Ar Yone Oo
Social Development Association

Addressing climate vulnerability and farming system challenges with local agroecological knowledge

Insights from collaborative research with rural communties in Chin State and Sagaing Region, Myanmar

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Executive summary

Landslides and floods in the aftermath of extreme weather events are already a challenging reality for rural communities in northern Chin State and Sagaing Region and will likely be more common in the future – in effect of global climate change. Many rural communities in Myanmar were devastated by the impacts of extreme weather events during the 2015 monsoon season. These events caused the loss of lives, and destruction of villages, rural infrastructure and croplands of small scale farmers. Already poor and food insecure households were thus thrown into crisis.

Rural development actors work to address these challenges; supporting communities to recover from natural disaster impacts, reduce vulnerabilities and thus build long-term resilience to climate change. But to design successful development interventions, initiatives require detailed insight into the realities of rural livelihoods and farming conditions in target communities. Targeted project activities need to build on detailed knowledge about local social, economic and environmental contexts, climate vulnerabilities, and farming system challenges. Yet, such knowledge is not often readily available to development actors in Myanmar. Instead, organisations have to find rigorous and efficient approaches to generate the required information themselves.

This brief presents such an approach, and insights from a research collaboration between Ar Yone Oo – Social Development Association (Myanmar) and Chalmers University of Technology (Sweden). These organisations partnered in 2017, to document lessons from Ar Yone Oo's STRONG project activities for disaster affected communities in northern Chin State and western Sagaing Region [3]. The initiative also conducted participatory research, to assess climate vulnerabilities and farming system challenges that project beneficiaries encounter. Insights from this collaboration can inform inter-organisational learning and knowledge sharing for rural development and agroecological initiatives in Myanmar, and across the region.

The STRONG project

Ar Yone Oo Social Development Association implements the three-year project "Strengthening The Resilience Of Natural disaster affected Groups (STRONG)" in Tedim and Tonzang Townships, in northern Chin State and Kale Township, in western Sagaing Region, Myanmar. The project is realised in partnership with Welthungerhilfe (WHH) and funded by the Federal Ministry for Economic Cooperation and Development of Germany (BMZ).

The project's backbone is its Linking Relief, Rehabilitation and Development (LRRD) approach. The project supports natural disaster affected communities to cope with and recover from impacts of severe landslides and floods that were triggered by the extreme weather events of the 2015 monsoon season, which affected rural farming communities across many regions in Myanmar. The project further seeks to increase the overall resilience of targeted communities, in the context of annually recurring flood and landslide events.

The project implements a range of complementary activities in targeted communities, including: cash for work programs; the creation of job opportunities, through rehabilitation of public infrastructure i.e., renovation of farm land, irrigation systems and public roads; provided support for the construction of latrines; small grants to engage households in off-farm income generation; the reconstruction of damaged water supply system and reconstruction of small bridges; the provision of agricultural inputs and seeds for potatoes, taro, maize, ginger, cabbage, cauliflower, sesame, rice bean, green bean, soya bean, pigeon pea, groundnut and paddy crops; FFS trainings; vegetable production trainings; the formation of village development committees, farmer and vegetable grower groups, CBDRR committees and water management committees; the construction and rehabilitation of disaster risk reduction infrastructure; hygiene promotion campaigns and CBDRR trainings.

Activities effectively target 3054 households, in 30 rural villages of three Townships in northern Chin State and western Sagaing Region: 13 villages in Tedim Township, 9 villages in Tonzang Township

How can local knowledge inform rural development interventions?

Rural development actors increasingly recognise the complementary nature of expert knowledge held by extension agents and academic researchers, and local agroecological knowledge of rural people.

Agroecology

"a truly transformative agroecology aims to rebuild a diversity of decentralized, just and sustainable food systems that enhance community and social-ecological resilience to climate change" [1]

The FAO has identified ten interconnected elements of agroecology [2]:

1. Diverse production systems
2. Co-creation and sharing of knowledge
3. Synergies of agroecosystem elements
4. Resource use efficiency
5. Imitation of natural ecosystem cycles
6. Resilience of human-nature systems
7. Human and social values for sustainable livelihoods
8. Diverse and culturally appropriate diets for food and nutrition security
9. Responsible governance of land and natural resources
10. Innovative markets in a solidary and circular economy

Co-creation and sharing of knowledge

"agricultural innovations respond better to local challenges when they are co-created through participatory processes" [4]

To integrate this local agroecological knowledge of rural communities in development planning and implementation, participatory research and monitoring tools have been used and refined for decades – and inspired the approach presented here [5] [6]. Now, such tools become increasingly important for rural development actors, who work to support disaster affected communities to recover from disaster impacts, address rural peoples' vulnerabilities to extreme weather events and build long-term climate resilience of farming systems and livelihoods.

