

The **Community Resilience Case Studies** explore and document insights about changes in community resilience to climate change and disasters. Case studies were undertaken in Fiji, Kiribati, and Timor-Leste.



**Australia Pacific
Climate Partnership**

Case study 3 | Community resilience in Morcoluli, Manufahi Municipality, Timor-Leste

Morcoluli is a small community located in a mountainous part of central Timor-Leste, within Manufahi Municipality. Rainfall is highly seasonal in Morcoluli, with the wet season typically taking place between December and May and the dry season between June and November, though this has been changing in Morcoluli in recent years, according to research participants. Morcoluli is experiencing extended dry seasons, with seasonal rainfall becoming less predictable. Access to water is an ongoing challenge for the community, particularly in the dry season when acute water insecurity occurs for many households.

Approximately 70% of families in Timor-Leste rely on some form of farming activity for their livelihoods. In Morcoluli, most households rely heavily on coffee as a source of income, selling it at the market in a nearby town. Travel to the market is via a single road which takes 40 minutes by motorbike. Continued access to the market is therefore a key priority.



Community participants from Morcoluli and the research team on the last day of data collection. [Photo credit: PARTISIPA]

As well as longer dry seasons, Morcoluli is experiencing heavier wet season rainfall, which damages crops, houses and roads. Landslides caused by heavy downpours result in severely limited access to markets during the rainy season.

Community members described some of the actions they are taking to adapt to the changing climate, many of which involve cultural practices of collaboration, sharing of resources and local rituals and customs around water. Morcoluli residents are diversifying their livelihood activities. Instead of growing only coffee, households are growing corn, kidney beans, potatoes for both sale and consumption. Changes to local water management is also providing an opportunity for to embed technical knowledge about climate-smart water management, which is needed at the local level to adapt to climate change.

This case study highlights that the strong collaborative culture in Morcoluli provides a valuable entry point to support locally led climate and disaster resilience activities. External support, such as technical assistance to improve water and food security, can align with local priorities and systems to provide an inclusive and sustainable approach to climate resilient development.

Community context

Morcoluli is one of the six hamlets (aldeias) in Suku Liurai, located in Turisca Administrative region in Manufahi Municipality.

With a population of 158, Morcoluli is situated in the mountains at 1200m elevation. Access to Morcoluli from Turisca Administrative Post is via a road prone to landslides, with steep and rocky terrain difficult to access (and at times not passible) through the wet season, especially after heavy rain.

Much of the Morcoluli population farm coffee, and sell it and other agricultural products such as corn, potatoes etc., at the Turisca market, with profits comprising their primary income. Accessing the market via the single road, which takes 40 minutes to travel to on motorbike from Morcoluli, is therefore a key priority.



Figure 1: Map of Timor Leste showing the location of Liurai village – the location of Morcoluli community (Source: Google Maps, 2024)

Climate impacts

Community members in Morcoluli described the following experiences of climate change over the past 20 years:

Longer dry seasons in Morcoluli have reduced water availability and quality. People increasingly need to walk long distances on physically demanding and isolated mountainous terrain to collect water from natural springs and creeks. Family members typically rotate responsibilities for collecting water, except for family members who cannot walk long distances, including older people and people with disabilities.

If there's no water, people could die. If this keeps going, it's worrisome.

– Chief of Suku Liurai



Morcoluli is located in the mountains of Manufahi Municipality
[Photo credit: Jessie Meaney-Davis, UTS-ISF]

The lack of water during dry seasons causes particular challenges at the local primary school, where toilets overflow and pose sanitation and hygiene risks, and children, not being able to shower, develop skin rashes. The health worker who is posted to Morcoluli now stays in the neighbouring town of Turiscaï (a 40-minute drive from Morcoluli) due to lack of water at Morcoluli health clinic, limiting access to healthcare for residents of Morcoluli. Unequal access to water sometimes leads to conflicts between families, which have to be resolved by the Suku (village) Council¹.

Erratic, unpredictable seasonal rainfall reduces the quantity and quality of agricultural produce (especially coffee), which in turn reduces income for people with agricultural livelihoods and contributes to unpredictable cash flow.

