



*Empowered lives.  
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# INLE LAKE

## CONSERVATION AND REHABILITATION

STORIES FROM MYANMAR

UNITED NATIONS DEVELOPMENT PROGRAMME

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Donor Partners:



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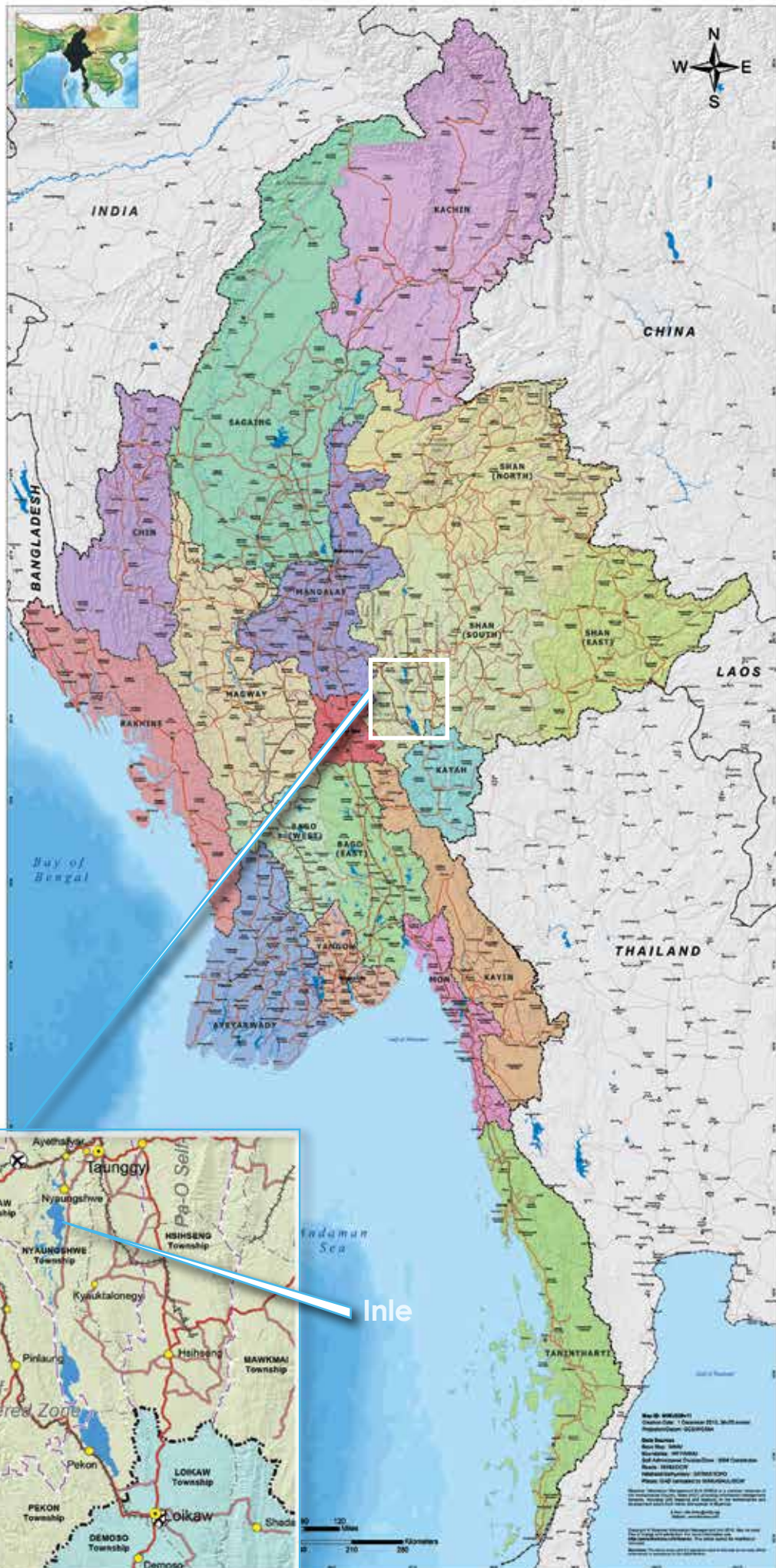
Our thanks are also directed to our implementing partners – national non-governmental and community-based organizations. We would like to acknowledge each of them for their truly remarkable effort to protect the ecosystem of Inle Lake and sustainable use of its natural resources. We would like to specifically thank: Danu Literature & Culture Development Association (DLCDA); DEAR Myanmar; Doe Taung Thu; Ecology and Economic Development Company Limited (EcoDEV); Ecosystem Conservation and Community Development Initiative (ECCDI); Ever Green Group; Farm Business Development Technical Group (FBD); Friends of Wildlife; Golden Moon Construction; Golden Plain Agricultural Products Co-operation Society Ltd.; Inle Drinking Water Supply Organization (IDWSO); Innthar Literature, Culture and Regional Development Association (ILCDA); Lanthit Foundation; Myanmar Agro Action; Myanmar Ceramic Society; Pwe Hla Environment Conservation and Development Organization (PHECAD); Sein Hla Nanda (SHN); Sympathy Hand; Thirimay Women Development Society Ltd.; 24 Hours Electricity Supply Committee for Inle Region.

We would also like to thank the United Nations Educational, Scientific and Cultural Organization (UNESCO) for its technical role in supporting the Government of Myanmar in achieving the successful designation of Inle Lake as the first Biosphere Reserve of Myanmar.

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The project would not have been possible without generous funding from the Government of Norway and we take the opportunity to express our appreciation of their contribution. Our special thanks are due to the people of Inle Lake who have shown great willingness to change current unsustainable practices. They are the lead characters of our stories.

# Map of Myanmar





## INTRODUCTION

This compilation of stories aims to document the experience of the United Nations Development Programme and its partners including United Nations Educational, Scientific and Cultural Organization (UNESCO) and non government organizations in promoting and supporting community-based action to contribute to conservation and rehabilitation of the Inle Lake. Over the past decades Inle Lake and its watershed area has been experiencing severe environmental and physical degradation due to several human, natural and anthropogenic factors. The impacts of climate change, the rapid increase of population and the intensive unsustainable practices have led to a rapid shrinkage of the water surface and decline in water quality. The lake's biodiversity and ecosystems have been seriously endangered.

The initiatives described in our stories were implemented under UNDP Inle Lake Conservation and Rehabilitation Project, which was launched in 2012 with financial support from the Government of Norway in an urgent need to act in the face of deteriorating conditions of the lake and its inhabitants. The goal was to reverse environmental degradation and uplift the lives of the local community.

To optimize potential impact, the Project concentrated its financial and human resources in one watershed, Kalaw-Chaung, which was identified as the most critical in terms of environmental degradation and in most need of conservation and restoration. Some 9,500 households in 71 villages in Nyaungshwe, Kalaw and Pindaya townships were included. The Project was implemented under the framework of the Inle Lake Conservation and Restoration Plan (2010-2015) of Ministry of Environmental Conservation and Forestry of Myanmar.

Stemming the loss of biodiversity, and lifting half of the world's poorest people out of poverty — are two of the United Nation's Millennium Development Goals. Many studies have shown that poverty frequently overlaps with areas that are a high priority for biodiversity conservation.





Indeed, development usually goes hand in hand with greater consumption of natural resources. Political leaders are often faced with tough choices about where to focus efforts to alleviate poverty, even if there are negative impacts on biodiversity.

But can development be achieved without damaging the environment? How to strike the right balance? How to scale up and institutionalize? How to concentrate resources to prevent fragmentation? These are some of the questions the actions described in our stories address. They demonstrate that efforts to preserve biodiversity can benefit the people who rely on natural resources for food and income. Indeed, they demonstrate synergies between conservation and development can and must be achieved.

Essentially, our stories reflect the importance of a long-term engagement and high-level political commitment to achieve a meaningful impact. They highlight a vital role of a sustainable local management mechanism, cross-sector cooperation and involvement and support of all interested parties, in particular the private sector, which has a strong interest in maintaining the lake region as an attractive destination for visitors.

The key to our success has been prioritization of local participation in an effort to develop indigenous capacities to own and lead more environmentally friendly socio-economic practices. Indeed, one of the greatest achievements of the Project was creating awareness, knowledge and experience to learn from.

The publication captures insights and examples of good practice. But it also identifies challenges and what needs to be considered when replicating them. We hope our stories will generate interest among policy makers and practitioners as well as a broader audience concerned about the future of the lake and its people.

# INLE LAKE



Myanmar's Inle Lake is often described as the most magical place in the country. It is located in the heart of the Shan Plateau, an extensive region criss-crossed by streams and the mighty Salween River.

The tranquil waters of the lake surrounded by lofty mountains, contain a number of endemic snails and fish species. On this highland lake a unique, centuries-old civilization has flourished. There are small villages along the banks with Buddhist temples, one-hut schools and bustling markets. Many houses rest on stilts above the waterline. There are floating vegetable farms. And the fishermen propel long, wooden skiffs by balancing at the back of the boat and wrapping their leg around a single oar as they push through the still waters with a unique motion that has become the symbol of the Innthar, the native lake-dwellers.<sup>1</sup>

## 'On the Verge of Environmental Disaster'

The scenic beauty of the lake can no longer conceal how ill it has become. A wide range of conditions, including cattle grazing, pesticide, fertilizer and sewage runoff, and extensive alteration of the lakebed have degraded its health. Activists and policy makers say the lake is on the verge of environmental disaster.

## 'Good old days'

"Believe it or not, not too long ago you could drink the water in the middle of the lake when you got thirsty. You could swim. Fish was abundant, and drought in the summer was unheard of," says 62-year old Daw Than Tin from Min Chaung East village. "The situation now is different".

## What is happening to the lake?

- The lake area has decreased significantly - from 271 km<sup>2</sup> in 1934 to 163.2 km<sup>2</sup> in 2007. Only 62.2 km<sup>2</sup> remains open source area.<sup>2</sup>
- In some places the lake is only canals between floating gardens or farm plots.
- Water is polluted, poisoning fish. The lake's natural filtration system may have worked in the past, but the pollution is now too severe.
- People who drink water from the lake and eat its fish face severe health risks. High rates of diarrhoea and dysentery are reported in the downstream communities.
- Invasive species are fast breeding endangering the once-abundant native flora and fauna and degrading people's livelihoods.

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<sup>1</sup> The population of Inle Lake consists predominantly of Innthar, with a mix of other Shan, Taungyo, Pa-O (Taungthu), Danu, Kayah, Danaw and Bamar ethnicities.

<sup>2</sup> Land Records and Settlement Department (2007)

## Why?

- **Considerable overuse of chemical fertilizers and pesticides:** local farmers who grow tomatoes and other vegetables on floating gardens and surrounding lands use excessive quantities of chemical fertilizers and pesticides to boost yields. They spray it directly on the plants in unregulated amounts. The toxic chemicals not only poison food but also are carried into the lake; they are polluting the lake's waters and devastating its ecosystem.
- **Population growth** has also had ill effects. Most of the more than 160,000 people living on and around the lake regularly dump sewage directly into the water, while small family-run weaving and silversmith businesses allow untreated waste water to flow.
- **Increased utilization of fuel wood** around the lake for cooking and cottage industries, is denuding surrounding mountains, eroding soil and filling up the lake with unnatural levels of sediment carried by the streams that feed the lake.
- **Rapid tourism development** with nearly 100,000-150,000 visitors heading to Inle Lake every year, have added to the strain. Studies indicate that international tourist visits have increased from 20,000 in 2009-2010 to 110,000 in 2013-2014.<sup>3</sup>
- **Climate change** - Analysis of climate data reveals the length of the monsoon period has decreased by as much as 10 days over the last 30 years resulting in a corresponding 5% decrease in average rainfall. However rainfall intensity is increasing as the average temperature in Myanmar has risen by as much as 0.7°C over the same period (DMH, 2011).