Climate change impacts add strain to already vulnerable livelihoods of poor and food insecure households in western Myanmar, and across South-East Asia. Many good interventions to address this challenge are already underway and could be scaled-up and adapted to local livelihood and farming system contexts, e.g. in STRONG project villages in northern Chin State and western Sagaing region. But to target the right communities with the right interventions and address the unique realities of rural households, organisations require detailed knowledge about local climate vulnerabilities and farming system challenges. Yet, development actors usually work in data scarce environments, where such information cannot be readily obtained from government authorities – who are still in the process of obtaining respective data.

In such circumstances, organisations are well advised to engage in two-way learning and knowledge sharing processes with rural communities that their interventions target. Residents of these communities make a large share of their living from the land – through farming and the collection of e.g. fodder, fuelwood or construction timber. Through practical experiences and years of daily observations of their local environments, these people thus gain detailed knowledge about different types of local plant species and crop varieties, agroecological conditions and processes, and locally adapted farming practices [1]. Communities experience local climate conditions and can witness changes in climate patterns if they occur. And, most importantly, households are the greatest experts of their own livelihood realities, aspirations, needs and the constraints that limit their decision making and activity space.

Through participatory research, organisations can mobilise this rich knowledge for the conception of their own activities, partnering with rural communities to see local conditions from their beneficiaries' perspectives, and experiment jointly – for locally relevant innovations.

Exploring local agroecological knowledge – a practical example

Overview

The participatory approach to collaborative research by Ar Yone Oo and Chalmers university combined systems thinking with participatory exercises, to learn about climate vulnerabilities and farming system challenges of STRONG project communities. This brief presents this approach in detail, as a practical example for other initiatives, who would like to integrate participatory research and local agroecological knowledge in their program activities.

Systems thinking was used to understand how different aspects of households' livelihoods, local social, ecological and environmental conditions, and external factors related to one another. And to explore how interactions among these elements lead to cause-effect chains, and feed-back processes that – over time – stabilise or change local agroecological conditions and households' ways to make a living.

Participatory approaches included brain storming exercises with STRONG project staff and focus group discussions (FGD) in STRONG project communities that centred around the development of causal-diagrams. Qualitative interviews, and a structured quantitative survey with a stratified random sample of 103 households complemented these activities and served to generalise results of the participatory work across six sample villages.

Identifying knowledge gaps

The first step of the participatory research process was to identify topics of interest to Ar Yone Oo and Chalmers University, and knowledge gaps that could be addressed to further develop STRONG project activities or plan future interventions of Ar Yone Oo in the project area. Chalmers staff proposed initial research topics and questions. Meeting with Ar Yone Oo management staff, and small workshops during STRONG project staff meetings, were used to refine these suggestions and capture additional ideas. The STRONG project team also documented its perceptions of farming system challenges that target communities face. These activities lasted 2-4 hours and were facilitated in a participatory manner, using methods such as brainstorming and causal diagramming.

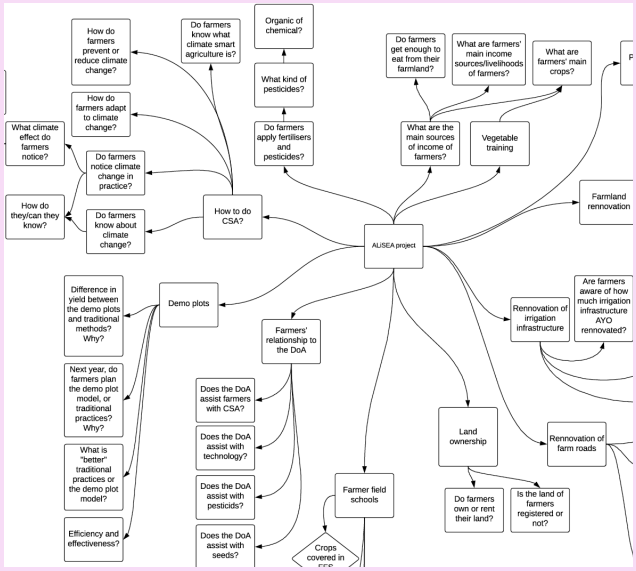

Image 1: *Section of a diagram that documents results from brainstorming activities with STRONG project staff*