We rely on agriculture to sell products. So January to April cash flow is very low, our kids are asking us to buy school supplies but it's really hard at this time of year.

- Man from Morcoluli

Heavier rainfall, when it does rain, damages crops, houses and roads, and causes landslides, resulting in damaged and impassable roads, severely limiting access to markets and the nearest town, Turiscaï, during the rainy season.

Community adaptation and resilience

The following climate change adaptation and resilience actions were described by participants in Morcoluli:

Actions to absorb and adapt to immediate climate shocks are common amongst Morcoluli participants. To cope with climate shocks such as reduced access to water during prolonged dry seasons, people in Morcoluli walk long distances on difficult terrain to collect water. Participants described how they dig for groundwater to use for cleaning and share food items with other families in the dry season who have less access to resources. When agricultural produce is affected by extended dry seasons and unpredictable rain, some people in Morcoluli buy food from markets, grow food only for consumption, and borrow money from family and neighbours, sometimes with high interest rates. After heavy storms, people help each other repair damaged homes. Some participants are saving seeds to plant in future seasons, and diversifying the crops they usually grow, e.g. instead of growing coffee only, they are also growing corn, kidney beans and potatoes to eat and sell at markets.

We try to shift to other crops to grow and sell instead of coffee alone, such as potato and sweet potato. But due to the difficult road conditions, we can't sell it at the market. We'd like to sell in Dili but the road is too hard to access.

- Man from Morcoluli

The establishment of a local water management group has potential to support climate resilient water management in Morcoluli. The local group is called a GMF (Grupu Maneja Fasilidade) and are part of Timor Leste's community management systems for operation and maintenance (O&M) of rural water systems. Local community members are elected to the GMF and have increased ownership of, and responsibility for, water management, including O&M, regulating water use and quality, collectively financing repairs, and coordinating with Municipal Water, Sanitation, and Environment Services (SMASA). GMF research participants spoke proudly about these responsibilities.

I'm grateful for my position, I'm hoping for more knowledge to be shared and training, capacity building from SMASA. I'm proud of my new knowledge of how to manage water in terms of writing reports.

- Secretary of GMF

¹ Suku council is an officially recognised body of local governance adapted from traditional communal authorities at the *suku* (village) level.

In Morcoluli, the GMF is a new community structure. The extent to which water management practices, GMF coordination with SMASA and the National Program for Village Development (PNDS - that rehabilitated the water system) will result in transformative change is yet to be evaluated. All GMF members in Morcoluli expressed their willingness for additional technical training and support from SMASA – which could include technical climate change information for longer term community resilience (see recommendations section).

Exploring financial models for long term sustainability of water management. As part of the GMF, households contribute a small amount of money on a monthly basis to support O&M of water infrastructure. The Morcoluli GMF plans to continue to collect community funds as an ongoing source of revenue for O&M. Several participants, including members of the GMF, noted that the amount of funds the GMF has collected is insufficient to make significant repairs. GMF participants did not seem to be aware of the option to access up to 15% of the funds required for higher O&M costs from PNDS, highlighting an opportunity for increased information sharing and awareness raising by PNDS.



The natural spring in the mountain has spiritual significance for the community. [Photo credit: PARTISIPA]

Traditional knowledge and practices relating to water and land care form a strong basis for future climate resilience. Participants from Morcoluli expressed pride in their ongoing traditional knowledge and practices of environmental stewardship handed down to them over generations. Respect for land, water, trees and ancestors is evidently an integral part of Morcoluli culture, with people practicing water and food rituals, *tara bandu* (traditional customs for land clearing, tree management and water preservation), and school teachers encouraging children and young people to care for the land and plant trees to preserve water and soil.

I feel proud of the land. I feel connected to the land. I was born here and I grew up here. Growing up here, living here, whether it's good or bad things happening, this is home.

– Woman with a disability from Morcoluli

Some research participants acknowledged that demands for water have increased in Morcoluli in parallel with its increasing population and the introduction of household level toilets, and they are aware and concerned about the pressure this puts on water resources. These population impacts on water resources, as well as climate change driven impact highlight that while traditional knowledge may be preferred, it may need to be complemented by climate projections, as it is unlikely to be sufficient to meet the scale and rate of transformation required to adapt to a changing climate.

