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PAK

2011

# ALONG the RIVER INDUS

ENGAGING COMMUNITIES ▮ SUSTAINING ENVIRONMENT

## Lessons Learned from Partnership Fund Supported Projects

INDUS FOR ALL PROGRAMME
WWF - PAKISTAN

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Layout and Design: Sabiha Mohammed Imani

Edition: First

Year: 2011

Photographs: Partnership Fund Secretariat & Partnership Fund Project Partners
Sara Faruqi and Sameena Haidermota

Number of Copies: 1000

ISBN No. 978-969-8283-70-4

This publication has been developed and published under the publication component of the Partnership Fund, Indus for All Programme, WWF - Pakistan supported by the Embassy of the Kingdom of the Netherlands.

# Along the River Indus:

ENGAGING COMMUNITIES ▮ SUSTAINING ENVIRONMENT

## Lessons Learned from Partnership Fund Supported Projects


INTERNATIONAL
OF FORESTS

# Contents

# Foreword

It gives me immense pleasure to see that the "Indus for All Programme Partnership Fund", being implemented by WWF -Pakistan in collaboration with numerous stakeholders, has successfully published the second 'lessons learned' study 2011. It is heartening to note that the Partnership Fund has smoothly steered its course towards making remarkable progress in all realms of its four fundamental themes.

Indus Ecoregion faces a host of ecological, social and economical challenges that can only be addressed through a pragmatic and integrated approach. It is pertinent to acknowledge that the Fund has enabled better alignment and collaboration with stakeholders for the strategic interventions in the Indus for All Programme. As the Chair of Partnership Fund Technical Committee (PFTC), I have been intimately associated with the Fund. It is noteworthy to acknowledge the valuable guidance and profound support provided by the diverse PFTC members to the Fund.

The Fund has supported conservation and livelihood initiatives by the partners for the past two to three years in the Indus for All Programme, particularly strengthening institutional cooperation in the light of the Indus Ecoregion Conservation plan. I am therefore impressed by the effectiveness of the approach adopted by the Programme, whereby the stakeholders representing the government, local NGOs/ CBOs and academia are engaged in implementation throughout.

The present 'lessons learned' study 2011 entitled 'Along the Indus River: Engaging Communities, Sustaining Environment' provides a glance into the achievements of various projects supported by the Indus for All Programme Partnership Fund in the Indus Ecoregion and Indus Basin. I am delighted to learn about the various interventions undertaken by the partners including the successful revival of Natural Dye Indigo, the Revision of Forest Act 1927, the Rehabilitation and Restoration of Pai Forest and Haleji Lake and the Conservation of Dolphins. These admirable achievements of the Fund will go a long way towards protection of natural resources and biodiversity. The Fund has also assisted the Sindh Forests and Wildlife Department, Government of Sindh to revise their Forest Act 1927 in light of evolving institutional, economic and social changes. This has been a vital step and has been recognized by the Planning and Development Department, Government of Sindh.

The content of this publication is evidence that much has been achieved in a short span of time, which would not have been possible without diligent planning and careful implementation of the Fund activities. I hope that other stakeholders working at the conservation of natural resources will benefit from this publication and replicate successful initiatives. The Government Departments can also scale up these projects within their given mandate. On behalf of Planning and Development Department, Government of Sindh, I assure full support and cooperation for the upcoming time in the implementation, especially in obtaining wide support from all stakeholders.

**Fazal A. Nizamani**

Senior Chief, Water & Drainage/ Chairman PFTC
Planning and Development Department
Government of Sind

# Preface

A joint initiative of WWF-Pakistan and the Government of Sindh, the Indus Ecoregion Conservation Programme is based on an ambitious 50-year Indus Ecoregion Vision (2005-2055), which is being implemented in phases. The first phase of this 50-year venture, called Indus for All Programme, began in July 2006, and concludes in June 2012.

Identified as one of the forty most significant ecoregions of the world, the Indus Ecoregion, named after the River Indus, falls entirely within the boundaries of Pakistan. This life sustaining river is the primary source of fresh water for the country but the volume and quality of its waters has been diminishing. This is due to a number of reasons including damming of the river for irrigation and hydropower, extensive deforestation, industrial pollution and climate change. The river's decline has been as devastating to those who depend on the river for their livelihood as it has been to the flora and fauna that once flourished along the banks of the Indus.

Recognizing the importance of participatory development as the key to conservation and sustainable development, the Indus for All Programme sought to mobilize people at the grassroots level through a small grants programme. Established with the support of the Embassy of the Kingdom of Netherlands, Indus for All Programme focused on four priority sites: Keti Bunder (deltaic ecosystem), Pai Forest (riverine forest ecosystem), Keenjhar Lake (fresh water ecosystem), and Chotiari Reservoir (desert-freshwater ecosystem).

Taking a new approach to conserving biological diversity and ecological process, the Programme focused on conservation of species and habitat and the promotion of sustainable natural resource-use that would contribute to livelihood diversification. To do this, the Programme aimed at creating a sense of ownership among the communities inhabiting these areas and spreading awareness of the threats that further degradation to the habitat poses to them. Simultaneously, it worked to build alliances between communities and environmental and resource conservation groups and government departments. By mobilizing the communities to take responsibility for conserving their environment and by building linkages among like minded groups, the Programme hopes to ensure the success of the Indus Ecoregion Vision.

