



BRACING FOR CHANGE: INNOVATIVE AGRICULTURE PRACTICES IN MYANMAR



Country Director's forward

Climate change on a global scale is the biggest threat facing our planet today, and its affects are already being felt in cities and villages across the world. Myanmar is particularly vulnerable, with the majority of the population drawing their income from agricultural activities, therefore changes in climate and weather have the potential to devastate millions of lives. At this pivotal time in the country's economic development, it is more important than ever to support rural communities in their development, and to focus on increasing their resilience to extreme environmental changes. Climate change has always been one of the key priorities of ActionAid globally and in Myanmar. This study documents evidence of climate resilient sustainable agriculture practices in three ecological zones in Myanmar. I believe that this document will contribute to awareness raising of how climate change affects agricultural workers in Myanmar and the steps that can be taken to strengthen communities and adapt to change. The Climate Resilience and Sustainable Agriculture project within the BRACED program aims to educate agricultural workers and demonstrate how small practical changes in farming methods can have a significant effect on their crop yield, and help build a sustainable livelihood. Our thanks go to the three farmers who participated in the demo plot activities, for their cooperation and willingness to try new methods and ideas. Many thanks to DFID for funding this program, to Khin Win Kyi, the BRACED team and the ActionAid Myanmar field team for their hard work in implementation and Dr Win Htin for sharing his expertise and experience on agriculture and climate change. Additional thanks go to Tauhid Ibne Farid, Head of Programs for ActionAid Myanmar for his supervision and guidance, and to Hannah Russell for capturing the project in this study.



Shihab Uddin Ahamad

Climate change in Myanmar

Myanmar is a country with a rich and diverse environment, and an established agricultural tradition. Today over 62% of the population relies on agriculture for their livelihoods while 70% of population live in rural areas, however climate disasters are threatening the future of farming. According to the Global Climate Risk Index, Myanmar ranks as the second country in the world most affected by climate change in the last 20 years. Change in weather patterns is already affecting large parts of the country, for example the high temperatures caused an extreme drought in 2009, resulting in a record loss of crops and water sources across the country, particularly affecting the dry zone. Similarly, the heavy rain in 2011's monsoon season caused flooding in multiple regions, resulting in the loss of almost 2 million tons of rice³.

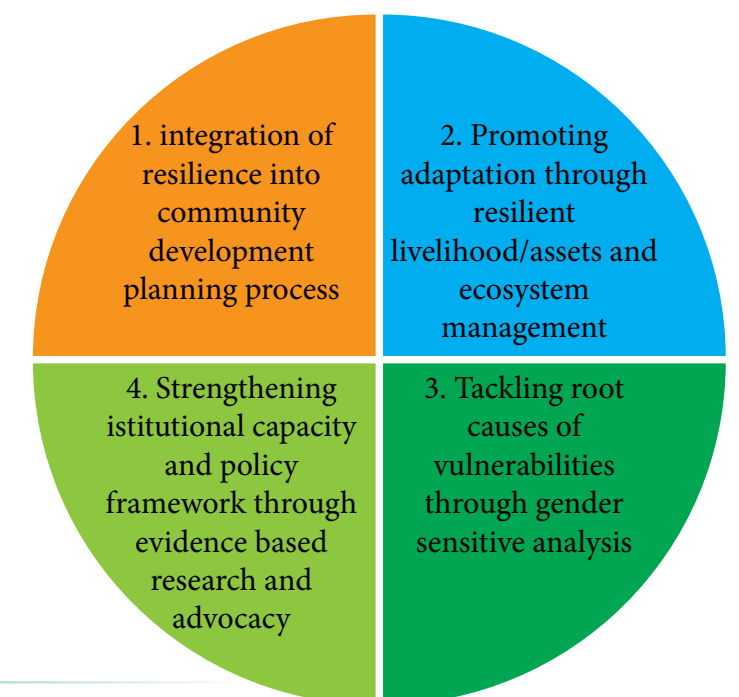
With the risk of natural disasters and changing weather patterns increasing every year, ActionAid Myanmar (AAM) is working to help prepare farmers to increase their resilience, learn new farming methods and secure their livelihoods for the future.

