brac

Coping with climate change

STORIES
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PHOTOS
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PUBLISHED BY
Climate Change Programme, BRAC
BRAC Center, 75 Mohakhali
Dhaka 1212
Bangladesh

FOREWORD

Countries development is threatened at scales by climate change. The adverse effect is mostly felt at the community level. Millions of people living in local communities in Bangladesh depend on natural resources to meet living needs. They are the ones who are disproportionately affected by the impacts of climate change.

We cannot stop the climate to change, but there is no alternative than to adapt. According to the flagship report by Global Commission on Adaptation (GCA), without adaptation measures, global agriculture yield may face a loss upto 30%. That will affect nearly 500 million small farms around the world.

To combat with such ramification, adaption technologies in agricultural sector have been introduced by the people living on the verge of climate change. From each of the climate vulnerable people's own situation, such technologies has helped them to combat the impacts of climate change while improving their lives and building climate resilient livelihoods.

This book illustrates 20 climate change adaptation stories from the most climatic vulnerable zones of the country including coastal area, haor basin, drought prone area, hill tracts.

The stories may have been collected in a short span of few months, but the adaptation technologies demonstrated through each of the stories are a culmination of the communities' hard-earned knowledge and generations of experiences. Their knowledge and skills have inspired many of their surroundings; and, through this book, it's our aim to share their experiences in the form of a story with pictorial evidences to inspire many more climatic vulnerable people to come forward and take a stand for their potential for improving their livelihoods.

BRAC, being a leader, takes the opportunity to disseminate the knowledge from the grassroots level to a wider audience. We will be honored if the book can serve to a verity of audience to explore more.

Dr. Md. Liakath Ali
Director
Climate Change Programme
BRAC and BRAC International

MESSAGE

There are simply two ways we can tackle the risks induced from climate change, mitigation and adaptation. Mitigation means limiting Green House Gas (GHG) emission, and adaptation is to accept the fact that climate is changing and act accordingly to limit the negative impact.

The biggest priority for adapting to climate change impact is awareness, which has been happening in large scale. Here to cite that, Bangladesh is the champion in making people aware about responsive adaptation to natural occurrences like cyclones. Through a robust approach called Early Warning System (EWS) and awareness campaigns in the local level.

Then it comes to building capacity to adapt, absorb and transform. Building this type of capacity will need investments in creating evidence, generating knowledge and education.

Taking into account a specific need of knowledge materials of such kind would showcase how local knowledge and experience is helping the generation to generation to become more resilient in the given situation.

The initiative taken by BRAC Climate Change Programme is arguably appreciable while it creates milestone once again.

Dr. Saleemul Huq
Director
International Centre for Climate Change and Development (ICCCAD)
&
Adviser
Climate Change Programme, BRAC

CONTENT

Southeastern Bangladesh

Vegetable farming in wetland makes agriculture attractive

A heightened interest in otherwise unusual vegetable farming in the southern wetlands of Bangladesh has been attracting an increasing number of people into agriculture from other professions.

Alongside paddy and fish cultivation, vegetable farming is the other important agricultural activity in Bangladesh.

Lokman Mia, 45, used to be a full-time rickshaw-puller in the southern district of Bhola only five years ago until he got interested in vegetable farming. “Things weren’t easy at the start. I didn’t have any land of my own. So, I had to lease a piece of land to try out my luck,” said Lokman.

He amassed Tk 15,000 by adding a loan from a local lender to his own meager savings and took a 0.5 decimal (0.02 hectare) land on lease for one year in his locality – Char Fashion.

The land Lokman took on lease remains under water for most of the year. So, he had to do something innovative to make that land usable for vegetables. First, he had to bring some soil from a nearby high land and build isles in the lowland. Then using fertilizers, they made the land usable and planted a number of different types of vegetables.

Asked what he grows, Lokman said: “What not? From pumpkins to beans, I grow all kinds of seasonal vegetables.”

Interestingly, this doesn’t mean the remaining low wetland remains unused. Lokman, like many other neo-vegetable growers in that area, has been using the lowland for fish cultivation. They use nets as shades over the ditch where the fish grow and the vegetable plants grow on the net-shade.

Last year, Lokman made a profit of Tk 3 lac by selling his vegetables in the nearby market. Unlike paddy, vegetables can be grown throughout the year. As a rickshaw-puller, Lokman’s average annual income was barely half of what he now earns as a vegetable grower.

This has had an impact on another level as well. The district of Bhola, which even 10 years ago grew very little of its demand for vegetable, is now self-sufficient. This also means that Bhola, which is also one of the most vulnerable areas in the world to the fallouts of global warming, being frequently hit by cyclones and a victim of the slow poisoning called salinity, has now found a new avenue of survival for his almost entirely agro-based economy.

Salinity tolerant rice becoming popular

The agricultural coastal districts of Bangladesh are among the worst sufferers from climate-changed triggered sea level rise and the resultant salinity, which has large affected the paddy farming.

According to the Soil Research and Development Institute, around 0.5 million hectares of arable land in the coastal belt have already been turned barren due to excessive salinity. The district of Bhola, which has been exposed to the elements of nature more than any other areas in the coast, a staggering 68,000 hectares of arable land have been turned barren by salinity.

However, like all the ever resilient coastal people of Bangladesh, Bhola has been fighting back with the help of high salinity tolerant breeds of paddy invented by the Bangladesh Rice Research Institute (BRRI). In the last few years, when the impacts of climate change have been becoming more visible than ever, BRRI, the government research body, has developed more than 10 salinity tolerant paddy varieties. More importantly, some of these varieties have already reached the farmers in the coastal districts.

Many farmers in Bhola, who had taken up other professions more than a decade ago, have switched backed to farming in the last three years, thanks to BRRI's salinity tolerant breeds. Jasim Uddin has been cultivating the "BRRI 52" variety of paddy for the last few years in his one-acre land.

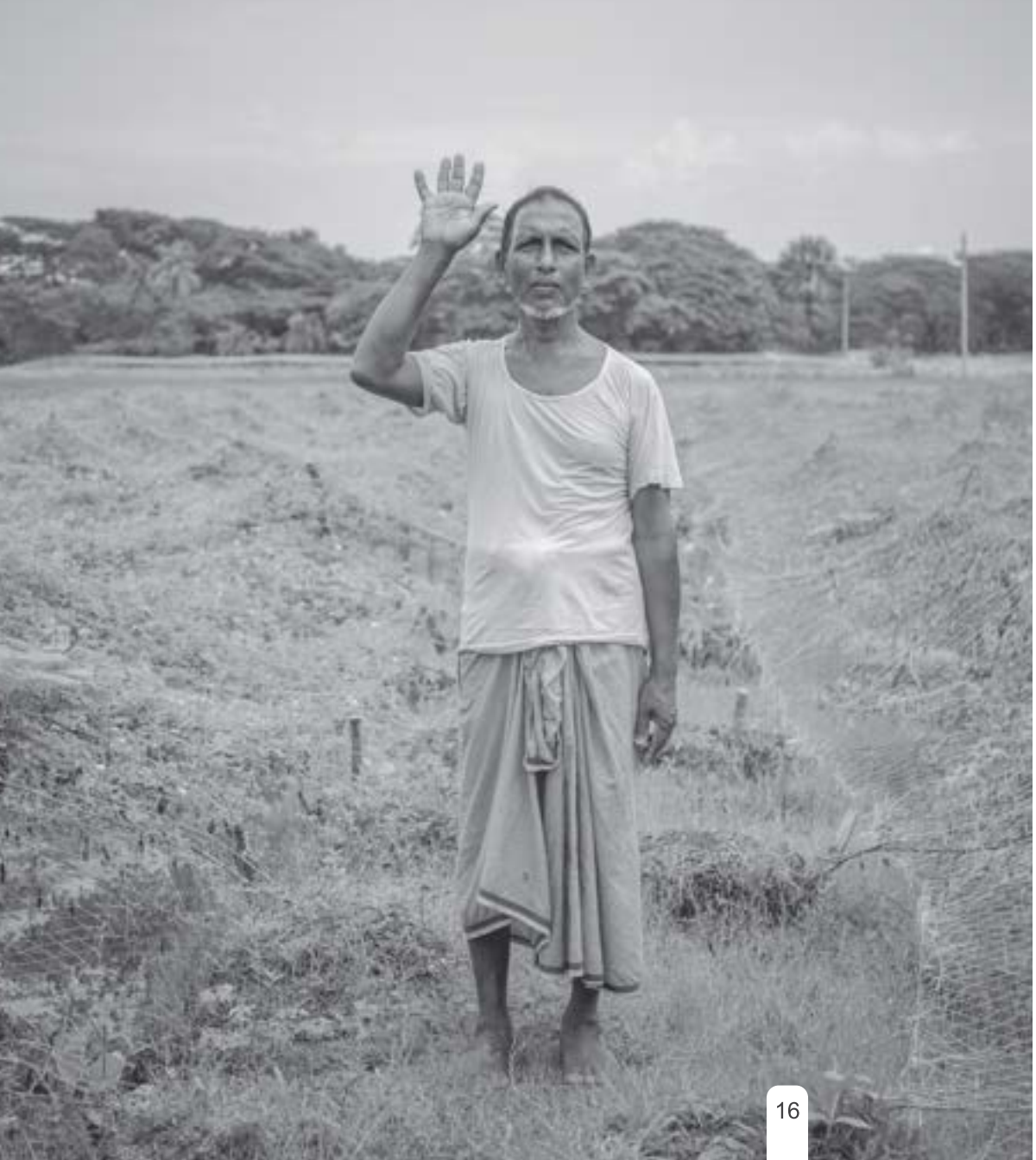
"I am happy with this variety [BRRI 52] because it gives me around 80 maunds [nearly 1,500kg] per acre which is more than enough. A few years ago, I stopped growing paddy as the production of older varieties had become very low," Jasim said.

"But the situation has now changed. Many farmers are cultivating the new salinity tolerant varieties. Their production is good too. In addition, these are physically stronger and can tolerate very strong wind. This is especially helpful during turbulent weather," Jasim, the farmer based in Char Fashion Upazilla also said.

According to Jibon Krishna Biswas, former director general of BRRI, developing stress-resistant rice varieties was one of the core agendas of the government. "Such varieties, in addition to bringing farmers back to the field, are also making sure that fallow lands are being used again," he said.

What BRRI is doing is immensely important particularly because Bangladesh's food security largely depends on the production of paddy, the staple.

A move towards chemical free vegetable farming



Sultan Ahmed Madrasi, 55, lives in Char Afzal village under Char Fashion upazila of Bhola district in the south of Bangladesh. He is one of the 25 members of the Adarsha Chashi Unnayan Samity (the ideal farmer development association), who have been working together for five years to produce vegetables round the year without using pesticides.

In recent times, there has been a growing awareness around Bangladesh regarding organic food, considering the damage that chemical fertilizers and pesticides can do to human body and also to the natural ecosystem. From such thoughts, the members of the Adarsha Chashi Unnayan Samity have been growing vegetables without pesticides.

“We had two motivations. Firstly, we wanted to make food [vegetable] free from the harmful residues of chemical pesticides. Secondly, the flora and fauna of nature consists of tiny species which are killed by chemical pesticides. These tiny organisms have their important role to play in nature,” said Sultan.