Contained in this compilation are stories of some of those who have worked at the community level on a variety of projects to promote harmony between people and their environment.

**Rab Nawaz**
Regional Director/ Team Leader
Indus for All Programme
WWF-Pakistan, Karachi

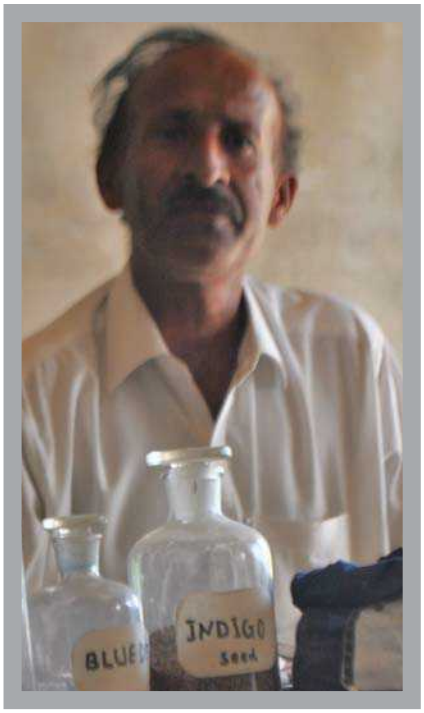
# The blue gold of Sindh

A Crusty Rock of Indigo

Charkar Jalbani is optimistic. He has come to Goth Sudhar Sangat, an NGO that works to promote the cultivation of indigo, to buy indigo seeds for the next harvest.

Although his indigo crop was destroyed in the unprecedented floods that scoured Nawabshah in the summer of 2011, Jalbani is not discouraged. Summing up what other indigo farmers feel he says, 'There is money in indigo. The costs are lower than that of planting cotton or wheat; so even though my crop was destroyed last season, I have come to buy seeds for the next plantation.'

What is noteworthy about Jalbani is that he is investing in a crop that was all but extinct in the region till about a decade ago.



Muhram Ali Keerio, President of Goth Sudhar Sanghat


Munir Ahmed, project manager gives a presentation to local farmers on the benefits of growing indigo


Leaves of the Indigo plant before it is fermented to produce dye

Nearly all blue dye produced today - several thousand tons each year - is synthetic. Blue dye however, was once rare and in its pure form was extracted from plants.

A variety of plants were used to cultivate indigo, the most natural indigo being that which is extracted from the genus Indigofera, native to the tropics and the Indigofera tinctoria,(also known as true indigo) common to the subcontinent.

The subcontinent was one of the earliest centers for the commercial production and processing of indigo where the dye was used for textile and printing. From India, the dye made its way to the Greeks and the Romans, where it was valued as a luxury product, used as a pigment for painting and for medicinal and cosmetic purposes.

India continued to remain one of the primary suppliers of indigo to Europe throughout the Middle Ages. Because of its high value as a trading commodity, indigo was referred to as Blue Gold. However, with the growth of the woad dye industry, a chemically induced blue dye derived from the woad plant, many European countries banned the import of indigo to protect their local industries.

No exact reason is known why the indigo went into decline in Sindh, but by the early twentieth century, the plant once growing wild on the banks of the Indus, had become extinct in its natural habitat.

The Indus for All Programme in partnership with a local NGO, Goth Sudhar Sangat, began its efforts to promote the cultivation of the indigo plant in Sindh.

Headquartered at Haji Keerio, a village in the vicinity of Nawabshah, Goth Sudhar Sangat began an outreach programme and soon inducted ten villages in its efforts. Muhram Ali Keerio, the president of Goth Sudhar Sangat and a technical support team visited Hala and Bhitshah to learn more about indigo from the elders there. Seeds were initially purchased from a cultivator in Miani Forest who had experimented with growing indigo but these seeds did not germinate so another 60 kilos of seed was purchased from Muzzafargarh in the Punjab and the first three acres of indigo fields were planted in Village Haji Keerio. The experiment was a success and was replicated. Farmers were encouraged to switch from cotton and wheat to indigo. Now 20 acres of land are under cultivation in areas further away in the Miani and Pai Forest areas.


Bottles with samples of seeds and blue dye

Interestingly enough, when floods destroyed the indigo crop in Muzaffargarh, Goth Sudhar Sangat was able to provide them with seeds to start afresh.

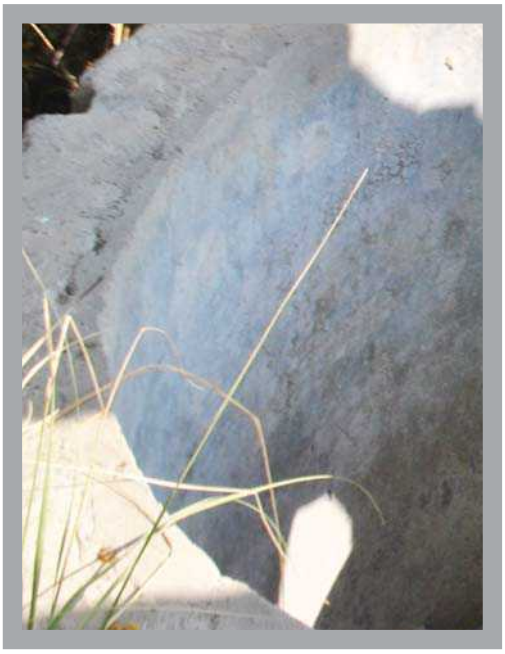
Munir Ahmed, the Project Manager for Goth Sudhar Sangat talks about how indigo is derived from the plant.