To build communities to become more resilient and prepared for effective emergency response bringing necessary changes policy and practices both at community and national level, AAM has been working DRR and resilience program since 2008 Cyclone Nargis. In line with global frameworks on DRR/CCA and National Action Plans such as MAPDRR/NAPA, AAM builds local resilience and response capacities along with 150 communities, 11 local and international organizations, 5 Government departments such as Relief and Resettlement Department, Department of Meteorology and Hydrology, Department of Forestry, General Administrative Department and Department of Rural Development. With the support of UKaid and ECHO, AAM builds 150 young people capacities to lead community resilient activities in 150 villages in Myanmar. To build the resilience of coastal and urban communities through inclusive DRR in Myanmar, AAM is the leading agency of Myanmar Consortium for Community Resilience (MCCR) with Help Age International, Oxfam, Plan, UN-Habitat, and Action Contre La Faim (ACF). AAM is an active member of Steering Committee of DRRWG in Myanmar. And AAM leads Public Awareness Technical Taskforce which is formed under DRRWG. For building Resilience and Adaptation to Climate Extreme and Disasters, through BRACED project, AAM is collaborating with Plan International,

al, World Vision, UN-HABITAT, Myanmar Environmental Institute and BBC Media Action to empower communities to take leadership in determining their local priorities for Disaster Risk Reduction and Climate Change Adaptation. This documentation of good practices on climate resilient sustainable agriculture has been supported by BRACED project and funded by UK Aid

ActionAid's approach to Climate change

AAM's approach to building resilience in Myanmar comes from years of working experience with stakeholders at all levels, from grass roots communities, to national level advocacy, to international campaigns and large scale knowledge sharing. Women are placed at the center of all programming in order to address the gender inequality endemic in social power structures, and particular focus is given to ensuring the participation of the most vulnerable and marginalised groups in project communities. We have integrated community-based Disaster Risk Reduction (DRR) with resilient livelihoods across Myanmar, and facilitated the production of the village DRR plan by using the 'Village Book' approach, incorporating resilience assessments and school planning, in order to formulate a comprehensive development planning process for each community. AAM forms linkages between the communities and their service providers in local and national government, so that their analysis and solutions to DRR issues can become part of policy and go on to benefit others nationwide.



¹ <http://themimu.info/sector/agriculture>

² <https://germanwatch.org/en/download/16411.pdf>

³ <http://myanmarccalliance.org/en/climate-change-basics/impact-of-climate-change-and-the-case-of-myanmar/>

Climate Resilient Sustainable Agriculture

Climate Resilient Sustainable Agriculture (CRSA) is an initiative AAM and partners have been developing based on the science and practices of agro-ecology and the recognition of people's right to food. It represents an effort to incorporate in our work the new challenges posed by climate change and its impacts on people's lives. It is based on the identification of the major risks and challenges local communities now face, and are likely to face in the future, and on the design and implementation of site-specific adaptation strategies aimed at reducing vulnerabilities and increasing the resilience of smallholder production systems. AAM is part of the BRACED project, which aims to build the resilience of 350,000 people across Burma to climate extremes through protecting livelihoods, improving institutional coordination and influencing national policy, which is supported by UKAID. As part of CRSA, AAM designed a pilot program in three different geographical locations in the Delta, Dryzone and the South East Region in Myanmar which was piloted in 5 communities across 3 townships; Laputta, Hpa'an and Meiktila. The program selected 5 communities that would be used to test the effectiveness of climate resilient farming techniques on the crop yield, and also to measure the effect of capacity building processes with farmers. The demo plots are used as a sustainable farming practice to showcase how the project could be ex-

panded and sustained to make the agricultural industry more resilient countrywide. Each of these project areas has a particular climate and agricultural conditions which make crop yield unreliable and uncertain. The effect of climate change on these areas in recent years has changed the way crops develop and how they are harvested. As a result of the slow onset disasters, the farmers and community members are exposed to multiple hazards which leads to losing hope and confidence for their near and long term futures. Laputta, located in the Delta region in Myanmar, is well known for quality rice production and fisheries, which were severely devastated by Cyclone Nargis in 2008. Changes in climate have resulted in high levels of flooding, intrusion of saline water and increased number of cyclone and depression, which has led to water encroachment in the fields and sedimentation of sands on the farm plots. Hpa'an is located in Kayin state in the South east Region has a almost similar similar problem, with higher levels of flooding either from sea water or salinewater, making the land less fertile it has also been affected by protracted crises for almost five decades due to conflict situation. Meiktila is located in Manadaley Region falls under the dry ecological zone. The climate change induced hazards are a bit different in Dry zone than other regions. Mostly farmers experience extreme climate conditions with extended dry periods, leading to drought and intensity of heavy rain causing devastating flooding. The result is damaging soil erosion and crop production.