### Fewer but more intensive rains

The summer of 2010 had very high temperatures causing the water level of the lake to drop so low, the lowest in nearly 50 years, that drinking water had to be fetched from elsewhere and the floating market was in danger of disappearing.

By April, the vast area of water had shrunk by one-third, turning the vicinity of Phaung Daw Oo Pagoda, a sacred Buddhist pilgrimage site usually accessible by boat, into a virtual wasteland. Villages on the lake were also affected.

In the wet season intense rainfall is increasingly becoming a hazard rather than a blessing causing flash floods, erosion and landslides and increased sedimentation of the lake (which not only raises the lake level and therefore flooding risk, but also contaminates the water thus hindering economic activity on and around the lake).

The Inle Lake matters profoundly to the health and development of local communities. The individual species (birds, plants, fish, insects, bacteria, and other organisms) living on and around the lake and the ecosystem they make up provide food, purify air, water and soil. The Lake is a vital source of income for many people - fish caught from the Lake are a staple of the local diet and also the means of trade. The Lake's plants are used for production of ornamental objects and fabric.<sup>4</sup> The Lake is also a major tourist destination and the main water resource for the Law Pi Ta Hydroelectricity power plant, one of the major power plants in central Myanmar. Reversing the degradation of the Inle Lake and its rich ecosystem has become an urgent priority.



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<sup>3</sup> Inle Lake Conservation 5-Year Action Plan (2015-2016 to 2019-2020), May 2015, Ministry of Environmental Conservation and Forestry Myanmar

<sup>4</sup> E.g. a unique fabric from the lotus plant fibers is produced only at Inle Lake and is used for weaving special robes for Buddha images called kyathingahn (lotus robe).



# FROM WASTE TO FUEL

FUEL EFFICIENT STOVES



The fuel-efficient burning stove utilizes rice husk and corn cobs as fuel to cater to small cottage industries. It is cleaner, safer, and consumes less.

## Why Fuel Efficient Stoves?

Situated in Shan State in eastern Myanmar, the Inle Lake is being battered by a web of woes. Dumped into its waters is toxic waste from a coal mine along with sedimentation as villagers denude the mountain slopes of forest cover adding to already serious water pollution from overuse of chemical fertilizers and pesticides by farmers.

The resulting fall in water levels and several years of poor rainfall, believed to stem from climate change, has shrunk the originally 100-square-mile lake by a third. Fears have been voiced that one day it may simply vanish.

The population of Inle Lake has been growing at an increasing rate. More people require more resources to sustain them, often at the expense of forests and other natural resources. As population increases these demands become unsustainable and lead to a serious loss of forest cover.

Khaung Taing is one of the villages located by the side of Inle Lake. Like other mountain side villages, it depends on the once-lush forests to cook food. *"We have to find and cut trees every day. We need them every day,"* said 45-year-old Daw Myint May sitting in her hut, stirring sunflower seeds with a long wooden spoon, while a heavy smoke from cooking fire is filling up the room.

Logging within the Inle Lake's watershed loosens the soil in the shrinking forests, creating excessive sediment run-off into the increasingly shallow lake, warming the water and creating a detrimental environment for aquatic life.

To reverse environmental degradation, it is vital to curb logging in order to prevent unnatural levels of soil erosion and sedimentation, which is important for preserving the hydrological regime of the Lake watershed, which in turn will contribute to preserving water and water-related resources and livelihoods.

Khaung Taing is a village of 200 households. It is a close-knit community, with families lending help to one another whenever needed. They are farmers growing vegetables. Off-season, they also make rice crackers, a popular local snack, which they then sell in local markets.

The rice crackers are steamed on traditional village stoves made of clay, which are fueled by firewood logged in surrounding forests. These traditional stoves are an unassuming construction, made locally by the villagers themselves. They have no shutters, no chimney and exhume lots of smoke.

A family using a traditional stove requires on average 8,000 trees of one foot girth per year. It is also a matter of cost. A family running a small-size rice cracker production spends between



60,000 Kyats (about USD 60) and 105,000 Kyats (about USD 105) per month on firewood alone, which comes as a heavy financial burden.

In addition to livelihood and environmental consequences, there is also the health burden resulting from the use of open fires. Women and young children are particularly vulnerable. According to WHO, over 4 million people die prematurely each year worldwide from illness attributable to the household air pollution from cooking with solid fuels. More than 50% of premature deaths among children under 5 are due to pneumonia caused by particulate matter (soot) inhaled from household air pollution.<sup>5</sup>

## What Did We Do?

*“Everything needs to be balanced. We need to preserve forests but also people need to live, cook and eat,”* says Khin Mg Soe, a volunteer from Khaung Taing.

In an effort to reduce heavy reliance on wood-fuels, UNDP sponsored the local production of fuel-efficient stoves to cater to small cottage industries. The project was implemented in close cooperation with the Forest Department.

The project mobilized local experts to design a stove, which would be safer (i.e. produce less smoke), fuel-efficient (i.e. consume less wood) and cheaper (i.e., cost less for stove owners to maintain) while keeping it simple to construct.

The new design is not intricate. It uses locally available but more durable, energy efficient materials (aluminum and bricks) replacing clay used in conventional stoves. A few new elements (a shutter, an air vent and a charcoal collector), which are absent in conventional models, have been added too. Fabrication procedures are simple. But crucially, the new design utilizes rice husk and corn cob as fuel, replacing increasingly expensive and unsustainable firewood.

### Comparative description of conventional and fuel-efficient stoves

Conventional stove	Fuel-efficient stove
<ul style="list-style-type: none"><li>• Iron frame with earthen pots and earthen walls</li><li>• Thin walls</li><li>• No shutter (high air circulation in the stove)</li><li>• No chimney</li><li>• No separate charcoal collector</li></ul>	<ul style="list-style-type: none"><li>• Iron frame, aluminum pots and brick walls</li><li>• Thick walls</li><li>• A shutter (controlled air circulation)</li><li>• A smoke vent pipe</li><li>• A separate charcoal collection hole</li></ul>

<sup>5</sup><http://www.who.int/mediacentre/factsheets/fs292/en/>



*Building efficient cookstove for small scale industry*

The new design has been tested for its effectiveness and efficiency before it was introduced to the communities.

The production of the new stove costs USD 220 per unit (including material and labour). The project offered its beneficiaries a co-funding option: 70% of the cost covered by the project while a beneficiary family was requested to contribute the remaining 30%.

The beneficiary families were trained to build the stoves. Project staff and masons contracted by the project provided technical support and oversaw the job, but the community team did most of the work: mixing the cement, lime and sand, laying the bricks, building the inner chamber, coating the stove, and installing the chimney. Building a stove takes three to four days.

Technicians employed by the project have also trained beneficiary families on how to clean and maintain the stove.

The project supported construction of some 90 stoves. U Khin Mg Swe (45) was one of the beneficiaries of the project.

*“My wife died 2.5 years ago, from cancer”, says U Khin Mg Swe. “Her death was a massive blow but I had to get my act together. I have three children to look after. My sister is helping. We are running a small family-based business making rice crackers, roasting beans, groundnuts and sunflower seeds. We are selling them in a market in Taunggyi [the capital of Shan state]. With the old stove, the business was unsustainable. We spent 6,000 Kyats (USD 6) per day on firewood and for 30 viss of rice crackers I would be paid 1,400 Kyats (USD 1.4)*

*only. About a year ago, UNDP approached us and offered 120,000 Kyats (USD 120) to help construct a new, fuel-efficient stove. I have managed to top it up with 130,000 Kyats (USD 130) from my own savings. It was a lot of money but I reckoned it was worth it. A local mason helped. The design was simple but it made a lot of sense – it has a chimney, has a shutter and does not waste the energy. What is more important, I no longer need to buy firewood, which means I no longer need to spend 6,000 Kyats every day. The new stove works on corn cob, which costs me only 3,000 Kyats (USD 3) per day, so I save up 50% of the money. This is a lot for me. I have stocked up a year's supply of the corn cob. We make about 600 rice crackers per day. It is hard work. My sister spends long hours at the stove but at least there is little smoke now and it is not too hot in the kitchen as it used to be."*

The stove using rice husk is equally efficient. It consumes rice husk at a rate of 10 kg per day. A pack of rice husk costs 200 Kyats (USD 0.2) only.

People have further adjusted the design to their individual needs. E.g. to make a rice cracker, you need round-shaped aluminum pots, while for roasting groundnuts and beans, you need a conical shaped large pan. Some families have opted for corn cob or rice husk fueled stoves, while others continue burning firewood.

*"I do not have enough room to store corn cobs. Firewood takes less space. But I am happy anyway because the new stove requires twice as little firewood. I used to spend 10,000 Kyats (USD 10) on firewood per day. Now, to roast the same quantity of soya beans, I spend only 5,000 Kyats (USD 5) on firewood per day",* says U Ye Aung Soe from Khaung Taing village, where UNDP piloted production of fuel-efficient stoves.

U Ye Aung Soe built two stoves. One with contribution of UNDP and another one with the money he has saved.



*Efficient cookstove used for roasting green beans*

*“Yes, it is a heavy investment. But the old one used to collapse often. It was made of mud and cracked often due to the heat. I don’t need to spend that much anymore on repairing the new stove,”* adds U Ye Aung Soe with a happy grin.

U Win Htike Mon (38) makes soya bean snacks for sale. *“We boil soya beans in these pots”, says U Win Htike Mon pointing at two massive aluminum pots perching on a newly built fuel-efficient stove. “We then drain boiled soya beans in these baskets and grind them. We then roll them into small balls and flatten with a stone before we dry them in the sun. It is delicious”,* he says.

U Ohn Pe (58) is still using a conventional wood fire stove. *Its mud walls are cracking and heavy smoke is burning the eyes. The smoke is so heavy it is hard to breath. “Yes, I have seen the new stoves built by my neighbours and I want to build it too. I am saving up and will start building a new one once the monsoon rains are over. Will I opt for a corncob fuelled stove instead of firewood? - Probably not, as I do not have enough storage space for corn, and also, corn cob is available only at the end of the corn harvest season, i.e., not all the year round. So firewood. But firewood will do. My neighbors save at least 50% with the new stove. I am hoping I will too”.*

U Aung Myint and Ko Phyo Aung from Kyun Gyi North and Myay Ni Gone villages have experimented with the size of the stove. They have reduced the frame while retaining other elements of the fuel-efficient stove, and have managed to build a stove with about 100,000 Kyats (USD 100) only, cutting the construction cost significantly. *“The output of this stove is the same as with the one built with USD 220”,* says U Aung Myint. *“This one is more compact and cheaper”.*

## Good Practice

The case for fuel-efficient stoves is strong. It reduces the use of wood by up to 50 percent. The stove can be fueled with rice husk and corncob instead of wood. Rice-husk and corncob are available after every harvest in rural areas and are often left piling up, decomposing and polluting the air (decomposing husk emits methane, which is a powerful greenhouse gas). By burning rice husk people rid the environment of this pollutant and trees are saved enabling them to go on absorbing carbon dioxide, another greenhouse gas, from the atmosphere.

The new stove also reduces cooking time and saves money. Time and money saved in cooking helps provide opportunities for exploring alternative livelihoods. Ma Khin Nu says she can now cook faster, which means she can make more rice crackers per day and earn more. With the money she has saved after the installation of the new stove, Ma Khin Nu was able to finally fix the leaking roof. She believes she can save more and is planning to expand her livelihood through investing in pig-rearing, too.