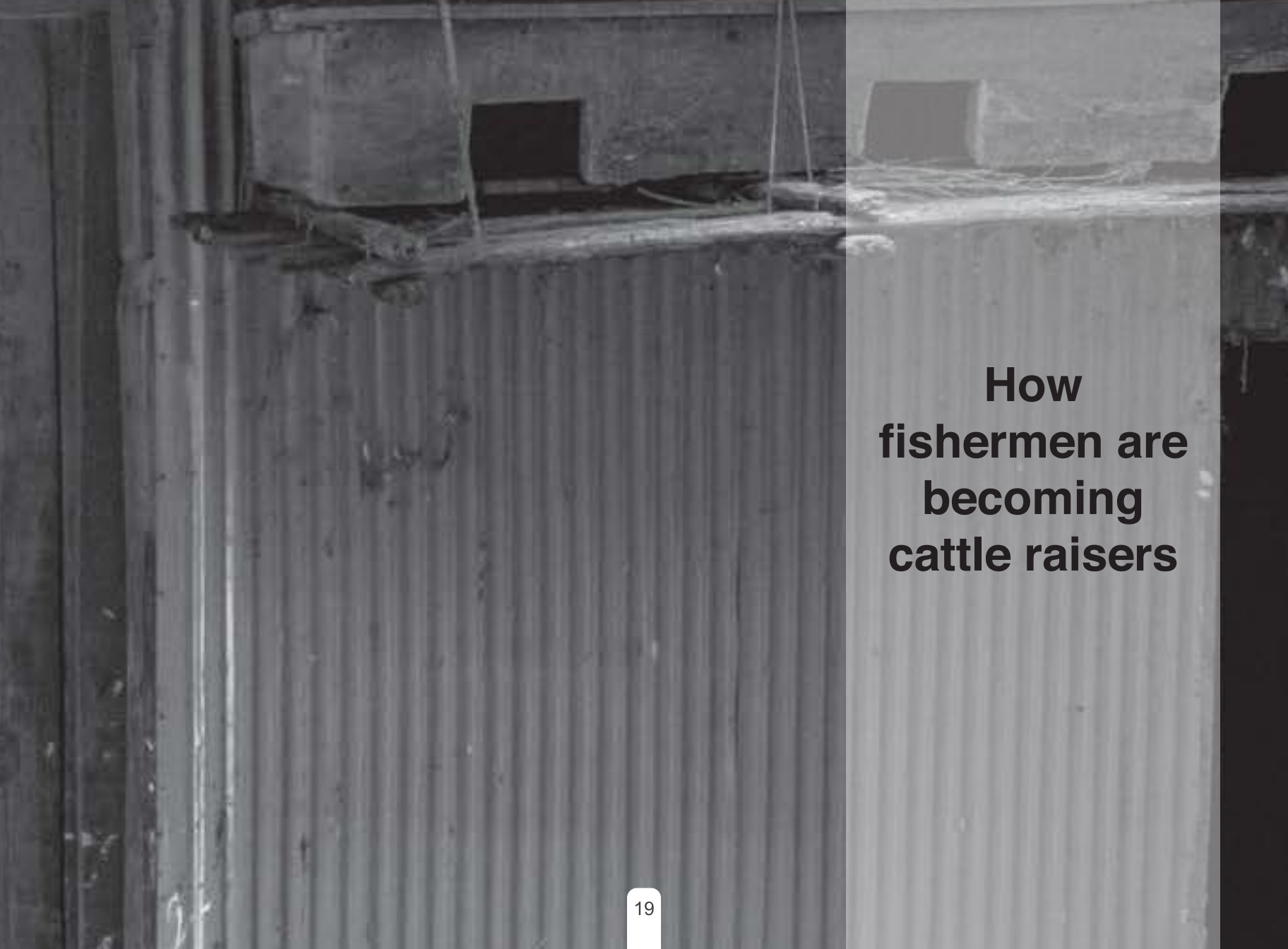
He also thinks that the modern high-yielding methods of agriculture using chemical pesticides might give good production in the short run, but in the long run, such practices were only going to make agriculture unsustainable by damaging the nature.

They have introduced the “pheromone trap” method of fighting pests in their vegetable plantations. This method of pest control has been rarely used in Bangladesh because it is expensive as it uses a special hormone attractant to draw insects into a jar or a bottle where it gets killed.

Sultan and his fellow farmers use a local adaptation – they use different combinations of Neem extract, cattle urine, limewater, and mulberry, all of which are thought to have pheromone properties, for different insects. The smell gives sexual impetus to the male insects and draws them towards the jar. The jar contains soap-based detergent which kills the insects.

However, there are a couple of disadvantages to this as well. Not using chemical pesticides means production has been 20% lower. Moreover, their methods of using organic control are also more expensive than chemical-based pesticides; as a result, the price of their vegetables is also higher than regular vegetables.

Despite the drawbacks, Sultan and his fellow farmers hope to continue their effort as there has been a slowly increasing demand for chemical-free food in Bangladesh.



How fishermen are becoming cattle raisers

As a child, Nur Uddin's most favourite hobby was to take their family boat and sail carefree in the Tentulia River on which stood their homestead. It was not an abnormal hobby because Nur Uddin's family has been catching fish for a living for several generations.

Eventually, as he grew up, that hobby became his profession. Very often he, along with other fishermen from his locality, would venture past the boundaries of Tentulia and go into deep sea in search of fish. They brought some of the catch for home for their own consumption, and sold the rest to fish traders.

But a significant spike in the frequency of depressions in the Bay of Bengal in the recent years has cut down the number of times they venture into the deep sea. Depression makes the sea and the mouths of the incoming rivers very restless, making fishing difficult and staying on the river risky. That, quite understandably, has adversely affected their incomes as well, forcing them to explore alternative professions, such as cattle rearing.

The met office strongly discourages venturing into the sea when cautionary signal number 3 is being hoisted when there is a depression in the sea. That directly affects what people like Nur Uddin do for a living. Studies show that the met office has issued more such signals in the last few years than ever before. This therefore also means that Nur Uddin had that much less time to go fishing into deep sea.

Other studies have often directly linked to the growing number of natural calamities such as cyclones and depressions with the global climate change.

Nur Uddin has not yet fully given up the profession of three generations of his ancestors. But, because he now goes to the sea less often, he has begun rearing cows, goats, pigeons and ducks in his "leisure" time.

"I am trying to do other types of work, which do not depend on weather conditions," he said.

Nur Uddin mainly buys young cattle from the local market, feeds them to fatten them up and then sell them back at prices higher than his cost.

"But there is one big problem. This part of the country… there is water everywhere. There is not enough open grassland. So feeding cattle is not easy," he added.

People like Nur Uddin, whose lives are a constant struggle against the might of nature, this has given an alternate option to survive in the face of ever increasing brutality of the elements.

Northeastern Bangladesh and Haor

*Haor is a wetland ecosystem in the northeastern Bangladesh.

Indigenous couple welcomes cassava to Bangladesh

Small huts of indigenous communities living in the foot of small hills in northeastern Bangladesh might be picturesque, but the lives of people who live in these huts are not as beautiful as the setting.

Nomita Dasel, 58, who belongs to the Garo indigenous community in the hills of the northeastern district of Netrakona near the border with India, has always struggled to ensure three decent meals for her family. The 3-acre land her family owns yields rice just once every year, which barely covers for her family's annual demand.

Unfortunately, about a decade ago, even that became difficult, thanks to the sand-filled flash flood that comes from the upstream hills in India's Meghalaya, leaving most arable lands in its track barren.

"Ten years ago, we set up a small makeshift tea stall in our village [Patlabon] and have somehow been managing a living with the income from that stall," said Nomita.

However, something that has happened recently is now giving them hopes of being able to rise again.

Four years ago, Nomita's husband brought something from the other side of the border that nobody has ever seen before. He brought with him the seed of a strange new vegetable called Cassava – also known as Brazilian arrowroot or "Shimul Aloo" as they call it in India.

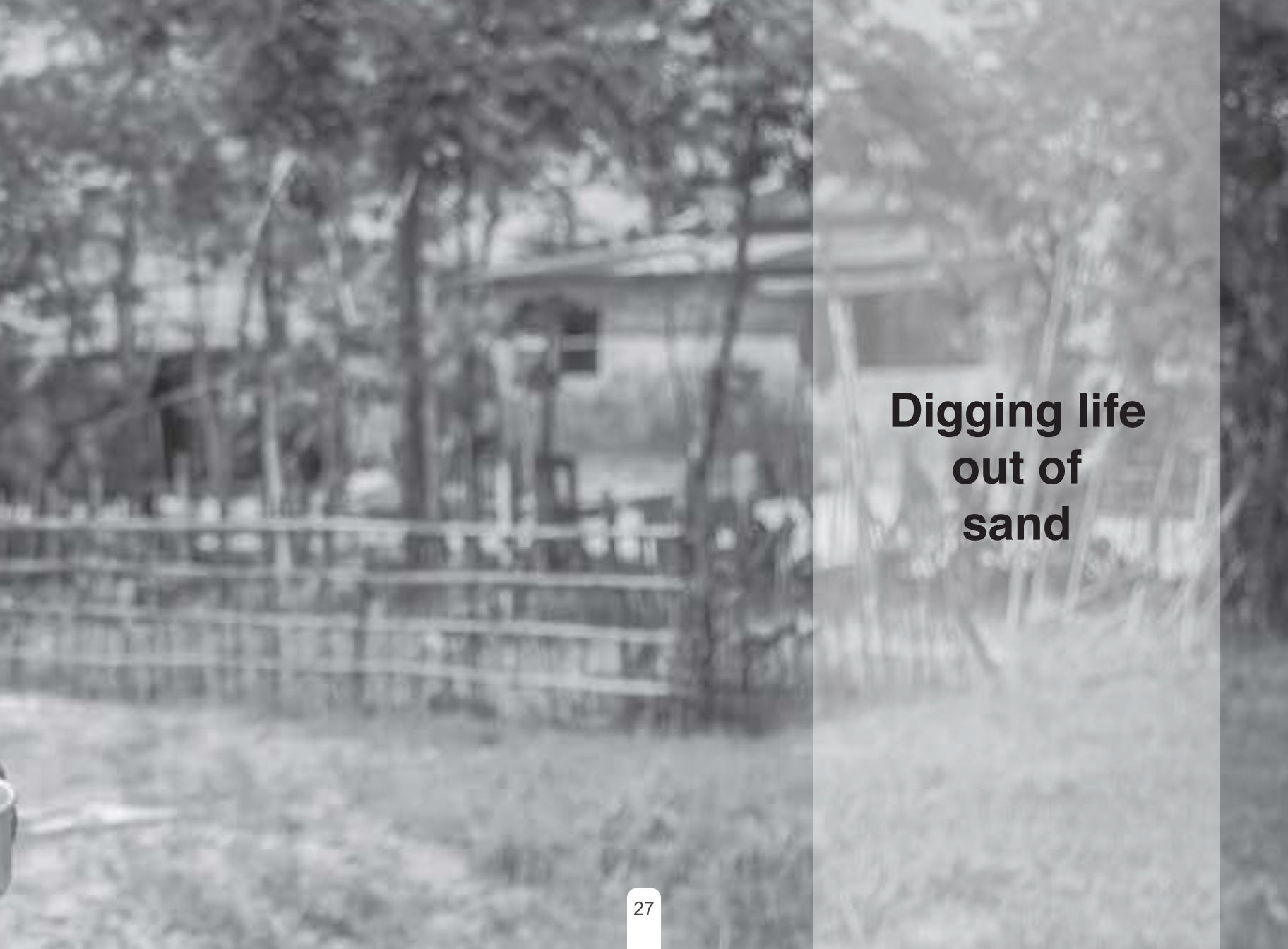
Cassava, which is an edible root rich in carbohydrate, is very similar to carrot. It originates in South America and is widely cultivated in northeastern part of India.

Nomita had absolutely no idea what this thing was but still she decided to plant the 50 Cassava seeds in a 10-decimals fallow land near her tea stall. The first crop was not of any significance, and naturally, couldn't interest Nomita anymore. But what happened next year, turned things around.

The following year, the Cassava plantation yielded 26 kilograms, which they sold at Tk 20 per kilogram in the local market.

"We are not accustomed to this type of food. But now, we are beginning to like it and is consuming this on a regular basis," Nomita said.

This year they are planning to sow 100 seeds of Cassava, with hopes that they would be able to make similar profits once again.



