MercyCorps

THE DRY ZONE OF MYANMAR

A strategic resilience assessment of farming communities

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KEY RECOMMENDATIONS FOR ACTION

The purpose of this study was to evaluate the potential for agricultural-based communities in the Dry Zone of Myanmar to be harmed by shifting environmental conditions, a disabling governance and policy environment, and inefficient agricultural-based markets. Though specific topics such as water resources, indebtedness, and agricultural policy are well studied in the Dry Zone, few systematic efforts have been employed to evaluate and prioritize the cumulative impacts resulting from interacting and multi-sector shocks and stresses facing communities. This report presents an overview of a Strategic Resilience Assessment (STRESS) conducted by Mercy Corps in partnership with Enlightened Myanmar Research (EMR).

The use of credit is vital for Dry Zone farming communities, but debt accumulation and restrictive repayment terms reduce the ability of households to positively cope and adapt to easily perturbed social, economic, and environmental conditions. Other types of shocks and stresses such as poor access to quality inputs, unsupportive policies, erratic rainfall, and land degradation are in a dynamic state of interaction with both the debt cycle and each other. They are feeding off one another, and their cumulative impact is greater than from an individual stress.

To build resilience and positively manage challenges, development strategies should be tailored to increase the absorptive, adaptive, and transformative capacities of communities. Together, these represent the short-, medium-, and long-term capabilities that are essential for community resilience. They are also the foundation of support recommendations presented here through a Theory of Change (ToC). Potential resilience-building development strategies have been placed into three groupings that support and reinforce one another: (1) *better and more flexible financial options* can increase the potential profitability of existing livelihood strategies and the ability to invest in new ones; (2) *improved crop production strategies* can intensify production more sustainably by getting more from less, better absorbing the impacts of variable conditions, and increasing the market power of farmers and laborers; and (3) *diversifying income streams* aims to help households better manage risk by spreading investments across more than one type of livelihood strategy.

Farming communities with poor access to supplemental water and markets are much more sensitive to environmental shocks and stresses than those with good access. This places them at much greater risk during the crop cycle, particularly after planting when they have already financed input purchases and committed to specific crops. Priority development strategies should increase access to more flexible credit options, foster adoption of low-cost strategies that protect and improve the productivity of soil and water, and improve access to off-farm or complementary livelihoods options.

Farming communities with good access to supplemental water and markets are more impacted by market-based shocks including indebtedness, poor access to quality inputs, and price fluctuations. Priority development strategies should increase opportunity for income diversity and increased market power (inputs and outputs) with support for improved technical capacity and investment in productive assets.

INTRODUCTION

The agricultural sector is a vital and historic source of livelihood in Myanmar, particularly for the poorest segments of its society. Yet, the country continues to underperform compared with its regional neighbors. Agricultural communities largely remain food insecure and trapped in poverty as a result of decades of ineffective institutional support, international isolation, and unsupportive policy. As Myanmar undertakes a process of political and economic reform, there is renewed effort to improve the contributions of the agricultural sector toward pro-poor economic growth.

To effectively reduce poverty and improve food security, more strategic support is required, which necessitates a systematic understanding of the current and potential future challenges facing communities in Myanmar. It is for these reasons that Mercy Corps Myanmar, in partnership with Mercy Corps' Environment, Energy and Climate Technical Support Unit (EEC TSU) and Enlightened Myanmar Research (EMR), has undertaken a Strategic Resilience Assessment.

Shocks and stresses play key roles in food insecurity and poverty in the context of agricultural livelihoods. The primary goal of this assessment was to evaluate the potential for agricultural-based communities in the Dry Zone of Myanmar to be harmed by shifting environmental conditions, a disabling governance and policy environment, and inefficient agricultural markets. Though conditions in the Dry Zone are well studied, little analysis has focused on evaluating and prioritizing the cumulative impacts resulting from the interaction between multi-sector shocks and stresses facing communities. Therefore, this work is intended to inform the development of a broad and interdisciplinary resilience strategy for the Dry Zone—one that supports and guides the integration of such a strategy into future development programming.

The assessment utilized Mercy Corps' STrategic REsilience aSSessment (STRESS) methodology. STRESS is a process for identifying and prioritizing vulnerabilities to shocks and stresses, as well as the capacities of a system to absorb, adapt, and transform in the face of these. The STRESS process is designed to establish a sufficient understanding of existing context and systems dynamics in order to develop an evidence-based theory of change for a resilience-building strategy or program. This multi-scale (community, regional, national) assessment sourced and analyzed information from existing studies and secondary data (top-down) with information collected from communities and stakeholders across the region (bottom-up). This STRESS comprised three distinct phases: (1) literature review and background research, expert and key informant interviews; (2) community data collection; and (3) analysis and strategy design.

The products of this work are presented here, including a summary and analysis of the findings from each phase of the assessment process and the resulting Theory of Change (ToC), which aims to inform future Dry Zone development programming. An overview of relevant social and economic characteristics, primary shocks and stresses, impact analysis and recommended development strategies are detailed in the following sections.

THEORY OF CHANGE

Food insecurity is a primary constraint for Dry Zone communities. The majority of households are dependent on agriculture-based income (83%) in a context of low profitability, poor diversification, high debt, and reliance on credit.[1] As a result, farming communities are ill-equipped to effectively respond to the shocks and stresses they are persistently exposed to. The most common shocks and stresses chronically affecting farming communities interact with one another with their cumulative impact greater than those of individual ones.

At the center of the relationships between shocks and stresses is the debt cycle. Credit is a vital capacity, but overwhelming debt and restrictive repayment terms reduce the ability of households to positively cope and adapt to easily perturbed social, economic, and environmental conditions. Indebtedness is further exacerbated by ineffective use of inputs of suspect quality, erratic rain, less productive land, and agricultural policies that stifle profitability and choice. In turn, when the debt burden becomes unmanageable, households have reduced input purchasing power, including the ability to hire sufficient labor, and they are more likely to engage in negative coping strategies that degrade the environment, reduce productivity, and inhibit investment in productive assets.

Absorptive Capacity is the ability to minimize exposure to a shock and recover quickly when exposed.

Adaptive Capacity is the ability to quickly and effectively respond to changing conditions.

Transformative Capacity is the ability to move beyond chronic poverty and insecurity through systematic changes that promote resilience.

Figure 1: Definitions of capacity

In order to break the cycle of poverty, development strategies must be tailored to increase the capacities of communities to positively manage these challenges. Community capacities can be categorized into three groups: absorptive, adaptive, or transformative (Figure 1). Together, these represent the short-, medium-, and long-term capabilities that are essential for community resilience[2] and are the foundation of support recommendation presented here through a Theory of Change (ToC). Strengthening capacity in these three areas is the intended outcome of the strategies outlined in the Resilience Pathways section of this report.

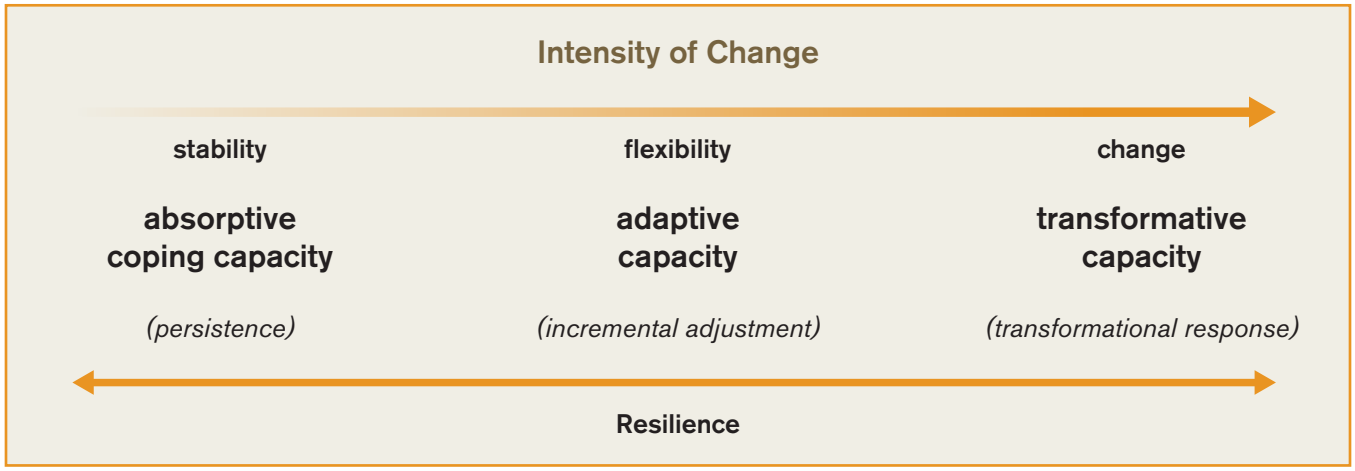

Figure 2: Functional roles of resilience programming, Source:, Béné et al. 2012,.