## Lessons Learned

Production of a fuel-efficient stove (catering to small cottage industries) requires an investment. USD 220 (even USD 100 for a more compact version of the fuel-efficient stove) is a significant amount for an average family in Myanmar and may not be affordable for all, particularly for the rural poor. This heavy initial investment, however, is off-set by longer-term benefits – the stoves not only save trees, which means cleaner air to breath and safer water to drink, but also save people’s money over time.

## Sustainability

The new stoves are easy to build and maintain. They are an efficient and safer alternative to conventional stoves. Community interest in the project areas has been remarkably high. More and more people show interest in the new design, a strong early indication of success.



*Efficient Stove for Food Processing in Kaung Taing Village*



# RURAL ELECTRIFICATION

SAVING TREES, IMPROVING LIVES



## Why Rural Electrification?

Of 444 villages in the Inle Lake, only about 100 have access to electricity. Furthermore, more than 50% of residents in the villages, which are connected to the electricity grid, still lack power. Turning on the lights has become an urgent priority.

In the absence of electricity, the reliance of the rural population on wood has been high. People cut wood to cook and build, stripping the surrounding mountains of trees. In the absence of other alternatives, they have no other option to survive. But the logging has reached unsustainable levels and its effects are devastating.<sup>6</sup>

The quality of the land deteriorates due to soil erosion, leading to sedimentation in the lake. While both soil erosion and sedimentation are a natural process, they accelerate with deforestation. Trees and plants act as a natural barrier to slow water as it runs off the land. Roots bind the soil and prevent it from washing away. The absence of vegetation causes the topsoil to erode more quickly. It's difficult for plants to grow in the loose, less nutritious soil that remains. Fewer trees also mean more sediment in aquatic ecosystems, which leads to a decline in surface water quality and biodiversity.

The Inle Lake, with one of the richest fresh water fish faunas in the world, is particularly vulnerable. Many of the fish species in the lake are sensitive to habitat degradation and are imperiled. These species act as indicators of the overall health of the ecosystem.

Rural electrification aims to bring electrical power to rural and remote areas. The objective is not only to bring lighting but to also contribute to a reduction in the use of fuel wood for cooking and for small industries, and thus to decrease the pressure on surrounding forests.

By protecting trees, we are protecting not only the plants in the forests and the air we breathe, but also sensitive fish species in the water, which is not only an important and unique biological resource, but also our own source of clean freshwater.

## What Did We Do?

In an effort to reduce unsustainable reliance on wood, UNDP has responded to a request for support from local community-based organizations to bring electricity into more homes in rural and remote areas around the lake.

The strategy was simple: to identify villages and families in and around the Inle Lake without access to power and connect them to the existing electricity grid.

The project began with extensive consultations with the local population, authorities, informal leaders and representatives of the private sector.

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<sup>6</sup> Inle Lake Conservation 5-year Action Plan (2015-2016 to 2019-2010), May 2015, Ministry of Environmental Conservation and Forestry, Myanmar



Through a participatory approach, a community action plan was developed for each targeted village. The plan described in detail the gaps and needs in the villages and outlined an action plan to ensure improved access to electricity.

The project facilitated formation of community sub-committees chaired by village heads (where they did not exist) and provided training, guidance and support to empower the sub-committees to lead the works in their own communities.

The role of each stakeholder, including the project team and beneficiaries, has been agreed during long discussions and documented. This was vital to the success of the project to manage expectations and secure support and participation of all.

In addition to electrification works, the project also succeeded to get commitment of the communities to initiate other feasible environment conservation activities e.g. planting trees and organizing environment cleanup campaigns.

A series of awareness-raising sessions was organized by the local CBOs contracted by the project to educate the population on the importance of environment protection and what each of them individually and collectively could do to prevent its degradation.

In some villages a new transformer of 50 KW-capacity was set up. In others, the system was upgraded from 100 to 200, or from 50 to 160 KW-capacity based on findings of the technical assessment conducted by the implementing partners in each targeted village.

Than Taung was one of the targeted villages. It is home to 37 families. They are mainly farmers growing groundnut, sugar cane and garlic.

*“There are three hydroelectric sub-stations in the area but the electricity they generate is used to serve other communities in Myanmar,” says Daw Myint Htay (30). “The project connected us with relevant authorities and provided power transformers, poles and cables. We had to contribute too. Each family in the village paid 422,000 Kyats (about USD 400). We had to borrow money but we have covered the debt now. It was worth it. Just not everyone could afford it”.*

Of 37 families in the village, only 13 families have participated in the project.



*"We have electric stoves now instead of wood burners, which means we no longer spend money on firewood. And it is much cleaner now in the house," says Ma Mya Aye (30). "How much we spend on electricity bills? - About 3,000 Kyats (3 USD) per month. I used to spend 30,000 Kyats (USD 30) per month on firewood only for cooking."*

*"We bought a fridge and a water pump too. I used to walk down to the stream to fetch water, but now I no longer need to," adds Daw Myint Htay, a mother of four.*

In Taung Kyar, a neighboring village, 80 families have participated in the project.

*"We have very active women groups in the village," says Ma Ngwe Ya, a resident of Taung Kyar Htet. "We have helped each other to collect enough money. It was not easy but we managed"*

*"Nyaung shwe town is not too far. They have had electricity for many years. We saw the advantages of it and wanted to bring it in our homes too. An electricity power plant is only 1.5 miles away," says U Kyaw Sein (49). "Life is so much better now"*

*"One of us used to stay home to cook while others went to the farm," says Ma Yin Tint, mother of two, talking about advantages of the electricity. "Now all of us can contribute in the farmland as we no longer need to spend long hours at the cooking stove"*

Daw Khin Hnin May from Pyar Pin Village is teaching in a local school. She used to cook on a wood stove, which used to fill the room with lots of smoke, burning her eyes and making her cough. Every month she would spend 8,400 Kyats (8-9 USD) to buy firewood. She was one of the households who participated in the UNDP-sponsored project and now she has electricity. She has bought an electric cooker and a TV set, which until very recently was a remote dream for her family. The monthly electricity bills come to 5,000 Kyats (5 USD), which for her is significantly less than what she used to pay for firewood. She now spends less time to cook and has lights after the sunset, which means she has longer hours each day and her children have more time to read books and do their school homework. She no longer needs to spend money on candles and batteries. In addition to all this, she feels safer in her well lit home.

The project was implemented in 10 villages.

*"We have approached 13 villages with 673 households without access to power supply, but only 10 villages succeeded to get connected to the electricity grid," says U Tin Soe, Chairman of ESCIR (Electricity Supply Committee for Inle Region), a local community-based organization contracted by UNDP as an implementing partner. "Others could not afford to join the project. Even within the villages we have worked with, not all families were connected. To replicate the project, it would require a subsidized arrangement or an accessible loan system"*

A private company contracted by the implementing CSO installed electricity transformers, cables and posts. The role of the CSO was to facilitate the process, to raise community awareness, and to train beneficiaries in the use and maintenance of electric appliances.



*Using electricity for cooking reduces the use of fuelwood*

## Good Practice

The project has provided strong evidence of the direct impact of rural electrification on environment conservation. Reliance on wood has significantly reduced. As a result, more trees remain standing keeping the soil intact, the air cleaner and waters in the lake less silted.

The key achievement was empowering local communities to lead action in their own villages. Local women groups have been particularly active demonstrating determination and a strong sense of solidarity and mutual support.

## Lessons Learned

Identifying villages for piloting the project was a challenging task considering the magnitude of the problem in the area. Over two-thirds of the country's population does not have access to electricity. In rural areas, it is less than 16% with access. So there is huge need. With the economy growing, the demand for electricity is sharply rising calling for urgent action to find a sustainable solution to cover the entire population.

## Sustainability

While initial investment from beneficiaries was significant, the monthly electricity bills are reported to be affordable, and the change in the quality of life in the targeted villages has been immediate.



# CURBING INDISCRIMINATE FISHING

FISHING FREE ZONES



## Why Fishing Free Zones?

*"I've only caught one fish until now," said U Aung after six hours of casting his net. "It's just too hard to catch fish these days."*

At high noon, the thin, wrinkled 62-year-old man rested on his old boat, the blue mountains of Shan in the background. His clothes traditional, the broad-brimmed Intha hat protecting his face from the sun and long pants rolled up to his thighs, he still had five hours on the water ahead of him.

*"When I was 12, I would catch almost 15 viss (54 pounds of fish) by noon and, I would then go home. I did not need to fish all day," he said. "It has all changed now".*

Inle Lake was once brimming with aquatic life, home to nearly 30 species of fish and snails, many of them endemic, but the lake's biodiversity has come under threat.

### **Why fewer fish in the lake?**

Despite new jobs in the tourism industry, fishing along with agriculture remain the mainstays for a growing population of some 160,000 Intha people living on the lake.

Unregulated and harmful fishing practices threaten the Lake's habitat. They decrease ecosystem health and productivity and adversely affect focal and other species.

Fishing does not cease during the breeding season, leaving no space for the depleted fish stock in the waters to regenerate. Fishermen often abandon their nets in the lake, which continue to trap and kill fish. Traps are often placed at the mouths of river streams destroying fish spawning ground.

Another reason for fish scarcity is the popularity of electric shockers among fishermen. The technique is an effective method for stunning the fish before they are caught, but it also devastates microorganisms in the lake that can improve water quality as well as provide an important part of the food chain for fish.

Water pollution, aggravated by the run-off of untreated waste and chemicals washed from the surrounding households and farmlands into the lake, contributes to the gradual depletion of fish. Increased number of motorboats, siltation accelerated by deforestation and proliferation of predator species (such as Tilapia and African Catfish) all add to the problem posing a threat to native flora and fauna in the Lake.

*"Fish have a headache from these motorboats", says Daw Than Tin (62) from Min Chaung Le village referring to growing number of motorboats charging the lake waters. "It is just too much and no one is controlling their number".*



*Fishermen in Inle Lake*

The Department of Fisheries reported that pH levels, a measure of acidity, had risen to between 8.4 and 9.6 at points on the lake, endangering once-abundant native fish species such as the Inle carp (*Cyprinus intha*, known locally as Nga-phane).

Daw Than Tin said she did not need to read the environmental reports because in the past she would pay 700 kyat (USD 0.7) for a viss of fish and now a viss of fish costs 8,000 Kyat (USD 8). *"Fish are getting scarce. I can't buy many now,"* she said.

*"I only catch about 3 viss [4.8 kg] after spending the entire day on the lake,"* says 25-year-old Mg Thet Naing Win of Kyae Sar Kone village, compared with bringing in at least 4 or 5 viss on a single morning before the fish began dying out."

*"I earn just 1,000 kyat (USD 1) for one viss of tilapia. They are the only fish I catch, but not in a very large amount,"* says the father of a 3 year old.

Irresponsible fishing practices affect not only the fish under the water, but also migratory birds, as their habitats have been declining. The number of water birds is reportedly decreasing.

## What Did We Do?

"The right to fish carries with it obligation to do so in a responsible manner so as to ensure effective conservation and management of the living aquatic resources" (1995 FAO Code of Conduct for Responsible Fisheries)

In an effort to address indiscriminate fishing practices all year round without a closed season, UNDP supported the establishment of Fishing Free Zones in the lake.

Fishing Free Zones are demarcated areas in the lake where fishing is not permitted. The objective of the Fishing Free Zones is to protect the lake's essential habitats.

Area closures have been recognized as a useful management tool for rebuilding overfished populations and minimizing habitat degradation.

The boundaries of the Zones are clearly demarcated and all fishermen are required to respect them. The clear demarcation of boundaries is very important in order to prevent conflicts among fishery communities. Two types of demarcation methods were used.

