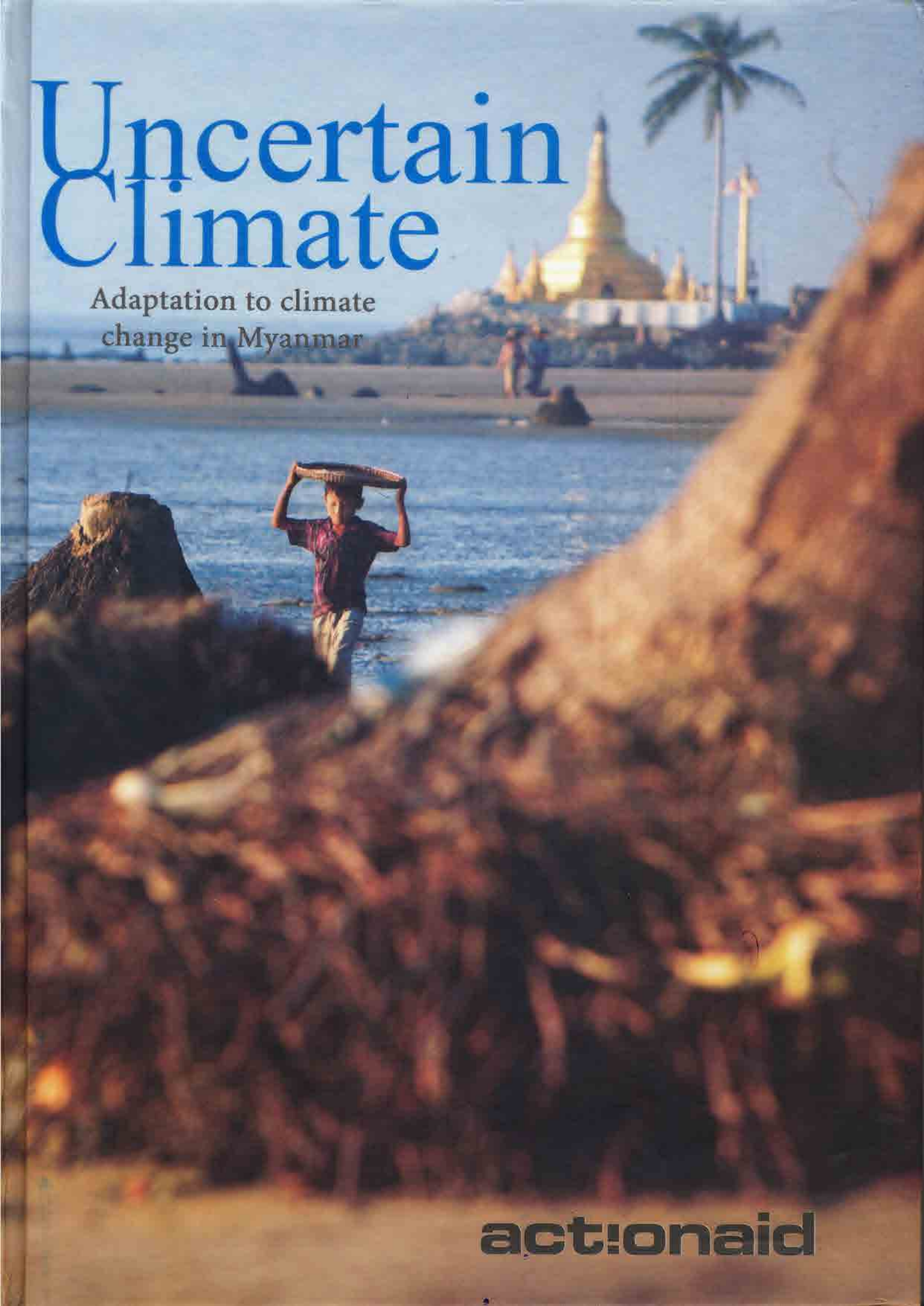
Uncertain Climate

Adaptation to climate change in Myanmar



actionaid

Foreword here?

Front Cover: Thandar Win in front of her house near Daw Nyein village in Pyapon Township. She dropped out of school to help her mother work.

Next page: A herder leads his cattle along a dusty road towards Ye Cho village in Pakkoku Township.