In Sindh, he says, indigo plantation is blessed with a long growing season that enables the farmers to get three cuttings of the crop in one year. The sowing begins in March and soon green sprouts appear. These grow rapidly and by June they are ready for the first harvest.

Once cut, the leaves are taken to the fermenting wells. Here the leaves are tightly packed in the first, and deepest of the three wells, and left to steep in water. Within a couple of hours bubbles start to form and the clear water changes to a light green as the dye is extracted from the plant. Once the fermentation is complete the liquid is drained from the steeper well to the beater well where the farmers use paddles, known as *mandani* locally, to prompt a chemical reaction which turns the liquid from a rich green to a dark blue. Clear water rises to the top and a blue sludge-like sediment, which is the dye, starts to settle in the bottom of the well.

Once the separation is complete, the water is drained off and the mushy sediment containing the dye is transferred in to the third or settling well. Here all excess water is removed from the sediment which is then transferred to long sheets of cloth; and left in the sun to dry out. This is the last step and is known as the curing stage.

Munir Ahmed picks up an indigo plant that has already been cut for cultivation



Fermentor Holes

Over a period of time, the sludge dries into hard, crusty rocks, which is the indigo dye.

The plants are by then ready for the second harvest and a month later for the third. The total life span of the indigo plant is nine months.

Munir Ahmed explains that the initial costs of planting indigo are lower not only because the seeds are cheaper but also because indigo is self fertilizing and hardly uses any pesticides.

The indigo dye produced in Haji Keerio found an immediate market in Hala, Bhitshah, Nasrpur and Naushero Feroze where the dye is used by craftsmen largely for the production of Ajrak. Indigo is also used for *kashi* work, ceramics, and as a component in *mehndi* production. Traditionally, indigo is also used for medicinal purposes: for family planning, the treatment of piles, and as an antiseptic balm.

The awareness programme initiated by Goth Sudhar Sangat met with such success that farmers from nearby villages have been coming to them asking for seeds. Unable to cope with the growing demand, the NGO has decided to allocate one acre of land especially for the cultivation of seed to cope with future demand. The seeds should be ready in time for the March plantation.

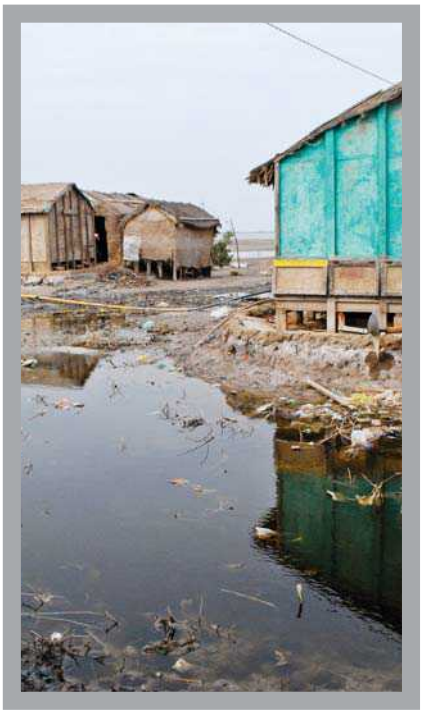
Muhram Ali Keerio the President of the NGO says they are now planning to register the seed at the patent office in Hyderabad.

# Empowering women improving lives

Bahar, the women's welfare organization in meeting

Nestled amidst the creeks of Keti Bunder are many small islands which are home to the hardy fisher folk. Eking out a meagre living from the sea, the population of these islands, and Keti Town itself, live far below the poverty line.

This was not always so. Keti Bunder, not so long ago, was a bustling town and the hub of fishing activities in lower Sindh. However the damming of the River Indus and the diversion of Indus waters for agricultural purposes has meant less water for those living below the Kotri Barrage and a gradual death of the Indus Delta. The dense mangroves, which once acted as a nursery for shrimps and freshwater fish and as a natural barrier against storms and encroaching sea water, are fast disappearing. Completely dependent on natural resources, the inhabitants of these towns and villages have been watching their livelihood drain



Tippan village

away as their habitat is gradually destroyed.

The people here are wholly dependent on nature for survival, yet nature can also be the cause for distress and destruction. When Cyclone Phet hit the region in June 2010, thousands were rendered homeless in Keti Bunder and the four creeks-Chann, Hajmoro, Turchann and Khobar. Roofs caved in, or were blown away, thatched huts were torn apart and fishing boats destroyed. With their source of livelihood in disarray and their homes unlivable, many residents of these creeks were reduced to penury.