Methodology

In order to select the locations for the demo plots, AAM conceived a design methodology that incorporated both community perceptions and rigorous data collation and analysis.

Firstly, data was collected and reviewed on the status of implementation of existing agriculture projects in the target townships. The key challenges and possible solutions were identified through the gathering of data from questionnaires and interviews with the fellows from the target areas, and multiple field visits by the research team. This information allowed AAM to construct a specialised coding system for mapping units for this project, which categorized incidents of climate change into four groups: events, class, variety and intensity. These mapping units were tested at the field level in collaboration with community fellows, and their use was supervised by the CRSA team throughout the project. The implementation of the new farming techniques was monitored and analysed by the CRSA team in a series of follow up field visits.

The survey questionnaire was the first step to identifying the project villages suitable for the project, comprising of 2 out of 30 villages in Meiktila, 2 out of 16 in Laputta and 1 out of 10 in Hpa'an. The questionnaire helped establish which 5 of the 56 villages was the most vulnerable to incidents of climate change, so the questions focused on practical events that had affected the farmers. The questionnaire focused on several areas of inquiry; types of disaster experienced in the community, the location and severity of the attacks, and their impact on livelihoods, food security and local infrastructure. The survey also included follow up questions on the vulnerable groups affected by the climate change induced disasters, and the livelihoods that

sustained the most damage. Once the data was collected, the CRSA team met with fellows, village elders and committee members to discuss the results and assess the feasibility of demo plot implementation in their community.

Trainings were conducted by AAM at each of the 3 project townships over the course of the program, in order to equip demo plot farmers, township AAM staff and Fellows with the knowledge and tools required to implement sustainable agriculture activities successfully and with a view to the long term.

The CRSA team met with AAM fellows from each of the target communities and conducted a training session on the structure of the questionnaire, and then requested that they carry out a mock survey in preparation for the actual survey for data collection. This exercise familiarized the fellows with data collection and the formation of mapping units, which helped to build their capacity to conduct future surveys and understand data gathering. The demo plot farmers, fellows and AAM field staff attended a training session which focused particularly on the impact of climate change on livelihoods, agriculture and the environment. The training also included a component on the design of the CRSA program, innovative technology and strategy formation. The final training was given to selected farmers of the demo plot, fellows from the selected villages, AAM staff and also other farmers from the townships. The training was centered around best agricultural practices, such as quality seed selection techniques, seed treatment and priming, crop production management, efficient and effective use of fertilizer, cultivation and storage techniques and minimizing post-harvest loss. After this training, the demo plot farmers were given some input funds to spend on tools, fertilizer and seeds recommended by the CRSA team.

Table 1: Geographical context of demo plot areas

Area	Incidents of Climate Change	Overall effects of Climate Change	Additional issues	Crops Grown
Labutta (Delta region)	Increased flooding, tidal surges, sea water intrusion, cyclone, heavy rain, river erosion, landslides	Crop damage and loss, low crop yield, farm assets damaged, houses and infrastructure destroyed, saline water intrusion encroachment into farm land, soil erosion, sand deposition in paddy land, loss of soil fertility	Lack of knowledge on seed selection, production and storage. Application of new fertilizers has led to post harvest damage. Lack of agriculture extension. Lack of access to ready capital. Lack of information on market accessibility.	Rice
Hpa-An (Lower Myanmar-Coastal region)	Increased flooding, cyclone, heavy rain, landslides			
Meiktila (Central Dry Zone)	Limited rainfall, drought, irregular but intense rain, high temperatures, strong winds	Poor growth, low and failed crop yield, soil erosion, food shortage, increasing poverty	Lack of agricultural knowledge on efficient fertilizer application, lack of awareness of Good Agricultural Practices post-harvest loss, multiple / mixed cropping and crop rotation	Butter beans, mung beans, sunflowers, mace

⁴ The Village Book is a crucial social mobilization tool that allows the community members to come together and analyse their own problems and find the solutions. This tool enables them to demand their rights from the duty bearer. It is also an effective tool that empowers vulnerable members of the community to challenge the existing power structures, within and outside the community.

