

HCLFoundation

FOLLOW US ON



hclfoundation@hcl.com
HCL Technologies Ltd. | Technology Hub, SEZ
Plot No. 3A, Sector 126 | Noida – 201304, Uttar Pradesh | India

www.hclfoundation.org

MISSION
MANGROVE

THE SUNDARBANS' EXPERIENCE

“If we cannot help nature recover,
then there is no help for us humans.”

~Wilson Gas Tanes



Vision
"To conserve, restore and enhance indigenous environmental systems and respond to climate change in a sustainable manner through community engagement."

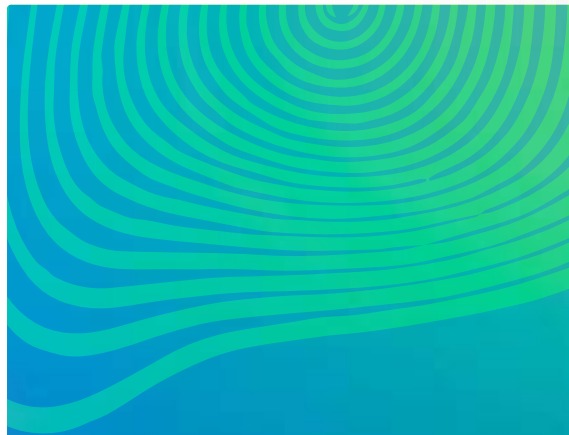
Aligning with the UN's 'Decade of Ecosystem Restoration', HCL Harit conserves, restores and enhances indigenous environmental systems.

With participation and stewardship of local communities, it is implementing sustainable measures to combat climate change.

Spread across nine states and embracing ecosystems from mountains to sea, HCL Harit is working with urgency to mitigate the impact of environment degradation.



Thematics



This journal takes you inside the Sundarbans to experience the tranquility of the forest and recognize the dire need for its preservation through breathtaking photographs and perceptive narratives.

The story describes how the coastal community joined forces with the **HCL Foundation** and made determined efforts, led by women's organizations, to fight climate change by reforestation and planting mangroves.



📍 South 24 Parganas | West Bengal

a scenic view of the natural mangrove forest across the riverine belt

an introduction

Mangroves are salt-tolerant trees, particularly of the family Rhizophoraceae, which form dense thickets along tidal shores, having well-developed aerial roots. The widespread mangrove species present in the Sundarbans, known as "Sundari", is where the name comes from.

Known for its ecological importance and unique biodiversity, this wetland ecosystem offers a wide range of environmental services. It not only aids in carbon sequestration and silt trapping, but it also serves as a protective barrier against cyclones and surges. It also provides a nursery and breeding ground for a variety of marine species, including fish, which in turn supplies food for the majority of the surrounding inhabitants.

Undoubtedly, these deltaic coastlines are as dynamic as the issues that surround them, including the inhabitants, who mostly constitute lower-income groups whose vulnerability is exacerbated by the impact of climate change. The major occupations are fishing and agriculture or allied labor. With the inevitability of these seasonal livelihoods, a majority of the population is compelled to migrate.

Despite these adversities, the **HCL Foundation**, in partnership with DRCSC, is committed to restoring the coastal ecosystem and enhancing climate resilience in the region through stakeholder engagement.

This community-driven, inclusive project aims at conserving the rich biodiversity of the region by restoring the natural habitat, in tandem with mitigating climate change, and finally generating income for the villagers through mass mangrove plantations.

📍 South 24 Parganas | West Bengal

a vista of natural mangrove forest along the creeks

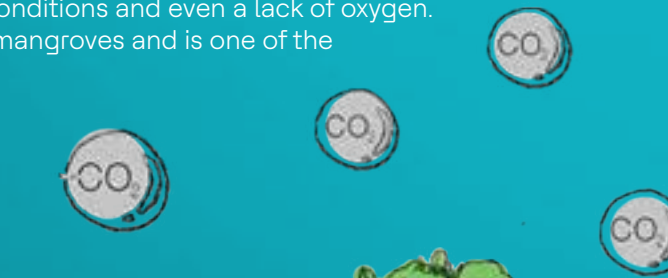
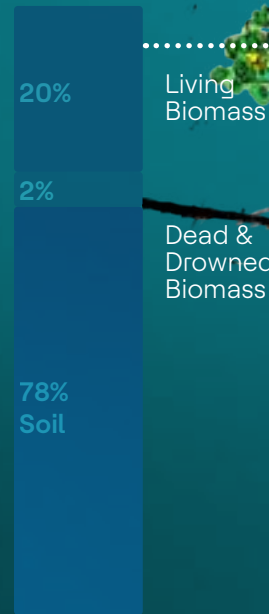