1 "A Nutrition and Food Security Assessment of the Dry Zone of Myanmar," Save the Children and World Food Programme 2014.
2 "Resilience: New Utopia or New Tyranny? Reflection about the potentials and limits of the concept of resilience in relation to vulnerability reduction programmes," Béné, C. et al. 2012.

This proposed ToC is a product of the quantitative and qualitative information collected and analyzed throughout the assessment process. However, it must be considered as a starting point. The contribution to resilience these strategies aim to deliver must be tested, measured against, and revised as knowledge and experience is gained. As conditions change in the Dry Zone, the validity of the ToC should be regularly questioned and revised.

Mercy Corps' Theory of Change for Increasing the Resilience of the the Dry Zone

If we build absorptive, adaptive, and transformative resilience capacities at individual, household, and community levels to better manage environmental, governmental, and market-based shocks and stresses, then the well-being of farming communities in the Dry Zone will be improved.

Impact

If this Theory of Change holds true, then the food security of farming communities in the Dry Zone will be enhanced by improved capacity to prepare for, manage, and ultimately continue to positively develop in the face of environmental, governmental, and market-based shocks and stresses. The impact performance measure is the growth and stability of household incomes.

The overall result is supported by three outcomes, which individually aim to support short-, medium-, and long-term capacities. Collectively, three outputs support these three outcomes. The development strategies grouped under each output support either increased absorptive, adaptive, or transformative capacity. *Better and more flexible financial options* aim to increase the potential of existing livelihood strategies (productivity and income), as well as the ability to invest in new ones and diversify sources of income. Improved crop production strategies aim to sustainably boost profitability by yielding more from less, better absorbing the impacts of variable conditions, and increasing the market power of farmers and laborers. *Diversifying income streams* aims to help households better manage risk by spreading investments across more than one type of livelihood strategy. Individual development strategies are purposefully broad because of the wide-ranging context found in the Dry Zone. Any deployed strategy must be tailored to the specific context and priorities of an individual community.

Outcome 1 | Increased Absorptive Capacity | Development strategies improve the capacity of farming communities to reduce and manage risk throughout the crop cycle.

Risk fluctuates throughout the crop cycle, but peaks during the early growth period. Pests and disease, fluctuations in rainfall and temperature, and extreme events such as droughts and floods all threaten productivity once the season begins. Come harvest time, fluctuating market conditions, including dips in commodity prices, are potential shocks to income. Farming communities can better absorb shocks by accessing options to effectively manage income disruptions, to improve the productivity of soil and water, and to invest in structures and techniques that mitigate the impacts of natural hazards (such as anti-erosion or flood protection measures).

Output 1: Improved access to financial strategies

- When climate- and market-related shocks impact communities, mechanisms such as increased access to crop insurance, emergency credit options, and emergency food stocks increase the ability of households to absorb those impacts while minimizing their long-term damage (such as possession of productive assets).

Output 2: Improved agricultural production strategies are employed

- Increasing capacity to absorb erratic rain can be supported through better soil and water management practices that stabilize and improve productivity throughout the crop cycle, while also

increasing access to sources of supplemental irrigation, flood mitigation structures, and weather forecasting.

- Increasing the absorptive capacity in the face of pest infestations and plant disease can be strengthened through improved access to and use of quality pesticides and fertilizer.

Outcome 2 | Increased Adaptive Capacity | Development strategies improve the capacity of farming communities to respond and adjust to variable climate and market conditions.

Low agricultural profitability is a critical constraint to farming communities in the Dry Zone. Poor access to supplemental sources of water amplifies the impact of erratic rainfall on crop production. Though inputs of all levels of quality are generally available, most farmers cannot afford suitable ones and have difficulty differentiating between good and bad. Inflexible loan repayment terms for inputs force farmers to sell their output at harvest, which floods the market and reduces incomes. Poor quality and quantity of production reduces the market power of communities, particularly remote ones with poor road access, leaving them with fewer and less profitable options to sell their outputs. As a result, the income for many farming communities is low, which, in turn, stifles their ability to invest in productive assets and skills.

These conditions create a foundation of vulnerability, leaving communities unable to adapt to shifts in market conditions such as variability in crop prices, environmental conditions such as pest and disease outbreaks, and erratic weather patterns such as floods or drought. Farming communities can better adapt to shifting conditions with improved access to and use of more supportive and flexible finance options, access to and correct use of better quality inputs, and engagement in a more diverse array of on- and off-farm income generating activities.

Output 1: Improved access to financial strategies

- Boost the quality and quantity of more diversified production options by increasing access to credit options that are not limited to specific crops or uses and sufficiently cover the cost of productive inputs at a reasonable interest rate. More flexible loan repayment terms will help farmers adapt to fluctuating market prices and maximize profits by selling when the market is not saturated.

Output 2: Improved agricultural production strategies are employed

- Boost the quality and quantity of production options through increased access to quality inputs and production technology via strengthening input supply chains, increasing access to information services, increasing extension services, and increasing the quality control of pesticides and fertilizer.
- Boost revenue and income through improved market power. This includes improved post-harvest processing and storage, improved buyer-seller networks, and better collaboration between farmers (and laborers).

Output 3: Diversified income streams are employed

- Manage risk better by increasing household capacity to invest in multi-crop production strategies and seed production for resale and personal use, while increasing access to off-farm livelihood inputs, assets, and options.

Outcome 3 | Increased Transformative Capacity | Development strategies improve support structures and create an enabling environment for farming communities.

Institutional support for farming communities across the Dry Zone is low. One of the primary causes is an absence of accountability measures and mechanisms for inclusive decision-making within government support structures. Though improving, civil society remains fragmented and weak, and is still in the early stages of being able to effectively leverage and represent community needs in ways that produces meaningful policy, statutory, budgetary, and regulatory reforms. Importantly, the ability for farmers and laborers to associate is inhibited, which limits their capacity to establish better leverage in the marketplace. As a result, agricultural policies, services, and land and management arrangements are not effectively reducing the high levels of poverty found in agricultural communities, nor reducing the impact of land degradation on critical ecosystem services.

Systemic changes that will transform the ability of farming communities to sustainably move beyond poverty and chronic food insecurity require institutional risk reduction support and more functional and inclusive land and infrastructure management.

Output 1: Improved access to financial strategies

- Tailoring formal disaster risk management and early warning systems to the needs of Dry Zone agricultural communities will improve their ability to adapt to climate variability and minimize the impact of extreme weather events. Improved institutional risk reduction includes establishing formal safety nets, improving response coordination and capacity, and by providing assistance during lean periods or acute shocks to improve the stability of agricultural incomes and prevent asset depletion over the long-term.

Output 2: Improved agricultural production strategies are employed

- Establishing better accountability mechanisms between government, private sector, and civil society stakeholders in planning and management systems in order to improve the efficacy of budget allocations, technical support, and development prioritization.
- Improving integrated watershed management, and increasing the functionality of and access to irrigation systems will also help households absorb climate shocks, adapt to variable conditions, and maintain the quality of critically supportive ecosystem services such as soil and water. It is vital that all water uses and users be managed together in order to sustain and enhance the ecosystem functions that support human needs.
- Improve the market power of farmers and laborers by establishing more formal mechanisms for them to legally associate, and access export licenses.

Output 3: Diversified income streams are employed

- Improving the policy and enabling environment for export promotion could lead to increased and more diversified revenue streams by expanding sales options.
- Reforming the seed certification process to promote the availability of genetically-diverse varieties will help increase and diversify profits, while reducing risk to changing climate conditions.