It was in this depressing situation that Bahar, a women's welfare organization in Keti Bunder, stepped in to work to rehabilitate the villages destroyed by Cyclone Phet. In partnership with Indus for All Programme of WWF Pakistan, Bahar set out to rebuild huts and formulate an action plan for the rehabilitation of the cyclone affected communities.

Fish hung out to dry


A hut built with the help of Indus for All Programme

One of the communities targeted for assistance by Bahar was Tippan village, situated in Hajamro Creek. In Tippan, the poverty and lack of facilities is apparent. There is no potable water or drainage. Small 2 x 2 ft thatched structures stand behind the huts acting as toilets, yet streams of untreated waste flow underneath these structures towards the sea. There is little concept of cleanliness or hygiene. Dead fish lie in heaps outside the huts waiting to be prepared as chicken feed to be sold later. Larger sea creatures like stingrays also lie decaying in the lanes. Buffaloes are tied close to the huts, adding to the filth. While outwardly the village is dirty, inside the homes are clean and tidy.

Bahar identified six families who were hardest hit by Phet in Tippan as the ones to receive new homes and 45 homes were deemed in need of urgent repairs. Each recipient of a new house was asked to contribute Rs 2000/- and labour towards the project.

Built about three feet above ground level, these single room houses provided under the project, measuring 12 x 12 ft, are unlike the regular huts of the village which are barely solid; the structure of the newly built


A signboard outside the school at Tippan village

Bringing in the catch

A village girl outside her wooden hut

huts is durable and should be able to survive strong winds.

Funds were also allocated to build a school house. At the edge of the village, close to the sea, Bahar built a 16 x 16 ft school house with large windows and a small patio running around it. The school should easily be able to accommodate twenty children. Unfortunately the school lies abandoned for lack of a teacher.

All in all, Bahar constructed 25 thatched houses in Keti Town and its surrounding localities and provided repair material for 200 homes and 12 fishing boats.

Though Phet may have caused much mayhem, out of the destruction has come good: the empowerment of women and a sense of achievement in the community. Talking of the change Bahar has made to women's lives, Hajrah Ronjho, President of the organization, proudly says, 'My husband consults me on every decision he has to make. He encourages me to go out and be independent. It was not like this earlier. Women were never asked for an opinion. Decisions were made for us and we accepted them.'

Bahar has changed her life-and that of her daughters and of the generations of women to follow.

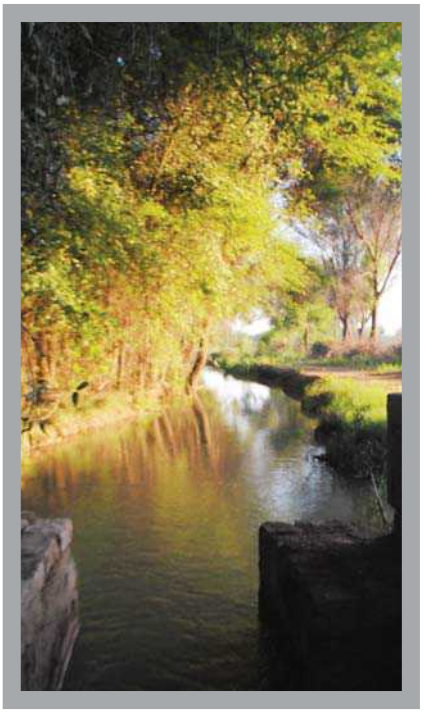
# Water for Pai


A sign provided by the Indus For All Programme

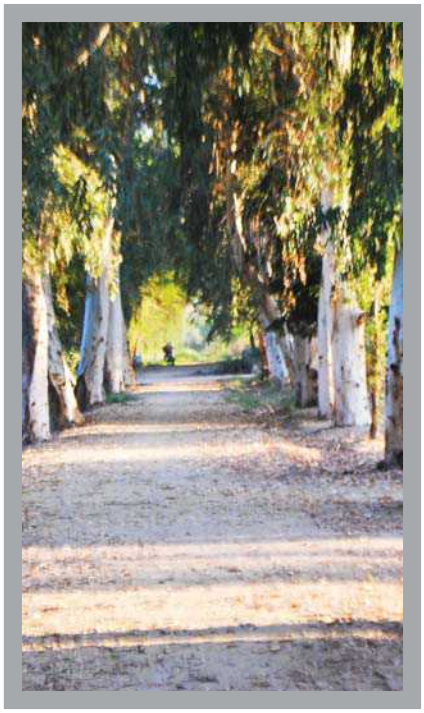
Deep in the forest the silence is broken only by the chirping of birds and the sound of water gurgling in a water channel nearby. It is difficult to believe one is standing just off the Sukkur-Karachi Highway; the silence of man is absolute, but the forest resounds loud.

Once a natural riverine forest and a game reserve for the former rulers of Sindh, Pai Forest was cut off from its water source when a flood protection embankment was built along the river bank during the British Raj. Pai is now an irrigated forest, watered by the Rahib Shah Minor, an offshoot of the Rohri Canal.

