally, the monsoon season starts in 2nd week of July but now it has shifted to around early August. The community reports extreme temperature during summer season (the highest temperature in 1985 was just 39 °C) up to 45 °C in recent years. According to the Research station records more frequent occurrence of drought conditions was noted in 2011, 2012 and 2015.



Climate Change Impact on Agriculture in HteePu Village

The impact of recent climate change has significantly affected agricultural, crops depends. I can no longer rely on a steady, predictable amount of precipitation through the growing season. For example, in past decade, sesame was a pre-monsoon crop cultivated widely in HteePu village. However, rain shortage and drought period mid-season frequently. Sesame cultivation as pre-monsoon crop tends to fallen with lower yields. Farmers are shifting their cultivation to peanut. However peanut crop failure was occurs also observed with lower yields and poor quality.

Observed Climate Change		Impact and Consequence
1	Late Onset and early withdrawal of monsoon, Lower and Unpredictable rainfall	Changes in cropping pattern
		Less water availability in pond
		insufficient moisture content for proper growth of crops
		Yield loss
2	Extreme Temperature, Intense Rainfall and strong wind	Land Degradation through reducing moisture control and wind and rain erosion
		Water scarcity for livestock and agriculture
		Farm are destroyed
		Higher salinity level in tube well
		Yield Loss

Climate Change Impact on Livestock

Small scale livestock production is a diversification strategy in Dry zone. It is also a major livelihood for some households who lack access to land for agricultural production. Cattle, goats, pig and indigenous species of poultry are common livestock reared in HteePu village.

In HteePu village, cattle are mainly raised for purpose of agricultural activities, and are kept in home stead and staff fed. Farmers also cultivate sorghum as a source of green feeds for cattle. Free grazing forests and in the open field, is practiced for goats and for pigs. The community explained during the Focus Group Discussion (FGD) that, the availability of forage is becoming difficult (even from the community forest) as a result of drought and less rainfall.

CSA Technological Options for HteePu

1. Participatory Varietal Selection (PVS)

Diversification and intensification are key elements in the CSA strategy aimed at reducing vulnerabilities and risk to climate change. Implementing PVS trials can help identify the crop varieties which are locally adopted (tolerance to climate change: drought, heavy rain, etc), resistance to pests and diseases and low input requirements).

According to International Rice Research Institute;

"PVS is a simple way for breeders and Agronomists to learn which varieties perform well on-station and on-farm and to obtain feedback from potential end users in the early phase of the breed cycle. It is a means for social scientist to identify the varieties that most men and women prefer including the reasons for their preference and constraints to adoption. "



In Myanmar, the Dry zone has a higher share of agricultural production especially in pulses and oil crops. The major crops of HteePu village are Groundnut, Pigeon pea, Sesame and other pulses such as green gram and black gram. In HteePu village, IIRR introduced the practice of PVS for farmers for green gram groundnut, pigeon pea and sorghum. The seeds of recommended varieties have been collected from the Department of Aungban Agricultural research station.

2. Introduction of new crops (testing) for diversification

The introduction of new cultivated species and improved varieties of crop is a technology aimed at enhancing plant productivity, quality, health and nutritional value and/or building crop resilience to diseases, pest organisms and environmental stresses. Crop diversification refers to the addition of new crops or the introduction modified of cropping systems which respond to meet market demands and household needs/food security and nutrition.

Major driving forces for crop diversification include: (a) increasing income on small farm holdings, (b) mitigating effects of increasing climate variability, (c) balancing food demand, (d) improving fodder for livestock animals, (e) conservation of natural resources, (f) minimizing environmental pollution, (g) reducing dependence on off-farm inputs, depending on crop rotation, (h) decreasing insect pests, diseases and weed problems and (i) increasing community food security.



Pulses and oil seeds crops are primary crops in HteePu village, the types of pulse which the community cultivates are aimed and local markets and primary for income generation not for home consumption (especially pigeon pea and black gram) farmers are affected by unstable prices groundnut resulting from unpredictable trading policy of foreign countries. To reduce this type of vulnerability of risk and to diversify the crops for market opportunities, many households are introduced three types of pulses (Lab Lab, Lima bean, and cowpea) which have local market potential and fruit tree.



3. Intensification of Home Stead production(Fruits tree Plantation)

Home gardens are found in both rural and urban areas in predominantly small-scale subsistence agricultural systems. These gardens have persistently endured the test of time and continue to play an important role in providing food and income for the family and it can be managed even by women, children, and elders. Home gardens have been an integral part of local the food systems in developing countries around the world.

Home gardens are kept primarily for the food they produce, but densely planted gardens that include trees and shrubs can bring many other benefits as well. They can benefit as shade trees all across compound, sheltering the house and garden from the hot sun. Tree roots draw rainwater from deeper into the ground, helping to maintain moisture and boosting resilience to drought. And multi-layered gardens with trees and shrubs can provide crucial protection during storms, buffering the impact of heavy winds and rains and it can contribute to carbon capture. Importantly home gardens provide crops of nutritional importance.



Most of the rural villages possess large homestead land areas. Home garden is primarily intended for continuous supply of fresh vegetables for family use. Vegetables in home garden can contribute some advantages including (a) Supply fresh fruits and vegetables high in nutritive value, (b) Supply fruits and vegetables free from toxic chemicals (c) Help to save expenditure on purchase of vegetables (d) vegetables harvested from home garden taste better than those purchased from market. Home gardens can be used to conserve vanishing vegetable biodiversity.

As a project inception activities, dragon fruits, jack fruit and custard apple trees have been distributed to 15 women-headed HHs. Mango, pomegranate and guava plants were distributed to 30 HHs of farmers to plant on their farm.