Women's microfinance provides a safety net in times of crisis. Four small self-organised groups of women in Morcoluli have been utilising the *Moris Rasik* program (a microfinance organisation offering loans and financial literacy for disadvantaged women) to take loans and manage repayments collectively since 2014. While loans are held at the household level, the groups of women work collectively to help each other repay their loans. Members described the program as an important safety net for disadvantaged women, because it provides lower interest rates than other informal options; it is available immediately in times of crisis; and it can provide larger sums of money that may not be possible to borrow from family members or neighbours.

Repaying loans is, however, at times challenging, especially during wet seasons when it is not possible to travel to the market to sell produce due to road conditions, and when there is less demand for produce within Morcoluli. Group members described incidents of distress selling of livestock and drastically reducing prices for their produce to repay loans.

Usually we sell a bucket of oranges for \$15, but sometimes we have to sell them for \$5. There is less demand because of the road condition, so we can't transport to places where people would buy the stock.

- Woman from savings group in Morcoluli

Factors enabling adaptation and climate resilient development

Strong human and social capital existed in various forms in Morcoluli. The Suku Chief, Council and cultural leader expressed motivation to support the community. A strong local culture of *amizade* (unity and working together to overcome challenges) was also evident, and described by different social groups. The GMF is also an example of an emerging group that has potential to further support resilience to water security challenges in Morcoluli. Support to the GMF via SMASA will be important for the GMF's ongoing sustainability and capacity to deliver O&M of the water supply.

Women are taking on leadership positions in GMFs. The research team observed that the majority of formal leadership positions in Morcoluli are held by men. The establishment of the GMF in Morcoluli might influence gender dynamics of water management and local governance more generally, noting the gender balance in the newly established GMF in Morcoluli, and the pride expressed by female GMF participants.

As a woman, working on the technical aspect of water management is great. I like the practicality of it, the technical implementation of water systems is really interesting and I like being responsible for that.

- Young female technical officer from the GMF of the neighbouring aldeia

Access to financial resources enabled a level of resilience for some members of the community, particularly in times of crisis and disaster. Members of the *Moris Rasik* microfinance program, which targeted disadvantaged women, described how their access to finance provided an important safety net. However, as noted above, it also came with challenges due to inability to make loan repayments on time. Government subsidies for older people over 60 also support older people to purchase groceries. Participants emphasised the importance of assets that support their resilience, such as motorbikes, which facilitate access to markets and services, and horses, which are used to transport heavy loads, including to transport larger amounts of water from natural springs.

Personal experiences of past hardship and disaster events enabled people to cope with climate impacts. People in Morcoluli have endured multiple hardships, including during Portuguese colonial rule, the Indonesian occupation, conflict in the lead up to independence, and more recent political instability. People living in the mountains of Timor-Leste are well known for their fortitude, even outside of Morcoluli. These attitudes have continued since Portuguese and Indonesian occupation, with villagers working together on farming, fixing roads and water pipes, repairing homes damaged by storms, and providing resources to families experiencing food insecurity or financial hardship.

If we work together, then it's easy to solve issues. For people who live in remote areas, it's hard if you don't work together.

- Man from Morcoluli

Barriers to adaptation and climate resilient development

The quality and sustainability of resources and infrastructure posed a barrier to resilience. The poor quality of the main road to Morcoluli exacerbates livelihood insecurity, and the increased maintenance requirements of the rehabilitated water infrastructure intensify water insecurity. The poor road condition was mentioned by all stakeholder groups as a significant barrier to their resilience. In regular weather conditions, it takes approximately 40-minute to drive to Turiscaï to access markets and services. The weather conditions in wet and dry season made the road

vulnerable to damage, making access and transport to markets even more challenging, and at times impossible. This was a limiting factor to income generation, as selling agricultural products takes place at the market in Turiscaï.

We have plenty of foods available, oranges, avocados, but the thing is the road condition means it's not possible to transfer from here to the market.