1. **Anchored Buoys painted in red color:** Advantages of using anchored buoys are easy to change the size of FFZ if required while occupying little space, less cost than other methods, and no troubles to water transportation.

2. **Erected poles:** At the Bungalow FFZ, the corners of the zone are posted with red and white bamboo poles that can be easily seen. In addition, sign boards with information about FFZs and rules and regulation of fishing are posted at the FFZs and in neighboring villages.

The project supported development of two Fishing Free Zones within the core zone of the Inle Lake Wildlife Sanctuary. The Zones are covering 1,743 acres. The protection duration is permanent.

The locations and the size of the Zones were determined based on the indigenous knowledge of life history and movement patterns of focal species. Priority has been given to sites located around monastery compounds and pagodas, given the prominent role played by monks in promoting conservation and rehabilitation of the Lake. Therefore, the first FFZ was established around the rest bungalow situated in the middle of Inle Lake while the second one near to the bird watching centre situated at the northern part of the lake.

Local fisherman and local CBOs, which are concerned about the health of the lake's ecosystem, have been mobilized to patrol the Zones. Encroachers are intercepted and handed over to the Lake's administration. The participation of government officials provides the patrols with the authority to arrest and fine perpetrators. Those penalties send a clear message that the FFZs need to be respected.

The project has worked with 10 villages, which mainly depend on the lake for fishing, to pilot the initiative. *"We know what we are doing is bad, but what other option do we have?! We need to feed our families,"* says Mg Thet Naing Win.

Indeed, life is hard for fishing communities. Most of them live on less than 2 USD a day. *'It is worse during the cold season; hardly any fish at all,'* adds Mg Thet Naing Win.

People survive on money borrowed through family and community networks. Most fishermen live in modest houses of bamboo walls and a thin thatched roof. Only very few can afford a zinc roof over their dwelling.



The project has mobilized the communities and local authorities to discuss the root causes of fish scarcity in the lake. We have facilitated the process to bring all key stakeholders together. If the project was to have any meaningful impact, it was important the action was locally owned and driven.

The discussions resulted in creation of village-based Fishery Development Committees, which would take a leading role in managing the Fishing Free Zones.

The members of the Fishery Development Committees were trained in community-based natural resource management. The training covered negotiations, bookkeeping and other practical skills. The project has facilitated a series of Committee meetings to discuss progress and challenges, as the project was ongoing.

Joint patrolling of the Fishing Free Zones was a practical decision made jointly by the local communities, the lake's administration, and Department of Fisheries. The patrol is organized in shifts and perpetrators are intercepted.

*"We have caught two perpetrators recently and handed them over to the police", says U Aung Soe Lwin (47) of Min Chaung East village showing the photos of the perpetrators he has taken with his mobile phone. 'They are not from here; [they are] from other villages but they will know now that it is not permitted to fish within the demarcated areas'.*

The project also facilitated production of indigenous species to replenish fish stocks in the lake. A number of fishponds were established to nurse fish before being released into the lake. Some 85,000 fish fingerlings and over 100,000 fish fry have been released during the project period.





*Fishermen in Inle Lake*

## What Did We Achieve?

While it is too early to report on biological changes inside the Inle Lake, it is evident that the project has commenced the process to curb indiscriminate fishing practices.

Commitment of the local communities to the success is evident. E.g. appreciating the harm of electric shockers, a ban on its use has been self-imposed by the local fishermen and its use by others is being vigilantly monitored. Residents of Min Chaung East village have voluntarily surrendered their battery-shock gears.

Fishermen want to maintain their livelihoods. But they also want to ensure fish populations remain in the lake for years to come. Catching too many fish at a time can result in an immediate payoff. However, indiscriminate fishing diminishes fish stocks and threatens certain native fish species in the lake, endangering future livelihoods.

*"I have realized that if we do not act today, it may be too late tomorrow. It affects us all", says Mg Thet Naing Win.*

Over time, more fish in the lake will mean more income for the communities, and a healthier ecosystem in the lake.

## Good Practice

The initiative originated from indigenous organizations, which meant it was owned and led by local actors, who had intimate understanding of the realities on the ground. This was crucial to gain confidence and cooperation of the fishing communities.

During the project period, the project dedicated full-time staff and significant resources to engage all key stakeholders including the lake's authority and the Department of Fishery. The project has brought them together to begin examining the challenges and solutions. The extensive consultation, a participatory, bottom-up approach and strong support from local authorities, has been fundamental to the success.

Fishery Development Committees have proven to be effective in managing the Zones. The Committees have been actively engaged and reporting on their work regularly back to the communities.

Crucially, the project has awakened a sense of civic responsibility among the fishing communities to act, now.

## Lessons Learned

The initial observations indicate that Fishing Free Zones can be a viable solution to saving fish stocks, but it will only have a meaningful impact when all fishing villages are involved. Installing Fishing Free Zones in a water body such as the Inle Lake requires all fishermen to respect and patrol the protected area.

The size, spacing and location of Fishing Free Zones are equally essential and must respect movement patterns of species that are targeted for protection.

The sustainability of Fishing Free Zones is rooted in strong and accountable local institutions. With this in mind, the project has dedicated significant resources to organize communities and strengthen their capacities.

## Sustainability

The Fishing Free Zones are a beginning of a long journey. The functional role of current area closures will need to be re-examined over time.

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# EMPOWERING FOREST COMMUNITIES



## Why Community Forestry

Myanmar has one of the highest rates of forest loss on earth. Myanmar's forests covered 31,773,000 ha, or 48 % of the country in 2010. On average, it has lost just over 1% of its forest cover every year since 1990, or more than seven million hectares in all, according to the UN Food and Agriculture Organization's 2011 State of the World's Forests report.<sup>7</sup> The situation in the Inle Lake watershed is particularly critical.

Trees hold the soil together. Fewer trees mean increased erosion of the land and accelerated sedimentation, which is heaping up at the bottom of the Lake, shrinking and polluting the Lake's waters. Fewer trees also mean more carbon dioxide loose in the air, which scientists argue leads to global warming. Saving the forests, therefore, becomes vital for the health of the Lake's ecosystem and the people that inhabit its surrounding lands.

Community forestry is an approach to forest management in which governments are transferring legal forest usage and tenure rights to local communities. The local communities, thus, assume a pivotal role in forest management. While ambitious, forest devolution is possibly the best chance to save forests and improve people's lives.

## What Did We Do?

The project selected 10 villages in the watershed area of Kalaw and Pindaya, which are posing the highest risk to the lake's ecosystem due to their high vulnerability to soil erosion accelerated by deforestation. It started with community mobilization.

*"When we started the project, we first had to meet with elders in each village as well as the formal authorities. We called the entire villages in a meeting to explain what we have been planning to achieve. Some villages were quick to come on board; others were slower. Finally we had 10 villages participating in the project,"* said U Htun Paw Oo of UNDP.

The project has promoted a collaborative approach. It encouraged the adoption of participatory decision-making and planning methods.

Forest User Groups were formed in each targeted village to lead the management of the forest resources. These groups include representatives of the local forestry communities, both men and women. The group has established internal rules and regulations on financial management, division of responsibilities and accountability. This was vital to ensure effectiveness of the group's work.

To prepare them for their new opportunities and responsibilities, the project has organized a series of training events. Training focused on creating skills related to effective management of the community forestry, day-to-day decision-making, ability to resolve internal conflicts, and ensuring community benefit sharing.

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<sup>7</sup> <http://www.fao.org/docrep/013/i2000e/i2000e05.pdf>

*“The training was indispensable for the community forestry to succeed. Residents of forest communities must be able to participate effectively in decision making, they must be able to engage other stakeholders and express their perspectives, and they must be able to collaborate and negotiate effectively with other actors,”* says U Ba Than of UNDP.

Through a participatory process, led by the Forest User Groups, the project helped targeted communities to identify needs, anticipate change, reach consensus, articulate communal expectations and communicate them easily. This was an important first step towards fair, transparent and participatory forest related decision-making.

*“In our culture, elders lead. When I first joined the project, the elders were suspicious and thought that the project was about to put a ban on our traditional ways of land cultivation. You see, we burn and clear forests for farming. After planting on the cleared land for a year, we then move to a new location to start the process all over again.... But after I shared what I had learned about the value of standing trees, I have managed to convince them. They understand now and are willing to support,”* said Aye Tint (25) from Taung Kyar Le village.

In consultation with the village elders and other local authorities, the village-based Forest User Groups developed a 30-year land use plan, which articulates local community thinking on how to turn gradually bare lands (or lands under shifting cultivation) into an established forest.

The process included identification of community sites and clarification of land ownership. In Myanmar, all lands are owned by the State and communities are required by the law to obtain the government permit to use the forest land for an initial period of 30 years.



*Forest user groups practice gap planting in Taung Kyar Village*



*U Khin Mg Oo PHECAD, Pwehla village stands amongst trees planted under community forestry*

*“Not everyone is aware of the legal requirements. We had to therefore explain the process. We have also assisted in submitting applications for a permit to the Forest Department,”* says U Ba Than.

Forest User Groups from 10 villages participating in the project received community forestry certificates from Forest Department to start developing a community forest.

Once the certificates were obtained, implementation of the 30-year development plan commenced. Each village planted trees - Santalu (*Santalum album*), Gliricidia (*Gliricidia sepium*), Pyi lon Chan Thar (*Eucalyptus torelliana*), Crab apple (*Eriolobous indica*), Tamarind (*Tamarindus indicus*), using seedlings from a nursery established through the project.

In Pwehla and Pwint Lann in Pindiya township, over 200 households have come together to initiate the community forestry.

*“We have managed to secure 178.4 acres of forest land for conservation. It has not been an easy process but we want to take control of our land to stop forest land grabbing for commercial use,”* says U Khin Mg Oo, a 43-year-old secretary of PHECAD, Pwehla Environment Conservation and Development Organization.

PHECAD, is a community-based organization, established in 2010 with an objective to conserve water sources in Inle Lake’s watershed area. The area was hard hit in 2010 by severe drought drying out streams and killing crops. *“It was then that we realized we had to start acting immediately to preserve the environment,”* recalls U Khin Mg Oo.

*“We have established a community committee. We had enthusiasm and motivation but did not have much knowledge on how to proceed,”* says U Khin Mg Oo. *‘The project supported by UNDP has re-energized us and have given us a know-how. We have grown since and have now over 200 members from 15 villages. We are all volunteers from different tribes working for the same cause – the safer future. Village-based groups [Forest User Groups] have been established in surrounding villages too’.*



The project has awakened a sense of civic responsibility among the local communities and stimulated creation of village development funds. People have contributed generously. Local monks have been particularly active, helping mobilize communities and raising awareness on the importance of the environment conservation. The majority of local population is devout Buddhists and they listen to what monks have to say.

One outcome of the project's engagement was a nursery in Pwehla. The land, 1.5 acres near the village, was allocated by the local administration to grow seedlings.

*"Since 2012, we have been growing seedlings in the nursery and planting 50,000 trees every year", says U Khin Mg Oo. "In the first year, the seedlings (50,000) were provided by UNDP but we continue to maintain the nursery with our own community resources. We have been patrolling the forests, and monitoring the growth of planted trees while educating people on responsible ways of collecting fire wood for cooking".*

In 2015, the Pwehla community has reapplied for a permit. *"We are hoping to expand the community forest area", says U Khin Mg Oo. "We can certainly do more".*

*"Everyone is cutting and no one is planting", says U Chit Sein, 58-year-old chairman of DLCDA, Danu Literature Culture and Development Association, another community-based organization partnered by UNDP to implement community forestry project.*

*"We have planted seven different varieties of trees to refill the gap in our forests", continues U Chit Sein. "Although some have been damaged by the cattle and did not survive, many trees have grown tall now after three years of planting".*



*"I believe a recipe for success is to focus more on quality rather than quantity", says U Chit Sein. For each seedling we must have a three to five year plan. Planting alone is not enough. To have any meaningful impact, we must provide an incentive for communities to care for the trees as they grow. The variety of trees, which are planted, must be carefully selected too. The higher the economic value of the trees, the more are the chances that local communities will look after them".*

## What Did We Achieve

The project has empowered communities in wanting new environmental conservation initiatives. It has widened the scope of local implementing partners and beneficiaries in promoting forest management. Increased awareness on concept of environmental services is emerging. The project has also strengthened individual skills of men and women involved in the project.