Magnificent Mangroves

Mangroves are a family of evergreen trees and shrubs that thrive on the coast, in the intertidal zone of some tropical and sub-tropical areas. These forests are best known for their dense tangle of roots, which can give the appearance of trees on stilts in the water.

The Sundarban mangroves are truly tropical forests found both in coastal regions and on the mainland. They can withstand extreme saline conditions and even a lack of oxygen. This South-Asian delta is home to the world's largest mangroves and is one of the most important biodiversity reserves.

Mangrove Carbon Storage
1,083,000 kg/Ha¹



Major Threats

- Deforestation** 30-50%¹ of mangrove forests have been lost due to shrimp farming, tourism, intrusive coastal development, and other factors.
- Pollution**
- Climate Change**

Mangrove Ecosystem Services

Biological Diversity Hub

- The mangrove ecosystem serves as a breeding space for more than **3000 fish species**². Up to 75% of tropical commercial fish species spend part of their lives here.
- Millions of migratory birds**³ depend on mangroves for food and temporary shelter during their journeys.
- Numerous invertebrate species**⁴ are found here.
- Indeed, also **home to many endangered species**⁴.

Coastal Protection

- Restoring mangroves for **coastal defense is up to 5 times more cost-effective** than 'grey infrastructure' such as breakwaters.⁵
- Rehabilitation of degraded mangroves supports the **growth of root mats which promotes accretion**, protecting from sea level rise and ensuring a stabilized shoreline.⁶
- Dissipates strong wave and wind energy. They **reduce wave height by up to 66%** during storm events.⁷

Climate Regulation

- The **carbon storage potential of mangroves is 3-5x higher** than that of tropical forests due to long-term strong carbon storage in the soil.⁸

Forest Resources

- Its density makes **mangrove woods a valued source** of timber, fuel, tannins-resins, ornamentals, and fodder.

Bio Filtration

- Extraction of excess nutrients and **removal of pollutants** from surrounding water/ soil.

Tourism

- Promotes **eco-tourism and related attractions globally**, such as boat tours, bird watching, trail walks, kayaking, and fishing.

Source: Presented in the references in chronological order.

the 'Sundari' saga

During a recent visit to the Hingalganj and Partharpratima blocks (24 Parganas, West Bengal), we took a look at the scenario and engaged in community interaction to get feedback on what we have established thus far.

The cyclone's wrath has severely visited upon the villages in these blocks, causing a shortage of food and portable water, the destruction of safe shelters, multiple ailments, and health hazards in the course. *"Although the forecasts and alerts are made, preparations don't come in handy,"* confirms a resident. Since the importance of mangroves has been realized, the villagers have united to make conscious efforts toward the cause.

After the mangrove plantations were initiated, a ray of hope was lit among the natives, as they believed this joint effort could save them from natural calamities and mitigate their vulnerability in the long run. An elderly resident during the community meeting in the Hingalganj block office acknowledged his participation in making the community aware of how these mangrove barriers can keep their embankments safe by reducing the wave strength. He was glad to share that the efforts laid down by the **HCL Foundation** not only helped them to achieve this but also encouraged them to take a step further in the activities to make the space livable.