Theory of Change for farming communities in the Dry Zone of Myanmar

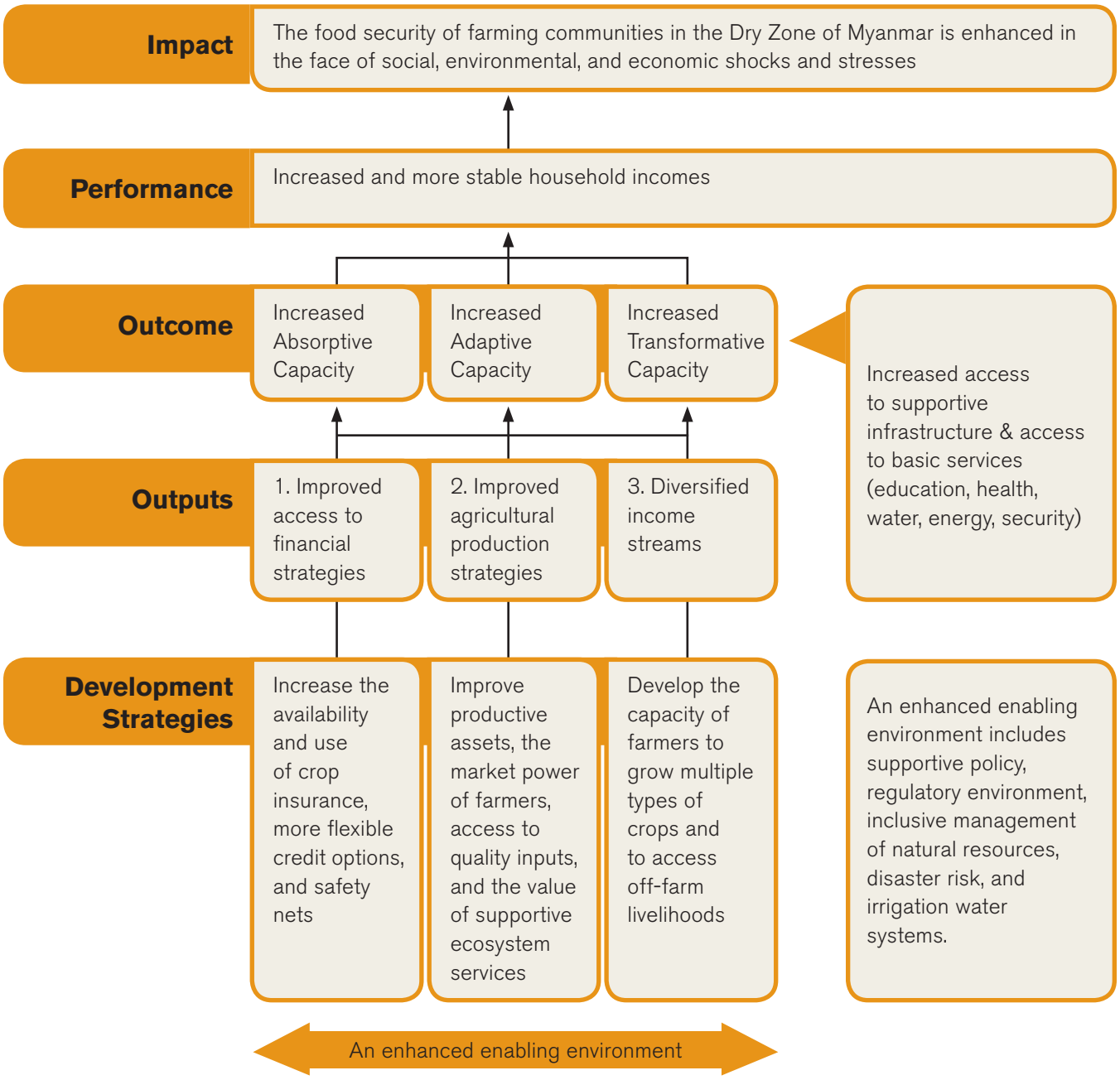

Figure 3: Theory of Change for increasing the resilience of farming communities in the Dry Zone to environmental, governmental, and market-based shocks and stresses.

FARMING COMMUNITIES IN THE DRY ZONE

An overview of important social and economic characteristics

The central Dry Zone of Myanmar is characterized as densely populated and more rural compared to the national average. The current population of Myanmar's Dry Zone districts is 9,794,814 (19% of total).[1] Of these, the great majority are rural residents (83%)[1]. Population density is approximately 1.7 times the national average,[2] and households consist of five to seven persons on average.[2]

Food insecurity is a primary constraint for Dry Zone communities. The situation is characterized by a reliance on market purchase for food access in a context of low, undiversified, agriculture-based incomes, high debts, and reliance on credit. Households generally report adequate food utilization, dietary diversity, and consumption. However, nearly 40% of households have difficulty meeting their food needs on an annual basis. The primary reported coping strategy is a reduction in portion size (27%).[3]

As a result, Dry Zone communities experience significant challenges in meeting their nutritional needs. The situation is characterized by high rates of low birth weight, wasting and stunting in children, and high rates of under-nutrition in mothers, with an indication that the nutritional status of mothers who are pregnant or lactating is worse than those who are not. The rate of wasting is of 'high' public health concern (WHO 2000), and the rate of stunting is of 'medium' public health concern (WHO 1995).[3]

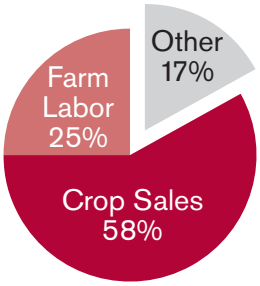

Figure 4: Livelihood activities are dominated by agricultural activities, Source: JICA, 2010

The primary livelihood strategies in the Dry Zone are related to crop production (See Figure 2)[2]. Other livelihoods activities include livestock production, industrial labor, government, remittance, and petty trade. Income diversity in the Dry Zone is poor. The median number of income sources per household is two[2]. On average, over half of total household spending is for food purchases (53%). Spending on education, health, and transport is very low in terms of absolute and proportional investment, indicating minimal means to access affordable service options.

The primary crops grown in the Dry Zone are rice (22% rainfed and 29% irrigated of the national total), oil crops (89% of sesame, 69% of groundnut, 70% of sunflowers), and pulses (93% of pigeon pea and 97% of chickpea). According to GoM land use classifications, the majority of farmland is designated for production of field crops (68%), irrigated rice (12%), rainfed rice (9%), and garden/upland crops (5%). Average farm size is small, but larger than the national average. More than half of farms are less than five hectares (54%) and 83% are less than 10 hectares.[2]

Access to stored water for crop production, a potential critical mitigation strategy against the scarcity and variability of rainfall in the Dry Zone, is low. The Government of Myanmar (G0M) has constructed over 2,000 reservoirs, ponds and tanks. There is no consensus on the amount of irrigated cropland in the Dry Zone, but the GoM estimates the potential total irrigable area to be 344,257 hectares, and the International Water Management Institute (IWMI) estimates the current total irrigated area to be 256,578.2 An estimated 100,000 hectares of farmland are irrigated using groundwater from an estimated 33,081 tube wells. The growth rate in groundwater extraction is an estimated 2.9% per annum, which exceeds that of other sources of irrigation.

Like regular access to water sources, differences in access to markets leads to significant disparity in the livelihoods choices and outcomes amongst Dry Zone farming communities[2]. Access to good road

infrastructure reduces transport costs, which keeps their farming outputs competitive and puts places these communities in a stronger negotiating position because they can bargain with a larger set of buyers. However, a significant number of Dry Zone communities lack good quality road links to township and state capitals, which puts many communities at a significant comparative market disadvantage.

Want to know more?

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2. "Water Resource Assessment of the Dry Zone of Myanmar," International Water Management Institute 2014.
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PRIMARY TYPES OF SHOCKS AND STRESSES

A general overview of the general types of environmental, governmental, and market-based shocks and stresses impacting farming communities in the Dry Zone

Environmental

1. *Land Degradation*[1,2,3] – Desertification is intensifying in the Central Dry Zone and 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 organic content, exposure to brief periods of intense rainfall, and low annual rainfall totals. The primary drivers of desertification are ***deforestation, erosion,*** and ***salinization***. Increasing deforestation is largely attributed to demand for fuelwood and 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 sandy soils, which are very common (Figure 3). All types of erosion are exacerbated by deforestation. Increased soil alkalinity in the Dry Zone is primarily caused by the use of saline groundwater for irrigation. Additional causes of reduced soil productivity include fertilizer and pesticide misuse, and overcropping.
2. *Erratic Rain*[4,5] – Highly variable rainfall is a significant stress to farming in the Dry Zone, which is primarily rainfed (Figure 4). As a result, farmers are highly susceptible to climatic variability, particularly the beginning and end of the monsoon season and the duration and timing of the mid-season rain gap. Farmers report a