There isn't enough rainfall

On the edge of Kannet village there is an enormous hole in the earth about three metres deep and in the middle of which remains just a single toddy palm atop a small mound of earth. The landscape is scarred by caterpillar tracks and excavation marks but this hole – or at the least the rainwater that should fill it – is the fix the community has been hoping for.

Daw Htay Myaing and six other women from the village sit under a palm tree, making jokes and surveying the new water pond from the earthen bank. They're in high spirits and are looking forward to the rainy season when their new pond will be tested. If all goes well it will collect enough water for household use and perhaps some irrigation too. At the very least, it is expected to save the villagers a lengthy walk to the water pond in a nearby village where currently they travel twice a day.

The problem is drought. This area of Pakoku Township, which is located just a few hours from Mandalay in what is known as the Dry Zone, receives rainfall during monsoon but in recent years many farmers say it has been too little or has come at the wrong time for their crops.

The women are mostly in their forties and fifties and were born in the village. They talk over each other

Above: Women from Kannet village enter the principal water channel that will help fill their village's new water pond.

Previous page: The new water pond has been excavated on what used to be farmland.

without embarrassment, eager to tell the tale of their village's struggle for water. "When I was 17-years-old the water was fine, the rain was fine, farming was fine," says one of the women, "but after that it became worse and worse year by year."

Farmers say their crop yields are declining and some have stopped farming altogether. Kannet is reliant now on remittances from relatives working in urban areas such as Mandalay and Yangon and some have even travelled to Malaysia. The women estimate that about half the village's population – approximately 250 people – are working elsewhere.

"We hope so much that the people living away will come back. Some of the women have left their children in the village," says another of the women. But without successful farming or the development of other industries the village will continue to rely on remittances.

Not too far away in [Village Name] Daw Myo Than admits to the frustration that many farming families are feeling:

Daw Myo Than and her goats in [Insert village name].

“We’re just sitting and waiting for the rain,” she says. Since most farmers in the area have no access to irrigation, they rely on growing crops during the rainy season from May onwards and then look for other work between January and April. Daw Myo Than’s family stopped farming two years ago because production was so poor. She sold their two buffalo to pay off debts.

Instead of farming, Daw Myo Than is now breeding goats thanks to some assistance from an NGO. Like many of the women in the village, she also makes brooms from slender sticks woven together with coloured plastic, which are then sold in large towns. Her husband, U Thein Zaw, left the village in 2006 to work in the oil industry. He is just one of more than 20 men in the village to do so.

"If there is no rain in the village there are no jobs and the village will die."

Cho Ma

Above: Making brooms like the ones above is an important industry for women in [Insert Village Name]

Right: Cho Ma raises her two young children in the village and relies on broom-making for an income. Her husband works away.

Above: Bullock carts unload aggregate at the dam site in Kan Gyi village, Pakkoku Township.

Left: Daw Mya Shwe pictured above the dam site.

In nearby Kan Gyi Village, a shift to livestock rearing and other industries has taken place too, says Daw Mya Shwe. Her eldest son owns 40 goats and her daughter about 20. They started breeding them about five years ago because their farm incomes were in decline.

Daw Mya Shwe says that low rainfall has been a problem for her village since she was a child but it has worsened in recent years. “When I was younger it would always rain at least once per year but now it isn’t guaranteed. And when the rain does come it is really heavy. When it last rained, in October, the existing dam was destroyed,” she says.

With assistance from the government and ActionAid, this dam has now been renovated and the earth compacted to strengthen it against heavy rainfall. Another dam has been built a few hundred metres away to trap even more water. Together the dams have created a small reservoir that is already providing a stable source of water for livestock. Daw Mya Shwe hopes that migration from the village will lessen if there is more water for farming.

Above: Ko Kyaw Linn climbs one of his 40 toddy palm trees in Ywar Thit village, Meiktila Township.

Previous page: U Aung Gyi beside a large earthen dam nearby [Village name] in Meiktila Township.

Ko Kyaw Linn at home with his youngest daughters.

U Aung Gyi's village in bordering Meiktila Township has also benefited from the renovation and enlargement of a dam but he is more sceptical about its impact on the community. At a few hundred metres long, the dam should provide additional water for rice cultivation in the area but he is not certain it will be enough to stop migration from the village.

"There is no future in farming for the next generation. They are already working in Meiktila and can earn more money there than in farming. Also, there are facilities like teashops and motorbikes, and nice clothes – working the fields is not attractive to children once they've experienced urban life," he says.