Digging life out of sand

For people living in the cities who have the luxury of getting running water by a mere press or twist of the knob of a tab. Even those who access water from tube-wells might think that they are extremely lucky when they come across what people like Bichitra Nafak do for a drop of life – water.

Bichitra, 30, a housewife belonging to the Garo indigenous community in the northeastern Netrokona district of Bangladesh, has been struggling for water for as long as she remembers. During the rainy season, which lasts for about three to four months in that region, things are slightly easier as they can meet their need for drinking water by harvesting rainwater.

But for the rest of the year, it's a constant toil.

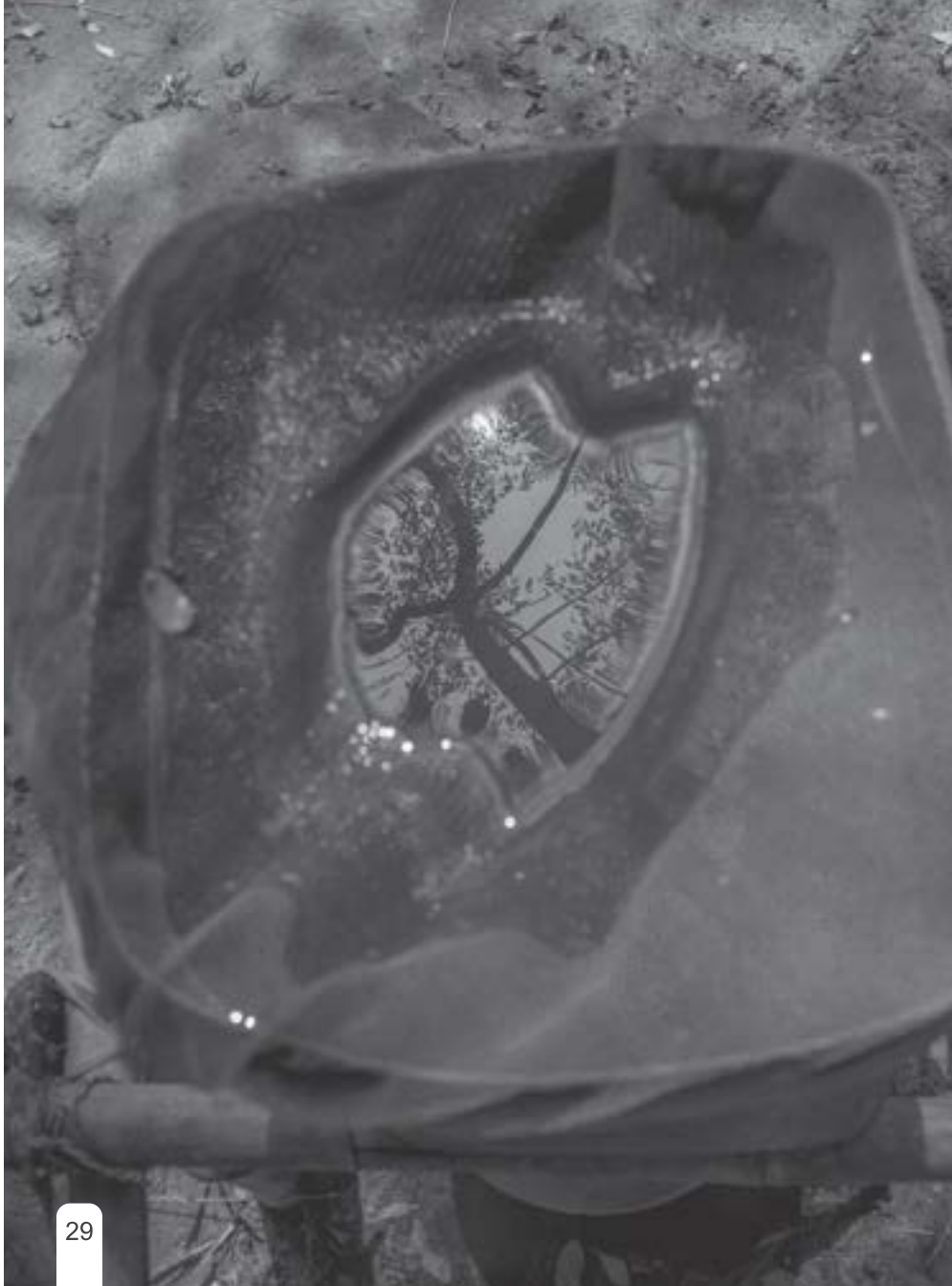
Studies have already shown that among the many tolls that the ongoing global warming is taking, one is on the Earth's water system. In the coastal belts, increasing sea level and the resultant salinity is damaging drinkable

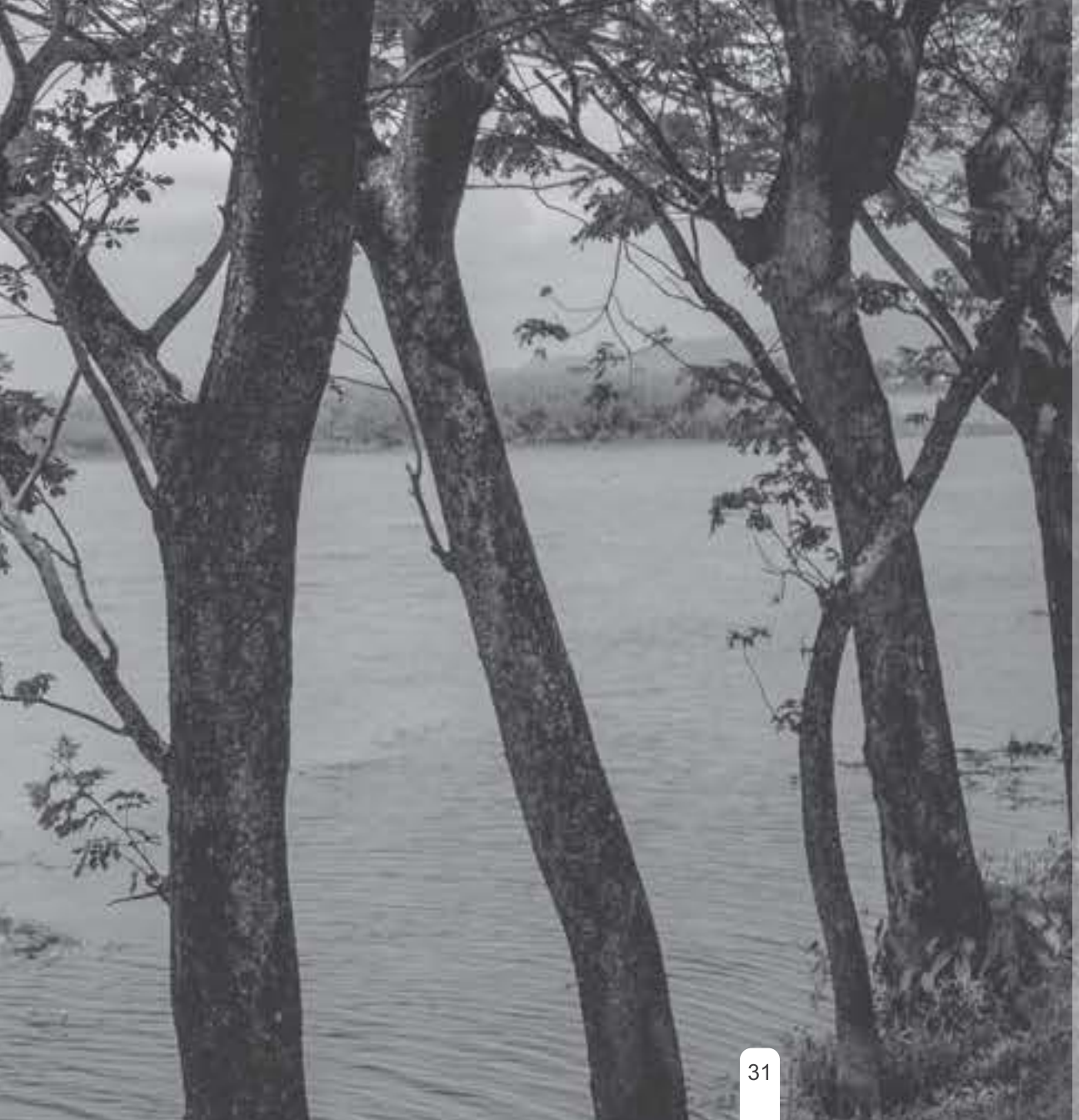
groundwater reservoirs. Elsewhere, the dry season is getting drier every year, causing draught-like situations, depleting underground water storage.

“Our area is dry and the ground is sandy. There was a time when we dug 1-2 hands [about 3 feet] holes in the ground and found water. But now, we are having to go deeper and deeper every year,” said Bichitra.

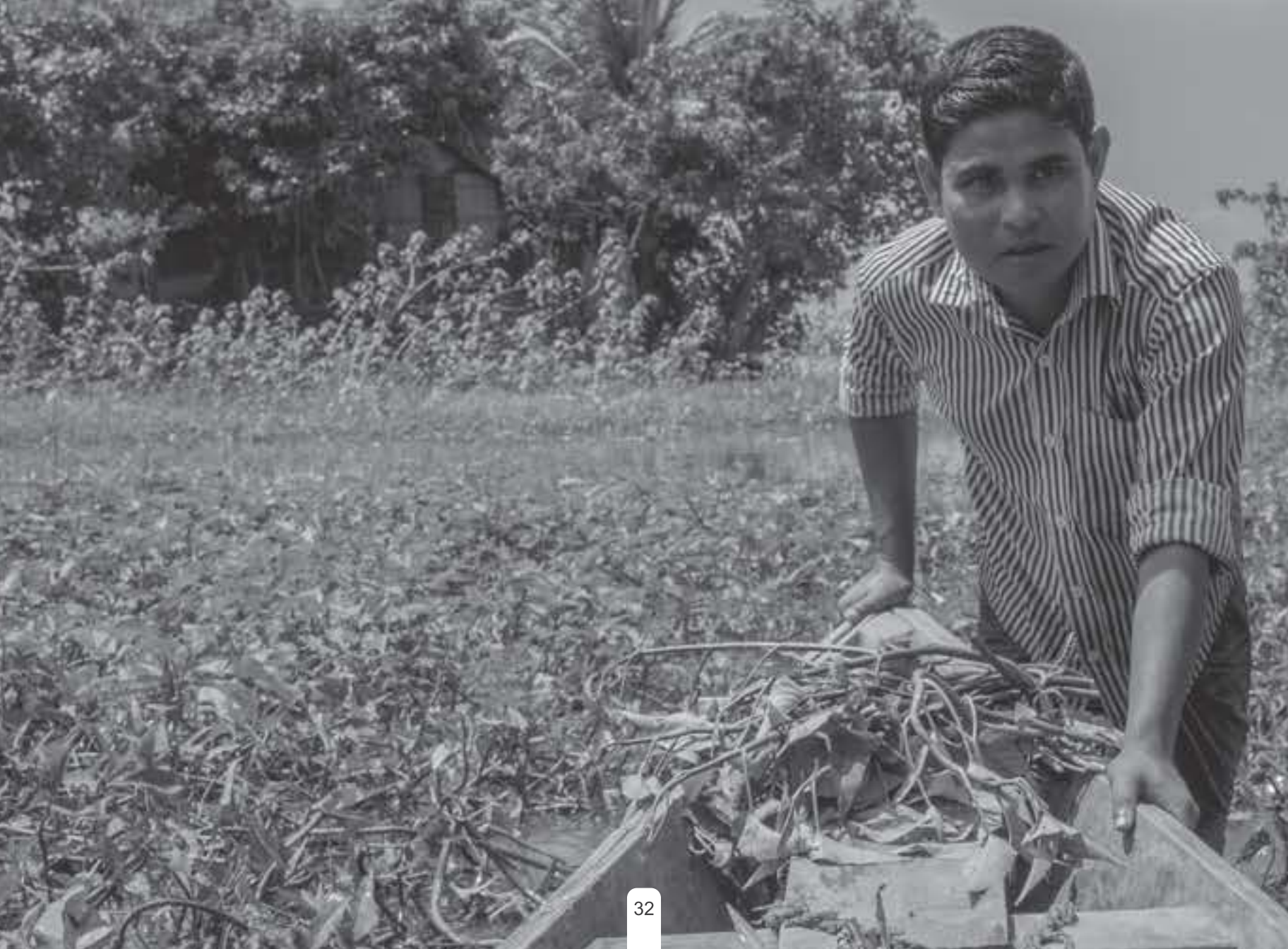
They have a handful of tube-wells in their area but those too are almost unusable because of excessive presence of iron. So, they have come up with an innovation – a filter of their own to get rid of the excessive iron.