⁵ Cyclone Nargis landed in Myanmar in May 2008, causing mass devastation across 37 townships and affecting an estimated 2.4 million people, source: <http://www.ifrc.org/en/news-and-media/news-stories/asia-pacific/myanmar/myanmar-cyclone-nargis-2008-facts-and-figures/>

Criteria for plots and farmers

In order to ensure that the demo plots were based on the needs of the community rather than the project, the research team developed criteria for village selection, model plot design and farmer selection. This criteria was customized and contextualised in line with ActionAid Myanmar's approach to CRSA, and designed to select the most suitable location and farmer that would benefit the most from the project.

The village selected had experienced or was experiencing extreme incidents of climate change, which have a strong and consistent impact on the community at large the agriculture and livelihoods of the community members.

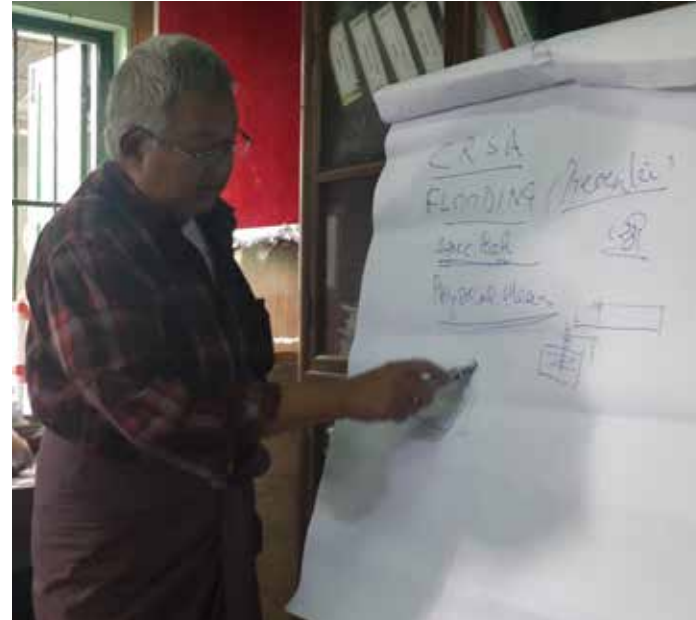
It was important that the demo plot was located incomparatively easily accessible cultivated farm land, and located nearby the community living in village , in order that it could be replicated across the commu-

nity effectively. The CRSA team also ensured that the demo plot was the farming land of the project farmer and was not involved in any current land disputes that could complicate the project.

The demo plot farmer was required to be dedicated and skilled at traditional farming practice, and have experienced the adverse effect of climate change events in his fields. Therefore, the farmer should have had a high interest in the project and be willing to follow and implement the activities. Crucially, he should be willing to share the innovative knowledge and techniques gained from the research initiative with the native community, to maximize the number of project beneficiaries. But unfortunately, during the selection process, no female farmers were available or interested, which resulted in selection of only male farmers. The lack of gender diversity in the farmer selection remains one of the limitations of this research initiative.

Solutions and technologies

Based on the existing agricultural context, environmental constraints and consultation with local farmers and community members, the CRSA team formulated a series of recommendations to be implemented to adapt to and mitigate risk, increase yield and improve the livelihood of the farmer and his family. The recommendations were divided into two parts, one for Laputta and Hpa'an as they faced similar problems, and one for Meiktila in the Dry Zone.