*"What we are seeing is that community leaders become more vocal and assertive in meetings with local government, and marginalized groups within communities, such as women make their voices heard", says Myint Zaw of UNDP.*

## Good Practice

- The concept for Inle Lake's community forest took shape based on the core principles of direct community governance, economic benefits staying in the local community, and strong environmental stewardship.
- The project has prioritized enhancing the capacity of village level organisations, local communities and village level institutions to plan, implement and manage on their own.
- We followed a participatory method to facilitate thinking about the future and mobilized all key stakeholders to help change the way forest communities and local governments interacted. As a result the forest communities collaborate more effectively, they have assumed responsibilities and self-organized to benefit from the opportunities that communal control over forests offered.
- Participation of Buddhist monks has had a positive effect on community organisation and obtaining of forestry results. They have played an important role in shaping the attitude and awareness of members of the community.

## Lessons Learned

- Building the community capacity to manage their forests equitably while protecting them and using them as a sustainable natural resource is a big task, but one which begins with small steps. There are a number of challenges that must be faced when developing a sustainable management strategy for community forestry. Land ownership, organizational capacity and managerial skills (community's competence to organize a



*Gap planting in Taung Kyar Village*

forest management programme), as well as technical knowledge and a start-up capital to obtain a legal management permit are key to the success. Other factors that influence success include illegal loggers (who log valuable species without the community's consent, and without a legal management plan).

- For a conservation project within a community forest to succeed, community involvement is imperative. Community Forestry Development plans must be driven and owned by the local communities to safeguard their continued engagement and commitment.
- No single stakeholder by itself can ensure the success of such a project. Participation from various levels of community, government and non-government organizations are essential. The participation of proactive Buddhist monks in the planning and realization of activities enhances the likelihood of their successful implementation and maintenance.
- At least five-year engagement is required to achieve any meaningful change and to consolidate the achievements.

## Sustainability

The project has emphasized not only the technical aspects of community forest management but also the socio-economic needs of the communities to nurture the self-reliance. Communities with livelihoods linked to forests have a stake in guaranteeing that forests are available for future generations and they have an incentive to be responsible custodians.



# ORGANIC FARMING

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Logos: Norwegian Ministry of Foreign Affairs, UN Women, MAA

## Why Organic Farming?

Agriculture is the primary source of livelihood for the majority of rural communities in and around the Inle Lake.<sup>8</sup> But it has also been a major problem for the Lake's ecosystem. The unsustainable spread of floating gardens, largely along the western side of the lake, is of particular concern. These beautiful gardens float on the surface of the lake, where locals grow vegetables and fruit. Their beds are formed by extensive manual labor. The farmers gather up lake-bottom weeds from the deeper parts of the lake, bring them back in boats and make them into floating beds in their garden areas, anchored by bamboo poles. The practice of floating gardens was introduced in Myanmar in 1960s and has since been escalating to the point that it has now reached an unsustainable rate. Between 1992 and 2009, the total area of floating gardens increased 500%.<sup>9</sup>

### Why are the floating gardens a problem?

- They spread rapidly, encroaching into the diminishing area of the lake since over time, the floating beds become solid ground.
- The availability of open water area declines. About 93% (nearly 21 km<sup>2</sup>) of the recent loss in open water area of the lake is thought to be due to this agricultural practice.
- Runoff of pesticides and fertilizers from these gardens pollutes the water and poisons fish and other aquatic species.
- Nutrient levels in the lake increase, as a result of which more invasive species such as water hyacinth are fast breeding, posing a threat to native flora and fauna of the lake.
- Level of sedimentation in the lake increases.
- The lake is becoming smaller, shallower and polluted.

To boost yields farmers use excessive quantities of chemical fertilizers and pesticides. The consequent run off of pesticides and fertilizer from these lands pollutes the water and poisons fish and other aquatic species. The chemicals are toxic and pose a severe health risk to people who drink water from the lake and eat its fish. If left unchecked, this process can cause irreparable damage to the lake.

A study by Inntha Literature, Culture and Regional Development Association found that tomato farmers dump approximately 460,000 tons of agriculture waste into the lake every season.

"Cypermethrina synthetic insecticide, is applied at 1500% of the recommended rate and the fungicide Metalaxyl is applied at 5900% of the recommended rate", reads the study.

### Why excessive use of chemical pesticides?

- Many farmers use hybrid seeds for popular crops e.g. tomatoes, which require more fertilizers and pesticides than non-hybrid crops.
- Poor understanding of fertilizer use. "They spray it directly on the plants in unregulated amounts. Far more effective and safer would be to apply fertilizers 1.5 inch under the surface and distribute them evenly instead of concentrating in few spots. The local farmers also use power sprayers, which cause more harm compared to knapsack sprayer", says Myint Zaw of UNDP.
- Lack of agricultural extension services.
- Unregulated market of uncertified/ unknown chemical inputs at an affordable price.

<sup>8</sup> Currently, more than 60% of InleLake's basin area is dedicated to seasonal or permanent agriculture (DMH, 2011).

<sup>9</sup> Inle Lake Conservation 5-Year Action Plan (2015-2016 to 2019-2020), May 2015, Ministry of Environmental Conservation and Forestry Myanmar



*Hyacinth cutter in Kyun Gyi Taung village used for preparing compost*

*"I have to use more fertilizer than before. Last year, it was one bag for one floating garden. Now, I have to use one and a half," said Ma Htay Htay Win, mud caking both her hands as she stopped working on the tomato beds. "If I don't, the tomatoes will be very small and nobody will buy them," she said.*

*"Five years ago we had terrible drought. Water in the lake became so shallow that floating gardens ended up sitting on the bottom of the lake. People lost their harvests and income. The price for tomatoes skyrocketed because demand was much higher than the supply. To recover, farmers had to find ways to fast-track the growth of their tomato crops. Chemical fertilizers appeared to be the only way," says U Aung Soe Lwin (47) from Min Chaung East village.*

By promoting organic farming, the project aimed to raise awareness to reduce the dependency of farmers on chemical fertilizers. Research shows they have little benefit to yields while inflicting serious longer-term side effects.

### **What is organic farming?**

Organic farming combines scientific knowledge of ecology and modern technology with traditional farming practices based on naturally occurring biological processes. While conventional agriculture uses synthetic pesticides and water-soluble synthetically purified fertilizers, organic farmers are using natural pesticides and fertilizers.

The principal methods of organic farming include crop rotation, green manures and compost, biological pest control, and mechanical cultivation. These measures use the natural environment to enhance agricultural productivity: legumes are planted to fix nitrogen into the soil, natural insect predators are encouraged, crops are rotated to confuse pests and renew soil, and natural materials and mulches are used to control disease and weeds.

## What Did We Do?

The project promoted techniques to improve soil fertility. Organic farming relies heavily on the natural breakdown of organic matter, using techniques like composting to replace nutrients taken from the soil by previous crops. This biological process, driven by microorganisms, allows the natural production of nutrients in the soil throughout the growing season. One of the approaches encouraged by the project was composting of farm waste like groundnut stock, rice straw, and cornhusk. There is an abundance of such farm waste after every harvest. However many farmers either did not know or have forgotten the usefulness of this freely available resource.

*“We used to burn wastes after harvest,”* said Ma Su Su Hlaing from Taung Kyar Htet village in Inle Lake area.

It takes two-three weeks to turn farm waste into usable organic fertilizer. The incentive to farmers of creating their own organic fertilizer instead of using chemical fertilizer is a lowering of costs. Depending on the crop chemical fertilizer costs between 15,000 Kyats (USD 15) and 35,000 Kyats (USD 35) for 50 kilos. Tomatoes need 200 kg per acre, beans 75 kg and paddy 100 kg per acre.

To curb disposal of kitchen waste into the lake, the project also provided household kitchen waste composter bins and supported training and public awareness campaigns on kitchen waste recycling technology. A continued monitoring has confirmed that 80% of the trainees have adopted the practice. Kitchen waste recycling not only decreases lake pollution, but also provides safe and easy fertilizer and compost for farmland reducing the need for chemicals.

The results have been varying but largely successful. Many farmers have reported an increase in their yield. Khin Swe Thet from Min Chaung village has doubled her yield of groundnut to 42 baskets from 1.5 acres of farmland.



*Ohnmar Myint practices organic farming using compost*



The project also promoted the utilization of Water hyacinth for compost making. Water hyacinth is a plant not native to the lake, which has been growing rapidly at an unsustainable rate, filling up the smaller streams and large expanses of the lake, blocking waterways and robbing native plants and animals of nutrients and sunlight.

Advantages of using Water hyacinth for organic farming are multiple: it is available everywhere, it is easy to collect and is more cost effective and durable. In the villages where the project introduced the methodology, it was successfully adopted as an alternative to traditionally used pondweed. Farmers in Myay Ni Gone village, encouraged by the success, decided to put together their resources to design a community-owned cutter to be able to cut more hyacinth faster. The cutter has used a Chinese chili grinder as a model and replicated it in a bigger size.

Ohnmar Myint from Min Chaung East village used to spend her entire morning to collect water hyacinth and then cut it into small pieces with her kitchen knife before she used it for her floating garden. Now that the cutter is available in her village, it only takes her 5 minutes to shred a boatload of Water hyacinth, which is sufficient for 0.10 acre of a floating garden. It saves her time and money. The cutter is available to all community members for rent at a cost of 2,000 Kyat (USD 2) per day.

#### Advantages of Water Hyacinth to Pondweed

##### Water Hyacinth

- Available everywhere
- Easy to collect large amounts quickly
- Its removal can clear water ways
- Easy for women to collect
- Lasts for over 12 days when used for mulching
- Takes only 30 minutes to fill up a motorized boat 24' long and 6' wide
- Only 3 people required to collect & cover 0.35 acres
- Labour cost: 2,000 Kyats x 3 people = 6,000 Kyats
- Can be collected without a boat

##### Pondweed (traditionally used)

- Not easily available
- Not easy to collect; not always possible to get the sufficient amount
- Its removal can increase water pollution, can decrease food to aquatic insects and fish.
- Difficult for women to collect
- Dries up quickly within 6 days when used for mulching
- Takes 2 hours to fill up a motorized boat 24' long and 6' wide
- 8 people required to collect & cover 0.35 acres
- Labour cost: 2,000 Kyats x 8 people = 16,000 Kyats
- Cannot be collected without a boat.

*"We used to make composts in the past, but it always took so long. Now, we know there are rapid techniques of composting, which is very useful",* says Ohnmar Myint.

Vermi composting was another technique promoted by the project in an effort to reduce the use of chemical fertilizers and pesticides. Vermi compost is similar to plain compost, except that it uses worms in addition to microbes and bacteria to turn organic waste into a nutrient-rich fertilizer and soil conditioner.

In Nyaungshwe Township alone, 33 farmers from 11 villages were trained in vermi composting (60% of those trained were women). 90% of those trained have subsequently applied the



*Vermicomposting is an effective alternative to chemical fertilisers*

vermi technologies to their farms growing garlic, onion, tomato, legume and betel leaf. The yield has significantly improved. Vermi composting proved effective not only in supporting plant growth but also in controlling plant diseases.