Defining research questions

Once these activities were completed, the research team organised and synthesised all ideas thematically. This revealed that the STRONG project already implemented a wide range of rural development activities in target communities. Yet, project staff was interested to gain a deeper understanding about:

I. Which specific impacts the 2015 natural disaster had on households' livelihoods, and farming systems, and how beneficiaries perceived respective STRONG project activities;
II. how target communities experienced climate change, and which climate change impacts and extreme weather events they were vulnerable to;
III. and which other farming system challenges affected local livelihoods and food security.

Meeting local authorities

Informal meetings with local agricultural authorities from the district level office in Kalemyo were used to exchange knowledge and share information about planned activities under the AliSEA funded initiative. Staff of the agricultural department, in turn, shared reports about farming system challenges in Kale township and provided an overview about extension and material support that the department provides to local rural communities. Staff members also explained about the extent of flooding and associated relief activities that had been realised by the department after the extreme weather events of the 2015 monsoon season.

Image 2: *Groups of male (top) and female (bottom) farmers make causal diagrams of their local agroecological knowledge*

Involving target communities

Local agroecological knowledge about farming system challenges and climate vulnerabilities, was systematically captured during 11 FGD with residents of six case study villages. The number of participants in each FGD differed but ranged between 30+ men and women in Kimlai village, to the preferred size of 5-10 men or women in most other sessions. This form of inquiry was realised with separate groups of male and female farmers – to provide female participants with greater room to share their knowledge in a situation in which they felt comfortable.

Discussions centred around a causal-diagramming activity and were facilitated in local languages by AYO's members of the core case study team, with support from Chalmers staff. First, participants were asked to identify locally common farming system challenges that are associated with climate events, or other socio-economic and environmental factors. These challenges were recorded on paper cards and served as initial nodes of causal diagrams that were developed step-by-step.

Next, beneficiaries were asked to identify all the different effects, of the previously identified challenges, on their farming systems and livelihoods. These effects were again noted on cards and then arranges in causal chains – where cards with associated effects were arranged one after another, and arrows were drawn to show links between them.

Then, the groups added the causes of the farming system challenges and climate vulnerabilities that had been identified. Similar to the previous step, causes were recorded on cards, arranged in chains of associated causes, and arrows were drawn to indicate causal links.

Finally, participants were asked to reflect on where STRONG project interventions, in particular agroecological practices promoted in the FFS, supported them in addressing or overcoming some of the mapped challenges. Participants also added notes on coping and adaptation strategies that communities already realised by themselves.

One the participatory activities were completed, all paper based causal diagrams were first translated to English and then digitalised in English and local languages.

Deepening the inquiry

Qualitative, in-depths interviews with more than 20 individuals and groups from STRONG project target villages were conducted to further explore respondents' experiences with the STRONG project and their local agroecological knowledge.

Interviews lasted between 30 and 60 minutes, and respondents were purposefully selected to capture a diverse range of experiences across case study villages - including those of the administrative heads of villages, male and female participants of FFS, and respondents from households who did not participate in these trainings.

Additional interviews with AYO's agricultural technician, the main facilitator of FFS in the case study villages, were realised to capture his perspectives on local farming system challenges and the FFS implementation process. All interviews were transcribed by Chalmers' researcher and analysed with a software package for qualitative data analysis – NVivo.

Generalising insights

A quantitative household survey was administered to a stratified random sample of 103 households from the six case study villages. Stratification was based on the biophysical location of case study villages (upland vs. lowland) and participation in FFS (FFS participants vs. non-participating households). The aim of the household survey was to statistically assess, in how far findings from FGD

Image 3: *Respondents of qualitative interviews from Taakmual, Taakzang and Kimlai villages*

Image 4: *A resident of Taakmual village shares his local agroecological knowledge during the household survey*

and qualitative interviews reflected beneficiaries' common experiences across the different case study villages.