But for U Aung Gyi farming is a way of life and the bedrock for his community. "I'll continue farming whether the weather is good or bad," he says, "I don't want to work elsewhere regardless of the difficulties."

Declining rainfall may be pushing young people from the Dry Zone to urban areas but the financial benefits migration offers can extract a heavy cost on families says Ko Kyaw Linn, a farmer with eight hectares of land and about 40 toddy palm trees.

Twice a day he walks out into the fields, often with one of his daughters, to harvest the family's toddy palms for sap, which they use to make jaggery, a coarse dark brown sugar. He says the lack of rainfall this year has reduced sap production by around 50 per cent compared to normal years and last season's farm production was enough to provide seeds for the coming season only.

For the past 10-15 years production has been okay he says, but judging the weather has become more difficult. "When I was 20-years-old we could predict the weather but after that we couldn't any longer."

If the production of his family's palms doesn't improve then it will be difficult to justify the investment in pots to collect the sap, ladders to climb the trees and ropes and knives. The fall in production has already affected the family. His second eldest daughter Than Than Aye dropped out of school because she wanted to support her parents and five sisters. The family borrowed money to send her across the Thai border at Tachileik and illegally on to Bangkok. She now works in a poultry factory and sends money home to support the family and pay off the loan.

"If last year's harvest had been okay then she would not have gone, I would not have let her," says Ko Kyaw Linn. "I said if the work is too hard or if you feel too tired then come back."

He doesn't want any of his other daughters to make such a sacrifice but admits that if the harvest next year is poor they may have to drop out of school too and find work in a town or city.

“If the rain is less and less the farmers will face more poverty than before.”

U Tin Htun

Left: U Tin Htun and his wife Daw Kyi at home in [insert village], Meiktila Township.

Previous Page: Ko Kyaw Linn’s daughter collects the toddy palm sap that her father brings down from the palms.

Next Page: A boat chugs along one of the Ayeyarwady Delta’s wider channels in the early morning fog.

The shoreline is

eroding

Above: A young boy walks past dead palm trees towards the northern part of the eroding sandbank that makes up part of Kaing Thaung Island at the southern tip of the Ayeywarwady Delta.

Previous Page: A fishing boat navigates the shallow water beside the pagoda on Kaing Thaung Island.

The pagoda on Kaing Thaung Island hasn't always been by the sea; it rests on a sandbank that once extended a few hundred metres into the Andaman. But this changed about 15 years ago says U Win Naing, the village head and owner of a teashop, when the natural process of sand erosion and deposition that kept the shoreline stable changed and erosion began to strip the sand away.

Kaing Thaung is an hour's boat-ride from the most southern reaches of the Ayeyarwady Delta and was settled in the early 1960s. Access to fishing in the Andaman Sea brought migrants to the island and at one point the sandbank supported a village with about 400 households. But the exposed location is vulnerable to climate hazards such as storms and flooding; the village was affected by the Indian Ocean tsunami in 2004, Cyclone Mala in 2006 and then Cyclone Nargis in 2008, which damaged or destroyed 75 per cent of the houses. By the time Nargis hit, the township authorities had already decided to move the village, recalls U Win Naing, who says that the storms and tsunami exacerbated shoreline erosion dramatically. Today, the sandbank is just one third of its original size.

In June 2008 the village moved west, off the sandbank and onto a cleared area of mangrove forest on the main part of the island. The new village is now separated from what's left of the sandbank by a narrow creek. To retard erosion the villagers gather in May each year before the start of the rainy season to build rudimentary sea defences, which consist mostly of wooden stakes driven into the most

Above: The sandbank on Kaing Thaung Island is now regularly breached in the middle during high tide.

Previous Page: A young man squats atop a dead palm tree close to the sea on Kaing Thaung Island. The palms died from saltwater exposure so were cut for timber.

Above: Young men from Yangon work on a stone and cement embankment to protect the new village on Kaing Thaung Island from sea waves.

Next Page: Trader Mya Mya Moe lays out gutted fish to dry in the sun.

vulnerable parts of the sandbank. There was also a basic embankment on the seaward side of the new village that used tree branches to dissipate wave energy.

The old embankment was a temporary solution says U Win Naing, who is hoping that a stone embankment funded by a local NGO and under construction will help protect the new village. “We expect it can withstand a bit more although we can’t guarantee protection against really high waves,” he says.