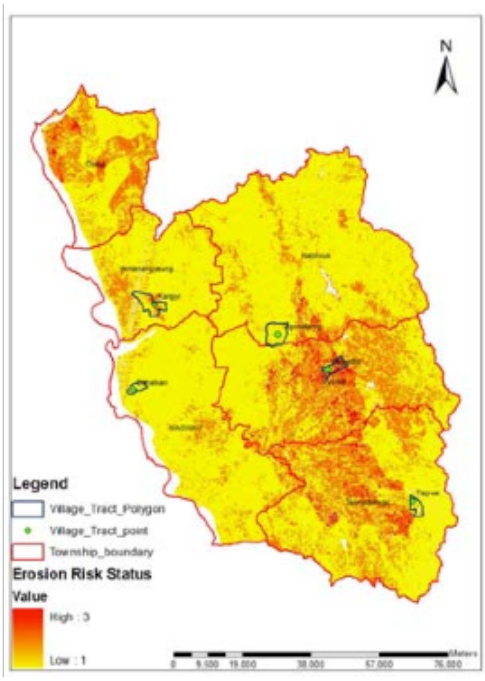

Figure 5: In the Dry Zone, range lands, barren lands, and dry agricultural lands, especially on steep slopes and hilly terrain have high erosion risk as shown in Mayway District. Source: Wan & Sangchyoswat.

shortage of water that affects crop production approximately every three years on average. The result is recurring shocks in the form of both ***drought*** and ***floods***. Low seasonal rainfall totals limit crop selection, production yields, and quality, particularly towards the center. In recent years, a statistically significant reduction in June rainfall totals has also occurred, which has increased the risk of drought conditions during the primary planting season. Exacerbating the situation is insufficient crop water management. At present, the volume of water used for irrigation in the Dry Zone is low compared to total runoff, and crop water productivity is generally poor. Moreover, the management of existing irrigation water systems is inadequate with little capacity to equitably, sustainably, and efficiently provide water to farmers. As a result, few farmers take advantage of small-scale supplemental irrigation techniques and technologies and existing large-scale irrigation systems reach a small number of intended users.

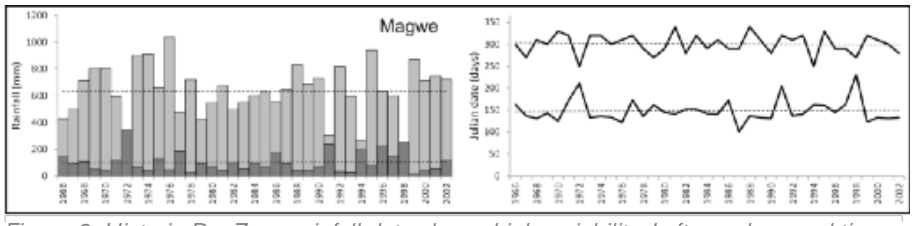

Figure 6: Historic Dry Zone rainfall data shows high variability. Left panel: annual time series of seasonal rainfall depth (light grey bars = wet season. dark grey bars = dry season). Right panel: annual time series of wet season occurrence (bottom curve = wet season onset. top curve = wet season retreat). Source: IWMI 2013

3. *Pests and Plant Disease*[6] – Dry Zone farmers are exposed to several types of ***plant diseases*** and ***pest infestations*** that can reduce or completely destroy a season's worth of income. The generally hot and dry climate reduces the exposure of Dry Zone farmers to pests compared with other agro-ecologic regions, but infestations still occur when favorable conditions exist (such as cloudy with standing water). As a result, farmers use pesticides and fertilizer, which can be challenging to access, increase input costs, and reduce profits. Common pests of Dry Zone crops included pot borers (chickpeas), aphids (sesame), army works (nuts, beans, sesame), and boll works (cotton).

Governmental

4. *Unsupportive Agricultural Policies*[7,8,9] – Historically, agricultural policies in Myanmar have been narrowly focused on maximizing the production of paddy crops through intensification in order to keep the price and availability of rice low in Myanmar. The long-term result has been significant gains in paddy production but ***reduced farmer incomes*** because commodity prices have not kept pace with input costs. Current land policies are more flexible than in the past, but still narrowly focus support on ten 'pillar crops' that have been identified to grow in specific areas. Restrictive export controls create excess supply in the domestic market, which keeps crop prices low. This benefits national consumers but inhibits the income of farmers, particularly smallholders. Moreover, agricultural extension offices still frequently instruct farmers to follow the central government's annual agricultural production plans, so ***crop selection remains constricted*** which limits the flexibility and choice of farmers. Finally, in recent years, the kyat has been strengthened relative to the dollar while inflation has been high compared to regional neighbors. This ***combination of inflated input costs and lower kyat prices for exported outputs*** have counteracted much of the potential gain from a greater supply of credit and are forcing farms and businesses into insolvency via increased indebtedness burden.

5. *Land Insecurity*[10] – The recently enacted Farmland Law (2012) aims to improve the legal rights of farm owners, and the associated formal ***land registration process*** is currently in the late stages of implementation in the Dry Zone. Customary land laws (particularly in the peripheral upland Dry Zone areas) have historically come into conflict with the official registration system and associated land classifications. Moreover, many elements of the land registration process remain unclearly defined (such as the taxation), which is creating uncertainty amongst farmers. Another key shock that affects

Dry Zone farmers is ***land confiscation***, which can be caused by factors such as debt, dispute, or industrial agricultural development. ***Land disputes*** occur as a result of poorly defined ownership and indebtedness. Land confiscation also occurs in the Dry Zone as a result of state-sponsored agriculture projects, private agro-industrial projects, large industrial development projects, military settlements, large public infrastructure projects, urban expansion, and private land speculation. Corruption, coupled with private sector exploitation, is believed to be the number one source of land confiscations in Myanmar.

Markets

6. *Poor Access to Quality Inputs*[9,11,12,13] – Inhibited and irregular farm incomes limit the purchase and effective use of quality inputs, including ***seed, fertilizer, pesticide,*** and ***labor***. Though good quality products are obtainable, the widespread availability of cheap pesticides and fertilizer of unknown and likely poor chemical composition contribute to short- and long-term production deficiencies. Most products are imported from China and quality controls are all but nonexistent. Moreover, due to a lack of extension services, many farmers lack the ability to effectively apply inputs such as fertilizer and pesticides. Incorrect (unsystematic) use of pesticides, particularly of poor chemical composition, can degrade soil quality and increase the impact of infestations by killing predatory insects (such as wasps and spiders). Another important consequence is that residue levels are too high to meet export standards. In addition, there is reduced availability of certified seed varieties for many crops. This is a result of a restrictive certification process, low production capacity of public seed multipliers, and undeveloped and inadequate private-sector import markets. Many farmers plant saved grain from the previous harvest rather than invest in existing genetically robust seed options. The resulting production is less than that of certified seed because it does not respond as well to inputs or improved water control and is less resistant to pests and disease. There is also currently a farm labor shortage, particularly during peak season, which is exacerbated by regionalization, urbanization, and low crop profitability, which in turn places a low ceiling on farm wages.

7. *Price Variability*[11,12] –In the Dry Zone, crop prices are more exposed to ***export price instability*** than many other regions of Myanmar (Figure 5). All crops are exposed to ***significant intra-annual price fluctuations*** around the harvest cycle. Rice is currently freely traded but its export is tightly controlled. As a result, price fluctuations are largely synced to availability. Prices are highest at harvest when the markets are flooded. Edible oil prices are known to fluctuate widely, caused by the relationship between domestic production variations and import volumes of palm oil. Reliance on single export markets also contributes to volatility. Though pulse production, primarily for India, has been a successful income stream for Dry Zone farmers, it exposes them to the risk of price instability related to external political, social, and economic conditions.

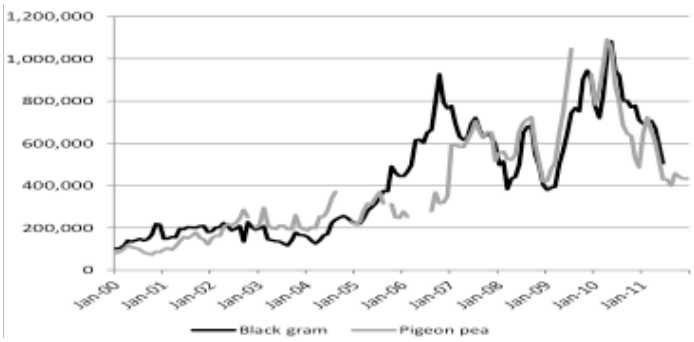

Figure 7: Pulse price volatility, 2000-11 , Yangon Market. Source: Michigan State University 2013.