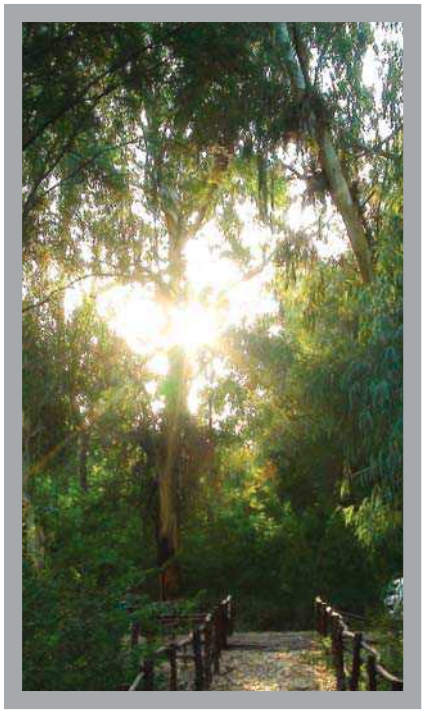
Spread over some 4777 acres and surrounded by cultivated fields, Pai Forest supports a flourishing ecosystem. Tree species, such as the *babul*, and *kandi* common to Sindh's riverine forests flourish here. While these



A water course in the Pai Forest



An avenue of trees



Sunlight filtering through the trees

species are indigenous to Pai, other species introduced to the Forest, *shisham* and eucalyptus have done well too. Introduced in 1960-1961, *shisham* trees today cover roughly 12 hectares, or 0.6 per cent of forest land.

The forest is also home to many animals including the endangered hog deer. Once found extensively in these parts, forest officials put the number of hog deer in the forest as somewhere in between 40 to 50. This figure is however challenged by Amyn Keerio , head of Sindhica, one of the CBOs working to revive Pai Forest. According to him, there are no more than 14 hog deer in the forest.

Other animals found in the forest are wild boars, Asiatic jackals, Indian grey mongoose, small Indian mongoose, Indian Bengal fox, Indian porcupine, desert hare and jungle cats. In addition, Pai provides sanctuary to over sixty bird species. Among the 70 bird species found here are the Eurasian collared doves, red collared turtle doves, green bee eaters, jungle babblers, purple sunbirds, rose-ringed parakeets and the endangered grey partridge. Migratory birds such as the green pigeon have found a home here too. People in the area attribute the abundance of bird life in Pai to the fact that other riverine forests in the vicinity are fast disappearing causing more birds to find sanctuary here.

Other than its importance as an ecological unit, Pai Forest is a life support system for 21 villages situated on its periphery. Most of the people living around the Forest are poor and marginalized. Their main sources of livelihood are agriculture, forestry and fisheries and thus they are dependent upon the natural products of the forest to meet their daily requirement of food, fuel wood and earnings.

Unfortunately, this rich ecosystem is under enormous pressure due to a number of factors, the most pernicious of these being chronic water shortage. Added to near drought-like conditions that have parched the Forest in recent years, Pai also faces serious threats of extinction due to encroachments by land grabbers and wood cutting by the local inhabitants.

Recognizing the importance of conserving and rejuvenating this very essential eco system, Indus for All Programme in partnership with the Sindh Forest Department agreed on a program for the rehabilitation and restoration of the internal irrigation system of Pai Forest and habitat conservation of the same. At the same time, the Programme hoped to educate the local communities and raise awareness about the importance of preserving this immensely important eco resource.

Irrigated by the Rahib Shah minor, its three water courses  and a number of tube wells, Pai Forest is


Sign informing visitors of the presence of hog deer in the area


Celebrating the International Year of Forests

sanctioned 30 cusecs of water per month. The reality, however, is that being at the tail end of the irrigation system, the Rahib Shah minor is perennially short of water. According to a local estimate the canal probably gets 25 percent of its allocated share per month. Compounding the problem of the low flow of water is the fact that farmers steal water from the minor and its channels without any check or fear of being caught.

In recent years, the water scarcity has become critical because of the collapse of the internal irrigation system of the forest. For lack of maintenance, the three water courses running through the forest had completely silted up and were in urgent need of repair and overhauling.

The first priority of the Programme was to remodel and desilt the three abandoned water courses that had once formed the internal irrigation system of Pai. This phase was successfully completed when 14,000 ft of water courses were excavated to ensure a smooth supply of water to forest. This should help pave the way to the repair of the habitat and ensure the recovery of the flora and fauna endemic to the ecosystem. Along with the excavation of the water channel, a pond was made near the newly constructed observation post for hog deers. According to M. Usama, Divisional Forest Officer at Pai, deer tracks have been observed near the pond showing that these animals come at night to drink from the water pool.

Another accomplishment of the Programme has been the construction of an ornamental gate at the main entrance to the forest just off the Highway. Standing as it does, just off the Sukkur-Karachi Highway, the forest should be a major tourist attraction. But as things stand now, few know of the forest. The ornamental gate which can be seen clearly from the Highway should help to both promote tourism to Pai and create a sense of pride among local residents of the beauty of their natural heritage.

While restoring of the water channels has been a major achievement, there are still many issues that confront Pai not the least of these being encroachment by land grabbers and indiscriminate hunting.

Neither the Sindh government nor the local VIPs are free of guilt as far as encroachments and hunting go.