 Hingalganj Ghat | West Bengal

a view of settlements and mangrove plantation along the riverbank where bamboo and net have been used to protect from the grazing livestock

the first observation



mangroves grew naturally due to the soil conditions, and they eventually regenerated

most of the houses were either kachha or the structure had asbestos sheets as roofs

boats were often shifted to trenches to protect them during high tide and stormy weather

pucca roads were narrow and often craked due to soil liquefaction

livestocks fed on naturally growing juvenile mangrove saplings which laid unprotected

bamboo structures used to create barrier against water surges and prevent soil erosion

Hingaljan | West Bengal

scenic view of a typical coastal village

hopeful Hingalganj

From cyclones *Aila* in 2009, *Bulbul* and *Amphan* in 2019 and 2020, to *Yaas* in 2021, they have remained devastated throughout, said a plantation worker at Hingalganj Ghat, whose house was very near to the riverbank, across which had a view of Bangladesh's coastline. She quivered a Bengali phrase, "*amader gram er, charidike nodi*", which explains that these compact coastal villages are often small islands that get disconnected from the mainland during calamities, leading to breaks in the supply of basic facilities and health services during the course. She gladly mentioned how the plantation initiative led by the **HCL Foundation** allowed them to increase their household income while also contributing to the well-being of the coastal neighborhood, thus adhering to their hope for resilience.

Later, she directed us toward the plantation site, where we witnessed women engaged in raising sapling beds and maintaining the plantation area. They responded that as a part of the women's mangrove protection group, they have been regularly engaged in the process as they believe when these mangrove belts are restored, it will ensure safety for themselves and their future generations.

📍 Hingalganj Ghat | West Bengal

mangrove saplings being planted along the riverbank and are maintained by the women mangrove protection groups

the tally tale

The location of the following visit was Rupmari Village, where a majority of the dwellings were constructed from mud, wood panels, and bamboo thatch. Since it was drizzling, we realized mud was being washed away from these houses, not only by the recurring cyclones but also by the monsoon rains each year, encompassing the vulnerability of the locality. A brick-laid embankment was built by the villagers around the settlement to establish an access route and a barrier against storm surges.

Since the bund also acted as the primary access route, the locals were compelled to use the slippery clay-laden pathway even during adverse weather conditions, as flooding in the vicinity was a common menace after storm surges and cyclones.

The Rupmari villagers told us that, conventionally, they were not very aware of the advantages of planting mangroves like this could prevent soil erosion or protect them against heavy winds from the sea. They employed techniques like bricklaying along the riverbank or covering the shore with coal tar-coated thatch (natively known as '*alkatra*') to prevent erosion.

📍 Rupmari Village | West Bengal

typical coastal village, kuccha houses and brick-laid roads for improved accessibility



📍 Rupmari Village | West Bengal

an interactive session with the women SHG involved in mangrove plantation

the community in need

However, their conventional methods were not the permanent solution to their challenges, which they realized after the community was sensitized by the partner NGO in the village. Multiple sessions were involved to create awareness and the change was visible in the form of enthusiasm among the villagers to protect the shores.

Mangroves were planted as part of their efforts to fortify the riverine belt on the opposite side of the bunds, while on the other side lay the settlements. The community showed up with keen interest as they recognized how mangroves were the key to coastal calamities in the long run.

Henceforth, they created a women's mangrove protection group and pledged their support for the **HCL Foundation's** plantation program. This also empowered them to voice their challenges and, thus, they were in a better position to act accordingly.

"We must give consideration to the things that are done for us. On a rotation basis, we oversee the plantation site in groups every three to four hours at regular intervals. We also fenced it off with bamboo poles coated with tar and old fishing nets. In addition to providing a means of support, our efforts represent our best hope against future cyclones", declared the Rupmari village ladies.

📍 Rupmari Village | West Bengal

sapling beds to support the plantation activity

the broad benefit

Our motivation was greatly fueled by the community's sense of belongingness and responsibility to restore the declining mangrove count in the Sundarbans region. We continued on to the next location, Putiamathbari, which required us to use a motorised local boat to cross the river. Asking the boatman revealed that the locals were skilled artisans and craftsmen as well. The boat we were aboard was built locally, though the timber came from a separate purchase.

We sought shelter at a neighboring stall, where the locals were welcoming as the drizzle turned into a downpour. We further inquired about the villagers' opinions on the plantation program because it was clear that they were aware of the benefits, and they responded, *"The majority of the people in our villages depend on agriculture and cattle. For processing paddy, we require firewood, which is typically sourced from surrounding forest patches. We add to the mangroves in the hope that one day we won't need to visit the forest as frequently. When the mangroves are completely established, they can supply us with both firewood and animal feed."*

📍 Rupmari Village | West Bengal

typical waterway transport for the local commutation

📍 Rupmari Village | West Bengal

mangrove plantation on the riverbank alongside lies the area left for grazing

the integrated interest

We now went to Purba Gurguria, a village where a rivulet displayed a stark contrast between a lush mangrove forest on one side and a sparse mangrove on the other side of the bank. Residents claimed that even after seeds were sown, the coastline would wash them over to the opposite side during high tide, which led to the opposite side's vegetation flourishing more. *"Since being a tiger-prone zone, collecting seeds from these mangrove forests can be life-threatening"*, admitted a native who earlier used to collect honey from there, nearly encountering death and leaving him with a hearing disability.