The finalised survey instrument captured information about households' basic socio-demographic characteristics, experiences with the extreme weather events of 2015 and associated coping and adaptation strategies. A digital survey instrument was used to capture responses with hand held electronic devices. This facilitated consistent data capture, and cloud-based information storage.

Sharing results with communities

Small meetings with the administrative heads of villages, and other residents were arranged during the last fieldwork days in the area, to share initial findings with participating village communities, Village residents were encouraged to provide feedback on the collaborative research activities, and ask open questions, which may have previously been left unaddressed.

Vinyl posters, with digitalised results of the causal diagramming activities were given to the communities, to provide village residents with a physical and lasting record of their knowledge and enable village residents to easily share and discuss their insights among one another, and with other stakeholders (e.g. NGOs) operating in the area.

Illustrative findings

2015 flood impacts and farming system challenges in the lowlands

To analyse and draw conclusions from participatory research data, development actors and researchers can use specialised software packages. Or they can continue to collaborate with target communities, to jointly discuss the implications of the created knowledge. Below, this brief presents selected findings from the research collaboration between Ar Yone Oo and Chalmers University, to illustrate one option to work with causal-diagramming results.

Figure one represents the local knowledge of women from Tuikhinzang village. The section of a causal-diagram that these women created, illustrates impacts of the 2015 flood, on agroecological systems in the STRONG project area – and thus in turn on livelihoods of households residing in Tuikhinzang village. The group attributed the 2015 flooding events to heavy rainfalls that triggered landslides. Rivers

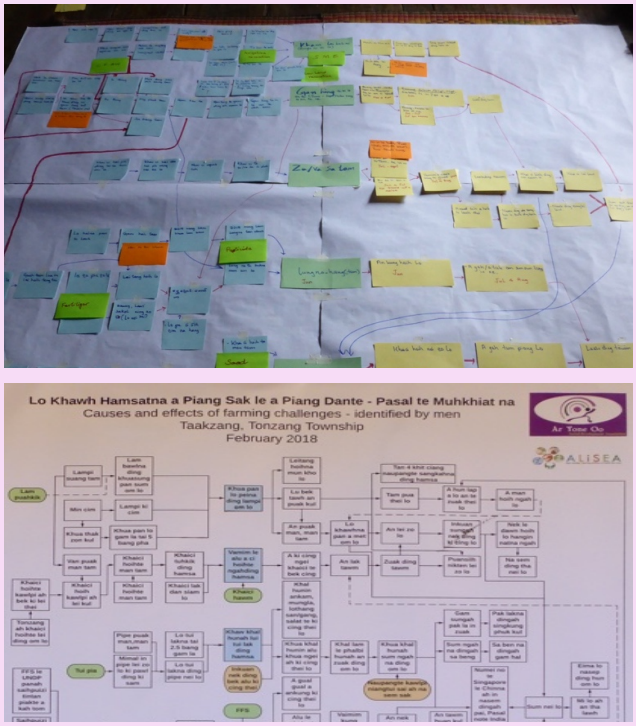

Image 5: *Causal diagram produced during FGD (top) and after digitalisation and print on vinyl posters (bottom)*

and streams swelled and washed sand and sediments onto fields, destroyed the village bridge, and valuable irrigation infrastructure.

In consequence, crop yields deteriorated, and households could no longer meet their food needs. Households who lost their entire livelihoods, coped by collecting valuable forest products for sale. But this was perceived as a dangerous strategy that could throw households into crisis if accidents occurred and households had to obtain loans or sell their assets. Some households established new swidden fields for the cultivation of upland rice, but these efforts were hampered by pest insects. Finally, declining food production, in the aftermath of the flooding events, led to food insecurity, conflicts and depression among village residents. Households were pushed into wage labour – resulting in a feed-back loop, where farmers had no longer enough time to manage their own fields, thus further lowering paddy yields for subsistence use and sale.