The township authorities now consider the sandbank too dangerous to live on during the rainy season but more than a dozen families remain on the northern part because it’s where fish are landed and fish waste dried in the sun before being bagged and sold for processing into animal feed.

Mya Mya Moe and her husband Than Zin have chosen to stay. Than Zin was a sea fisherman and would return every 3-4 days with his catch but Nargis swept away his boat and destroyed their home. With money borrowed from friends he and Mya Mya Moe established a new business trading fish. “It’s risky to stay here but this is our business and we have to pay our loans back,” says Mya Mya Moe.

The township authorities reacted quickly to the shoreline erosion by moving the village west but some families have been left dissatisfied with the manner in which the move was made. Mya Mya Moe says that although she and Than Zin had little money, because they were classified as business owners they received no assistance with land or housing in the new village, unlike many other families that received housing.

On the southern part of the sandbank Daw Than Soe lives with her husband in a small shelter. On the strip of sand she’s living on there used to be a garden and about 20 houses. Now the sea is about 50 metres away and the remaining houses are little more than temporary structures. She says she missed out on the opportunity for housing support in the new village because her daughter was giving birth so she couldn’t attend the community meeting.

"The lesson learned from Nargis is don't buy a lot of furniture because you can never predict the weather."

Mya Mya Moe

Above: Men unload the remains of fish that have been processed on the northern part of the sandbank on Kaing Thaung island.

Above Right: The fish waste is left to dry for a few days and sold to factories for processing into animal feed.

Below Right: An unfinished house on the southern part of the Kaing Thaung sandbank. Most families have moved west to the safety of the new village.

But the larger issue affecting the new village appears to be the way in which land was divided. During the planning stage, families were invited to purchase parcels of land based on a range of prices. The prime land on 1st street, which is next to the creek, was ten times more expensive than the land on 20th street, which is further west and close to the cemetery. Since the land was reclaimed from mangrove forest it was quite boggy so sand was pumped from the sandbank to fill-in the new village. However, this not only worsened erosion on the sandbank, which is now breached in the middle during high tide, but sand was not blown onto the cheapest land lots from 13th street upwards, which means the houses there are built above boggy water and the roads and paths are extremely muddy during rainy season.

"We poor people cannot have a voice," says Daw Than Soe's daughter Moe Moe Shwe, "we have to stay where we are placed, we have to go where we are told to go."

For those families still living on the sandbank there is little protection from the weather but also little incentive to move to the new village. "If there are any disasters or hazards we will be carried away," says Mya Mya Moe. She keeps a small boat by the jetty just in case she and Than Zin need to cross the creek to the new village in bad weather.

Above: Daw Thein and U Hla Sein walk along the front of Pha Yan Kone village. Storms have left rubbish everywhere and eroded the root bowls of the palm trees.

Previous Page: Daw Than Soe dries shrimp caught in the sea on Kaing Thaung Island.

The stone embankment in Pha Yan Kone village that was built in 2010.

Mya Mya Moe says the community was not consulted properly on the move to the new village or the erection of the new stone embankment. She would have preferred to see an embankment built on the seaward side of the sandbank first because this would have protected the creek from silt deposited by sea storms, helping to protect not just the houses beside the creek but also the working area of the village.

"The front row of houses has business people so if the embankment was removed by the sea it would affect business people and this would then affect day labour availability," she says.

Kaing Thaung is a dramatic example of how major storms can exacerbate shoreline erosion. Further north among the large channels and small creeks that comprise the vascular Ayeyarwady Delta, villages do not have to contend with such large sea waves but still face the challenge of erosion.

One such village is Pha Yan Kone, located a short distance from Labutta and bordering one of the large water channels that creep north from the Andaman. Daw Thein (75) and her husband U Hla Sein (77) have lived here since they were children. Daw Thein says she remembers playing in front of her house as a child but since marriage she and U Hla Sein have been forced to move five times as the channel has eroded about 800 feet of shoreline.
The shoreline erosion affecting the village has been happening for decades but there is now an increased threat from storms and cyclones developing in the Bay of Bengal. Cyclone Nargis took about 100 feet of land in one night, destroying the houses along the coast and forcing the village to retreat.

"There are stronger waves in the river than in the past and this can affect the land erosion," says U Hla Sein, who has witnessed the change in climate. "Sometimes the birds fly in land, which means there are strong winds at sea. This didn't happen much in the past but happens often these days," he adds.