The laterite soil was already difficult to walk on due to the monsoon rainfall. We continued on to our next location in Purba Gurguria, where post-rain flooding inundated the entire mangrove site. At Kumarpur, a similar scenario persisted. The villagers here, including women SHGs, actively participated in the plantation programme right from the beginning. *"We usually change the damaged mangrove saplings to ensure healthy growth and even spread. It has been just a while since we started, so we are committed to the benefit of our village"*, the workers associated with the plantation drive informed.



📍 South 24 Parganas | West Bengal

in the creeks, conventional small boats are used for fishing

the effort mechanism

The women-led mangrove nurseries play an integral role in restoring the wetlands in forested areas of the Sundarbans. Seeds from the mangrove fruits, which are either procured from the forests or older plantation areas, are being sown in nurseries for growing saplings. The saplings are then planted along embankments and in other locations based on the PRA ranking determined by members, including the community and experts. The formation of Women Mangrove Protection Groups (locally called 'Sundari Bansuraksha Goshti Samiti') assisted the NGO in their efforts as they took excellent care of the saplings. Additionally, community awareness campaigns inspired the locals to come together, which also acted as a way to capacity-build for further replication.

"Although we see the good green cover now, the mangrove plantation has its challenges. They are meant to be grown under their own natural conditions; otherwise, they are delicate enough to get decayed", says Tapas, a representative of our NGO partner. To avert sapling loss, they have been hiring experts who are skilled in choosing the right species for the right site, ensuring the survival rate of saplings. Once the saplings thrive, they spread along their natural course.

📍 Amberia Village | West Bengal

saplings are transported through boats, from where they are unloaded at sites for the plantation activity



📍 Swarupkathi Village | West Bengal

fencing work carried out to protect mangrove plantation sites



📍 Amberia Village | West Bengal

plantation work carried out by local women SHGs



📍 Amberia Village | West Bengal

plantation maintenance and watering for the healthy growth of mangroves

let the tide roll in

"We knew if there was a high tide, we might get an adequate amount of seeds washed down to the course of the river, but it can be difficult because the accumulated dirt makes the stream too dynamic and seeds might flow to places where there is a risk of tigers", said an NGO staff who used to escort the male workers who went for seed collection.

Emphasizing the importance of a mangrove nursery, he stated that the first crucial step lies in choosing the right spot for it. The survival rate of the saplings is highly influenced by the nursery's location.

The land should be relatively flat, with access to both high-quality salt and fresh water. It must have good drainage and not be waterlogged with mechanisms to allow periodic inundation. Regulated shade and conditions supporting good-quality propagation are also necessary for the sustenance of the seedlings. Last but not least, given that the saplings are susceptible to rot, proximity to the plantation site is very essential for the ease of transportation.



📍 South 24 Parganas | West Bengal

mangrove saplings being unloaded and sorted by workers for plantation



South 24 Parganas | West Bengal

mangrove saplings transported through boats



Children in these villages receive traditional knowledge from their elders and eventually become expert swimmers and learn the arts of sailing, fishing, net mending, etc.

They often go to nearby waterbodies, using a simple fishing hood, sting, and bamboo rod to catch fish and crabs.



South 24 Parganas | West Bengal



Amberia Village | West Bengal

workers preparing plantation bed on the riverbank for mangrove plantation



The fishing community often works in unison, knowing their common vulnerability.

They band together, singing sea folklore, erecting bunds to protect themselves from the cyclone, and keeping their boats safe in small rivulets during the storm.



Hingalganj | West Bengal



South 24 Parganas | West Bengal



Apiculture (beekeeping) is an alternate source of livelihood practised in the village.