Over the years, some 500 acres of land has been denuded of trees and the land cleared for agriculture. Closely tied to deforestation is the lucrative timber trade controlled by the lumber mafia. The trees are cut at night and smuggled out in trucks. Bachal Shah, a forest officer, speaks of the herculean task of policing 4000 plus acres of forested land with only six guards. A plan to build a fence around the forest never materialized.

The local villagers add to the problem of deforestation, says Bachal Shah, by cutting forest wood for fuel-wood. Plus, grazing cattle destroy ground cover and newly planted saplings.

Unlike the past when villagers were mainly herders living off their livestock, most have now turned to farming with the emphasis on growing cash crops like cotton, wheat, and sugarcane. This change has apparently put enormous pressure on the forest as local communities collude in encroachments as they see forest land as better utilized for cultivation.

A wooden bridge

A peacock in the Pai forest

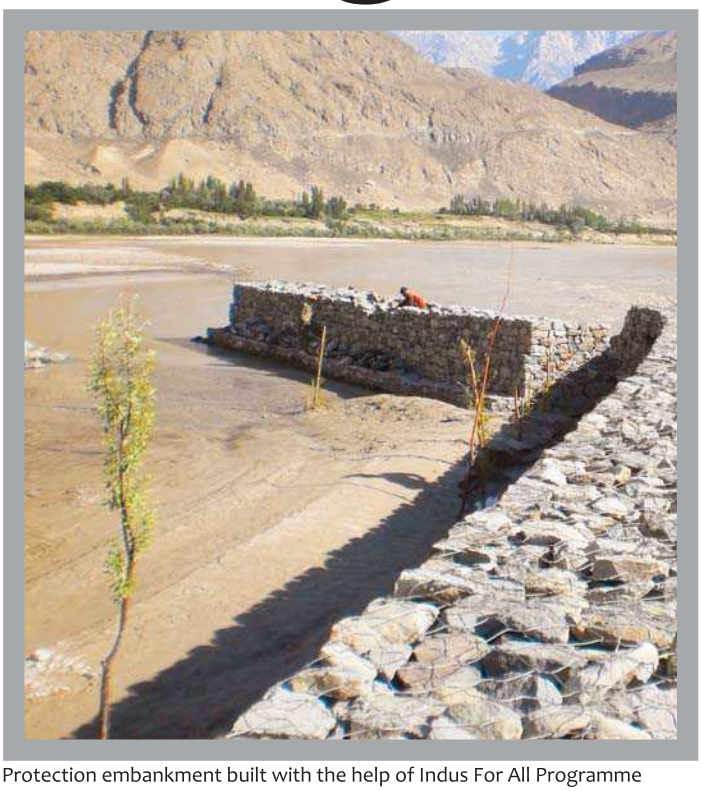
To counter this problem, WWF-Pakistan's Indus for All Programme encouraged fourteen Community Based Organizations (CBOs) in the surrounding villages to work towards creating awareness of the importance of the forest ecosystem. By educating locals on the importance of forests they hope to inculcate a sense of ownership in the communities and encourage them to move towards sustainable solutions and alternate sources of energy such as biogas.

Interestingly enough while Forest Officers blame the local communities for the degradation of the forest, Ameen Keerio, a member of a local NGO working for the conservation of Pai spoke bitterly of the involvement of Forest Officers in the destruction of the forest. 'None of this would have been possible without their connivance,' he said pointing to a large clearance in the middle of the forest where a field of vegetables now grows in what was once forest land.

Keerio feels that while on the one hand trees are being cut, new ones are not being planted fast enough and the ones planted are not given the care needed for them to mature. 28,000 saplings planted by the WWF in partnership with CBOs and the Sindh Government have died for lack of care. Similarly, 500 saplings planted by school children are dying of neglect.

A lifeline has been provided to Pai Forest by the restoration of its irrigation system. It is now for the officials and local community members to take the preservation of the forest to a new level.

# Facing up to climate change



Protection embankment built with the help of Indus For All Programme

Conducting a wildlife survey

The picturesque valleys along the upper reaches of the Indus have long attracted tourists and nature lovers alike. Sadly, recent data shows that these beautiful valleys are being subject to adverse climate change due to global warming. This is further aggravated by deforestation, overgrazing, improper land use practices and a substantial population growth, that is putting immense pressure on available natural resources.

In order to help people adapt to climate change, particularly in the form of river bank erosion and flash floods caused by random melting of glaciers, Indus for All Programme, WWF Pakistan in partnership with the Gilgit-Baltistan Forest and Wildlife Department initiated a climate change adaptation project in the Shigar River basin in Skardu. Named 'Climate Change Adaptation through Watershed Management', the programme was initiated in July 2009, with the aim of protecting the watersheds of the Shigar River while helping local communities improve their livelihoods through land reclamation and better management of natural resources.

Preparing sea buckthorn jam


A training workshop

The Shigar River is an important tributary of the Indus. It serves as a summer habitat for the Eurasian Otter (*Lutra lutra*). It passes along the Sarfaranga Lake (also known as the Jarbacho or Blind Lake) which is home to a number of migratory and resident birds. Unfortunately, recent increases in the global temperatures have randomized the melting of upstream glaciers in the Shigar River basin and almost doubled the flow of ice melt water in the river. This immense flow in turn exerts a strong pressure along the river banks causing extensive land erosion.