At the top is a bucket filled with sand and holes at the bottom. The water collected from the tube-wells is first run through this layer. The sand-filtered water is then collected in another pot at the bottom that has several layers of netting and clothing. The final collection pot is at the lowest tier and water filtered thus has much less iron.





The popeye of Bangladeshi haors



Forty-year-old Khokon Mia ferries cheap cosmetic products in the marshland villages of the north-eastern district of Netrakona in Bangladesh to provide for his six-member family.

Like his customers, he also lives in a village – Kumargaon, Notun Bazar – that stays under water for at least seven months (May-November) every year. For five months every year, he can ferry his products to the neighbouring villages on foot. But for the remaining seven months, he has to travel on boat which cuts down his profit. His income almost comes to zero during the monsoon months – May to August – when there is literally water everywhere.

That has been the story of his life for many years until three years ago he found a solution to not only this problem, but also a way to ensure a regular income throughout the wet season.

Kokhon owns a 10-decimal land around his homestead which comes to hardly any use because it remains under water for seven months of the year. So, three years ago, he decided to cultivate “water spinach,” which easily grows on water.

“Initially, it was just an experiment. But soon I was surprised to see the speed at which the spinach grew. You collect the harvest from one end today and the next harvest comes in just seven days,” Khokon said.

Kokhon now earns Tk 150-200 every day throughout the monsoon season by selling the spinach in the local markets. His spinach has special demand because vegetables become scarce commodity during monsoon because of water-logging.

Seeing Kokhon’s success, many of his neighbours are now growing water spinach on their water-logged lands and are making a sizeable income at a time of the year when they had nothing to do in the past.

Brahmaputra Basin

*The Brahmaputra is a transboundary river covers in China, India and Bangladesh.

New lifelines for Brahmaputra people

There is an old Bangalee saying that goes: like the banks of a river, people's lives are a constant game of destruction and regeneration, and this applies better for no other river than the mighty Brahmaputra.

During Monsoon every year, heavy rain in the upstream hills in India, where the river originates, brings huge volumes of sediment. As this sediment deposits in the riverbed, the river loses height and compensates for this through riverbank erosion along the basin, in the process often gobbling up acres and acres of fertile arable land. That also means more and more people are becoming landless every year.

The regular annual bank erosion and the loss of navigability also mean that the river is changing it course slightly every year, causing the submarine habitat to change, including the once-rich fish variety.

On the other hand, the river also gives back what it takes. While one bank erodes in the river, the sediment deposits pile up to form new lands on the river, known as shoals. The composition of the soil of these shoals makes them suitable for vegetable farming. Unlike paddy, wheat, or other food grains, the process of preparing lands for cultivating vegetables like pumpkins is not as rigorous and expensive.

For people like Muki Barman, 70, who depended on both agriculture and fishing for a living in Chilmari Upazila of the northern district of Kurigram, this is doomsday. Over the last few years, two major events have taken place in his live. First, the river had eaten up most of the 3-acre arable land owned by the family, including the homestead. Second, the fish resources in the river are not as abundant as in the past.

“Brahmaputra made us poor. It takes everything we have. Now we are trying to fight back by cultivating pumpkin, which grows easily on the new shoals,” said Muki.
Like the Barmans, hundreds of families all along the Brahmaputra River basin, especially those in the western bank, were forced to give up their generations-old profession and switch to other modes of earning a living like cultivating pumpkin.

The Barmans have also been trying out another new work – rearing sheep. Rearing of livestock such as cattle, goats, hens and ducks are common in this part of the world, but rearing sheep is gaining popularity only very recently – that too because the riverbank erosion-hit people have been desperately looking for alternative livelihood options.

The story is pretty much the same for 40-year-old Lalbanu, who also lives in Chilmari.

“Usually, a cows and goats breed twice a year. But sheep breed three times. That has been the advantage of rearing sheep,” said Lalbanu.

Why, therefore, rearing sheep has not been common? Lalbanu thinks this is because unlike cows and goats, sheep do not give milk.

Teesta Basin

*The Teesta is a transboundary river covers in India and Bangladesh.

The unquenchable thirst

There was a time when Monir Mia, 55, from the northern district of Lalmonirhat, would have laughed if someone said he was not going to grow paddy one day – the paddy districts along the Teesta River basin was so good for this farming.

In just a couple of decades, things have changed. The once mighty Teesta River has dried up so much – thanks to dams built in India in the upstream – that the once affluent paddy districts along the basin have ceased to be the hotbed for cultivating the staple.

All his life, Monir had grown the local winter paddy Boro in his 4-acre land which had always been enough to meet his family's annual demand. The regular Boro season usually spanned from January to April which is known as irrigation-thirsty paddy. During the first two dry months, the Teesta was there to cover for their irrigation needs.

However, over the last few years, Monir Mia has been forced to slowly shift towards less irrigation-thirsty maize and tobacco, which have shorter life cycles and are therefore less likely to suffer from “dry” wet months, because of two concurrent adversities – a drying Teesta and erratic rainfall.

“Sometimes there is excessive rainfall and sometimes the rain comes later than usual. This has been happening for several years now. We don’t have the Teesta either,” said Monir.

According to the Department of Agricultural Extension (DAE), Bangladesh’s average rice production is around 3.6 million tonnes against an aggregate demand of around 3.4 million.

“Paddy farmers shifting to maize and tobacco should be a matter of serious alarm, particularly for a district like Lalmonirhat, which is one of the major food production zones of Bangladesh,” said climate change and water resources expert Prof Aninun Nishat.

“If this continues, Bangladesh might end up losing the self-sufficiency in food production. If there is not enough rain and the river is drying up, the farmers would have to spend more on irrigation from underground water. No wonder they are switching to maize and tobacco,” he added.

The Boro paddy, a bulk of which grows along the Teesta basin, alone accounts for 1.9 million tonnes or more than 55% of the total demand for rice in Bangladesh.

Southwestern Bangladesh

Alpona's integrated vegetable farming

Alpona was born in a poor rural Bangladeshi family in 1975 and was married off – as is still customary for rural women in this part of the world – at the age of 17. Her life after marriage, too, was just like other married girls of her age from poor families – looking after the household and sometimes working as day laborer for a bit of extra bread for her family.

However, Alpona, who was a woman of little words, was not going to spend the rest of her life like that. The proactive kind she was, she set out on a difficult mission of changing the fate of her and her family.

In the late 1990s, she began on a small scale – growing seasonal vegetables on a small 33 decimal land that her husband inherited. She did that in between crops throughout the year. That was the only land they owned and so she could not afford to waste even an inch – they would grow potato and eggplant and in the empty space between rows of potatoes and eggplants, she grew beans.

Over the next one and a half decades, with the income from her vegetable production, Alpona helped her family add several things to their property: a pond for irrigation, 10 cows, 14 goats, and 100 ducks.

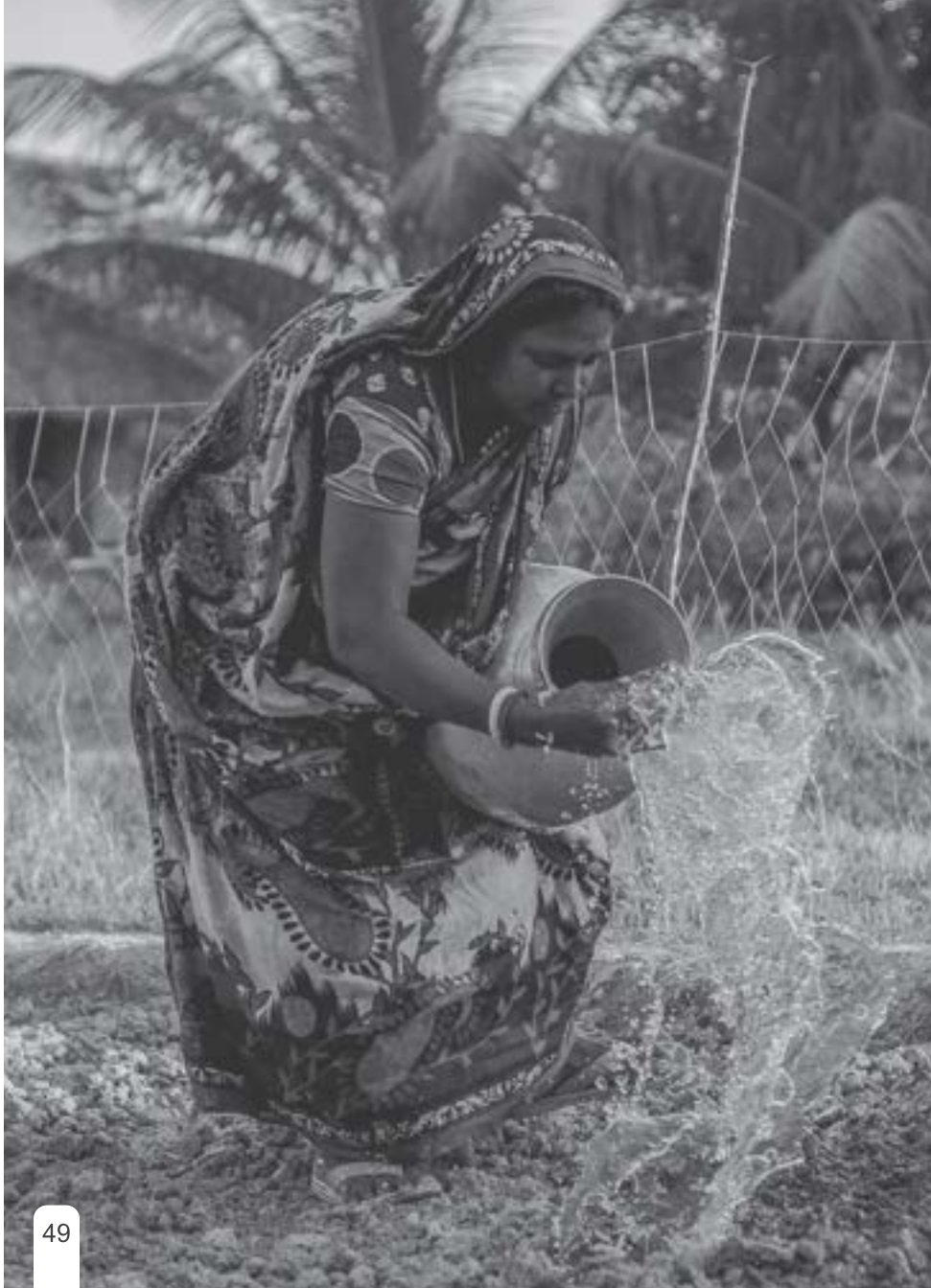
Sixteen years later, in 2014, Alpona Rani Mistori won the Bangabandhu Agricultural Award in the economic empowerment category.

So, what brought her the award? It was a significant lift of economic status for her family.

“From the social class I belonged to, it was literally impossible to think about educating children. But my son is into full-time education now, and that is no more a luxury for us,” Alpona said.