South 24 Parganas | West Bengal

local artisans help in providing boats to the fishermen community



South 24 Parganas | West Bengal



Also, some of the locals, with the help of local NGOs, have developed their skills to prepare manure from compost pits.

A localite here was skilled at growing natural fish food.



Amberia Village | West Bengal

backyard kitchen garden as a source to supplement the daily needs

the learning curve

Multi-species mangrove fringes have been proven to be a sustainable and effective frontline defense against climate change. The bio-restoration of degraded forest patches, and the creation of dense plantations can help to ensure the long-term sustainability of the embankments.

These forests play a key role in resisting the storm by reducing wind speed and breaking the waves, thus protecting the Delta as well as the Mainland from the adverse consequences.

HCL Foundation's approach to community forest management practices is integrally linked to the mangrove conservation programme, which is a significant virtue in framing resilient conservation methods.

Soon, these powerful carbon sinks will be ready to battle climate change. The coastal community's life and property will be protected by mangrove forests acting as natural bio-shields. Not only benefiting humanity but also biological diversity, it will restore the long-lost habitat for many species. With the right guidance and support, the inhabitants of the Sundarbans have definitely been able to turn this crisis into an opportunity.

📍 Kumarpur | West Bengal

site visit with the NGO Team and understanding the work progress



Boats are one of the major means of transport in these areas, reducing distance & time as well as pocket friendly to the locals.

The 'jugaad rickshaw vehicle' comes in handy for the clayey roads for the movement of people and goods.



📍 South 24 Parganas | West Bengal

boats are used to transport people, goods and even construction materials

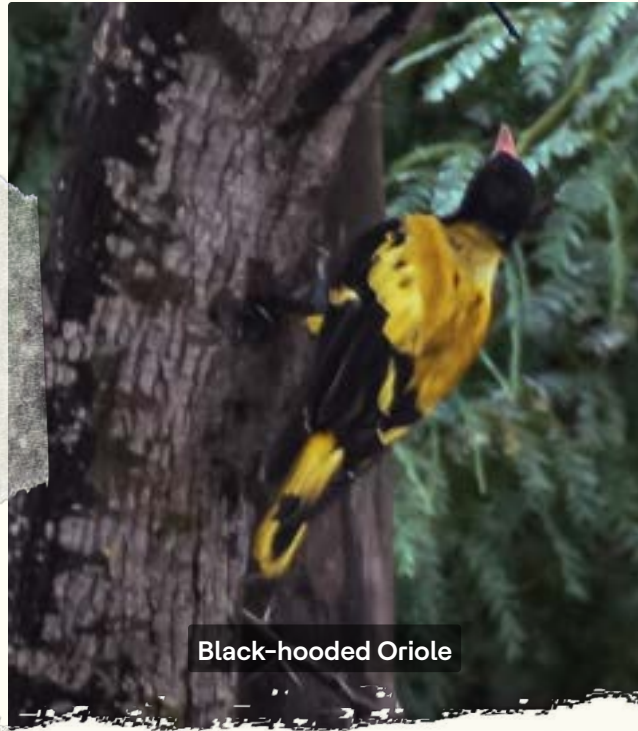
📍 South 24 Parganas | West Bengal

the 'jugaad' vehicle used in the mangrove belt

a pair of Common Kingfisher



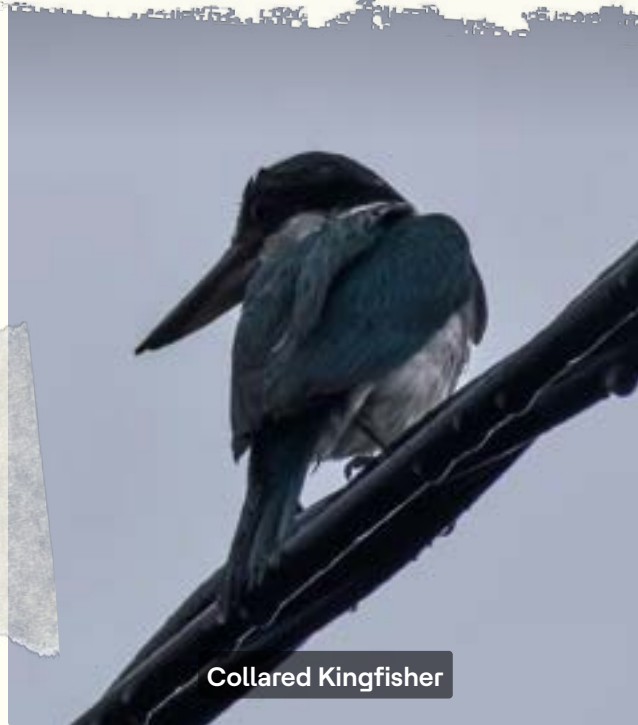
The largest mangrove in India is also home to the endangered Gangetic dolphin, Bengal tiger, saltwater crocodile, Olive Ridley turtles and the mangrove horseshoe crab to name a few. Sundarbans is a UNESCO World Heritage Site.



