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SHIDHULAI SWANIRVAR SANGSTHA

Bangladesh

Equator Prize Winner

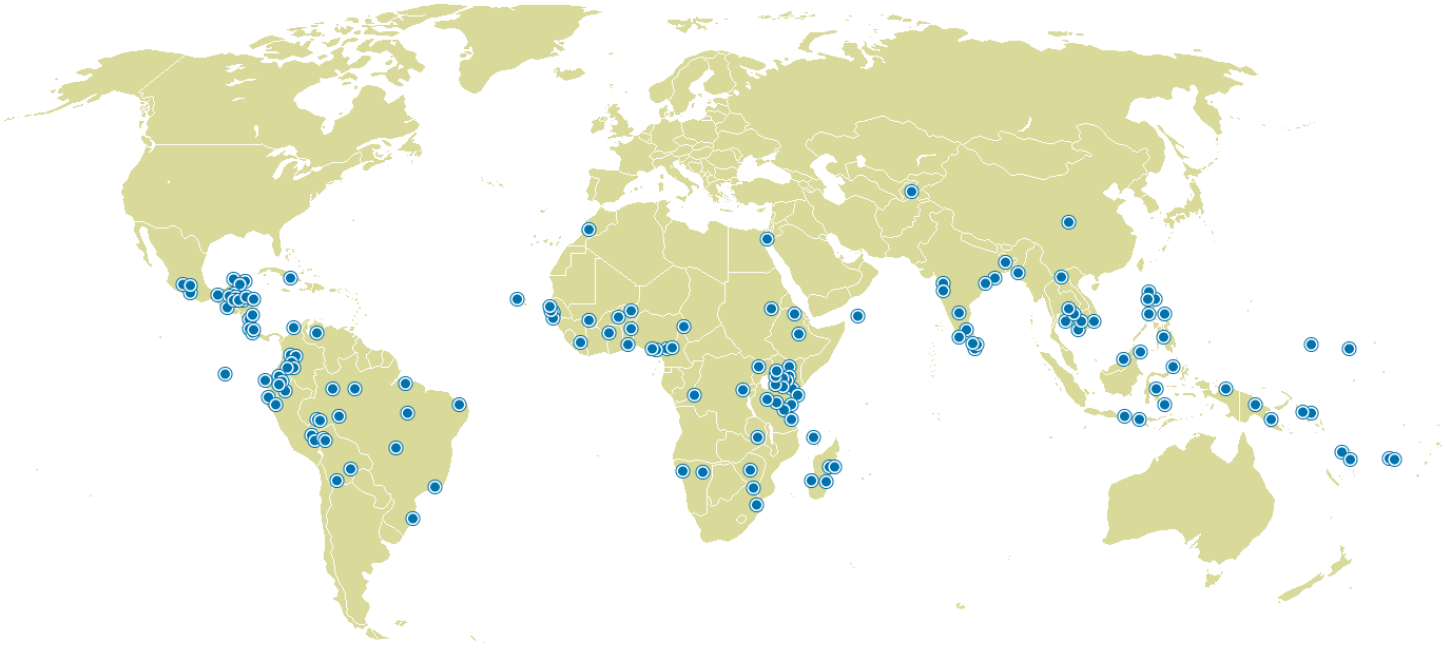
Equator Initiative Case Studies

Local sustainable development solutions for people, nature, and resilient communities

UNDP EQUATOR INITIATIVE CASE STUDY SERIES

Local and indigenous communities across the world are advancing innovative sustainable development solutions that work for people and for nature. Few publications or case studies tell the full story of how such initiatives evolve, the breadth of their impacts, or how they change over time. Fewer still have undertaken to tell these stories with community practitioners themselves guiding the narrative.

To mark its 10-year anniversary, the Equator Initiative aims to fill this gap. The following case study is one in a growing series that details the work of Equator Prize winners – vetted and peer-reviewed best practices in community-based environmental conservation and sustainable livelihoods. These cases are intended to inspire the policy dialogue needed to take local success to scale, to improve the global knowledge base on local environment and development solutions, and to serve as models for replication. Case studies are best viewed and understood with reference to '*The Power of Local Action: Lessons from 10 Years of the Equator Prize*', a compendium of lessons learned and policy guidance that draws from the case material.