Alpona’s son is a student at the Shyamnagar college in Satkhira. “It has been possible only because I thought about growing vegetables in an integrated way all those years ago. Things were not easy. We had to go through lot of hardship. But now the struggle is paying dividends,” she said.

But, her real success lies somewhere else. She has been an example of scores of other women in her area who have now adopted Alpona’s integrated use of land for vegetable farming as a means of becoming self-reliant.



The energy-efficient lady

In the face of the global warming as countries and scientists strive for low carbon fuel solutions, a woman with a clear vision in a sleepy village in southwestern Bangladesh has been pursuing energy efficiency in her own unique way, leveraging indigenous knowledge.

Moyna Rani Mondol, 55, from the district of Satkhira, has been using her own invention – the low-energy cooking stove – for many years now. In 2015, her energy-efficient stove brought her the prestigious Joyeeta Award given by the Ministry of Women and Children Affairs of the Bangladesh government. One year before that, she won the Divisional Environmental Award for her contribution in developing low carbon technology using local knowledge.

“For many years, I struggled to find a secured source of cheap fuel for cooking. Unfortunately, it was not be found in nature,” said Moyna.

In rural Bangladesh, which constitutes more than 80% of the country's total area, people heavily depend on organic fuel such as wood, straw and cow-dung for cooking. However, due to widespread deforestation to meet the demand for cooking fuel over the last few decades, these organic and cheap sources of fuel have ceased to be abundant in nature. This meant serious trouble for poor rural families because they cannot have piped or cylinder gas.

Moyna's stove runs on a very simple principle – preserving heat. Her stove prevents heat from escaping the stove as much as possible, thus cutting the need for fuel. The stove has a cement pipe, iron rods, and the structure is made of clay. It costs her from Tk 400-500 depending on the number of chambers which varies from one to eight depending on the size. These stoves require only half of the fuel compared to traditional earthen stoves.

When Moyna decided to make her own energy-efficient stove, Moyna had no idea about heavy jargons such as climate change, global warming, carbon emission and women empowerment. She was only looking to trim her household expenditure.

"I made the first stove for my own use. I never thought about selling it. But now, around 6,000 families and more than 100 restaurants in Satkhira district are using stoves made by me," Moyna said.

In the 1980s, the Bangladesh Council of Science and Industrial Research (BCSIR) had already invented its own low-carbon cooking stove – Bondhu Chula. Moyna did not have any idea about that either.

In the later years, several non-governmental organizations (NGOs) such GIZ, Barcik, Sushilan, JJS and NGF have worked to promote low-carbon stoves among rural women. Moyna has worked with several of them as a trainer.

The paddy daddy

It is now a matter beyond dispute that Bangladesh is one of the worst victims of the global climate change. Rising sea level and the resultant salinity intrusion have been directly affecting agriculture in the southern coastal districts, some of which are also – unfortunately – major producers of rice, the national staple.

Government agencies have been desperately trying to invent and promote high-salinity-tolerant paddy varieties with some degree of success, but that is no match for a clearly visible shift in agricultural pattern as traditional paddy growers switch to other saline-friendly crops or professions.

However, there is one man – who surprisingly lives in one of the worst salinity-hit areas in Bangladesh – has stood out as a stark exception.

When traditional paddy farmers in his area are switching to other crops, Sirajul Islam, a middle-aged farmer from Shyamnagar Upazilla in Satkhira, has been swimming against the tide. Over the last couple of decades, he has been collecting and preserving seeds of indigenous salinity tolerant paddy breeds. So far, he has collected a staggering 218 different varieties of paddy. He just does not collect the seeds; he also encourages fellow farmers to cultivate them.

“Once I had to travel 100 kilometers to collect a particular kind of seed. I took the trouble because I heard it could significantly resist salinity,” Sirajul said.

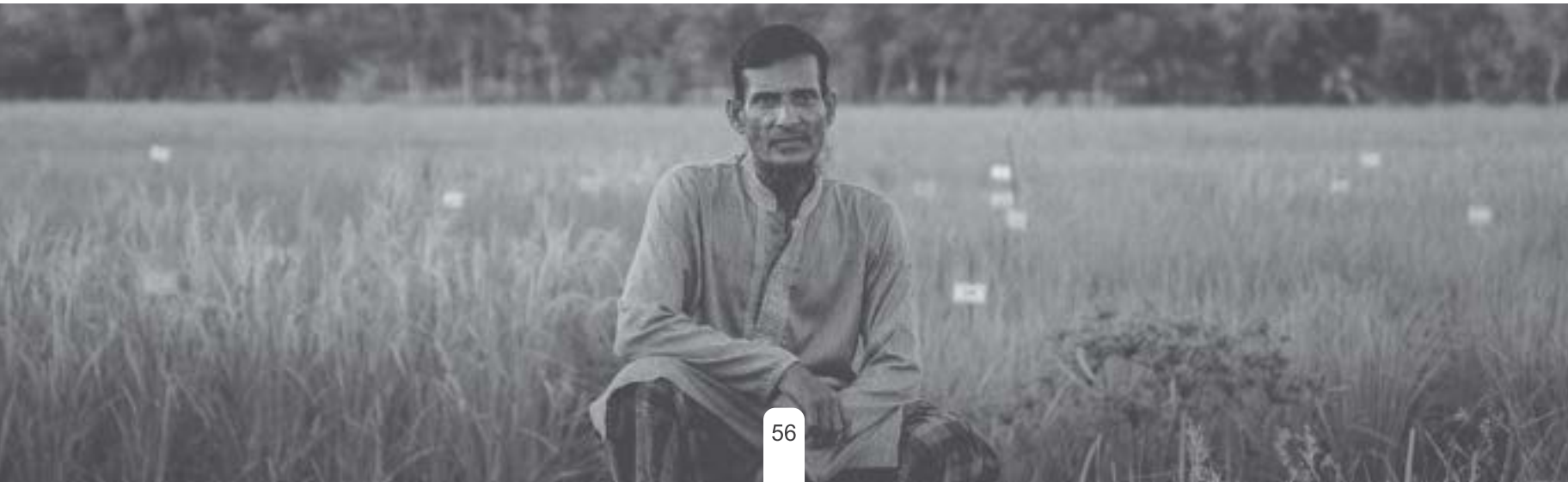
Many of these paddy varieties have gone nearly out of use as farmers slanted towards high yielding ones. That makes Sirajul’s seed bank even more important.

Usually, after collecting a particular kind of seed, he would cultivate it in a small piece of land. If the results were good, he would recommend it to his fellows.

“I have cultivated some varieties in shrimp beds to check their ability to stand against salinity. The level of salinity in shrimp beds are often as high as 20 ds/m,” he said.

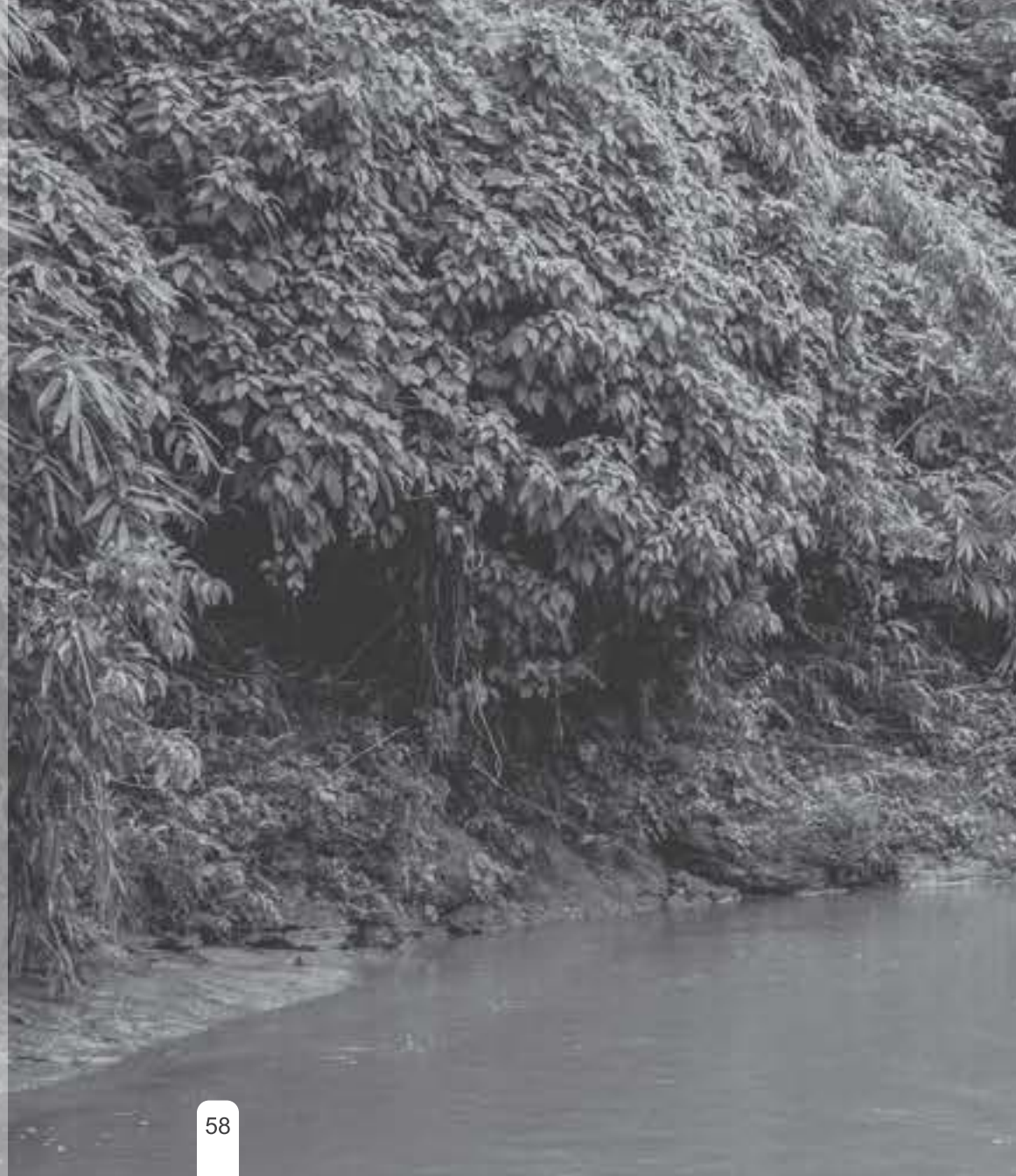
To promote the use of indigenous paddy varieties, Sirajul formed a voluntary organization called “Sheba Shongothon.” The organization now has 197 members – all farmers from the Haibatpur and Nokipur villages under the Shyamnagar Upazilla.