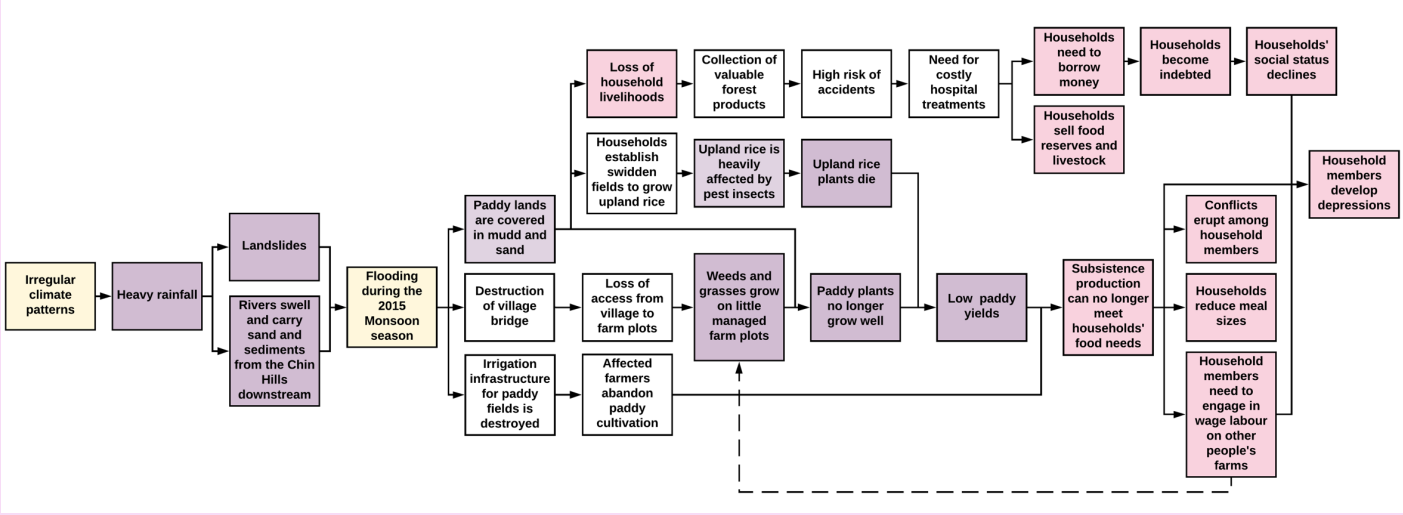

Figure 1: *Section of a causal diagram illustrating the local agroecological knowledge of women in Tuikhinzang village*

Purple fields in the diagram illustrate the groups knowledge about local agroecological processes and point to entry points for rural development interventions. Households in Tuikhinzang would likely benefit from support to restore soil fertility on their fields, address pest outbreaks and renovate village infrastructure. Some of these activities are already being realised by the STRONG project [3].

Climate vulnerabilities and farming system challenges in the uplands

Figure two, below illustrates the local knowledge of men from Gamlai New village. Participants of the causal diagramming activity in this village identified irregular climate patters and associated dry spells, heavy rainfall events and pest outbreaks as key challenges to their farming activities. These challenges trigger undesired agroecological processes that result in low crop yields, food insecurity and push households into wage employment and forest resource extraction.

Feedback cycles arise, where low yields and food insecurity pushe households towards cash-oriented income generation activities, and further away from subsistence crop production. Food insecurity also prevents households from saving money to invest into productive assets, for farming or nutritious food for their families – resulting in lowered farming success and crop yields.

Activities that support households to address undesired agroecological responses (purple fields) to irregular climate patterns – such as the STRONG project farmer field schools [3] – may help to build climate resilience, and break some of the causal-chains that currently lead to food insecurity in Gamlai New village.