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PROJECT SUMMARY

In the low-lying northwestern region of Bangladesh, a mosaic of wetland ponds and waterways make travel extremely difficult, particularly during the monsoon season when extensive flooding occurs. To address this challenge, Shidhulai Swanirvar Sangstha operates a fleet of 54 solar-powered boats to deliver services that range from schools to agricultural extension centers. The vessels are able to navigate waterways and pull up alongside villages that would otherwise be too isolated to receive such support.

Of Shidhulai's fleet, 20 boats are outfitted as floating schools that move along the wetland canals from village to village holding three classes per day for children in riverbank communities. Ten library boats are fitted with books, computers, printers, and mobile phones. Five health clinic boats bring free healthcare to more than 300 people per day, while five agricultural extension boats train farmers in sustainable farming methods.

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KEY FACTS

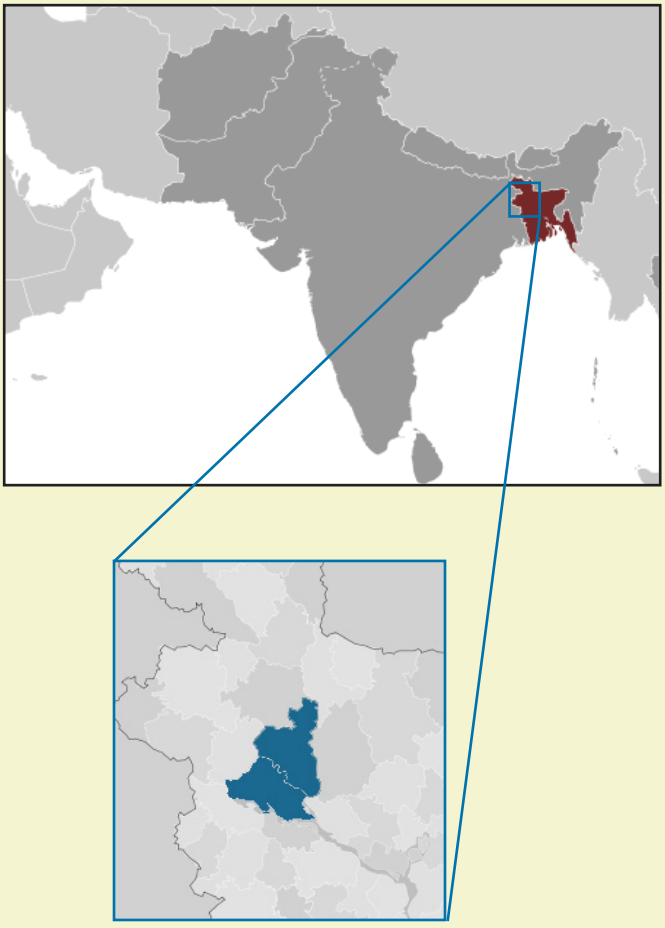
EQUATOR PRIZE WINNER: 2006

FOUNDED: 1998

LOCATION: Chalan Beel region, Bangladesh

BENEFICIARIES: 90,000 families

BIODIVERSITY: extensive wetlands



Background and Context

During its annual monsoon season, one-third of Bangladesh is submerged beneath floodwaters. A warming climate has increased the extent of this flooding in recent years. A low-lying coastal nation, the country constitutes the lower riparian of the Ganges, Brahmaputra and Meghna river system, forming the largest delta in the world. Over 92 percent of the annual runoff generated in this catchment area flows through the country. In extreme floods, such as in 2007, up to two-thirds of the country can be covered, causing destruction of villages and displacement of their populations. Bangladesh's demographic problems – it has the highest population density in the world, at 948 people per square kilometre – force many to live in remote rural areas, where the effects of flooding are worst.

With the aim of mitigating the impacts of floods on rural communities, Shidhulai Swanirvar Sangstha has pioneered innovations to bring services and electricity to the inhabitants of the Natore, Pabna and Sirajganj districts in the Chalan Beel region, north-west Bangladesh. Shidhulai operates a 54-vessel fleet of floating schools, libraries, health clinics and training centres, equipped with wireless internet access, serving close to 90,000 families. The boats are outfitted with solar panels that power computers, lights and medical equipment.