8. *Indebtedness*[5,13,14,15] – Access to credit is a vital coping mechanism available to most Dry Zone farming households. However, access varies based on location and socio-economic status. In the context of low profitability, undiversified production, and repeated exposure to environmental and market shocks, many households are experiencing a deepening cycle of debt, which acts to further

reduce their ability to cope and adapt. This issue is exacerbated by poor access to low-interest rates, unsupportive repayment schedules, inflation related to input costs and food, production shocks, land degradation, and low profitability. For example, debt has significant impact on earnings because many existing credit options require repayment at harvest time. As a result, farmers are forced to sell their crops when prices are lowest, rather than wait until the market is not saturated. And with an increasing debt burden, farmers and laborers become increasingly impacted by acute shocks that affect production quality and quantity such as low rainfall or pest infestations. Current data indicates that 79% of Dry Zone households are in debt that is large in absolute and relative terms. Farming households typically have larger debts than non-farm households. There are fewer households with regular (over-year) debt among farming households, which indicates that they have better access to emergency credit than non-farm ones.

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LINKS BETWEEN SHOCKS AND STRESSES

An analysis of the general causal pathways between different types of shocks and stresses acting on Dry Zone farming communities

Many environmental, governmental, and market shocks and stresses acting on farming communities in the Dry Zone are in a dynamic state of interaction, feeding off one another with their cumulative impact greater than those of individual ones. These interactions are a necessary part of understanding contextual vulnerability because the overall impact of specific shocks and stresses are in many cases driven not only by internal mechanisms, but also magnified by one another. The linkages with greatest impact are presented as follows:

A Sensitive Debt Cycle - At the center of interactions between shocks and stresses is the use of credit (see Figure 8).

Increasing household debt burdens in the Dry Zone are internally reinforced by poor access to flexible credit options, high-interest rates, unsupportive repayment schedules, inflation related to input costs and food, and international exchange rate fluctuations. However, indebtedness is exacerbated by the impact of shocks and stresses such as poor access to quality inputs, erratic rain, unsupportive policy, and land degradation. In turn, when the debt burden becomes unmanageable, households have reduced input purchasing power (including the ability to hire sufficient labor), are more likely to engage negative coping strategies that degrade the environment, are not able to invest in productive assets, and have reduced access to emergency lines of credit.

Figure 8: The continuously reinforcing cycle of debt facing agricultural communities in the Dry Zone—a result of exposure to several interlinked types of pressures (shocks and stresses).

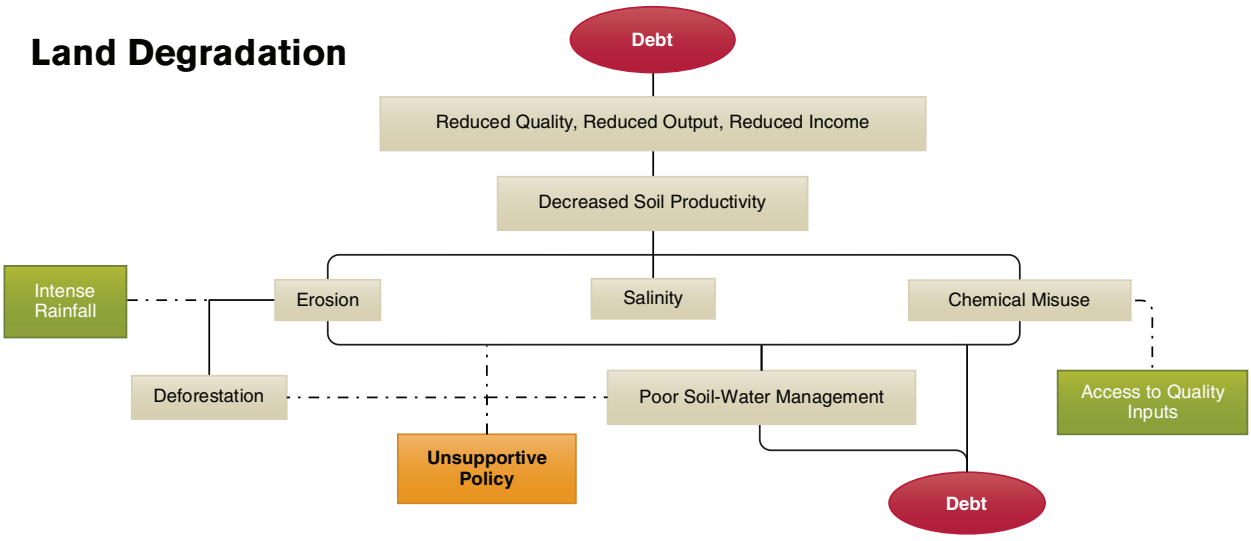


Figure 9: A summary of the full problem analysis for land degredation.

The primary stresses related to land degradation are deforestation, erosion, salinization, and chemical misuse (Figure 7). These drivers are also exacerbated by indebtedness, erratic rainfall, poor access to quality inputs, and unsupportive policies. Further soil degradation in turn, reinforces indebtedness and a general cycle of poverty, further exposing farming communities to shocks and stresses.

- *Indebtedness* – With a high debt burden and reduced access to credit, the ability of farming households to produce sufficient output is compromised. Farmers are unable to hire sufficient labor (and those they can hire are often not earning a living wage), purchase high-quality inputs, and invest in good soil and water management practices. These low-profitability farming conditions can further drive primary land degradation mechanism. For example, poor soil and water management practices can increase wind and water erosion. The use of fertilizer with poor chemical composition can decrease soil productivity.
- *Erratic Rainfall* – Intense rain events are a primary driver of water erosion, which acts to reduce the availability of productive topsoil. Secondly, rain events also function to flush salts and chemicals from the soil. In the Dry Zone, annual rainfall totals are low, which limits this important mechanism. Existing historical data and climate projections indicate that variability and the intensity of rain events will continue to increase, which will further drive erosion and reduce soil quality in the Dry Zone.
- *Poor Access to Quality Inputs* – If farmers introduce poor quality pesticides and fertilizers, they can inadvertently damage their soil. Poor market linkages, import regulations, and access to knowledge services further exacerbate the use of poor quality inputs.

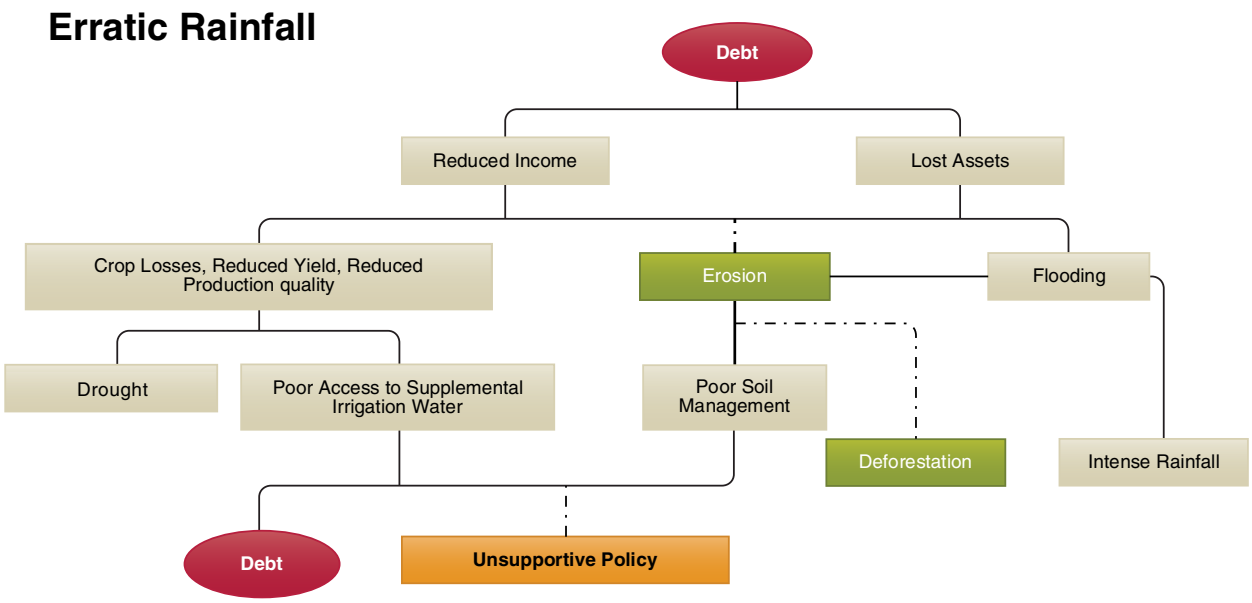


Figure 10: A Summary of the full problem analysis for erratic rainfall.