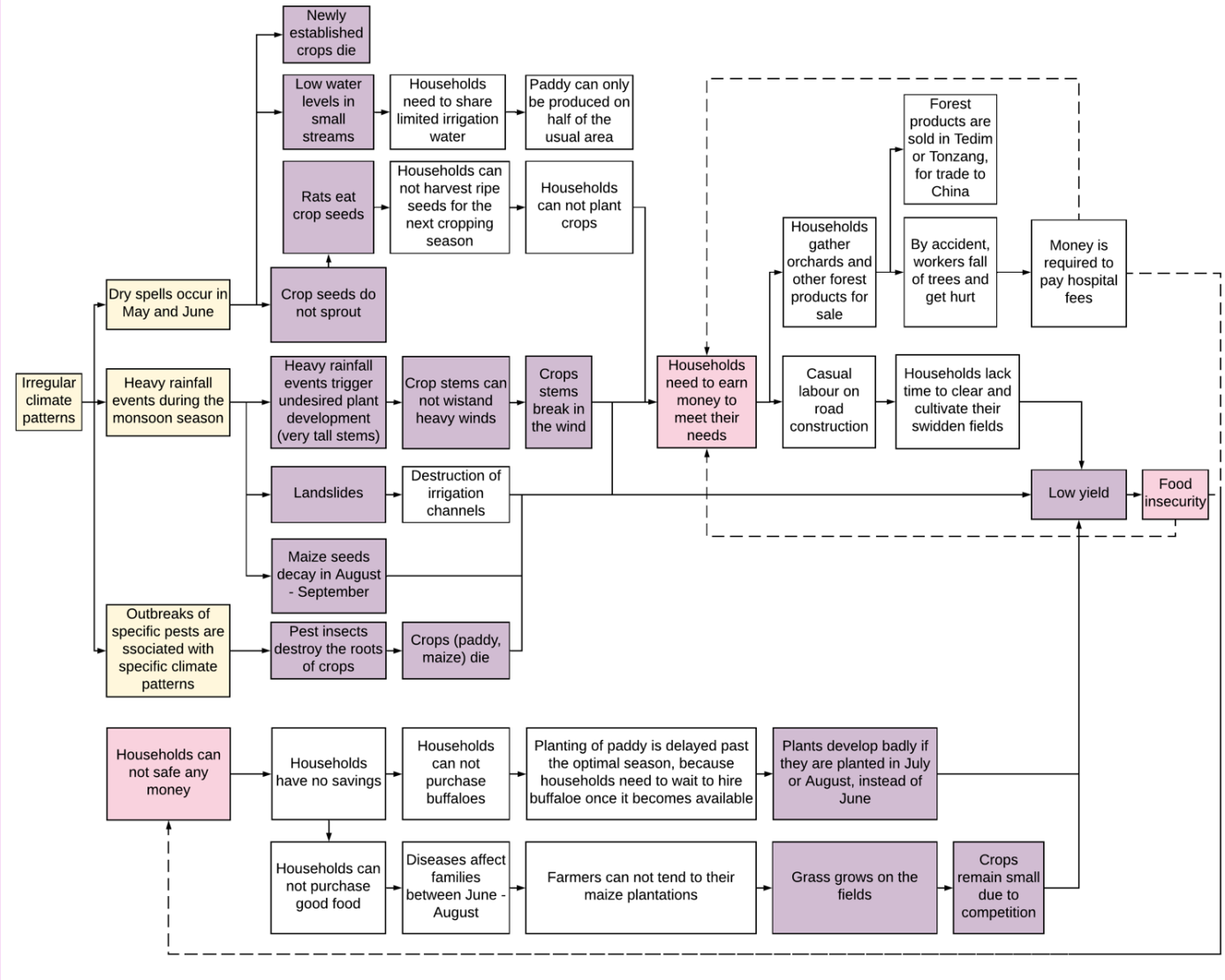

Figure 2: *Section of a causal diagram illustrating the local agroecological knowledge of men in Gamlai New village*

Key insights from collaborative research with STRONG project communities

This brief introduced an approach to participatory research with rural communities. This approach of a collaboration between Ar Yone Oo and Chalmers University can serve as a model for rural development actors, who seek to address climate vulnerabilities and farming system challenges in target communities – through co-creation and knowledge sharing activities. Key insights from the collaborative research with STRONG project communities in northern Chin State and western Sagaing Region include:

- ✓ Collaborative work of staff from rural development projects and academic researchers with rural communities requires time and commitment of all partners but can enrich rural development initiatives through the co-creation and sharing of knowledge.
- ✓ Local (agroecological) knowledge about climate vulnerabilities, farming system challenges and associated livelihood outcomes of rural communities can complement expert knowledge of researchers and rural development actors.
- ✓ Participatory research approaches, including brainstorming and causal-diagramming activities are well suited to engage project staff and rural communities in co-creation and knowledge sharing processes that explore and document local agroecological knowledge.
- ✓ Qualitative interviews and structured surveys can be used to deepen the inquiry and generalise findings from participatory research activities. Feedback meetings are important to verify insights and share preliminary findings and generated knowledge with participating communities.
- ✓ Causal diagrams that illustrate local agroecological knowledge of rural households can be analysed by project staff, researchers or together with participating communities, to identify entry points for rural development interventions.

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