The challenges facing flood-prone rural communities

The Chalan Beel region is an extensive lowland area in the lower Atrai basin, consisting of a number of static wetland ponds, or "beels", connected by a series of waterways. In the monsoon months (late June-September) the beel area expands to form a vast body of water; this flooding poses a challenge to economic and human development within the region. Local communities live along the canals, relying primarily on agriculture for their income and food supply. This is supplemented by fishing, as farmers typically only produce one crop a year and harvests are threatened by unpredictable water level rises. Boats are the only means of transport, while the villages have no mains electricity or telephone lines. Sanitation is very basic, and water is taken from wells or the rivers. Although children are entitled to free education, it has been difficult for teachers to remain in the region and for children to reach school buildings regularly. This has resulted in a high school dropout rate and widespread illiteracy. Cultural norms restrict the movement of girls, meaning many of them do not attend school at all. The primary school completion rate for girls is less than 40 percent (Save the Children, 2010), while the average age of marriage for females is 14.76 years (Bangladesh Household Survey, 2004).

Some socioeconomic challenges are linked to unsustainable farming methods. Agricultural runoff has taken its toll on the health of the rivers, while the rivers in turn make it difficult to reach farmers with information about environmentally sustainable farming methods. Fish numbers have declined due to cropland runoff contaminants resulting from the use of pesticides beyond the necessary application rates. This has a negative effect on the livelihoods and food security of thousands of households. In a country where one-third of the population is under 15 years of age, this impacts heavily on child health, compounded by a lack of access to health care facilities or health workers. Some 50 percent of children under five are malnourished, and the infant mortality rate is 41 deaths per 1,000 live births. Finally, while many in Bangladesh have benefitted from micro-credit schemes, the local populations of the Chalan Beel region are too poor and geographically remote to access these schemes.

From obstacles to opportunity

While still a student architect, Mohammed Rezwan founded Shidhulai Swanirvar Sangstha in 1998 as a means of transforming the region's waterways from obstacles to human development into pathways for education, information and technology. Shidhulai's objectives are to provide education in flood-prone areas through floating schools and libraries; to increase agricultural productivity through sustainable farming practices that protect the rivers and the environment; and to bring health services and environmentally sound technologies to

marginalised communities. Significantly, Shidhulai has also allowed local communities to adapt to increased climate change-induced flooding and unpredictable rainfall patterns. Its successful model has been nationally and internationally recognised, winning the United Nations Environment Programme (UNEP) Sasakawa Prize, the United Nations Development Programme (UNDP) Equator Prize, and an Ashden Award for Sustainable Energy in recent years.

The management structure consists of a General Council, which meets annually and approves audits, budgets, and project planning, and an Executive Committee, comprised of nine members, that meets regularly to approve specific projects. The initiative is otherwise driven by a small central staff and volunteer labour from the rural communities it serves.

"The question is 'Where will 20 to 30 million climate refuges go?' Already 948 people are living per square kilometer in Bangladesh, and northern parts will be flooded in future… Therefore, the 'floating community' concept is an appropriate solution for Bangladesh."

Mohammed Rezwan, Founder and CEO of Shidhulai Swanirvar Sangstha

Key Activities and Innovations

Shidhulai's work has been founded on its innovatory use of boats. The first school boat was designed in 2002, and the current fleet of 54 vessels house schools, libraries, training centres, and health clinics. All of these boats are solar-powered and equipped with communications technology. The boats have been designed to adjust to any equipment configuration as well as to protect the electronics from inclement weather, even during the height of the monsoon. Flat plank floors allow the boats to manoeuvre through the flooded areas. Electrical equipment such as laptops, computers and multimedia projectors are used for educational purposes on the school and training boats, and are powered by onboard solar photovoltaic (PV) modules. When the boats are docked, these solar modules face south, towards sunlight. Typically, boats have enough energy capacity for 2-3 additional days without recharging. With re-chargeable batteries to store electricity, the boats provide an independent AC electricity supply system which can be used during day and night. Boats have PV-powered lighting, as well as mobile phone service from two national networks. High-speed USB data cards provide connection to the internet.