#### **What is Vermi Wash?**

Vermi wash is a liquid that is collected after the passage of water through a column of worm action and is very useful as a foliar spray. It is a collection of excretory products and mucus secretion of earthworms along with micronutrients from the soil organic molecules. These are transported to the leaf, shoots and other parts of the plants in the natural ecosystem. The basic principle of Vermiwash preparation is simple. Worm worked soils have burrows formed by the earthworms. Bacteria richly inhabit these burrows. Water passing through these passages washes the nutrients from these burrows to the roots to be absorbed by the plants.

U Chit Swe from Kyun Gyi (North), a lakeside dweller who has switched to organic farming, was one of the most enthusiastic participants of the training. He pioneered the application of vermi wash in his village. As a result, his watermelons are far tastier compared to those grown with chemical fertilizers. The demand for his watermelons has increased. *“People used to frown at my water melons because they are smaller. But I would tell them, cut it and taste it. They are much sweeter and healthier. Slowly, people have started appreciating the quality of my produce”,* shared U Chit Swe.

Many farmers have also started producing vermi-tea (a byproduct of vermi-compost, which helps protect crops and improves the yield) not only for utilization on their own farms but also for sale, increasing farmers' income while also spreading the word about non-chemical ways of farming.

U Phyo Aung (37) from Myay Ni Gon village has been farming for 10 years now. *“I am a third generation farmer. This is what we do. My father was a farmer and his father farmed too. I have two children of 11 and 6 years old and I hope they will continue the family tradition,”* says the 37

year old. U Phyo Aung learned about vermi-composting from a friend, who was participating in UNDP-supported training. He did not join immediately. He wanted to explore and learn more. One day, he took some worms from his friend and decided to try vermi composting. It did not take him long to start producing organic products on a larger scale, not only for his farmlands but also for sale. *“I sell one worm for 25 Kyats (USD 0.025) and a pack of vermi-cast (worm manure) for 1,000 Kyats (USD 10) per a pack of 50 kg. In the first year, I earned less than 2,000 Kyats (USD 2) only. In the second year, I made it to 150,000 Kyats (USD 150) and last year I earned over 300,000 Kyats (USD 300) from selling the organic inputs – water hyacinth compost, vermi-cast and worms”.*

#### **The advantages of vermi composting**

- It is easy to learn and replicate
- Vermi-tea (a byproduct of vermi-compost) is cheaper than chemical foliar fertilizer
- Soil fertility and crop yield increases after application of vermi-tea and vermi-compost
- The demands for vermi-tea and vermi-compost is increasing as a result of increased awareness the project has created thus creating new opportunities for income generation for local farmers.

## Marketing

Crucially, the project supported farmers to obtain certificates confirming their product is chemical free, and to find markets where they could sell their organic produce for a higher price. E.g. in Min Chaung, Kyun Gyi and Shan Ywar Le Pyin villages, cooking oil produced by farmers from chemical-free groundnuts they have grown, was sold at 4,500 Kyats (USD 4.5) per viss in Yangon, when it costs 4,000 Kyats (USD 4) per viss in local markets.

The farmers are organizing themselves into organic producer groups to market their chemical-free products to hotels within the lake area and other markets.

“In 2013, we were only 18 members. In 2014, the number increased to 47 members. We hope to grow further”, said U Aung Myint (50) from Kyun Gyi North village.

## How Did We Do?

The project focused on creating awareness, knowledge, skills and experience. A number of local community-based organizations have been contracted to work with local farmers to re-introduce the idea of organic approaches. These community-based organizations were selected on the basis of their experience and track record in supporting marginalized communities in the Inle Lake basin. UNDP provided coordination, supervision, technical and financial support.

The methodology applied by these CBOs prioritized community mobilization and training. Sessions in classrooms were followed by demonstrations in the field to link the theory with practical application. The beneficiaries were grouped to ensure there was no influence of neighbouring farmers applying chemical inputs, which was not always an easy task. Each farmer



*Water hyacinth compost production using local made cutter*

was also encouraged to develop an “Action Plan”. This plan outlined how the trainees would disseminate the information they learned and help other farmers to set-up compost heaps.

Farmer Field Schools have been set up in Pindaya, Kalaw and Nyaung Shwe Townships of Southern Shan State of Myanmar. The project started with identifying local farmers willing to participate in the project. Community meetings were held in each targeted village (23 villages in nine village tracts) to explain the objectives of the project. This initial engagement was crucial to ignite the interest, and establish rapport and trust, which would be a foundation for maintaining openness and dialogue with local farmers throughout the project period.

Once the farmers were selected, a three-day training was organized by contracted local community-based organizations in each of the targeted townships. The training covered good agricultural practices (GAP) including soil testing, and production of natural pesticides and foliar sprays. Latest findings of scientific research on the use of organic materials including seed rates for crops were shared too.

This initial training was followed by regular sessions (at least twice a month) during eight following months to consolidate learning by delving deeper into the subject, practicing new approaches and sharing experiences and outcomes – both successes and failures. The sessions were held in the farmlands, not in a classroom. For this purpose, trial plots were set up (three plots in each of the three targeted townships, i.e. nine in total). To facilitate the trial process, the project sponsored procurement of seeds, manure, compost bags, foliar spray bottles, bio-insecticides and Neem pesticides.

A list of most common problems faced by farmers was then compiled and one by one, each of these problems were discussed, and new, more environmentally friendly ways to resolve them were proposed and tested in the trial plots to allow farmers to observe first hand the progress and results. The data was recorded systematically from trial plots. To allow comparison,

control fields not applying organic farming methods were also monitored.

Throughout the project duration, farmers were coached on how to improve methodologies. Each farmer was provided with a handbook in a local language, which described in sufficient detail crop husbandry, integrated management of pests and soil management. Observations and findings of the participant farmers from their own experiences/experiments after they have tested natural materials on the trial plots as well as their own farmlands were also collected in fact sheets and shared with the entire groups to encourage peer learning.

Trained farmers were also given soil test kits to test samples of soil from their own lands for soil pH, Nitrogen and Phosphorous content.

The advantage of Field Farmer Schools is that it provided space for participants to learn, try what they have learned, make mistakes, discuss and share. As a result the learning was more meaningful and tangible. The teachers accompanied farmers throughout this journey – from the beginning to the end of a cropping season.

What made Farmer Field Schools different from other community approaches was putting farmers at the core of the process. They were not passive recipients of the learning, but decision-makers identifying problems, testing new methodologies shared with them, studying the results and sharing their learning with other farmers. The school was a facilitator probing, encouraging, facilitating sharing and creating a space for learning. Only after the farmers saw with their own eyes how the plants had grown and observed the colour of plants' leaves in trial plots, they finally believed that the organic farming worked. All farmers participating in the Farmer Field Schools have subsequently adopted the new methodology on their farmland.

Trial plots set up by the project have attracted larger interest. Monitoring reports confirm of 3,728 farmers who have learned about organic farming from the 45 farmers who participated in the Farm Field Schools, and at the time of writing about 10% have already started applying the new methodology in their farmlands.

#### **Observations from Farmer Field School trial plots**

- Yield of Niger was significantly higher after application of organic fertilizers, compared to non-organic farmlands. Other plants had high yields too.
- Wheat plants were robust and had 4-5 tillers while plants treated with chemicals had 1-2 tillers only per hill.
- After application of organic methods, tomatoes were harvested 8 times (and still fruiting) compared to only 3-4 times after application of chemicals. Foliar sprays ensured the leaves were green.
- Choosing the right conditions for sowing was vital.
- Hard work and commitment paid off.

## What Did We Achieve?

- The project has created increased awareness of organic farming benefits and methods.
- Increasing number of farmers have started practicing organic farming.
- There is less chemical accumulation in the immediate catchment and in the Lake itself.
- Farm income has significantly improved due to less purchase of chemical inputs and greater production of locally produced or purchased organic-based inputs.
- Reduced exposure of farmers and consumers to chemical fertilizers and pesticides.

## Good Practice

- The project sensitized as many local authorities and CBOs as possible in the Kalaw-Chaung watershed on the economic and social benefits of environmentally friendly practices.
- Cost effectiveness and overall efficiency was strengthened by putting implementation in the hands of local NGOs with knowledge of the terrain and established trust with the targeted beneficiary groups.
- The project conducted all its activities in the field in the Myanmar language, which ensured there was no limitation as to who could participate. Likewise, written material distributed in the Kalaw-Chaung watershed was also provided in the national language.
- By combining training with demonstrations in the field, the project strengthened trust and commitment of communities to behavioural change.

## Lessons Learned

Promoting organic farming activities is an ambitious activity when there are few organic markets in Myanmar. Identifying potential markets is therefore vital to the success. Availability of and accessibility to inputs to promote organic-based farming is equally critical.

*“Chemicals are easily available in the markets. Farmers don’t even need to pay brokers upfront. If organic products are as readily available in the quantities required and farmers are encouraged to buy them, most certainly, many more will switch to organic farming”, says U Aung Soe Lwin (47) from Min Chaung East village. “Some local farmers have started producing organic products locally and awareness is growing, but the supply of organic inputs is not enough to cover the need. The organic products must be promoted at a scale chemical fertilizers have been for organic farming to hold its foot”.*

There is also need to raise awareness on acceptable chemical inputs to reduce use of uncertified/

unknown chemical inputs. *There is not a single organization that can solve the problem alone. There must be a coordinated and consistent approach backed up with strong policies and enforcement*,' says Myint Zaw of UNDP.

Building trust and confidence takes time. At the same time, organic farming is labour and knowledge-intensive. It requires farmers' commitment and hard work. The project was particularly successful where communities were better organized (i.e. where villages had functioning village development committees) backed by strong local leadership.

Effectiveness also largely depends on a communication strategy that empowers the communities to take informed decisions to secure the stability of their environment. The project has shown that stakeholders and beneficiaries react more positively when environmental conservation and restoration is demonstrated to increase economic and social opportunity and development, rather than projected as an end in itself.

## Sustainability

The project has created awareness, knowledge, experience and commitment to organic farming practices amongst farmers the project has engaged with. It has demonstrated that organic farming can be a viable economic activity in the Inle Lake area.

*"It is going to take time for people to start appreciating the organic products. But we will get there"*, says U Khin Mg Win (42), a local farmer.



*Compost making in Than Taung village in Nyaungshwe Township*





# BIO-SEPTIC TANK



## Why Bio-Septic Tanks?

Most of the villages on and around the lake are using 'hanging latrines', which deposit human waste directly into the lake. This is a problem that can have devastating health and environmental consequences.

The practice not only pollutes water in the lake endangering its ecosystem, but it also directly affects health of village population and ultimately its ability to develop.

Bacteria, viruses and parasites found in human excreta contaminate water resources, soil and food. This contamination is a major cause of diarrhea and dysentery. Women and children are particularly vulnerable. Chronic diarrhea can also hinder child development by impeding the uptake of essential nutrients that are critical to the development of children's minds, bodies, and immune systems.

The economic burden of these diseases on families, who are struggling to survive on bare minimum, is enormous. Frequent illnesses means that meager savings are spent on medicines making it practically impossible for the poor to break the cycle of poverty.

It is estimated that ecological way of disposing human waste can yield a 30 % reduction in diarrheal diseases. *"The challenge is to create sanitation solutions that work for everyone, including poor people, and that keep waste out of the environment",* says Myint Zaw of UNDP.

## What Did We Do

The project supported a local initiative, which aimed to: a) create awareness of safer alternatives to sanitation; b) introduce new technologies and c) demonstrate how it can be done.

To pilot the bio-septic technology, the project have selected eight villages in Nyaung Shwe Township of Kalaw Chang watershed area.