- Man from Morcoluli

Increased maintenance requirements of water infrastructure was also raised by all stakeholder groups as a barrier to resilience. An older water system from Indonesian occupation was rehabilitated by PNDS in 2019, however, participants noted that the plastic infrastructure materials were significantly less durable than the iron pipes of the previous system, though the iron pipes were prone to rust. The pipes had also not been buried, which meant pipes and hoses burst far more frequently and severely. As a result, people living closer to the PNDS-built water facility have greater quantities of and higher quality water than people living further away from the facility. Some participants noted that parts of the community had to walk more than 2km to access water.

There's an impact for families that live further from the water tank because they have less clean water, the quality is different.

- Woman from Morcoluli

Participants described limited access to information about climate change, agriculture and livelihood adaptation options, as well as services available for people with disabilities. A man noted his expectation that national government representatives would provide technical support and information about climate change, climate resilient livelihoods and environmental conservation, as local communities cannot take adaptive actions if they do not have enough information.

Local leaders ... can start doing some environmental actions, but we can't do it by ourselves.

- Man from Morcoluli

The District SMASA Director also acknowledged that SMASA staff are expected to visit each suku every three months to provide technical support and advice, but because of the challenging road and access conditions the timeframe sometimes has to be extended.

Community priorities

During case study activities, community members identified strengths that enabled their response to climate change and disaster risks. The research team analysed the long list of strengths, and consolidated them into four themes:

- **Attitudes of working together** (*amizade*), e.g. unity and social bonding, sharing resources, pride and connection to land.

- **Physical and natural assets**, e.g. local food and palm wine, assets such as horses, motor bikes, weaved products.
- **Leadership and governance** e.g. Motivated leaders, local council, four participants emphasised the value of recurring PNDS funds and projects, and members of the GMF highlighted the value of training provided by SMASA on water management.
- **Customs and traditions** e.g. traditional rituals to sustain water, traditional knowledge and *tara bandu*. Workshop participants discussed these existing strengths in small groups (women, men, older women, older men, young people).



Workshop report back from the women’s group. [Photo credit: Anna Gero, UTS-ISF]

Together, groups discussed which of these strengths will be most important to sustain or build upon into the future to strengthen resilience to climate change and disaster risks, and why.

As can be seen in *Figure 2*, groups indicated all themes as being important to build for future resilience. Each circle’s size reflects the volume of votes from different groups prioritising these strengths. The bubbles inside the large circles correspond to different groups who voted for the strengths.

Larger bubbles represent a higher number of votes received, indicating greater priority. All groups voted similarly, except ‘*Customs and traditions*’ received a higher proportion of votes from men. The similar number of votes across demographic groups highlights how all four strengths are important for facing the challenges and impacts associated with a changing climate.

[Customs and traditions] encourage the community to work together ... and look out for other’s conditions and difficulties.

One of the good examples is the spring water... rituals and beliefs help to support the quality of the water.

- Man from Morcoluli

In their report back, the women’s and young women’s groups discussed the importance of working together and sharing as a means to cope in times of hardship, including when water was limited.

We solve water problems together – it is a main challenge, so water is a main point we discuss together. We share resources during difficult times in Morcoluli.

- Woman from Morcoluli

Like older men, young men described the importance of customs and traditions, noting both the Church and traditional beliefs as supporting collaboration in the community.

The Church plays an important role to gather the community who have the same beliefs. Role is to keep the community together.

- Young man from Morcoluli

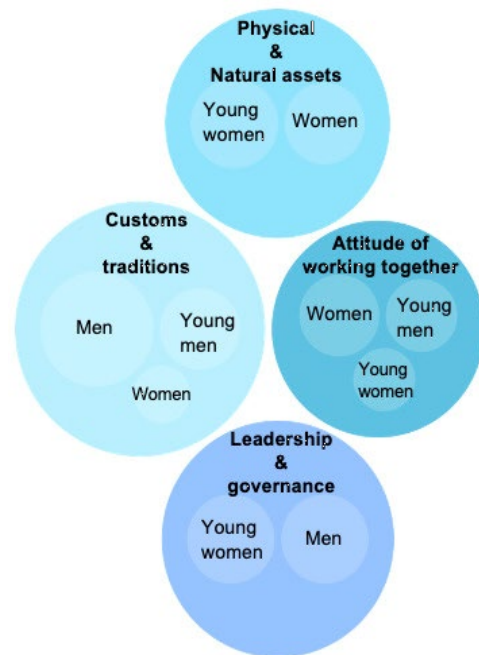


Figure 2: Results of workshop voting activity, where participants prioritised the strengths they would like to build on for future resilience to climate change and disaster risks.