The SuryaHurricane lantern

The onboard PV energy supply can also be used to re-charge solar lanterns, produced and sold to community members by Shidhulai. The SuryaHurricane lantern is an innovative low-cost solar lantern made from recycled parts of conventional kerosene hurricane lanterns. Women can bring used kerosene lanterns to Shidhulai, where the wick and burner is replaced with a bulb, and two six-volt sealed lead batteries are placed inside the oil reservoir. The opening of the reservoir is used as a re-charging socket. Shidhulai has also developed a portable solar home system, consisting of re-chargeable batteries, wall and table LED lamps, wiring and fixtures. The installation and maintenance of these solar systems on house boats is carried out by Shidhulai engineers.

Floating schools

Twenty school boats constitute the greatest part of Shidhulai's work, bringing primary school education to marginalized rural communities. Moving from village to village, the boats collect students directly from the riverbanks at various locations. At the final stop the class is given, before the students are returned to their villages. Three classes are taught each day, six days a week. Each boat has a classroom to accommodate 30 students, an internet-linked laptop or computer, a library, and other electronic resources. Solar power enables schools to provide late evening classes to children who work during the day. After classes, many students take home their recharged SuryaHurricane lanterns to provide light in their homes at night; students achieving high exam results are eligible to receive SuryaHurricane lanterns as scholarship prizes. The schools provide basic primary education up to Grade IV. Shidhulai has also introduced the first river-based environmental curriculum in the country that encourages children to protect the environment and conserve water sources. The boats also host meetings for adults each month on child and women's rights, health education, and micro-enterprise development.

Improving child and adult literacy

Library boats provide the facilities of a standing library: around 1,500 books, 2-4 computers with internet access, printers, and mobile phones. Children, youths, senior citizens, and particularly women are encouraged to learn computer skills, and gain information on job opportunities, exam results, and government processes and services. Late-evening literacy classes are arranged on these boats for schoolchildren's parents. Of the ten library boats, two are two-tiered boats with on-board classrooms, libraries, training spaces and solar lamp re-charging facilities. This allows children to attend lessons on the lower deck while their parents receive sustainable farming training on the upper deck.

Mobile health clinics

With doctors and paramedics on board, five health clinic boats provide free medication and basic healthcare to more than 300 people each day. Shidhulai also provides emergency relief services, with two boats bringing solar power to communities who have suffered from flooding, while ten further boats are used for travelling between the project sites.

Innovative communication strategies

Five training boats provide on-board training sessions and evening presentations to inform farmers about sustainable farming techniques. These sessions also provide information on affordable renewable energy technologies developed by Shidhulai, such as the paddle pump and solar lantern. Each village receives two visits a month for three months, with thirty farmers trained during each session. Shidhulai staff use laptops, multimedia equipment, educational presentations and databases to raise awareness of strategies for agricultural sustainability. Presentations use locally-developed content, including web tutorials, animations and documentaries. During the day, the boats host onboard training programs for farmers, while in the evenings educational programs are arranged on large screens on the riverbanks, allowing villagers to see from their houses. On average, 300 people attend each evening show. Farmers also receive information on commodity and farm input prices, and are able to use the boats' email and mobile phone services.

Training boat presentations also provide an opportunity for the formation of Water User Associations (WUAs). Around fifty farmers are grouped into these associations, which help farmers identify their agrarian needs and understand related environmental issues. Members attend monthly meetings where Shidhulai agricultural officers and technicians discuss ideas and identify the best techniques and strategies for specific problems.

Floating organic gardens

Shidhulai has also developed floating gardens, or FloodChars, which are used to promote the adoption of sustainable agricultural practices. Although floating gardens are common to flood-prone areas of Bangladesh, Shidhulai's model is more durable and robust, and is able to support layers of soil as well as people and cattle. FloodChars also allow for rigorous testing and analysis of soil type in on-board laboratories. The labs conduct soil analysis and provide farmers with recommendations for soil improvements and soil conservation. Samples received from farmers are routinely analyzed to determine their texture. Soil laboratories also provide testing for plant tissue, water quality, pesticides, and hazardous waste.