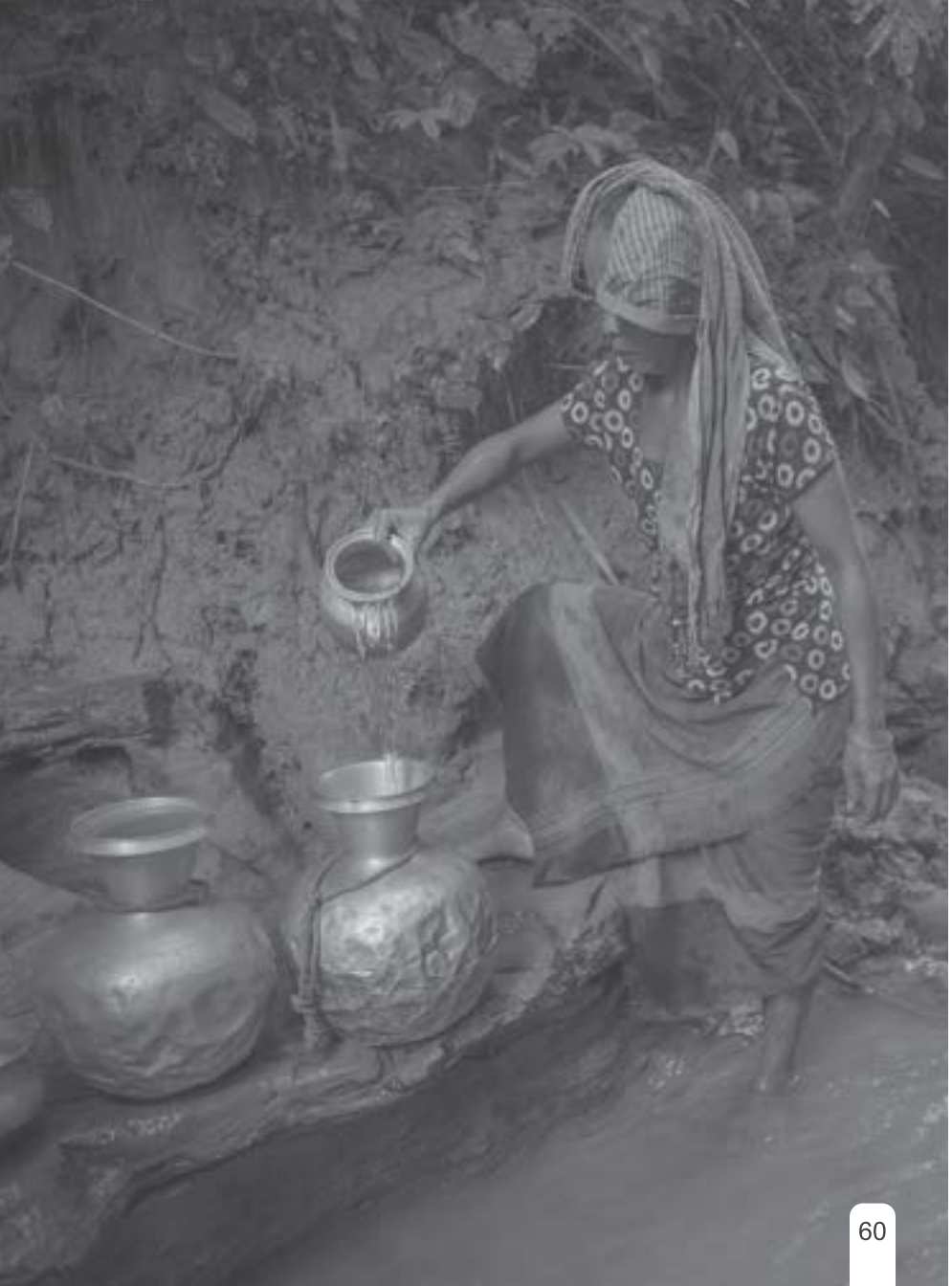
In 2016, he won the Bangabandhu Agricultural Award for his outstanding contribution in the fight against salinity.



Chittagong Hill Tracts

The preserver and the sustainer





For the last eight years, 35-year-old Chanchalmoy Chakma, a member of Bangladesh's biggest indigenous community, has been living at the foot of the Khagrachhari hill.

Like him, 10 other indigenous families are living at different parts of the hill several kilometers away from the main settlement as "community forest guards" nominated by their community who depend heavily on these hills essentials like fuel wood, bamboo, timber, fruit, and most importantly, drinking water.

For generations, the hill forests – spanning across 316 hectares – have provided for these indigenous communities with almost everything they needed for a living.

However, fast depletion of forest resources resulting from unplanned deforestation to meet the needs of a sharp spike in population have forced the indigenous communities to look for ways to preserve their sustainer – the forest.

"The community has sent us here to check the activities of outsiders who have been ruthlessly destroying the hill forest," said Chanchalmoy.

The community has given him and the 10 other families 2.25 acres of land each in the "common" forest and allowed them to make a living by gardening fruits and vegetables like mango and lychee.

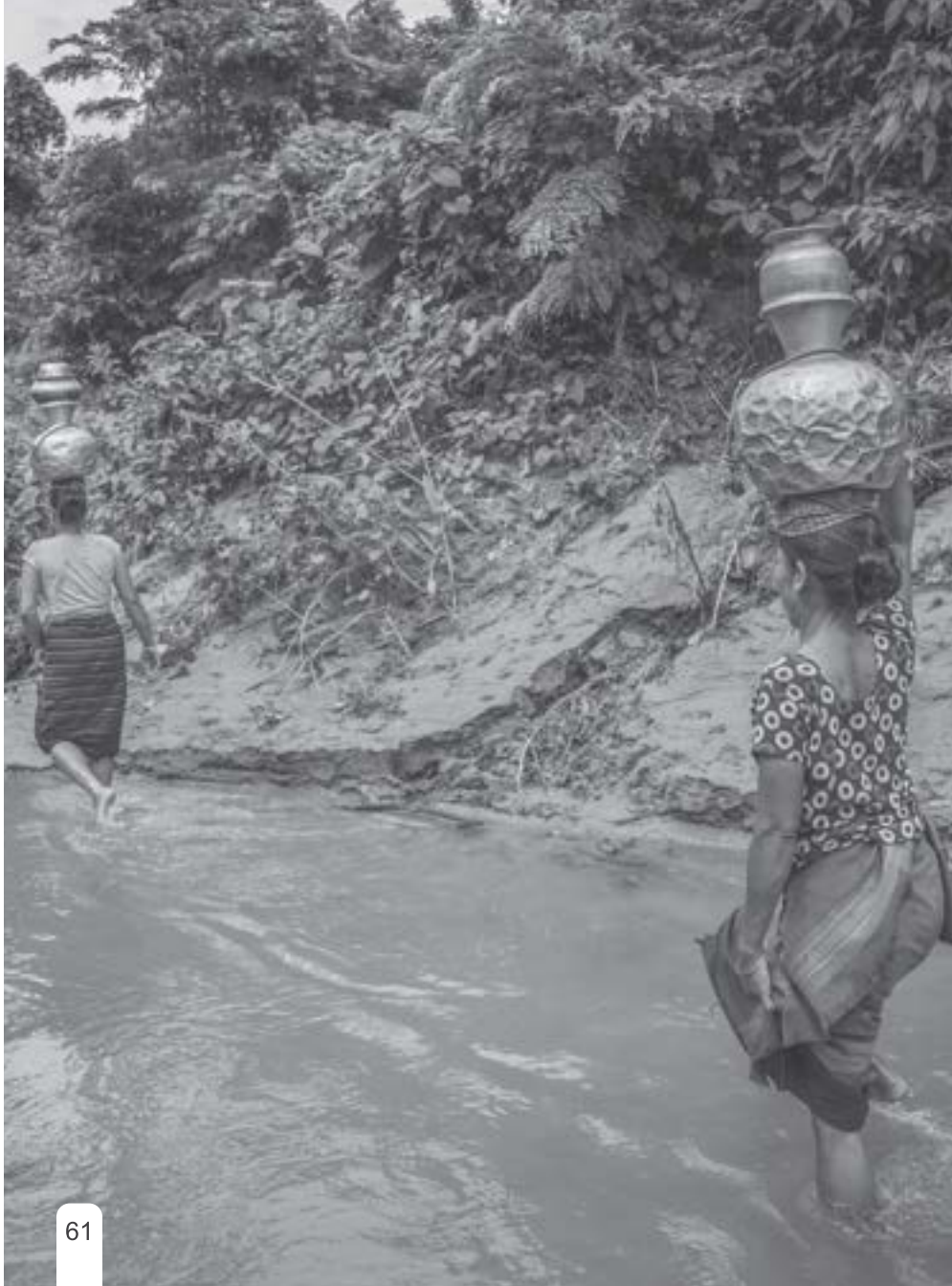
The concept of “Village Common Forest” was approved more than 100 years ago through the Chittagong Hill Tracts standing order of 1900. Indigenous communities around their villages maintain the common forests.

Initially, the community laid a plan for the common forest. They planted native plant species like bamboos at the foothills. They also set up a revolving loan fund with which the community people take alternative livelihood measures such as gardening, cattle rearing and small businesses.

“In last five years, I have not entered the forest to cut tress for a living thanks to the loan fund,” said Subol Chakma, a beneficiary of the loan fund.

The members paid a Tk 20 subscription per month to start the fund in 2009. Later an NGO donated around Tk 6.5 lac to that fund. In 2015, the size of the fund was Tk 12.4 lac. With the rise in population, one problem that has taken an acute turn is a shortage of drinking water. In the past, when the population was not as much as it is today, the indigenous communities built their huts along the creeks that crisscrossed the hills. However, with widespread deforestation, many of these creeks dried up causing these communities to struggle severely for drinking water.

“But that situation has now changed. Due to our vigilance, the forest has been growing again and the creeks are bringing down water again,” said common forest guard Chanchalmoy.



Babylon in the hills

In the face of widespread deforestation, the indigenous communities living and relying in the hill forests of the Chittagong Hill Tracts (CHT) have come up with various ways of preserving the nature. One of those ways is the “multi-tier orchard.”

In 1998, after repatriation from India under the CHT Peace Accord, Junu Chakma got a 2.25-acre hilly land under the rehabilitation project for living and plantation. He restored the slash and burn technique of farming in the hills–locally known as Jhum.

Within a few years, his land became unproductive due to repeated cultivation without allowing fallow periods for replenishment of fertility. He was left with no other option to feed his family other than collecting fuel wood and honey from the forest and selling those in the nearby market on a daily basis.

However, since 2009, the situation has changed a lot both or him and the forest, after he turned his land into a multi-tier fruit garden.

“Now I realize what a fool I was. We made a living by destroying the same forest that always provided for us,” said Junu.

This season alone, Junu made a profit of Tk 12,000 from the produced fruit sales including mango and lemon. Like him, at least 35 other former expatriate families, who got land from the government in the Bhoirofa village in Dighinala of Khagrachhari have turned their land into multi-tier fruit gardens.

Inspired by their success, as many as 200 other families from the locality have now started turning their hilly land into multi-tier fruit orchards.

The citrus success

Oranges and lemon (locally known as malta) might be very popular fruits but Bangladesh has always had to almost totally depend on import to meet the local demand because the flat lands have never been good them.

However, that scene has drastically changed in recent years, thanks to some ground breaking innovation by the Citrus Research Institute of Bangladesh who have invented some breeds of orange and lemon that yields really well in the slopes of the Chittagong Hill Tracts (CHT).

Nirmola Devi Chakma, an indigenous woman based in Bhoirofa bazar in Dighinala Upazilla of Khagrachhari, is one of the pioneers to try growing those new citrus variations some a lot of success.