The primary shocks related to erratic rainfall are drought and intense rain events, which have significant impact on the production and income stability of Dry Zone farming communities (Figure 8). These shocks are also exacerbated by indebtedness, land degradation, and unsupportive policies related to watershed management, extension services, and irrigation scheme development and management.

- *Indebtedness* – Reduced access to flexible credit options reduces the capacity of farmers to invest in effective technologies and practices that will help them to increase soil and water productivity. Poor practices can contribute to erosion, salinization, and other mechanisms that drive land degradation. Indebtedness also reduces the capacity of farmers to invest in and use supplemental irrigation water. This limits the capacity of farmers to mitigate the impact of the highly erratic Dry Zone climate system, leaving them exposed to persistent drought events.
- *Land Degradation* – Deforestation is widespread in the Dry Zone and is a primary driver of water erosion because topsoil is left exposed without trees and ground cover to anchor it. This magnifies the impact of intense rain events that act on the Dry Zone.
- *Unsupportive Policy* – The absence of effective watershed management results in poor protection of vital ecosystem services that Dry Zone farming communities rely upon. There is little in place to systematically address the negative repercussions of deforestation and erratic climate conditions. Poor access to extension services also limits the diffusion of effective soil and water management practices leaving farmers more exposed to erratic climate conditions. Finally, the development and management of irrigation systems are poor. As a result, they function at a very low level, leaving many communities within reach of them with no appreciable benefits.

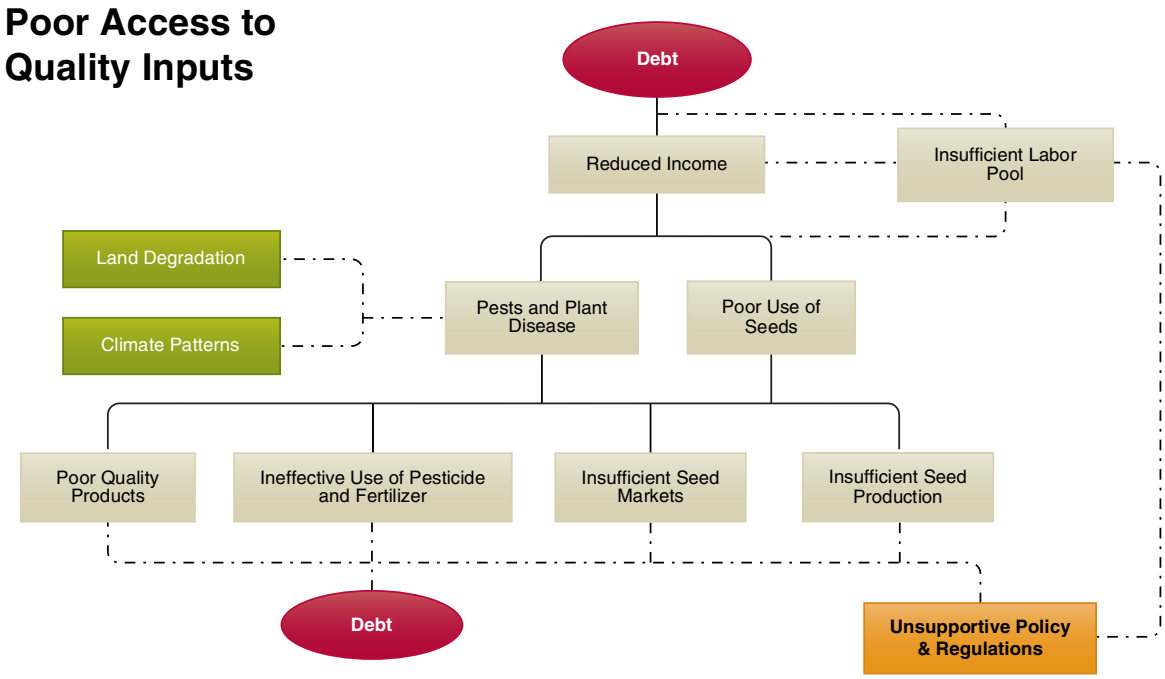


Figure 11: A summary of the full problem analysis of poor access to quality inputs.

The primary stresses related to *poor access to quality inputs* are deficient fertilizer, pesticide, and seed markets, in terms of product quality, affordability, and access. The labor pool is also currently perceived to be lacking as a result of low wages and higher-paying regional and international options that are driving out-migration. These stresses are further exacerbated by land degradation and erratic climate conditions, indebtedness, and an unsupportive policy and regulatory environment.

- *Land Degradation & Erratic Climate Conditions* – When pest infestations and plant disease impact farmers, they are obliged to spend more on inputs or face production and income problems. Pest

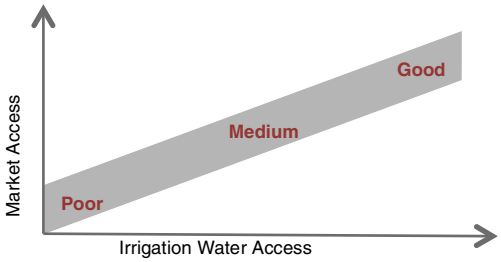
infestations and plant diseases are linked to land degradation and favorable climate conditions. For example, there is evidence that an increase in extreme weather events and climate extremes promotes the spread of invasive species. Moreover, pest infestations can be more widespread in years with a greater number of days with overcast and moist conditions. Finally, as farmlands degrade, it becomes necessary for farmers to increase the use of fertilizer, which exposes the land to increased potential contamination and increases the cost of production.

- *Indebtedness* – Reduced access to flexible credit options reduces the capacity of farmers to maintain a high level of crop production. This includes the ability to purchase genetically-certified seeds, good quality pesticides, and fertilizer, and to hire farm labor. There is evidence from the field of an acute labor shortage in the Dry Zone due to low farm wages and better alternate employment options. With reduced ability to purchase inputs, farmers are more sensitive to pest infestations and plant disease outbreaks. They are also unable to effectively intensify their production efforts and produce higher quality outputs, which in turn, reduces their income and marketplace competitiveness.
- *Unsupportive Policy and Regulations Enforcement* – Historically, agricultural policies in Myanmar are production focused. At present, there is little support in place to help farmers effectively access affordable and high-quality pesticides and fertilizer products and genetically-certified seed varieties. There are few input importers currently in operation and quality control measures are all but nonexistent. The result is that farmers often have few options and little confidence in what they are purchasing.

IMPACT ANALYSIS

An analysis of the impacts of shocks and stresses on indicative types of Dry Zone farming communities

Though the Dry Zone is considered to be one of Myanmar's three primary agro-ecologic zones, the conditions that individual farming communities there experience are notably varied based on social, economic, and environmental dynamics. Informed by EMR's ongoing Qualitative Social & Economic Monitoring work, Dry Zone farming communities were divided into three groups based upon water and market access conditions (Figure 10). By doing so, the assessment aimed to cover both the good and poor extremes as well as the middle context.



	Distance to Township Capital	Farms that use Irrigation Water
Poor	> 25 miles	None to 30%
Medium	10 - 25 miles	30% - 70%
Good	< 10 miles	> 70%

Figure 12, Dry Zone farming communities were divided into three groups based on market and irrigation water access. Poor communities were remote and did not have access to irrigation water. Good communities were very close to township capitals where traders, buyers, and processors are most concentrated and had majority access to irrigation water sources.

Sensitivity rankings for the three types of farming communities were determined based on existing literature, national-level experts inputs, and qualitative research conducted for this study by EMR in nine Dry Zone villages. The overall sensitivity of each type of community is based on the perceived impacts of the identified shocks and stresses on the livelihood and coping strategies most commonly employed. The impact of each category of shock or stress on each common livelihood strategy and coping mechanism was ranked from

one to 27 based on the product of three factors: trend, magnitude, and severity, with each factor receiving a ranking between one and three (Table 1). Finally, the overall sensitivity ranking for each type of strategy is the sum of all impact rankings from individual shocks and stresses. With eight primary categories of shocks and strategies, each strategy can therefore receive a total ranking between eight and 216.

	1	2	3
Trend	No changes	The magnitude or severity is increasing	The trend is increasing and is being exacerbated by two or more other shocks or stresses
Magnitude	Less than a third of the community is affected	One-third to two-thirds is affected	More than two-thirds is affected
Severity	A subjective ranking of potential for harm (low, medium, high)		

Table 1: The impact of each category of shocks and stresses on each commonly employed livelihood and coping strategy was the product of three factors: Trend, Magnitude, and Severity. Each were ranked between one and three.