4. Soil Conservation Practice

Desertification is intensifying in the Central Dry Zone and the productivity of agricultural land is declining as a result. Dry Zone soils are generally sensitive to degradation due to a combination of

low base fertility, high base salinity, low overall organic content, exposure to brief periods of intense rainfall, and low annual rainfall. The primary drivers of desertification are over-extraction of residences, deforestation, and soil erosion. Increasing deforestation is largely attributed to the demand for fuel wood and clearing for agricultural land. Soil erosion, particularly severe in upland areas, is largely as a result of high intensity rainfall and rapid surface runoff. Wind erosion is widespread throughout the Dry Zone, as evidenced by the sandy soils, which are very common. Increased soil alkalinity in the Dry Zone is primarily caused by the use of saline groundwater for irrigation.



To address this land Degradation trees and cover crops are being introduced along with advocacy for residence management (green leaf manure, cover cropping) CSA portfolio, rehabilitation and rebuilding of degraded soil plays important role. Demonstration and encouraging of *Cassia Siamea* tree plantation as hedgerow and windbreak is one of the approach for soil conservation. *Cassia Siamea* is locally well adapted tree and leaves can be used as green manure and provides very useful mulch and the wood can also be used as excellent charcoal. Accordingly, (all four sides of farms) IIRR has introduced the practices of soil conservation with *cassiasiam* trees as boundary planting to 25 farmers. The presence of trees creates micro climates which reduce soil and water loss.

5. Intensification of goat production via breeding center

Rearing small livestock has been promoted as a promising pathway out of poverty for rural farmers in developing countries. Livestock keepers are generally better off than those who depend entirely on crop agriculture. Livestock products are an important agricultural commodity for food security because they provide valuable kilocalorie consumption and protein. The livestock sector contributes to the major livelihoods of the landless and marginal farmers of the rural community. Livestock activity is one major category which contributes the resilience of the community for climate change impact and risk.



While the better off families have cattle, small livestock, eg goats will be introduced to the landless and women headed household along with homestead based gardens of fodder trees and grasses (calliandra, napier, leucaena, ect). Goat is well thrived livestock and common in dry zone and easier to manage even by women. In HteePu village, there is the community forest which is also grazing land for goats and cattle. Although the source of feeds are easily available, access of good quality breed is the main challenge in this village. To address for this challenge and to promote the resilience of marginal farmers and landless, 10 HHs of the community have been provided goats and being developed as breeding center for easier access of quality breeds in the village.

Generally, the community is practicing free grazing for goat rearing. However, feeds availability in the forest and grazing lands are limited during prolonged drought period. Under situation, the farmers should have prepared other source of feeds such as developing of fodder bank in house compound. For this reason, 10 of HHs have been oriented about the acacia catechu tree planting at the boundary of house compound as a fodder bank seedling will be provided (along with those mentioned earlier).

Acacia catechu is the common tree which can easily grow in dry zones and its leaves can be used as goat's feeds. According to world agro-forestry database, the tree's seeds are a good source of protein and branches of the tree are quite often cut for goatfodder and are sometimes fed to cattle.

6. School Garden

A school garden is a powerful environmental education tool. Through gardening, students have an opportunity to engage in agricultural practices on a small scale, learning about the responsibilities and impacts of land cultivation. School gardens teach students where their food comes from and how it grows. Moreover, the garden provides a dynamic environment in which to observe, discover, experiment, nurture, and learn.



In Myanmar, almost all the school's campus in rural area occupies large space of land and nothing was being done in there, the school of HteePu village as well. Accordingly, one school garden with various types of fruits trees and vegetable plot has been developed in coordination with village community and teachers and parents association.

Detail of Project inspection activitiesfor HteePu village (2018 Crops season)

Opening Activities 2018 Cropping Season	# of HHs
Participatory Varietal Selection crop trials	10
PVS trial Three Goundnut varieties from Nyaung U Research	3
PVS trial of Pigeon Pea from Philippines and local variety	2
Introduction of new crops for diversification	30
Introduction of quality Lab Lab bean cultivation	all
Introduction of Lima bean cultivation	18
Introduction of cowpea cultivation	12
Intensification of Home Stead production(Fruits tree Plantation)	60
Fruits Tree plantation (Mango, Pomegranate, Guava)	30
Fruits tree plantation (Custard Apple, Jackfruit, Dragon fruit)	25
Home Garden (vegetables production)	5
Soil conservation practice	55
Cassia Siamea tree as boundary planting for Mango farmers	30
Cassia Siamea tree for Home Garden	25
School garden	1
School garden with 10 types of fruits trees	1
Goat Breeding Center	10
2 goats for each HHs for breeding	10
fodder crops planting	



Summary and Tentative plans of CSA options for Masein village

Nearly 60 HHs out of total 275 HHs from HteePu village are participating on inception activities on Climate smart Agriculture options in the 2018 cropping season.

Climate Smart Agriculture options are very locally specific and the options will be varied depending on agro ecological zones and culture and nature of the community. All the options will not be constant ways of practices and methodology; it may be variable according to the climate change occurrence. Moreover, some indigenous practices which community using are already smart and just need to be enriched (eg better management practices).

Accordingly, annual planning and reviewing workshop will be held every year during project implementation, in coordination with each partner organizations and with support agencies (Food security working group, Yezin Agricultural university, Department of Agriculture Research Stations) to share, discuss and develop more locally adaptive strategy and options for climate smart agriculture options for each agro-ecological zones.

Future work will likely include enrichment planning of community forests with multiple use tree and grass species to serve as “banks” in case of long droughts in order to “save” livestock assets of HteePu.