Impacts

BIODIVERSITY IMPACTS

Shidhulai has been able to conduct annual surveys to measure its impacts on communities' environmental practices, as well as socioeconomic improvements. Consultants, academics, and scientists from research institutes and universities are engaged in these impact assessments. Among the trends monitored are school enrollment and dropout rates, pesticide sale records, numbers of people receiving SuryaHurricane lanterns, kerosene sales, additional income generated by using SuryaHurricane lanterns, numbers of participants at training sessions and using the libraries, numbers of books borrowed, numbers of youth learning how to use a computer, and numbers of patients treated on the health clinic boats. This ongoing monitoring has helped to build the evidence base for Shidhulai's work, including the benefits for local biological diversity and resilience to environmental threats.

Improved river health

Pesticide use has increased considerably in Bangladesh in the past three decades. In the Chalan Beel region, overuse of pesticide has had harmful effects on river biodiversity. Shidhulai's training boats have trained farmers on mechanical means of controlling the spread of harmful insects. As a result, they have reduced pesticide usage by 65%. Improvements in water quality have also followed training on establishing tree and grass 'filter strips' at the riverbanks, which has slowed soil erosion and filtered polluted agricultural runoff.

Reduced fuel use

Promotion of renewable energy sources has had wide environmental benefits. The introduction of affordable solar lanterns has reduced communities' reliance on kerosene. Assuming typical use of three litres of kerosene per week, it is estimated that each SuryaHurricane lamp saves about 156 litres of kerosene per year. The total annual saving from the 5,000 solar lamps produced so far is therefore around 780,000 litres of kerosene. This translates to an estimated CO_2 emission reduction of 2,028 tonnes per year.

Community-based adaptation to climate change

Shidhulai's work in environmental sustainability has proved a test case for community-based adaptation to climate change in Bangladesh. With rising sea levels expected to result in 20 to 30 million internally displaced climate refugees, strategies for living alongside and benefitting from waterways play a crucial role in supporting local livelihoods. In particular, Shidhulai's models for delivering mobile public services to marginalised communities and maintaining floating crop beds for agricultural production have provided case studies for adaptation in Bangladesh.

SOCIOECONOMIC IMPACTS

Shidhulai's work has had substantial economic and social impacts on the impoverished communities of the Chalan Beel region. These have been principally through delivery of services – education, health and communication infrastructure – and empowering local farmers to increase agricultural productivity.

Education

To date, Shidhulai has reached 90,000 families in the Chalan Beel region. Its twenty school boats currently serve around 1,600 students, with the library boats accessed by 15,000 people a year. The boat school model also allows children who work during the day, and otherwise would be unable to attend school, to study in evening classes. Students can borrow school books from the boats' on-board libraries, which has helped to improve exam results and enable some to apply for higher education. Literacy rates have improved, as children are now able to attend school consistently. Children's enrollment in education has increased by 40%, while the dropout ratio has been reduced by 45%.

Health, sanitation, and gender equality

In Bangladesh, religion and culture typically restricts the mobility of girls and women. The unique approach of Shidhulai's project addresses these barriers. Boats provide flexibility and reach villagers that, for logistical, social, or cultural reasons, could not otherwise access a permanent institution. Girls and women take full advantage of the education and information facilities delivered to their doorsteps. Female educational enrollment has increased, as the proximity of the facilities allays the concerns of girls' parents and guardians. The health clinic boats provide sessions to raise health awareness on issues such as sanitation, HIV/AIDS, unintended pregnancies, reproductive rights and early marriage issues. On average, 300 patients per day are served by the five floating health clinics. Sanitary latrine usage has increased by 80%, while early marriage rates have fallen by 75%.

Agricultural productivity

Due to adoption of new techniques, agricultural productivity has increased by 70%. On-board training sessions and evening presentations, assisted by Shidhulai's staff and technologies, have encouraged farmers to cultivate a variety of crops outside the normal growing season. Up to 300 villagers can view evening information sessions. The annual income of participating farmers has increased by an average of 55% since the introduction of Shidhulai's training sessions. In addition, FloodChars ensure the availability of vegetables during the monsoon. Shidhulai helps farmers to develop these floating gardens, which can be docked alongside riverbank villages. Farmers can cultivate vegetables by adding straw and rice stubble to the floating beds, and once the floodwater recedes, farmers carry the floating beds to higher grounds for use as organic fertilizer.