Impacts related to different types of communities

The different types of communities are similarly sensitive to governmental and market shocks and stresses as they are to environmental ones (Figure 13). Indebtedness and poor access to quality inputs are the highest ranking (most impactful) stress for communities with *'good'* access to markets and water. In addition to these, land degradation and erratic rainfall have high impact on communities with *'medium'* and *'poor'* access to markets and water. Even with high severity, land insecurity ranks comparatively low because a relatively small number of the population is directly affected by land confiscations. Communities are also perceived to be less sensitive to output price volatility, but particularly those with *'poor'* access to markets.

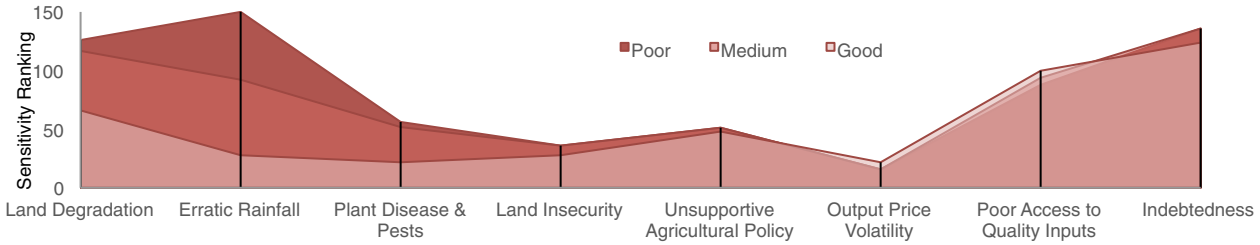


*Figure 13: **Cumulative sensitivity rankings by category of disturbance** – communities with poor access to markets and water are much more sensitive to environmental shocks and stresses, and all types of compmunities are highly sensitive to inputs issues and indebtedness.*

In addition to communities with *'poor'* access to water, many communities *with* access to sources of supplemental irrigation water also ranked erratic rainfall highly. These communities reported that poor management and shoddy construction often resulted in insufficient water availability during periods of drought. Moreover, some farmers reported being ill-prepared to bear the cost of diesel fuel for pumping water from irrigation channels or rivers. This indicates that the true cost of water from supplemental sources may not be properly accounted for in the financial calculations of farming households.

Commonly employed *coping* strategies generally are generally less sensitive to shocks and stresses than *livelihood* strategies. This is particularly true for communities with *'good'* access to markets and water (Figure 12). This is because coping strategies are generally unaffected by environmental shocks and stresses, which *'medium'* and *'poor'* communities are more sensitive to. The most sensitive coping strategy for all types of communities is the *ability to invest in productive assets*. This is because communities typically prioritize

investing in valuables such as gold in good years so that they can easily be sold during difficult ones. This coping strategy, in the face of cyclic environmental shocks such as drought events or pest infestations, deters investments in assets that boost productivity, which in turn, prevents farming household from investing in assets and skills that help them to invest in the ability to absorb and adapt to shocks and stresses.

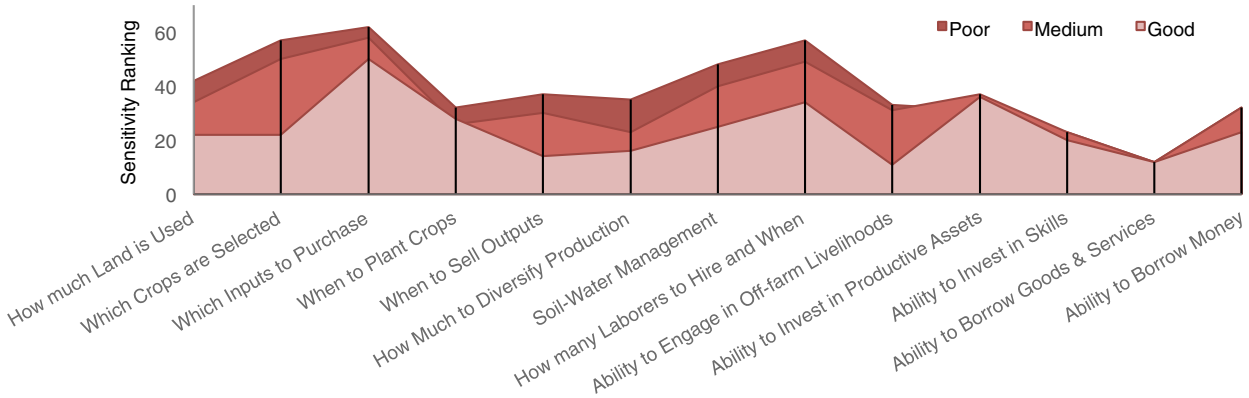


Figure 12, ***Cumulative sensitivity ranking by strategy*** *- some livelihood and coping strategies are more sensitive than others, and there are some notable disparities between different types of Dry Zone farming communities.*

The ability to purchase inputs, including supporting labor, is highly sensitive to shocks and stresses in all communities, but much more so for 'medium' and 'poor' communities. This vital strategy is *most* sensitive to land degradation and indebtedness, as well as erratic rainfall in *'medium'* and *'poor'* communities.

Livelihood strategies employed by *'medium'* and *'poor'* farming communities after planting has occurred are much more sensitive to shocks and stresses compared to *'good'* communities. These *'poor'* communities are more exposed to erratic weather conditions, pest infestations, and plant diseases, which occur during the crop cycle. *'Good'* communities have better financial means to absorb and adapt to environmental shocks by hiring more labor, using supplemental irrigation, or using more pesticides and fertilizer. *'Medium'* and *'poor'* communities are at much greater risk because they are most exposed after they have significantly invested time and resources.

RESILIENCE PATHWAYS

An integrated set of development strategies, based on the overarching Theory of Change described earlier, are proposed that include tailored approaches for the individual needs of different types of farming communities in the Dry Zone

Building the resilience of farming communities in the Dry Zone means supporting them to respond more positively to the shocks and stresses detailed in preceding sections. In order to break the identified self-reinforcing vulnerability cycle (Figure 5), development strategies must be tailored so that they effectively contribute to increased absorptive, adaptive, and transformative capacity. To this end, a number of potentially supportive development strategies have been identified and grouped into three categories. In a broad sense, this proposed set of development strategies addresses the primary deficiencies that have been identified from literature, experts, and communities. However, any deployed strategy must be tailored to the specific context and priorities of an individual community. In this study, Dry Zone communities have been grouped by access to markets and water. The following recommendations are organized in these groupings in order to more effectively account for differences in sensitivity that have been identified.

General Strategies

Based on the impact analysis, development strategies have been organized into three output groupings:

1. Increased use and flexibility of financial strategies,
2. Improved agricultural production strategies, and
3. Diversified income streams.

Farmers manage risk related to several types of recurring shocks and constant stresses identified in the preceding section. These include stresses such as indebtedness, use of poor quality inputs, and land degradation and shocks such as drought, market price crashes, pest infestations, and plant disease. Stresses erode both the income potential of farming communities and their ability to effectively respond and adapt to shocks. Shocks erode savings and deepen indebtedness. In combination, these shocks and stresses reinforce one another and limit the ability of farming communities to invest in increased income potential, stability, and general well-being.

The development strategies in each grouping support either increased absorptive, adaptive, or transformative capacity. The overall expected result is that, together, these outcomes will result in increased and more stable household incomes. Better and more flexible financial options will increase the potential of existing livelihood strategies (productivity and income) and the ability to invest in new ones, as well as diversify sources of income. Improved crop production strategies aim to sustainably boost the profitability of crop production by getting more from less, better absorbing the impacts of variable conditions, and increasing the market power of farmers and laborers. Diversified income streams, including both on- and off-farm options, help households better manage risk by spreading investments across one or more livelihoods options.

Absorptive Capacity – Farming communities can better absorb shocks by having the financial means to manage income disruptions, have better soil and water management, and employ improved disaster risk mitigation strategies. Financial options include increased access to crop insurance, emergency credit options, and emergency food stocks. Production options that will help households ***absorb*** the impact of erratic rainfall include better soil and water management practices, improved access to sources of supplemental irrigation, flood mitigation structures, and weather forecasting. Production strategies that will help households ***absorb*** the impact of pest infestations and plant disease are improved use (purchase and application) of quality pesticides and fertilizer.

Adaptive Capacity – Farming communities can better adapt to shocks and stresses with more access to flexible credit options, inputs, output markets, and diversified income streams. More flexible loan repayment terms will allow farmers to sell their products when they can get higher prices. More favorable, more flexible loan options would promote diversification by not being tied to specific crops (such as paddy), having low interest-rates, and being of sufficient size to adequately cover the cost of inputs.