To start with, the project staff held initial meetings with village leaders followed by mass meetings to which the entire populations of the targeted villages were invited. 65% of those who attended were women. The objectives of these meetings were to draw attention of the village population to the problem, to introduce the idea of bio-septic tanks and the methodology proposed by the project.

*"People knew what they were doing could not have been right but they did not know what else they could do. That's why I think the interest was so high when we arrived saying we know an easy way that could solve the problem",* says Daw San San Yee, Project Manager of Myanmar Agro Action.

43 residents agreed to participate in the pilot initiative. Training in a classroom was followed by demonstration of the system installation. Once the skills and knowledge has been transferred, the 42 families commenced replicating what they had learned in their homes.

Myanmar Agro Action (MAA), a local NGO with many years of experience in agriculture, environment protection and rural development, partnered UNDP to implement the project. Its technical staff provided on-the-site oversight of the owner-driven construction. Within five months from the start of the project, 21 bio-septic latrines were constructed.

The installation of septic tanks was followed by a series of training events organized by Myanmar Agro Action to ensure there is good understanding of the use and maintenance requirements. Maintenance of the septic tank requires a strictly followed behaviour by users e.g., flushing non-biodegradable waste items down the toilet such as cigarette butts or cotton swabs can cause a septic tank to clog and fill rapidly. Therefore these materials should not be disposed in that manner.

#### What is a bio-septic latrine and how does it work?

A bio-Septic-tank is a small scale, environmentally-friendly solution for wastewater treatment. Bacterial environment that develops in the tank decomposes the waste discharged into the tank. The technology uses beneficial microbes and liquid waste treated in bio filter is discharged into the lake. Construction of a complete system (including a latrine) takes two months.

*“The bio-tank used to be imported from Thailand but it is now produced locally too and is available in local markets”, says Daw Khin Mar Cho (44), mother of three.*

*“The microbes are also locally available and are cheap. We are six people in the family using the latrine and need a bottle of microbes per month. A bottle costs 2,000 Kyats (USD 2) only, which is manageable”, says Daw Khin Mar Cho.*



*Daw Khin Mar Cho, a bio-septic tank beneficiary*



*Bio-septic tanks are a safe sanitation solution that prevents disease*

*There is no smell and we know that we are contributing to a good cause – conserving the environment’, says Dow Aye Pu, 55 year old neighbor, who has also benefited from the project.*

In addition to bio-tanks, the project also supported construction of 24 concrete-septic tanks with a similar technology using bio filters but at a significantly less cost. Bio tanks are sold in a local market for 400,000 Kyats (USD 400) while the construction of the concrete-bio septic tank costs up to 150,000 Kyats (USD 150) only.

*“There is a perception that latrines are for the educated only. We have broken this misconception and have demonstrated that everyone can and must have a clean and safe latrine. The logic of the bio-septic latrine is simple really and people get it quickly. It works. How do we know it is successful? Well, they are still there,” says Ko Than Tun Aung, Assistant Project Manager, MAA.*

#### **Advantages**

- The technology is easy to install and maintain. Removal of remaining solid waste is required once every 10 years only.
- Reduces foul odor and pathogenic microbes in sewage
- Offers a safe sanitation solution that prevents disease and promotes health by successfully and hygienically removing excreta from the immediate environment
- Helps create physical environments that enhance safety, dignity and self-esteem.
- It is environmentally sound because it does not contaminate water.
- Bio-septic latrines are well accepted by all the members of the families without any gender conflicts. Both men and women share the latrines.

## Good Practice

- A viable technology for sewage management has been successfully introduced to reduce water pollution and run-off from human settlements.
- The project has created awareness and demonstrated what can be achieved in a limited time with limited resources.

## Lessons Learned

It is vital that latrine-owners understand the technology to ensure sustainability of the system. Any similar project therefore must prioritize education in addition to provision of material inputs.

Community engagement and behaviour change initiatives that address people's beliefs and motivations are key to sustainable sanitation solutions. If people are consulted and involved in the construction of facilities they will value them more and care for them better. If people are enabled to maintain a toilet they can ensure they are repaired when necessary. If they understand the benefits, they will save the money to build their own toilet. Working with a community to achieve this takes time, effort and resources.

## Sustainability

The construction of bio-septic tanks is an effective way to reduce water pollution from untreated human waste disposal in the lake. The project has demonstrated the technology is viable. However, it may not be affordable to many, particularly for the rural poor, at a cost of 400,000 Kyats per septic latrine. *"People will be willing to invest their own money into the concrete-tanks, but they would need co-funding or subsidizing arrangement to replicate bio-septic tanks"*; says Daw Aye Pu.



*Bio-septic tank installed in Shan Ywar Le Pyin village, Nyaungshwe Township*



# ENVIRONMENT EDUCATION



## Why Environment Education?

*"We have lived here for centuries. The people of Inntha have always depended on the lake for food and water. But our ancestors knew how to take care of the natural resources without causing too much harm. We must re-discover what we have long forgotten and teach our children too,"* says 62-old U Tin Aung Kyaw, in his gentle kind voice walking gingerly around the large well-lit rooms of the Environmental Education Centre in his hometown of Nyaungshwe, a town of 5,000 people, just a few kilometers north of Inle Lake.

Over the last few years the once-quiet town has become a buzzing hub for tourists, who arrive by boatloads to admire the serene beauty of the lake and the unique culture of its people.

Tourists have been warmly welcomed. They create jobs, bring money and development but there is also an increased realization that growing population puts additional strain on already stretched resources of the lake.

Hotels are springing up around the lake at an alarming rate, and increasing numbers of loud, diesel-driven longboats - the only form of tourist transportation - charge across the lake with no concern for noise, water or air pollution or the effect on the fish upon which the villages rely. Litter is building up in the water and rimming the lake near floating restaurants and shops.

The Lake's ecosystem has been degrading at an alarming speed. Tourists, however, are not its only trouble. Local farmers have been adding their share of pollution by over using chemical fertilizers and pesticides. The toxic waste washed into the water poisons its fish and native plants.

Increased deforestation of the surrounding mountains has been another cause of concern triggering soil erosion and filling up the Lake with siltation.

Raising understanding of the fragility of our environment and the importance of its protection has become an urgent task.

## What Did We Do?

UNDP has partnered with Innthar Literature, Culture and Regional Development Association, an indigenous community-based organization, to establish an Environmental Education Centre, the first of its kind in the area. The objective of the Centre is to educate the population about the environment and the importance of sustainable use of resources.

*"We need to learn how to live smarter to reduce our impact on the environment,"* says U Tin Aung Kyaw, vice-chairman of the Innthar Literature, Culture and Regional Development Association.

The construction started in August 2012 and in March 2013, the Centre was ready to open its doors to the public.





Environment Education Centre in Nyaungshwe township

*"Knowledge has an important role in building sustainable societies," says U Tin Soe, member of Environment Education Centre. "People with knowledge have the ability to emotionally understand the surrounding world and relationship between the environment and human behavior."*

The Centre is housed in a simple one-story building with large well-lit rooms. It has an auditorium, which can seat up to 200 people at a time.

The exhibition hall displays pictures of the indigenous species, many of which are found nowhere else in the world. The Centre also exhibits historical records and precious manuscripts on local land use and centuries-old agricultural practices. These manuscripts, some of which are as old as 700 years, have been donated by local monasteries and are the pride of the Centre. Their content has been carefully studied and included in education programmes promoted by the Centre.

The historic records show how drastically local practices have changed to the detriment of the environment and ultimately, the people. The manuscripts stand a proof that these changes are a recent phenomenon, which however can have consequences of a historical magnitude.

The Centre is open to people of all ages. But increasingly the focus now is on youth. The Centre is run by 50 to 60 years old volunteers driven by their passion for the cause. *"But who will take over after we are gone?!"* laments U Tin Aung Kyaw.

Concerned about the future, Innthar Literature, Culture and Regional Development Association has shifted its attention to youth.



Photo exhibition to raise environmental awareness

*“We have realized if we want to succeed, we must invest in young people because they are tomorrow’s leaders and need to be equipped for tomorrow’s challenges. We must adequately prepare our children for the future they will inherit”, says U Tin Aung Kyaw. “If you plan for one year, plant rice. If you plan for a decade, plant trees. If you plan for 100 years, educate children, a wise man once said!”*

The new venue is not only a museum for culture and environment, it is also used for meetings and public talks by NGOs and the local community.

*“We organize meetings, public talks, workshops, and education sessions on the importance of the lake’s ecosystem. We facilitate access to information and exchange of ideas. We develop posters and booklets and distribute them as far as we can reach. The physical environment is fragile and indispensable. When people begin to understand this, only then we can begin fixing the problems that threaten it”, says U Tin Aung Kyaw.*

He makes a powerful point that the environment is in critical condition and while there is still hope to change our course, time is of the essence. This is why the Centre also organizes outreach campaigns to bring messages on environment and human behavior to various groups outside of its immediate reach too.

The Centre works closely with the Government ministries and other community-based organizations. In partnership with the tourism department, the Centre is training tourist guides on the importance of the lake’s protection in order to be able to influence the understanding and behaviours of visitors from afar. New partnerships are being forged with academic institutions too to encourage research into environmental conservation.

*"It used to be all about development - now we also talk about conservation",* says U Win Myint, the Minister for Inntha Affairs.

## Good Practice

- The project has created awareness of the fragility of our environment and the importance of its protection. This is important because awareness is shaping a hierarchy of values, while at the same time influences on the sense of responsibility for inappropriate choice of values and indifference towards wrong doing.
- The implementing partner of the project has roots in the local communities. It speaks the local language. It is recognized and respected by township authorities and population at large. This has been vital to attracting greater interest and support from key stakeholders.
- The role played by the Innthar Literature, Culture and Regional Development Association has been indispensable. The Association donated the land, local materials, labour and their enthusiasm, without which the Centre would not have been what it is today. UNDP provided co-funding and technical support.
- A crucial factor for the Centre's success has been the involvement and cooperation of a wide range of local organizations.

*"The Centre can only be an empty room with bare walls if not the people who add meaning to it",* says Myint Zaw of UNDP.

## Lessons Learned

- The Project was designed with a timescale of two years to meet its expected results and objectives. This was too short. Changing attitudes and behaviours takes time and requires a long-term commitment.
- The strength of the project was its local implementing partner. By mobilizing the existing networks and investing in local capacities, the project has enhanced the chances of sustainability.
- A thorough understanding of environmental issues and the knowledge of factors affecting the environmental awareness were essential to the success.

## Sustainability

The Centre is letting its exhibition rooms for meetings and workshops, and runs classes in languages and computer literacy, which generate a small income sufficient to maintain the Centre and also to sponsor small-scale public awareness campaigns. Visitors are also encouraged to contribute as much as they can. With private donations, the Centre is now expanding to establish a Tourist Information Centre to extend the reach of its education campaign on the importance of environmental conservation.



# INLE LAKE: FIRST BIOSPHERE RESERVE IN MYANMAR



In June 2015, the Inle Lake was designated by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) as Myanmar's first Biosphere Reserve under the framework of UNESCO's Man and the Biosphere Programme (MAB), which is an Intergovernmental Scientific Programme that aims to establish a scientific basis for the improvement of relationships between people and their environments.

U Win Tun, the Union Minister from Ministry of Environmental Conservation and Forestry, mentioned "through implementation of MAB programme in Inle Lake Region, we believe that we may some extent contribute to the UNESCO's mission for natural science sector- by using science to build peace, to eradicate poverty and to promote sustainable development".