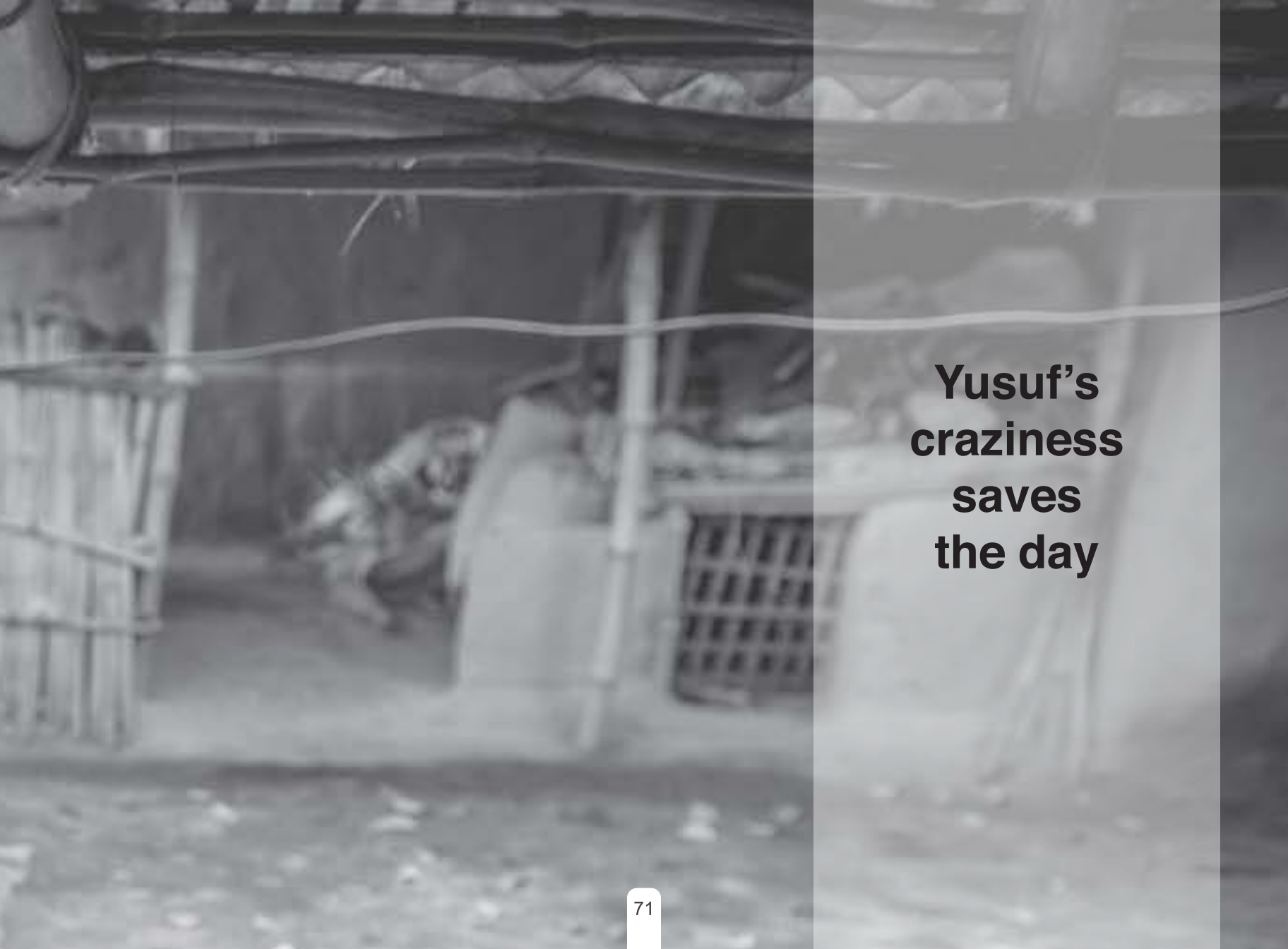
Initially, it was an experiment for the widow because nobody has ever grown these fruits in the area. However, for the last three years, her orange plants have given her a good harvest and now she is planning to expand her orchard.

“The best thing about these oranges is that they need very little care,” said Nirmola. In 2019, she made a decent profit of Tk 8,000 from her 10 orange trees.

This, quite understandably, has inspired many other indigenous families to try out the citrus fruits in their slope lands. Many of these families have had to struggle for food after uncontrolled jhum cultivation had left their lands barren.

Barind Tract

*The Barind Tract is known as arid region in Bangladesh.



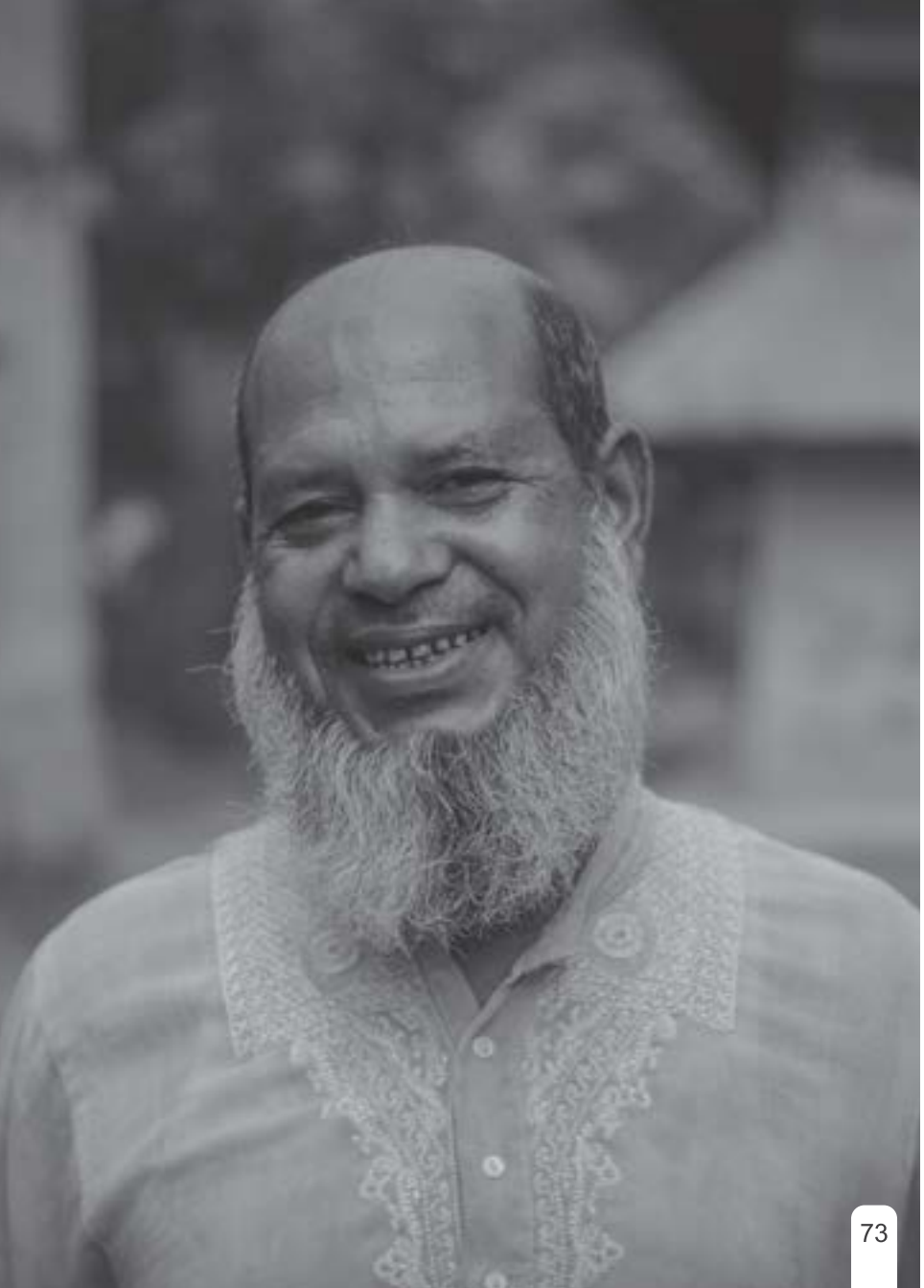
Yusuf's craziness saves the day

His neighbors thought he was “crazy” because he never cultivated the seasonal varieties of paddy in his field. In fact, he would select those varieties that have almost gone out of use many years ago because they couldn’t compete with the high-yielding-varieties.

Yusuf Molla, 60, lives in Tanore Upazila in the high Barind tract in the northern district of Rajshahi where scarcity of water is the biggest foe of paddy farmers. In the recent decades, most paddy growers in the area have abandoned the local indigenous varieties in favour of low-irrigation HYV paddy breeds.

The water shortage has become particularly acute in recent decades due to descending groundwater level and lower than normal rainfall during the dry season. For the last two decades, the Barind districts–Rajshahi, Chapai Nawabganj, and Naogaon–mostly grow the rain-fed Aman paddy.

However, thanks to several government initiatives, the farmers in these districts now have enough water to cultivate the major crop of country – Boro. The Barind Multipurpose Development Authority has built deep tube-wells to meet the raging demand for irrigation during the Boro season (January-May).



But Yusuf Molla is a traditionalist; so he wants to stick to the indigenous varieties because he realizes that excessive extraction has caused the level of groundwater to slide alarmingly.

“The weather pattern has not changed much in the last 30-40 years. So, if our ancestors could produce enough rice from the indigenous varieties, why do we have to rely on the high yielding verities?” he says.

Realizing the problem arising from fast receding groundwater, the government is now trying to encourage people to switch back to Aman. In such a situation, Yusuf Molla’s “craziness” with indigenous varieties is coming handy. Through years of experimentation, he has found several indigenous varieties of paddy that perform well in drought-like situations.

Encouraged by Yusuf’s good work, the Christian Commission of Development in Bangladesh (CCDB) has also found in a recent study that many local varieties perform better in the dry season or can tolerate heavy drought. Some of these varieties continue to grow without a single drop of water for as many as 25 days.

Some of them have very musical names: Bharira, Kalomanik, Sankorboti, Kalchina, Bolonsaita , Sani, Monowarasail, Dadkhani, Ranarsail, Khailjhuri, Ahona, Jhingasail, and so on. In 2015, the government recognized Yusuf’s outstanding contribution by giving him the National Agricultural Award for the Best Farmer.

Taking a page out of forefathers' book

Historically, the Barind Tract in the north of Bangladesh is infamous for extended drought with the three districts in this area–Rajshahi, Chapa Nawaganj and Noagaon–known as the most drought-prone zones in Bangladesh.

For generations, the local farmers have been resorting to an indigenous remedy called “Khari” to give themselves some respite during elongated periods of rainlessness.

However, since the formation of the government’s Barind Multipurpose Authory (BMDA), which provides the farmers with irrigation support and drinking water for households by extracting ground water through deep tube-wells, the Khari technique has lost importance.

Khari is an excavated, long drainage system inside arable land that stretch across villages. These canals are connected with the local lakes – which also are scarce in a predominantly dry area. Historically, these kharis have enabled farmers to obtain water from far away lakes for their paddy plantations.

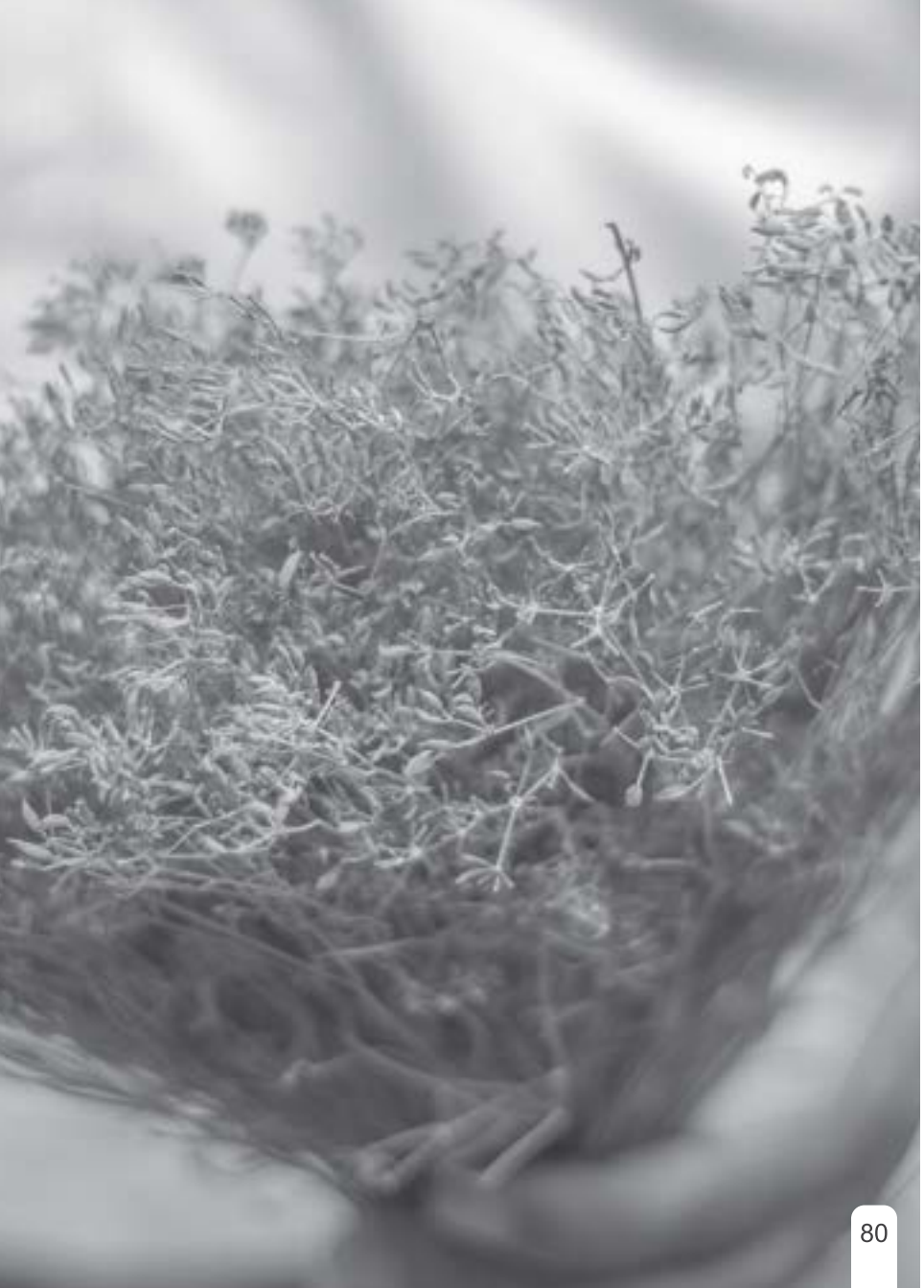
Due to excessive extraction of water through tube-wells, particularly for cultivating the low-irrigation Aman, the level of groundwater has gone down significantly in recent years. As a result, the government is now encouraging farmers to go back to the low-irrigation Aush paddy variety.