The villages of Kothang and Lamsa, situated alongside the Shigar River, were chosen as the target villages to implement the project. Home to 600 people, who are almost solely dependent on farmlands and pastures for survival, these two villages have been particularly hard hit by erosion. According to Babar Khan, Manager Conservation in the Northern Areas, in the last fifteen years, these villages have lost almost 75% of their cultivable land. If this trend is not halted, he fears the next fifteen years will wipe away the villages altogether.

The project has met with immense success not only in its primary goal of preventing further erosion of cultivable land but also in its auxiliary goals of conserving the area's natural resources and preserving its flora and fauna. The project's greatest success was the building of a 4150 cft protective embankment. Originally conceived as a 2650 cft bund against the Shigar River, it was extended to almost double its conceived length solely on the initiative of the community. Technical assistance to construct the wall came from the Frontier Works Organization (FWO) Engineers who trained three members of the community on the intricacies of building embankments that could withstand extreme weather events like flash floods, glacial surges and outbursts. The success of the project is evident from the fact that the embankment withstood the 2010 floods whereas a similar wall made by the Government was washed away.

To further strengthen the embankment, about 20,000 fast-growing trees such as sea buckthorn, willow and Russian olives were planted along the river banks and at selected watersheds. The planting of sea buckthorn in particular is of significance because its extensive root system and nitrogen fixing features will help stabilize the riverbanks. Other than binding the soil, these trees work as alternate sources for fuel wood and fodder.

An added bonus that the project had not envisioned was the alternate source of income sea buckthorn berries came to provide for the communities and the empowerment of women. By creating orchards of sea buckthorn, the project brought

A nature study camp

about a change in the perception of the people who for the first time began viewing the plant not as a bush growing in the wild, but as a fruit producing tree that could be used to their benefit.

Women were trained in sea buckthorn plantation, harvesting, collection and grading of berries as also in the post harvest process of making jams, jellies and squash from sea buckthorn berries. They were also taught proper labeling, bottling and packaging techniques; a project logo was developed and market linkages created to enable the women to sell their produce in the local market.

In addition to the above, women are now collecting berries for export to India and Thailand. So along with the bottles made for jam jelly and squash, berry collection sacks are now being made with the project logo for berry collection and export.

All in all, the project has yielded several benefits to the community of Kothang and Lamsa. Other than keeping them safe from the 2010 flash floods and containing soil erosion, the project has helped create employment opportunities for the rural youth and diversified livelihood options for local women. By sensitizing community members and school children to conservation issues, the project has created a community that is strongly aware of the need to protect its ecosystem. This in turn has helped villagers stand up against illegal hunting and fishing thereby increasing fish stock and waterfowl in the lake.

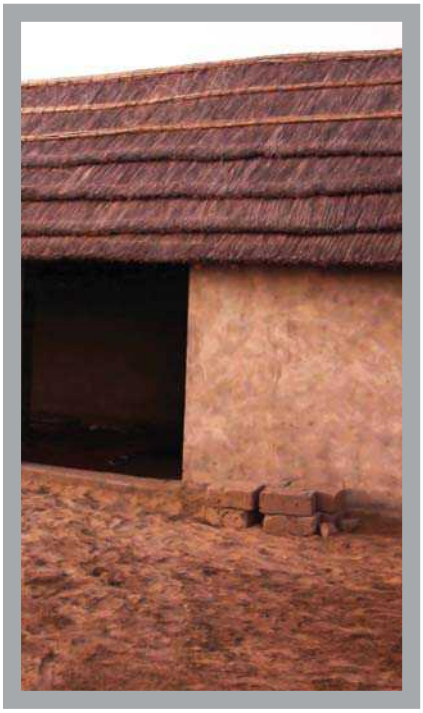
But over and above everything is the fact that by actively involving the community in conservation efforts, the project has created self confidence in the community in its ability to combat the changes being wrought by global warming.

# Integrating sustainable range land management practices with ecotourism

Chotiari Reservoir

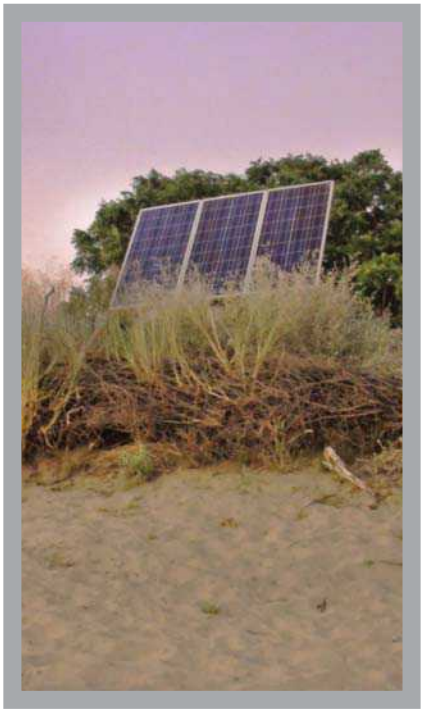
The land around the Chotiari Reservoir has some of the most beautiful and diverse scenery found anywhere in Pakistan. Rich agricultural land gives way to range lands where nomads roam. Sparsely populated, unpolluted and rich in bird life, it is a place destined for ecotourism.