Production options include both strategies that increase access to and use of quality inputs and production technologies, as well as improved market power of farmers. Increased access to and use of quality inputs, including improved input supply chains, better access to information services, more responsive and engaged extension services, and improved quality control of pesticides and fertilizer will allow farmers to maintain the productivity of their soil, adapt to climate variability, and reduce their debt burden. Improved market power, including upgraded post-harvest processing and storage, better communications with buyers, and improved coordination between farmers will allow farmers to get better prices and access more product markets.

Diversification strategies include adoption of multi-crop production strategies, increased availability of certified seed, improved access to livestock production opportunities, and increased access to off-farm livelihood opportunities. Improved access to diversification options will allow households to more effectively manage financial risk, leading to more stable incomes.

Transformative Capacity – Systemic changes that will transform the ability of farming communities to move beyond poverty and chronic insecurity include greater accountability in government support structures, improved institutional crisis management, and more functional and inclusive land and infrastructure management. Establishing formal safety nets will help improve the stability of agricultural incomes and prevent asset depletion over the long-term by providing assistance during lean periods or acute shocks. Tailoring formal disaster risk management and early warning systems to the needs of Dry Zone agricultural communities will improve their ability to adapt to climate variability. Improving watershed management, crop water productivity, and the functionality of and access to irrigation systems will also help households absorb climate shocks and adapt to variable conditions.

Farm households with 'poor' access to markets and water

Households with 'poor' access to markets and water typically have less financial means to absorb shocks, invest in productive assets, skills, and inputs. They are more likely to rank land degradation and erratic rainfall-related shocks and stresses as the biggest impediment to their livelihoods. They also report greater sensitivity to indebtedness with reduced access to loans and less disposable income available to either invest in productive assets or to absorb shocks.

Highest Ranking Shocks and Stresses

Land Degradation	Erratic Rainfall	Indebtedness

The focus of resilience-enabling development strategies should be to increase access to flexible loan options, promote low-cost strategies that protect and improve the productivity of primary environmental assets, and increase access to off-farm or complementary livelihoods options. In particular, there is great potential for improved agro-ecologic practices to provide low-cost opportunities to simultaneously absorb environmental shocks, reduce land degradation (erosion, chemical pollution, etc.), and improve water productivity, while also potentially building adaptive capacity through more diversified production.

Absorptive Capacity – Without access to supplemental sources of water for crops, 'poor' households are more likely during bad ones to lose extra income earned in good years. Improving access to emergency flexible micro-credit options and crop insurance would improve the ability for 'poor' households to absorb shocks, allowing them to invest in productive assets, skills, and inputs. Fostering low-cost strategies to improve soil and water productivity will help to absorb the impacts of inter-seasonal weather variability and therefore better stabilize the quality and quantity of production.

Adaptive Capacity – There is evidence from the field that collective efforts among smallholder farmers can lead to improved adaptive capacity. Farmers in 'poor' communities can diversify production by joining together to collectively learn the needed skills and investments to produce high-value crops such as thanatka, betel leaf, onions, or melons (with the use of small-scale groundwater irrigation schemes). Small-scale production of perennial crops can also help smallholder farmers adapt to variable weather conditions. Finally, villages have had success with small-scale livestock production. With reduced ability to purchase inputs, the use of compost fertilizers, especially coupled with livestock production, can boost soil productivity. Access to alternate cook fuel options could alleviate the need to burn crop residue, which could instead be used to trap moisture in the soil and add nutrients.

Transformative Capacity – 'Poor' households are typically at a comparative disadvantage because the quality and quantity of their production is lower and they are not as well-connected with as many market options. Enhancing their ability to form associations and collectives will strengthen their leverage with buyers and input providers. Collective efforts at community-based natural resource management (NRM) that include disaster

risk mitigation will reduce the impact of environmental shocks and protect long-term productivity of soil and water. Groundwater is a potentially effective source of supplemental irrigation water, but it has significant environmental risks. An approach that is coupled with inclusive NRM is recommended in order to balance the value of its exploitation with sustainable extraction. Finally, more direct and frequent access to extension services that focus on low-cost techniques to enhance soil and water productivity is needed.

Farm households with 'good' access to markets and water

Farmers with 'good' access to water and markets are generally more concerned with output price shocks and access to quality inputs (though maintaining soil productivity is also a priority). Although better access to supplemental sources of water shields these farmers better from drought events, flooding can be a source of vulnerability, particularly for communities with surface water access.

Highest Ranking Shocks and Stresses

Poor Access to Quality Inputs	Price Variability	Indebtedness

The focus of resilience-enabling development strategies should be on increasing opportunities for income diversity and increasing market power (inputs and outputs) with support for improved technical capacities and investment in productive assets.

Absorptive Capacity – 'Good' farming households invest a significant amount of capital into inputs, which could be lost if a shock occurs. Access to crop insurance options would greatly improve the absorptive capacity of this group.

Adaptive Capacity – This group has the ability to better diversify crop production compared with smallholder farmers. However, there are fewer and lower-value credit options available for non-paddy crops. Increasing access to flexible and low-interest credit options is a vital strategy for improving the adaptive capacity of medium- and large-holder farmers. This group will become less sensitive to environmental shocks as a result of access to improved input supply chains, including confirmed high-quality pesticides and fertilizers and certified seed. On the output side, this group can gain enhanced adaptive capacity by increasing its market power (leverage) through improved farmer coordination and better use of post-harvest processing and storage. More flexible repayment terms will further allow this group to get better sales prices by delaying sales.

Transformative Capacity – 'Good' farming households are more exposed to the effects of using poor-quality pesticides and fertilizers and genetically inadequate seed (or grain). Improving input quality controls and establishing greater access to extension services that that focus on systematic pesticide and fertilizer application will yield transformational improvement in this group's long-term income stability.

Laborer household strategies

Laborers typically share similar concerns with the farmers in their communities, but laborers are the poorest, most vulnerable livelihood group. They can be considered production stakeholders because they are typically paid directly with output from farming enterprises. Thus, laborers are generally most concerned with output price fluctuations as this type of shock has the most direct influence on their income. However, as stakeholders, they also highly prioritize shocks and stresses similar to farmers in their communities.

Highest Ranking Shocks and Stresses

Price Variability	Indebtedness

The focus of resilience-enabling development strategies should increase access to flexible credit options and opportunities for off-farm income diversity and investment in productive skills.

Absorptive Capacity – Compared with farmers, laborers have very low absorptive capacity because their income streams are typically so low. Moreover, since their income is typically dependent upon farm output, they are exposed to the same disruptions as farmers when shocks occur. Therefore, laborers need the same access to emergency and flexible micro-credit options as smallholder farmers in order to absorb the impacts of agricultural shocks.

Adaptive Capacity – Income diversification and improved market power are the keys to improving the adaptive capacity of laborers. Better access to flexible micro-credit options can help this group invest in off-farm livelihood options such as livestock production and small-scale commerce or training for skilled labor opportunities (in regional cottage industries, for example). Since incomes in this group are dependent upon output pricing, this group also stands to benefit from increased market power. Like farmers, they would benefit from increased coordination and better loan repayment terms, which would give them the ability to delay sales.

Transformative Capacity – The farm labor pool would theoretically benefit from a more profitable agricultural sector that is able to provide adequate wages and job stability. Therefore, this group stands to gain transformational capacity through development strategies that benefit the sector as a whole. However, laborers also stand to benefit from greater internal collaboration in order to protect their interests and needs and to establish greater leverage with farmers.

CONCLUSION

The context of Myanmar's Dry Zone is ecologically, socially and economically complex. Food insecurity and endemic poverty remain a critical constraint. The majority of inhabitants rely on farming-related livelihoods, and remain ill equipped to absorb, adapt, and transform in the face of repeated exposure to shocks such drought and market volatility.

Results of the assessment show that, within the Dry Zone, different types of communities experience shocks and stresses with varying effect. This suggests that development efforts are best tailored to the fit the specific needs of communities based on key factors such as supplemental water and markets access. The findings also imply that multi-sectoral efforts are required to increase access to and effectiveness of the range of capacities that communities need to employ in the face of shocks and stresses. Stakeholders from government, civil society, and the private sector must find new avenues to combine forces to confront the root causes of these challenges. Support from development actors should be tailored to support and augment those relationships. Ultimately, it is the strength and value of these relationships that will lead to more resilient Dry Zone farming communities.

ABOUT MERCY CORPS

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