To halt the erosion the community built a small stone embankment in 2010 with financial assistance from NGOs including ActionAid. The embankment appears to be working although the land in front of it is still eroding. To further stabilise the channel there are plans to plant mangrove trees again.

Above: ActionAid fellows Mar Mar Oo and Thein Lin walk with Ye Cho village head Moe Win (centre) along one of the reforested hillsides next to the town.

Next Page: Reforestation leader Aye Win shows how poor environmental management can worsen soil erosion around Ye Cho village.

In cases of shoreline or inland erosion it appears that communities in areas of decreased environmental resilience feel the effects of climate change most keenly. Ye Cho village in Pakoku Township has suffered from soil erosion for about seven years. The village had san pya or 'model village' status because of its high agricultural output but as the village grew so too did the envrionmental costs. Over time the forest cover on the local hillsides diminished because people cut the trees for firewood and let their goats feed there.

The effects of poor environmental management have been exacerbated by climate change says Aye Lwin, a farmer in the village who has led the implementation of a community effort to reforest the slopes. "It would rain easily during monsoon season but the

Above: Aye Lwin and Mar Mar Oo inspect vegetation cover on a reforested hillside near Ye Cho village.

Right: Mar Mar Oo at a nursery in Ye Cho village where 7500 saplings are being grown. They will be used to reforest nearby hills.

Next Page: Seven-year-old Hnin Thet Wai helps her sisters gather clams from their field a short distance from Kyon Hla village in Pakoku Township. Unseasonable rain damaged her family's crop last year so they're more reliant on finding the clams. One hundred sell for about 500 Kyat (US 40 cents).

rain pattern has changed and it's now less and less," he says. "Now the rain only comes once or twice a year and when it does it's so heavy that it can cause flooding, wash away plants and cause soil erosion."

The community now sources its wood from a nearby forest that isn't situated on a hillside and people are forbidden from chopping trees down completely. The goats have also had to move on as they are no longer allowed to cross the slopes and feed on the vegetation. With assistance from an NGO, the community planted 10,000 trees in 2009. This effort was not completely successful because 4000 trees died but a second phase of planting will take place in May 2013 with 7500 trees. The reforestation effort will not resolve the problem of declining rainfall but should at least protect the valuable agricultural land from washing away.

The Saltwater Challenge

U Soe is not satisfied with last season's harvest. He takes a handful of the rice in his left palm and uses the heel of his right hand to grind it. The husks slip off gradually to reveal rice that he says is low quality and worth little.

It's been a tough year for farming families in Pyapon Township. The farmland in this area, located in the eastern part of the Ayeyarwady Delta a few hours southwest of Yangon, is prone to natural saltwater intrusion but this can be worsened by storm surges and is likely to become a greater problem as global sea levels rise. Unseasonable rainfall is also a threat to crops and was particularly bad last year.

U Soe estimates his last harvest to be about 60 per cent lower than in 2011. The family has since cut down on spending and has taken a financial loan to cover the shortfall but if the harvest is damaged again next year, U Soe says he may be forced to abandon farming for himself and work as a farmhand for someone else.

Above: U Soe's family and one friend pose in front of their haystack.

Previous Page: U Soe shows the rice from last season's harvest, which he says was ruined by unseasonable rain and saltwater intrusion into the fields.

Next Page: U Maung Maung and his wife Daw Mya Thein stand in a field that they once farmed but which they had to lease to another farmer because they needed money after Cyclone Nargis.

"I had a lot of plans but the weather has destroyed them," says U Soe. He doesn't think much can be done to limit damage from unseasonable rain but it is possible to mitigate the effect of saltwater intrusion by raising embankments. A few decades ago the World Bank funded a large embankment in the area to protect farmland but in recent years landless families have cut down forest beyond the embankment to establish new farmland. U Soe would like to raise his embankment but says the labour costs are prohibitive.

In nearby Ta Khun Daing village, U Maung Maung (73) has already abandoned farming and now works as a day labourer, mostly creating embankments. He says that he and his wife Daw Mya Thein (67) never really recovered following Cyclone Nargis in 2008. The cyclone caused the deaths of almost 140,000 people and the accompanying storm surge flooded vast areas of land with seawater.