Improved social resilience

Finally, while Shidhulai's work has not led to infrastructural investment on the part of the government in the Chalan Beel region, they have helped to mitigate the impact of weather conditions. Thousands of landless farmers no longer have to leave their villages in search of work during the monsoon season: innovations and training have resulted in a more diversified agricultural output that is sustained year-round, while savings from increased incomes offer an alternative to emigration for employment. Households have better diets, access to renewable energy, and their children have access to schools.

POLICY IMPACTS

Shidhulai began discussions with the Bangladesh government in 2007 over the replication of the initiative's work, when representatives met with government officials in Dhaka at a celebration of the award of the UNEP Sasakawa Prize. These government figures included the heads of various departments, including the Minister for Education. Productive discussions have been put on hold since that time, however, as changes in the government disrupted this communication. During a recent parliament, MPs discussed bringing government support to the boat schools, as well as the need for more boat schools in the flood-prone areas across the country. At the local level, Shidhulai works closely with district government departments, including the Department of Agricultural Extension. This typically has involved scientists and outreach officers providing agricultural training for farmers.

Sustainability and Replication

SUSTAINABILITY

Much of Shidhulai's work is funded by various international organizations through multi-year grant agreements, but the initiative has also explored ways to generate income from its technological innovations that would cover the operational costs of their schools, libraries, training boats and health clinics.

Securing the initiative's financial future

One source of funding has been the SuryaHurricane lanterns, which are sold at a concessional price below that of comparable schemes. Women bring their used kerosene lanterns to the boats and pay USD 2.75 for conversion to solar power; alternatively, they are able to purchase new lanterns for USD 4.20. These lanterns can be recharged twice a week on the boats at USD 0.073 each time. Fifty percent of this income is directed towards Shidhulai operational costs and expansion, while the rest is reinvested in the boat schools, libraries, and healthcare support. It is hoped that with increased revenue from the SuryaHurricane lantern sales, the boat schools and libraries will be fully funded within the next three years.

There are also opportunities for future expansion within Bangladesh for both solar home systems and solar lanterns. Roughly ten million people in Bangladesh live without access to electricity, with relatively little chance of gaining access to grid power in the near future. According to a World Bank market survey, there is an existing market size of 0.5 million households for installing solar home systems on a fee-for-service basis, at a minimum cost of USD 200. These market opportunities lie in remote rural areas, river or offshore islands, in households that currently use kerosene lamps, and areas that are separated from the national grid by natural barriers.

The potential market for the SuryaHurricane lantern is estimated at 56 percent of the country's population: more than 90 million people. Shidhulai's marketing strategy has focussed on raising awareness of the project through news reports in the national press. At the community level, Shidhulai advertises SuryaHurricane lanterns by organising demonstration meetings in marketplaces, schools, and courtyards in villages. It distributes posters, leaflets, and brochures, and uses specific village marketing plans. A more ambitious marketing strategy for the solar lantern is being developed with a partner agency, using a website, visits by journalists to project sites, and promotional materials. The aim is to encourage foundations and banks to commit to supporting the SuryaHurricane program. This enterprise was a winner of the 2009 SEED Awards, in recognition of its potential for delivering "triple-win" economic, social, and environmental benefits in rural Bangladesh.

REPLICATION

There is great potential for scaling up Shidhulai Swanirvar Sangstha's work within Bangladesh. To date, Shidhulai has been the only development program to have shown the potential to reach the thousands of flood-prone villages that are only accessible by boats. As the boats, educational materials, technology and strategies have already been developed by Shidhulai, only funding is needed to scale up or replicate the project. The model can be replicated not only in any river-based community, but aspects of it — solar lamps, Solar Home Systems, locally developed educational content, and FloodChars — are applicable anywhere.

Shidhulai's 'floating education' model has been replicated by local organizations in Bangladesh. These have included Care Bangladesh/ Grameenphone, People's Oriented Program Implementation, Subarno Foundation, and Grambangla Unneyon Committee. Shidhulai has held meetings with these partners to aid with replication efforts. Replication of the project has also been encouraged in India in collaboration with UNICEF.