Ms. Renata Lok-Dessallien, United Nations Resident Coordinator in Myanmar said " The UNESCO Man and the Biosphere Reserve award places the global spotlight on Inlelake. It focuses our attention in a concentrated way on this beautiful yet threatened lake area. It galvanizes us all to find the right balance between human activity and nature's sustainability. It does this, by raising Inle Lake's visibility and importance, not only for Shan State, not only for Myanmar, but for the World."

*"This is a milestone achievement. Under the project, UNESCO has provided support to the government of Myanmar for the successful inscription of Inle Lake as the first Biosphere Reserve in Myanmar", says Sardar Umar Alam, UNESCO Myanmar. He adds that, "the lake has high potential to be a unique model for leveraging multi-stakeholder partnerships to further environmental conservation and sustainable development in the region".*

Inle Lake was formed more than 1.5 million years ago. Its unique geological history has created habitat conditions that led to a rich biodiversity with many native species found nowhere else. The wetland ecosystem of the freshwater lake is home to 267 species of birds, 43 species of freshwater fishes, otters and turtles. The lake is a nesting place of globally endangered Sarus crane (*Grus antigone*). In addition to its ecological importance, socio-cultural aspects of local inhabitants in Inle Lake are also unique, in the way they have adapted their lifestyle and livelihoods to their biophysical environment.

The designation comes amid expert warnings that the lake is under serious threat from environmental and anthropogenic changes. The impacts of climate change, the rapid increase of population and unsustainable practices have led to a rapid shrinkage of the water surface and decline in water quality. The lake's biodiversity and ecosystems have been seriously endangered.

Recognizing the gravity of the problem, Myanmar's government, United Nations agencies, local and international NGOs, and research institutions have been undertaking several research projects, conservation and sustainable development interventions, with the aim of conserving the valuable ecosystems of the area while ensuring the livelihood security of the communities dependent on the sustenance of lake resources.

In order to protect its rich biodiversity and endemism, the Government of Myanmar declared Inle Lake as one of the premier sites for long-term conservation interventions in the country. The Inle Lake Wildlife Sanctuary covering an area of 642 km<sup>2</sup>, was established in 1985. An area of 10.36 km<sup>2</sup> on the northern fringe of the sanctuary has been demarcated as a Bird Preservation Area, where around 25,000 birds consisting of about 267 species, both native and



*Inle Lake's unique cultural and biological diversity attracts thousands of tourists annually*

migratory species, congregate during the cold season months. In 2014, the Inle Lake was listed as Important Bird Area due its critical staging post on the East Asia-Australasian Flyway of the migratory birds from Siberia to Australia. The Inle Lake Wildlife Sanctuary was also designated as ASEAN Heritage Park in December 2003.

The challenge now facing Myanmar, as the country is opening up to global investment in a way never seen before, is to build on these efforts and secure the long-term future of the country's endangered biodiversity and unique habitats on which a large percentage of Myanmar's population depend.

## New Opportunities

The designation of the Inle Lake as Biosphere Reserve offers new opportunities to achieve long-term environmental stability and sustainable development in the region. The lake and its watershed areas become available as a pilot testing ground for multiple stakeholders to develop and test new strategies to protect the biodiversity as well as seek sustainable solutions to improve livelihoods within the lake.

*"It is important to note that enhancing the role of traditional knowledge in ecosystem management, and demonstrating sound sustainable development practices and policies based on research and monitoring are key objectives of biosphere reserves and their successful management," says Dr. Shahbaz Khan of UNESCO Regional Science Bureau for Asia and the Pacific.*

Benefits gained from being part of the global network also include access to a shared base of knowledge. Inle Lake was among 20 new sites accepted by the UN agency to the World Network of Biosphere Reserves, under the UNESCO Man and Biosphere (MAB) Programme in 2015.<sup>10</sup> The Network currently counts 651 biosphere reserves in 120 countries all over the world. This World

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<sup>10</sup> UNESCO's Man and Biosphere Programme was established in 1971 to safeguard natural and managed ecosystems, and promote innovative approaches to economic development that are socially and culturally appropriate, and environmentally sustainable.

Network is more than a listing. Biosphere reserves exchange knowledge and experiences on sustainable development innovations across national and continental borders.

In addition, the designation of the first Biosphere Reserve in Myanmar is likely to attract donor interest in implementing 5-Year Inle Lake Conservation Action plan to conserve and restore Lake Inle.

### **What are Biosphere Reserves?**

Biosphere reserves are ‘living laboratories for sustainable development’ and represent learning centers for environmental and human adaptability. They are areas that demonstrate innovative approaches to living and working in harmony with nature. One of the primary objectives of Biosphere Reserves is to achieve a sustainable balance between the goals of conserving biological diversity, promoting economic development, and maintaining cultural values.

*“Biosphere Reserves are internationally recognized, and aim to promote solutions reconciling the conservation of biodiversity with its sustainable use,”* says Sriharsha Masabathula of UNESCO.

#### **Objectives of the Inle Lake Biosphere Reserve**

Inle Lake biosphere reserve covers a total of 489,721 hectares. The main objective of the Inle Lake Biosphere Reserve is to conserve the lake’s biological diversity while promoting sustainable economic development and maintaining the cultural values of the communities living in the area. Specific objectives include:

- To conserve the Inle Lake with active participation of local communities and stakeholders
- To protect Inle Lake Ecosystem
- To find the remedial measures for the causes of environmental degradation
- To maintain the sustainability of national cultural heritage and natural heritage
- To supply sufficient water resources for Beluchaung hydroelectricity power plant which is the main factory for the country
- To mitigate and conserve the degradation of natural environment due to the global warming and climate change

Biosphere reserves promote interactions of mankind with nature in a responsible way. They demonstrate practical approaches to protecting the natural environment while sustaining local livelihoods and ensuring the continued healthy growth of the local economy. They recognize that quality economies require quality environments and that conservation is important for both.

Each reserve must meet a minimum set of criteria and adhere to a minimum set of conditions before being admitted to the World Network.



Each biosphere reserve is intended to fulfill three complementary functions:

1. A conservation function, to preserve genetic resources, species, ecosystems and landscapes;
2. A development function, to foster sustainable economic and human development; and,
3. A logistic support function, to support demonstration projects, environmental education and training, and research and monitoring related to local, national and global issues of conservation and sustainable development.

## What Led To The Designation

Biosphere reserves are nominated by national governments and remain under the sovereign jurisdiction of the States where they are located. Nominations are prepared and submitted to UNESCO by the national governments. With the approval of the President's Office, the Man and the Biosphere National Committee of Myanmar was established. The Committee had 14 members, including senior officials at the ministerial level, chaired by the Union Minister of Environmental Conservation and Forestry of Myanmar.

Under the Man and Biosphere National Committee, two working groups namely National Technical Working Group and Stakeholder Engagement Working Group were also formed in order to support the National Committee.

The local communities have been involved right from the beginning of the decision to nominate the Inle Lake as a biosphere reserve. A series of stakeholder consultation meetings were held in the Inle Lake and in its watershed areas to achieve the involvement of local community in designing the zones within the reserve. An important milestone was a workshop in March 2015 organized by UNESCO in partnership with UNDP and the Ministry of Environmental Conservation and Forestry of Myanmar. The workshop brought together representatives of the Union Government, Shan State Government, NGOs, academia, youth groups, the private sector, and other actors with a stake in sustainability of the Inle Lake. The workshop provided a space to share stimulating ideas. All participants expressed their full support and endorsement to the nomination of the Lake, as the first Biosphere Reserve in Myanmar.



The project also supported printing and distribution of promotional materials to raise awareness on the goals of Biosphere Reserves among wider communities.

The entire process took nearly three years. Preparation of the application dossier was a laborious process. Ministry of Environmental Conservation and Forestry of Myanmar led it. UNESCO provided technical support. The UNDP Project contributed to improved awareness among communities, media and the general public. The Project was instrumental in supporting the delivery of workshops and training related to development of the MAB application; development of awareness raising materials, including a website, posters and pamphlets; developing baseline data for Inle Lake; and conducting research on livelihood activities in relation to the lake ecosystem sustainability. A land use change map created by the Project contributed to understanding of the changes that occurred in the biosphere area over a 10-year period from 2000 to 2010. Government of Norway supported with financial resources. The role of community based organizations with their indigenous knowledge, which fed into preparation of the application dossier, was indispensable.

Background studies were completed in 2013 in order to fill critical data and knowledge gaps, and the initial nomination dossier was submitted to UNESCO's Man and Biosphere Secretariat on 24 September 2013. UNESCO's International Advisory Committee for Biosphere Reserve (IACBR), a technical body, after reviewing the application, recommended the Inle Lake for approval in March 2014.

The governing body of the Man and Biosphere Programme, the International Coordinating Council (usually referred to as the MAB Council or ICC), met in June 2014 to discuss recommendations of IACBR. The Council includes representatives of 34 member states (elected by UNESCO's biennial General Conference). It guides and supervises the MAB Programme and decides upon new biosphere reserves.

At the June 2014 hearing, the Council decided to defer the proposal from Myanmar until a set of the Council's recommendations were addressed. The Council noted with concern that population size in the Inle Lake core area – a strictly protected ecosystem that contributes to the conservation of landscapes, ecosystems, species and genetic variation - was significant and requested to reclassify the inhabited areas. It also recommended to limit the visits by tourists and to strictly maintain the livelihoods activities of the population to traditional levels.

A series of consultations followed resulting in the review of classification of inhabited areas. A new proposal including new zonation and descriptions was then prepared and re-submitted by Ministry of Environmental Conservation and Forestry of Myanmar in September 2014.

UNESCO's International Advisory Committee reviewed the revised proposal in March 2015 and the International Coordinating Council, the governing body of the Man and Biosphere Programme, made the final decision in June 2015 at UNESCO Headquarters in Paris, approving the designation of the Inle Lake as a Biosphere Reserve.

Senior officials from the Ministry of Environmental Conservation and Forestry of Myanmar represented Myanmar at the 27th Session of the MAB International Coordinating Committee meetings in Paris, where a total of 26 proposals submitted by 19 countries were reviewed by ICC for the inscription of new Reserves.

## Good Practice

- A coordinated approach between the Government of Myanmar, UNDP, UNESCO, other UN agencies and organizations to preparing the groundwork for the Biosphere Reserve proposal. The alliance with UNESCO has provided UNDP Project with a clear vision and mission as well as a mutually reinforcing activity to support the conservation and restoration of Lake Inle for the long-term.
- Extensive consultations with and participation of community-based organizations, academia, youth groups and the private sector in preparation of the nomination dossier has created a successful model of multi-stakeholder partnership.

*“Inscription of Inle Lake into the UNESCO list of MAB Reserves represents a concrete example of people working together towards tackling environmental issues in Myanmar”, says Saw Doh Wah of UNDP. “It sets the stage for improved environmental governance related to Inle Lake conservation and provides the basis for future management and technical support.”*

## Lessons Learned

- Preparation of a proposal and obtaining of a formal decision takes time and requires a long-haul commitment from local, national and international partners.
- Commitment and leadership by government authorities has been vital to the success.
- Equally important was participation of local communities and stakeholders, who have shown great willingness to change current unsustainable practices.



## Sustainability

Biosphere reserves are the only sites under the UN system, which specifically call for conservation and sustainable development to proceed along mutually supportive paths. Such mutuality requires cultural sensitivity, scientific expertise, and consensus-driven policy and decision-making. To what extent the Inle Lake Biosphere Reserve becomes an effective agent in catalysing new initiatives concerning sustainable development, time will tell. UNDP and UNESCO stand ready to continue supporting the Government of Myanmar and community-led action to enhance sustainability of this important achievement by continued investment into local capacity and knowledge building. Developing effective monitoring mechanisms (to measure the performance towards the stated functions and goals), as well as capitalizing on the vast experience in the region will be fundamental to the success.







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