Innovative technology: Meiktila

- Make use of identified local/ traditional crop varieties resistant to climate change
- Using crops that demand less water requirements for growth and are high yielding varieties
- Applying mixed cropping of 2-3 crops (butter bean, mung bean, maize, sunflower)
- Crop rotation of grain and green manure crops
- Conservation of traditional varieties resistant to climate change
- Ploughing more deeply into the soil to absorb more moisture and maximize
- Efficient minimal application of chemical fertilizers
- Application of Good Agriculture Practices, such as water management, weed and pest control

Innovative technology: Labutta and Hpa-An

- Make use of identified local / traditional varieties resistant to climate change
- Quality seed selection and priming techniques
- Efficient application of suitable fertilizers in correct quantities, used at the most beneficial time according to the plant's growth stages
- Application of Good Agriculture Practices, such as water management, weed and pest control
- Application of suitable agricultural practices appropriate to the location
- Applying techniques to reduce post-harvest loss



Table 2: Results of demo plot

Township	Village/ tract	Village	Crops grown	Crop yield from demoplots	Contextual analysis and observation
Meiktila	Te Hla/ Than Bo		Multiple cropping butter bean, mung bean, corn	Farmer's forecast: 20 basket/acre - for local plots: 5-7 basket/ acre CRSA yield: 12 Value of butter beans per basket: 19000 Myanmar kyat/14 USD Overall profit: 228,000 Myanmar Kyat/ 168 USD	Successful crop of butter bean, however the mung bean and corn crops failed. Beginning mid-October, Meiktila experienced daily rainfall for 6 weeks, causing flowers to drop and infestation of insects set in. This is the first time it has rained in October for 40 years in this area, clear evidence of the impact of climate change on the environment. Due to this extreme weather, the CRSA yield was not high for this area, however this was the only plot which yielded any crops at all out of the 200 other farmed plots in this village, all of whose crops were destroyed by the rain. As a result, many farmers are interested to learn about the new agricultural techniques.
	Let Pan Aing Anauk / Za Yat Kone		Multiple cropping butter bean, sunflower, maize	Farmer's forecast: 10 basket/per acre. CRSA yield: 9.5 Value of butter beans per basket: 8300 Myanmar kyat/6.2 USD Overall profit: 78,850 Myanmar Kyat/ 59 USD	Successful crop of butter bean, however the sunflower and maize crops failed. Beginning mid-October, Meiktila experienced daily rainfall for 6 weeks, causing flowers to drop and infestation of insects set in. This is the first time it has rained in October for 40 years in this area, clear evidence of the impact of climate change on the environment.
Labutta	Shwe Ni/ Poe Laung		Rice: Anwar Bo local traditional variety	Farmer's forecast: 40 basket/ acre CRSA yield: 90 basket /acre Overall yield increase: 125% Value of Anwar Bo rice per basket: 8500 Myanmar kyat/6.5 USD Overall profit: 765,000 Myanmar Kyat/ 585 USD	The Anwar Bo rice variety is native to the lower delta region of Myanmar. As it is native to the region it has a natural resilience to exposure to high volumes of saline water. Previously farmers were importing the High Yielding Variety (HYV) rice seeds, which are not climate resistant. Anwar Bo was the local traditional variety which has now been reintroduced to the region through the CRSA program.
	Aung Hlaing/ Thit poke			Farmer's forecast: 40 basket/ acre CRSA yield: 60 basket/ Acre Overall yield increase: 50% Value of Anwar Bo rice per basket: 8500 Myanmar kyat/6.5 USD Overall profit: 510,000 Myanmar Kyat/ 390 USD	
Hpa-An	Taung Galay/ Kyaaw Yin (Ah Htet)		Rice: Sinthukha local high yielding variety	Farmer's forecast: 100 baskets CRSA yield: 60 basket/ Acre Value of Sinthukha rice per basket: 8000 Myanmar kyat/6.5 USD Overall profit: 480,000 Myanmar Kyat/ 390 USD	Crop was planted late due to saline water in the field. This flooding didn't recede until November. At the time of harvesting there was a rat infestation, due to the CRSA innovative technology, the demo plot farmer collected 20 more baskets than the other farmers in his community.

Farmer testimonies

“Previously I was struggling with my confidence on my knowledge and skills that I gained over period of time, I have found the trainings and information very useful for improving my farming and crops. At first, I didn't know about the kind of fertilisers which the CRSA program introduced, but now I understand their function and application. Before, we wasted lots of seeds by spreading them too thickly, but now we scatter fewer seeds and practice deeper and more linear tilling techniques, which has produced more crops. I also learned how to properly make and use compost, and how to tell when it is ready to use in our rice paddies. I will continue using the techniques moving into the future, and I am happy that I had these trainings and improved my knowledge of farming.”