With productivity on his land severely compromised by the salinity and facing financial difficulties, U Maung Maung and Daw Mya Thein sold off some of their draft animals and in exchange for a loan leased their land to another farmer. U Maung Maung admits that without regular work it is unlikely they will be able to pay the loan back and have their land returned.

Cyclone Nargis has had a lasting impact on farmers in the area and global warming is expected to increase the risk of severe storms. Embankments are one means by which farmers can protect their land if they can afford to do so but such efforts are usually piecemeal and do not address larger environmental problems.

Above: U Soe Myint's grandchildren carry a locally grown crop that is burnt to extract oil.

Left: U Soe Myint atop his haystack.

Next Page: U Htay Kyaw clears one of his fields. Cyclone Nargis spoilt a lot of paddyland in the area.

Improved management of the local environment could better mitigate the effects of saltwater intrusion says U Soe Myint (63) from Ma Nann San village. He has struggled to maintain an embankment to protect his fields, which like U Soe's land is outside the World Bank embankment. He says that higher tides and strong winds are increasing salt water intrusion but this is being caused, in part, by poor management of local creeks, which are sometimes dammed by fishermen, and the lack of trees in the area, which have been chopped down to create farmland or for firewood. Some farmers in Ma Nann San have collectively provided 20 acres of land to grow tree saplings. With help from a local NGO, training has been given on how to grow nursery plants and increase forest cover in the area. It is hoped this will strengthen riverbanks and reduce the effect of strong winds, which can blow saltwater onto farmland.

But for those farmers living on marginal land like U Soe Myint, farming one crop per year seems increasingly risky because there is nothing to fall back on if the harvest is poor or fails. He's trying to sell his land but says that

“We don’t know what to do except farming. This is our tradition”

U Hla Shwe

nobody in his village has the money to buy it and people don’t want to take a gamble on such low quality land.

Not too far away in Labutta Township, U Htay Kyaw, the village head of Thaung Lay village, is burning his fields. His family’s land was damaged by Nargis and this will be the first year he’s to attempt cultivation again. He has businesses unrelated to farming so his family recovered from Nargis more quickly than most farmers. He estimates that of the 200 acres of farmland owned by about 30 families in the village, only about 30 acres are being cultivated. The drop in agricultural production means that most families cannot afford to send their children to middle school and those families that were once richer can no longer afford to help those that are struggling.

As a businessman and farmer, U Htay Kyaw thinks that if farmers are to recover and adapt then they need access to cheaper credit. Although families can get loans the interest rates are too high so they are not used for long-term business investment. U Htay Kyaw argues that the lack of investment by farmers and businesses also affects landless families by limiting the availability of day labour work.

Above & Left: Aye Khine's children beside their house near Daw Nyein village in Pakoku Township.

Aye Khine and her husband Khin Htwe have found themselves in this situation. To support themselves and their four children Aye Khine works as a day labourer when she can while her husband works on a fishing boat at sea. Khin Htwe left the village five months ago because he couldn't find sufficient work as a farmhand and the fishing boats pay a cash advance if you join them. Thandar Win and her brother have dropped out of school because there it not enough money to send them.

U Htun remembers a time before Cyclone Nargis when he could employ workers to help him farm and run his prawn business. Things have changed dramatically since then and he now finds himself in a situation where he doesn't have enough work. Nargis not only destroyed the house he shared with his wife Daw Khin Than Kyi but also the trust of buyers in the prawn industry.

Before Nargis businesspeople would pay money in advance

Above: The wall of U Htun's house is covered with slogans he's heard on the radio. They include: "The state's strength is farmers" and "Sea level rise is due to the melting of the ice. Therefore, towns and villages on the coastline are in danger".

Next Page: U Htun casts a prawn net over his pond.

to secure buying rights to his prawns. This situation was not ideal but at least it guaranteed his family an income and allowed him to make the necessary investments his business needed. "But now the businesspeople don't trust the weather and are less interested in investing," says U Htun. His family received a newly built house after Nargis from a company but with little capital of his own and no trust from prawn traders, he has little alternative but to borrow from moneylenders at high interest rates.

"After Nargis money lenders took advantage of us because we were so poor," he says. "Before Nargis we made a lot of profit from the prawns and could send all our children to school. Our son is in 9th Standard and it's difficult to send him to Labutta to attend school now."

With financial credit, U Htun argues that he could dig his pond deeper to protect his prawns from hot weather and potentially increase his production.