Insights and recommendations

This case study has identified recommendations and pathways for development programs to enhance community resilience:

Continue to support resilient infrastructure, especially roads, given the strong connection to economic livelihoods.

Climate driven hazards such as landslides (which block road access), are becoming an increasingly common yet difficult challenge to overcome for residents in Morcoluli. Participants highlighted the need for support to rehabilitate the local road to enable ease of access to markets and basic services (many participants described this as the number one barrier to resilience). This case study highlights the links between climate change, heavy rain, landslides, road access and income generation to support resilient livelihoods. Development partners' focus on infrastructure, especially roads, should continue to recognise these links and work with communities to find short- and long-term solutions to enable communities to continue to earn incomes to support their families.

Provide technical support on climate resilient water management. Improving the quality of water infrastructure in Morcoluli was reported as a priority to support community resilience. GMF members also expressed a wish for further upskilling, and this could include skills on climate resilient management approaches. For example, the GMF could be supported to incorporate seasonal and shorter term forecasts, and well as longer term climate projections into planning, decision making and monitoring.

Support coffee-growing communities with climate smart farming practices. Many Morcoluli residents rely on coffee crops as a source of income, however unpredictable seasonal rainfall and temperatures are affecting the quality and quantity of yields. Opportunities exist to support coffee growers with information on how to adapt coffee farming practices and other livelihood activities to the changing climate.

Create opportunities to research, evaluate and share learnings about water management in Timor-Leste. There is appetite in Timor Leste to share experiences and insights across municipalities and nationally about the extent to which GMFs, and the ways and extent to which they are supported by SMASA, contribute to transformative action and climate resilience. Research, evaluation and cross-learning on the following topics are likely to be highly relevant:

- The operational sustainability over time of GMFs and other local community structures supported by government.
- The ways and extent to which GMFs and other local community structures are strengthened by information and

services provided by PNDS, SMASA and other government agencies over time.

- Gender dynamics and disability inclusion in GMFs, and the extent to which they influence women's transformative leadership, gender dynamics, disability equity and justice in the suku more broadly.
- The use of traditional knowledge and practices and *tara bandu* in parallel or integrated with new forms of knowledge and regulations for water management.

Enhancing disability and social inclusion in Morcoluli and PNDS projects. In addition to the above points about access to information, services and opportunities for people with disabilities, and opportunities for research on gender equity, there may be opportunities to actively promote gender equity and women's leadership in PNDS initiatives and GMFs, where appropriate (in addition to researching, monitoring and evaluating these issues). Further, efforts to actively promote disability and social inclusion in PNDS initiatives, GMFs and SMASA activities were raised by participants in Morcoluli. PNDS has collected data on people with disabilities in Liurai Suku, however, benefits of PNDS disability inclusion guidance were not evident in Morcoluli.

People with disabilities and their family members expressed their wishes to be included in activities, while the family member of one woman with a disability described her sister being rejected from a PNDS employment initiative because of her disability, even though PNDS had promised to include people with disabilities. Separately, the Suku Chief expressed his motivation to encourage people with disabilities' active participation in all village activities, and his interest in connecting and collaborating with municipality representatives to strengthen disability inclusion in the Suku. This was in the context of the Suku Chief and other residents of Morcoluli, recognising one of the PARTISIPA research team members - a person with a disability - from DFAT's social media posts about opportunities to study in Australia and being inspired by their accomplishments.



The research team interviews community members in Morcoluli [Photo credit: Anna Gero, UTS-ISF]