In this circumstance, the locals have come together and found a way out by taking a page out of their forefathers' books. For the last year few years, they have been digging kharis for irrigation again.

One of these is located in the Alokchhatra village under Risikul union in Godagari Upazila in Rajshahi.

"It's a relief for all of us. Now we don't have to suffer for the high irrigation cost", said Arfan Ali, former member of the local union council and paddy farmer who now uses Khari.

The pursuit of novelty in agriculture



The economy of Bangladesh is heavily dependent on agriculture but unfortunately, not enough educated people have ever taken up farming as a profession. However, there are exceptions like Abdul Hamid, 50, from Tanore Upazila of Rajshahi, who has a college degree and has dedicated his life for agriculture.

He began like everyone else many years ago when the weather was much friendlier. But as an educated person, he has been observing how the climate has been changing over the last few decades.

The groundwater level in his area, the predominantly dry Barind tract infamous for frequent droughts, has been receding fast due to excessive extraction for irrigation. Hamid also realized that the underground water was not going to be easily replenished. So, he started looking for alternatives.

Instead of cultivating paddy and wheat, as he had done for many years like fellow farmers in his area, Hamid decided to try out spices, which Bangladesh mostly imports from India to meet the local demand. More unusual is cultivating the popular spice “cumin”.

“In 2014, one of my relatives went to India. Upon my request, he brought one kilogram of cumin when he returned. But I couldn’t start right away,” said Hamid.

Nobody in the locality knew how to cultivate cumin. So, he consulted the Spice Research Centre in the neighboring Bogra district and got the knowledge he needed to start cultivating cumin.

The first couple of years were only trial and error. Finally, in 2016, he successfully produced a small amount of cumin from a plantation that he did experimentally on a 5-decimal land alongside his regular plantations in the rest of the 20-acre land he owned.

“I believe that if I can have some success [in cultivating spices], other farmers will follow suit. This could be a good option for predominantly dry areas because spices require a lot less water than paddy and wheat,” he said.

Since then, his struggle to cultivate cumin is going on.

Apart from spices, Hamid has also successfully experimented and introduced an indigenous organic fertilizer called the Vermi-Compost–a method he developed using earthworms. He has been commercially selling the new organic fertilizer among the local farmers for the last five years.

Champions of adaptation

It has not been very long that Bangladesh has begun to adopt modern agricultural technologies, and most farmers, particularly those in the peripheral regions have hardly ever had a shot. They might have not got the chance to adopt, but relentless struggle with the elements of nature has made them very good at adapting.

Take for example the farmers in the “Barind” districts in Bangladesh’s northwest. For many generations, most farmers in these areas have been paddy growers, supplying a lion share of the total national demand for the staple.

However, a changing climate and the accompanying misbehavior of weather in the form of erratic pattern of rainfall have put their traditional livelihood under threat, forcing them to look for avenues of adaptation. Many of them are now switching to growing vegetables throughout the year on lands that they had previously used for cultivating paddy and sometimes wheat.

A drastically lesser amount of rainfall at those times of the year when they need the highest volume of water for paddy harvest has made it difficult for them to stick to this crop. So, they have adapted to this by switching to vegetables throughout the year because vegetables do not want as much water as paddy.

Brinjal, the local variation of eggplant, used to be a winter vegetable, but now, it could be found in the kitchen markets throughout the year. One reason behind this is that many former paddy farmers in the Barind districts have switched to vegetables.

Former paddy grower Sirajul Islam, a brinjal grower in Tanore Upazilla in Rajshahi, has been happily growing vegetables for several years.

“Every week [almost throughout the year], I pick around 190 kilograms of brinjal [on an average] from my 50 decimal land. I sell them for around Tk4,000,” said Sirajul.

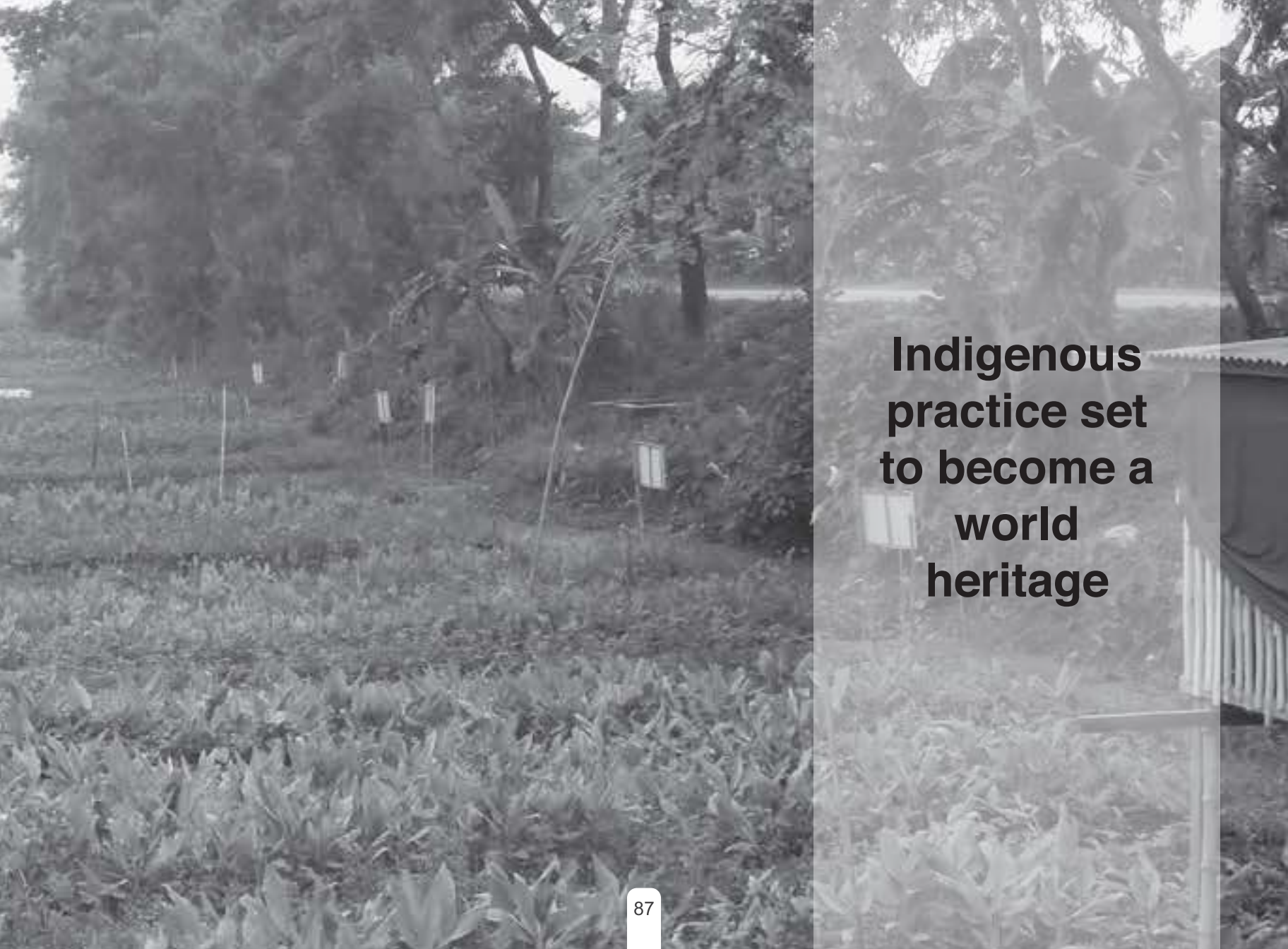
Usually, a 50-decimal land like that of Sirajul can yield up to 3,700kg of brinjal, fetching up to Tk80,000. The cost of production of such an harvest is around Tk40,000 according to the current market prices of agro materials. That’s a net profit of around Tk40,000–a 100% markup–which is much higher than what paddy would have fetched from a land of same dimensions. The high cost of irrigation in the predominantly dry region has made paddy less profitable.

Many years ago, the government established the Barind Multipupose Development Authority (BMDA) to ensure cheap irrigation for the farmers in this region by extracting groundwater with deep tube-well.

However, years of extraction has pushed the level of groundwater down alarmingly. Even the BMDA is happy now that the local farmers are switching to vegetables because in this way, the groundwater level will have some respite to replenish itself.

Lower Ganges Basin

*The Lower Ganges basin is located at the tail of the transboundary river Ganges.



Indigenous practice set to become a world heritage

Subimol Das, 45, an enterprising rural farmer, lives in the Tungipara village in Gopalganj district where waterlogging is a common problem for almost half of the year, making agricultural work difficult.

But Subimol is not the kind of man who quietly accept his fate. Despite stagnant logged water everyone, he, along with some of her neighbors, has found his own way of cultivating vegetable – he calls it the "floating vegetable garden."

The technique–locally known as "Baira' – is very simple but extremely effective. The first stage of making a floating vegetable garden is floating bamboo rafts on stagnant water and planting aquatic species such as hyacinths on them. These plants die and rot on the floating raft creating a nice organic bed for vegetables. The bed also acts like an organic compost fertilizer.

The vegetable planted on the raft also draws nutrition from water. As the water remains for several months, aquatic organisms, insects and plants die and decompose in this water, making it rich in organic nutrients.

During periods of extended flood and waterlogging – usually June-November – when vast stretches of arable land disappears under water, Baira gives these people a means of living.

"We have been cultivating vegetables on floating beds for many years. As we do not have enough land to cultivate crops except during the dry season, the local people invented this technique by making use of the indigenous knowledge," said Subimol.

The government has also made of note of this agricultural innovation and took up a project in 2012 to spread this to the other parts of the country where waterlogging is a common problem. The project titled "Enhancing Floating Vegetable Cultures in Flood and Waterlogging Prone Areas in Bangladesh" is financed from the Bangladesh Climate Change Trust Fund.

This practice has also caught the attention of United Nations' Food and Agricultural Organization (FAO), who is considering this practice as a world heritage.

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