U Saw Ka Shwe, 34, Taung Kalay village, Hpa-An

“I farm 5 acres of paddy fields, but for the last two years I have struggled to produce any crops. Almost 80% of our community members died cyclone Nargis in 2008, so we found it difficult to survive. One day, The AAM team came to our village and explained about the demo plot project, and I was selected as the demo plot farmer. I attended two days training in Labutta, which taught me about new ways of planting and selecting seeds. When I returned to my village, I applied the techniques from training in my model paddy fields by selecting the appropriate type of Paddy for my seeds, I built high boundaries to protect from salt water entering the field. Due to the extreme weather, most of other farmer's fields were full of salt water but mine were protected. AAM staff members came and visited my field and offered further advice and information. At the harvest time, we gathered more crops than ever before, over double what we have had in the past, and the highest in the village for that harvest. I hope that other farmers will use the same techniques that I did in the future to improve their crop yield.”



U Myint Zaw, 41, Labutta



U Aye Myint, 50, Tae Hla village, Meiktila

This demo plot came in a time when I almost decided to shift my job due lack of series of crop failure and my indebtedness. I gained new knowledge on agriculture techniques such as fertilizer production and

maintenance, seed maintenance, the multi cropping system, and use of natural pesticides. I gained knowledge on what types of crop are suitable for which soil, the amount of fertilizer that should be used and how to properly store seeds. AAM also supported us with the advice of a technical expert and cash for development. I planted butter bean as a main crop and corn as a mix-crop, and due to the new techniques I used while planting, my crop wasn't destroyed during the unexpected rainfall, the other farmers in my community had their fields flooded and crops destroyed. After that, the other farmers came to me and asked for my help in preparing their fields to be more resilient, and also for details of my fertilizer technique. Moving forward, I would like to help teach the other farmers in my community to learn new techniques to support their families.

Thanks to the CRSA project, I got 12 baskets of butter bean and sold 19000 kyats per basket, which will help me to support my 6 family members this year. “



For the next stage of the program, each target community produced a proposal along with a list of expenses for approval by AAM. The number of plots using CRSA technology has risen in each area, and the farmers have begun preparing the fields for the next season of growth. AAM is now working closely with the farmers to implement the following activities:

- Promote effective use of natural fertilizers in tandem with plant growth stages, and discourage the use of expensive or ineffective chemical/compound fertilizers
 - Improve farmer's knowledge on post-harvest technology, such as correct storage of seeds and transportation of crops to market
 - Establish of seed banks, funded through collaboration with the village committee
 - The demo plot farmer will become a focal person in the community for rolling knowledge from the CRSA project
 - A seed multiplication program will be established, where the farmers will produce their own seeds instead of buying. They will have a small plot dedicated to seed production from the successful crops.
- In June and July 2017, representatives from the Department of Agriculture (DOA) conducted trainings for the farmers in the project communities, and have agreed to work with AAM's field team to deliver future trainings and technical support. Additionally, the DOA are working to incorporate the CRSA approach into their own regional agricultural policy to benefit other farmers in the different areas, and eventually nationwide. AAM will continue to work with farmers and farming communities across Myanmar to improve their access to health, education and diverse livelihood opportunities.

Sustainability

Through data gathering and project implementation, the farmers have been able to either significantly increase their yield or retain significant crops despite extreme and unexpected climate events. The training and education sessions facilitated by the CRSA team

have helped to equip farmers with increased knowledge and skills, and combined with the success of the demo plots, has garnered the interest of other farmers in the area who are interested to learn and apply those techniques to their own agricultural practices.

“The Farmers initially had a very negative attitude; they were resigned to the effects of climate change on their crops. However when I said I could help lessen the impact and improve their yield they became interested. They didn't know how resilient they really were, and how that could be a source of power.”

Dr Win Htin

Dr Win Htin is a climate change expert, with over 50 years working experience in climate change and sustainable agriculture both in Myanmar and in South East Asia. His most recent work focuses on soils, crop, and water conservation. Dr Win Htin joined AAM in March 2016 as a consultant, and remained until the pilot conclusion in March 2017.

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