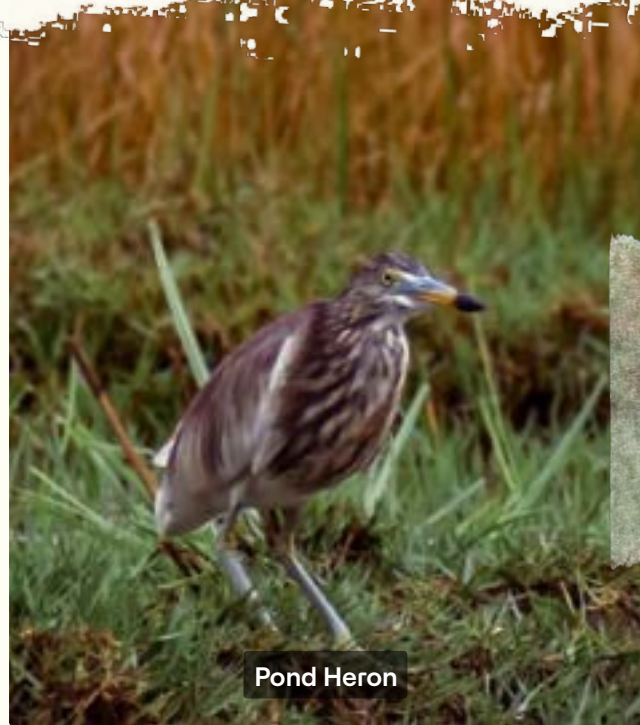
Black-hooded Oriole



Oriental Magpie Robin



Collared Kingfisher



Pond Heron





South 24 Parganas | West Bengal

a view of jetty in a mangrove forest with boats parked

common mangrove species used across plantations



Local Name: Sundari
Scientific Name: *Heritiera fomes*



Local Name: Kakra
Scientific Name: *Bruguiera gymnorhiza*



Local Name: Goran
Scientific name: *Ceriops decandra*



Local Name: Geuwa
Scientific Name: *Excoecaria agallocha L.*



Local Name: Gorjon
Scientific Name: *Rhizophora mucronata*



Local Name: Habal / Paras
Scientific Name: *Thespesia populnea*



Local Name: Kaalo Bine
Scientific Name: *Avicennia alba blume*



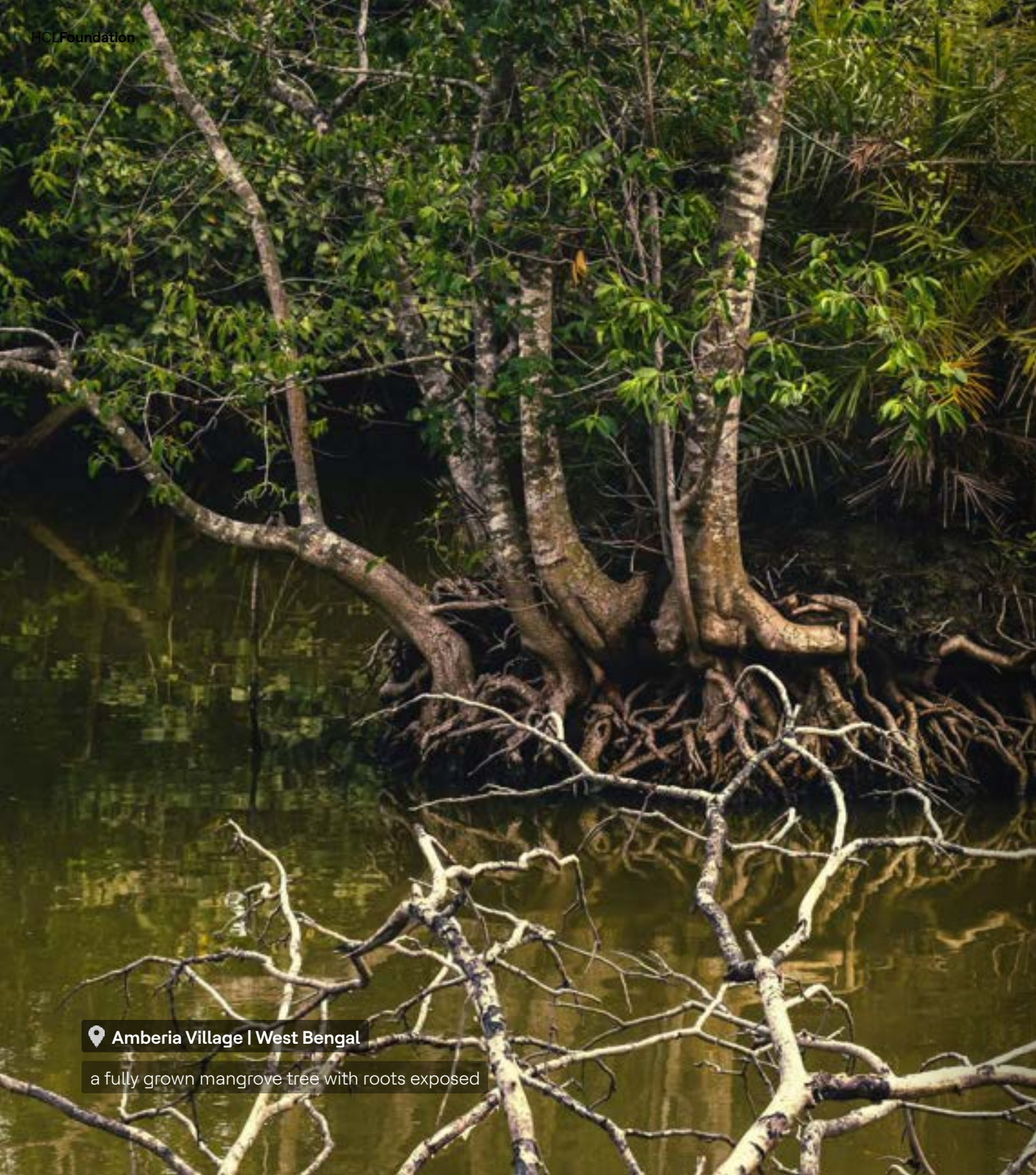
Local Name: Golpata
Scientific Name: *Nypa fruticans*



Local Name: Keora
Scientific Name: *Sonneratia apetala*



Local Name: Tora
Scientific Name: *Aegialitis rotundifolia roxb*



📍 Amberia Village | West Bengal

a fully grown mangrove tree with roots exposed

the impact-o-gram



The **HCL Foundation** leads innovative initiatives to conserve coastal and marine ecosystems, focusing on biodiversity enhancement and carbon sequestration through mangrove plantations.

Over the years, in collaboration with DRCS, have successfully planted 277,600 mangrove saplings across 17.3 hectares in Hingalganj and Patherpratima blocks, in 24 South Pargana, with an impressive 85% survival rate. Over more than 15 women-led mangrove protection groups actively participate in plantation and maintenance activities, fostering income generation.

HCL Foundation and DRCS through partnership-led orientation campaigns, engage stakeholders at all levels, stressing the importance of mangroves as coastal defenses. They've also raised 14,500 multi-species tree saplings and planted 6,500 roadside trees, enhancing green cover.

These efforts build climate resilience, safeguard lives and livelihoods from cyclones and storm surges. The HCL Foundation's work exemplifies its unwavering commitment to sustainability and biodiversity. It serves as a replicable model for community-based conservation, uniting businesses and civil society to ensure a sustainable future through ecosystem restoration and empowering local communities.





www.twitter.com/HCL_Foundation



www.instagram.com/hcl_foundation



www.facebook.com/HCLFoundation



www.linkedin.com/hcl-foundation



www.hclfoundation.org