In 2009, Shidhulai hosted site visits for the Open University UK. Researchers conducted studies on Shidhulai's floating education system for their English in Action (EiA) project in Bangladesh, a project of the Bangladesh Government, Open University UK, BBC Trust and UK's Department for International Development. The long-term aims of the project are to launch solar-powered boats in Bangladesh that target developing riverside residents' English language skills.

PARTNERS

Upazila Krishi Offices (sub-district offices) have provided technical support to the project since 2003, although currently there is no agreement between Shidhulai and these offices.

Daridra Bimochon Sangstha is a community-based organization bringing together large networks of volunteers. DBS has assisted Shidhulai with its volunteer groups to conduct water quality monitoring since 2003, although this partnership agreement also lapsed in 2010. Finally, since 2002 Shidhulai has encouraged the development of Water User Associations, Farmers' Steering Committees, Grassroots Extension Delivery Teams, and a Farmers Association in Flood-Prone Areas as community networks for knowledge-exchange and peer-to-peer learning in north-west Bangladesh, helping to extend the lessons of Shidhulai's sustainable agricultural training to as wide a rural audience as possible.

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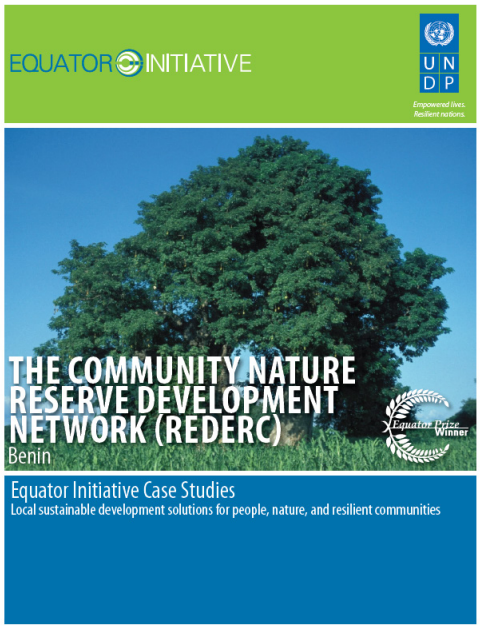

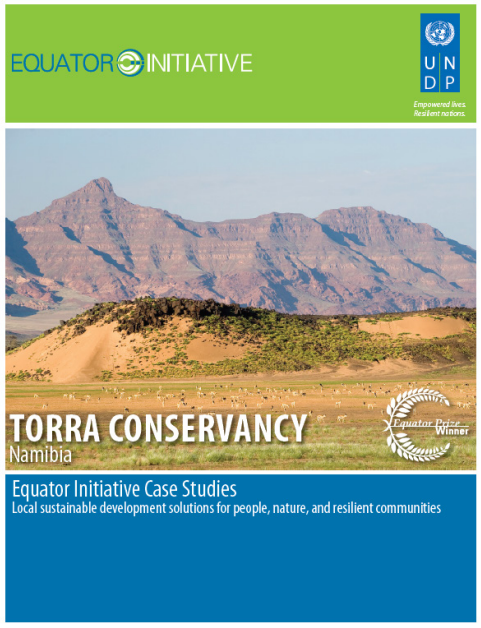

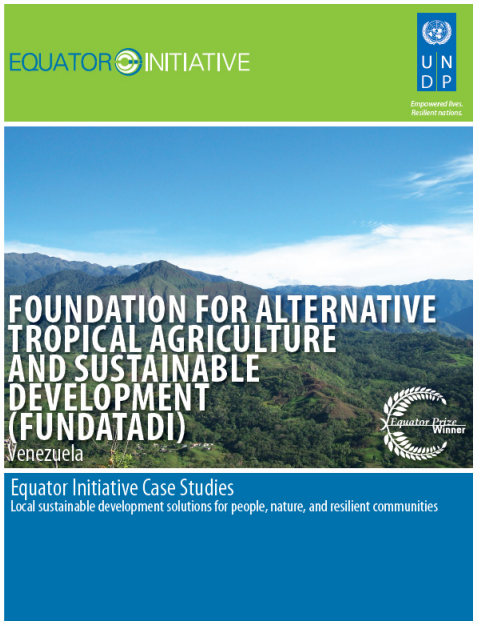

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