Accessible by jeep or boat, the area is popular with the locals who flock to the range lands during the monsoons and in winter when the weather is mild and pleasant. For those coming from further away, the place is less accessible for lack of amenities. The closest town, Sanghar, is 30 km away. This beautiful land is home to some of the most deprived people of the country.



A guest house/landhi built by Majeed Mangrio, CEO of SDF, for ecotourists visiting the Chotiari reservoir and surrounding

The bio-gas plant at Faqir Wanhyal Mangrio



Electricity through solar power

The reservoir lies on the western flank of the Achro Thar desert in Sanghar district occupying an area of about 18,000 hectares with water storage capacity of 0.75 million acre feet (MAF). While the reservoir has brought water to a parched land, it has also created challenges for the local population. A large segment of the population has been displaced by the construction of the reservoir because of their settlement falling within the reservoir boundary; more importantly, a considerable amount of grazing land has been lost to the community. The reservoir has also been partly responsible for the destruction of the Makhi Forest-so named for the abundance of honey bees found there. A once verdant wooded area, Makhi Forest has gradually been destroyed due to agricultural expansion, deforestation and construction of the reservoir.

A majority of the population living on the flanks of the reservoir is pastoral; rearing livestock-buffaloes, cows, sheep and camels-is their way of life. A survey of ten villages that lie on the periphery of the Chotiari Reservoir shows that the livelihood of nearly 400 families is dependent on livestock-raising. The health and well being of livestock depends on the health of the range lands where the cattle feed.

Unfortunately, the range lands are under great pressure. Despite its ecological importance to the region, the Chotiari wetlands complex has not been declared a protected area and so has no claims to special governance. A growing population, drought and unsustainable resource use have depleted grazing grounds. The pastoral community, always marginalized, has been pushed to the brink by the changes wrought by the reservoir and the continued drought.

In addition, the changing patterns of agriculture-large irrigated zones and mechanized farming-have weakened the historic link between the pastoral community and the settled farming community. Herders can no longer migrate through farm lands with their cattle during periods of drought, feeding their animal crop residue with the consent of the settlers.

Since traditional methods can no longer sustain livelihood, alternate modes of living have to be sought. It was this that prompted the Sustainable Development Foundation in partnership with WWF's Indus for All Programme to initiate a model project that would work to integrate sustainable range management practices with ecotourism and kitchen gardening. Ten villages on the edge of the Reservoir were chosen to initiate the model project impacting the lives of 2500 people.

Using Wood to cook

Another view of the Chotiari dam

Living as the community does on the edge of the desert and with the closest town at a considerable distance, the community has always been deprived of fresh vegetables and fruit. On market day, which in Sanghar is on Thursdays, a pick-up truck runs two trips through the desert on a sandy tract ferrying villagers to and from the market. The cost for coming and going is prohibitive for most of the community but few have any other option.

To reduce dependence on the town while ensuring healthy and fresh food for the community, SDF decided to help women in the ten targeted villages set up kitchen gardens. A number of women sub-committees were formed and two day-long training workshops were held to train women in organic farming. Twenty-five women participated in the workshop.

As the next step, SDF helped prepare 15 plots for backyard gardening. Hand pumps were installed and drip irrigation introduced to utilize water in the most economical way. Seeds for a variety of vegetables were purchased and distributed among the women. The women were encouraged to plant fruit trees and grow mudgrass as fodder for cattle along with vegetables. For mudgrass, earthenware pitchers were embedded in the soil for greater conservation of water.

All in all, SDF now has helped plant 21 kitchen gardens in seven of the targeted villages and have installed 19 hand pumps to facilitate the process.

Looking ahead to the time when ecotourism will start, Majeed Mangrio, the vision behind SDF, has built a *landhi* and two *chowrna* in the scenic village of Faqir Wanhyal Mangrio. The village sits on top of a high ridge overlooking the reservoir on one side and a natural lake on the other. It can be reached by boat in 45 minutes from Baqar Point on Chotiari Reservoir or by four wheeler in a trek through some of the most beautiful natural landscaped lands the country has to offer.

The larger of the two *chowrnas* will be used as a sales point for merchandise made by local women such as the *rilli*, the colourful patchwork quilts traditionally made by village women, and artifacts made of water reed that grows in abundance in the region. The second, smaller *chowrna* is to be used as a kitchen to make traditional Sindhi food for tourists.

A platform for bird watching is still under construction.

# A constructed wetland in Majeed Keerio

Canna lilies growing in the wet park at Majeed Keerio village

Driving through maze-like lanes, twisting and turning through narrow alleyways, one reaches an enclosed space; its mud brick walls no different from the many others that dot the countryside enclosing villages and townships. Inside, however, a surprise awaits. Red, yellow and orange cannas raise their heads above a bed of emerald green leaves in a profusion of colours. Interspersed among the cannas are tall typha grass and water reeds. Butterflies and honeybees flit across the field completing the idyllic scene.

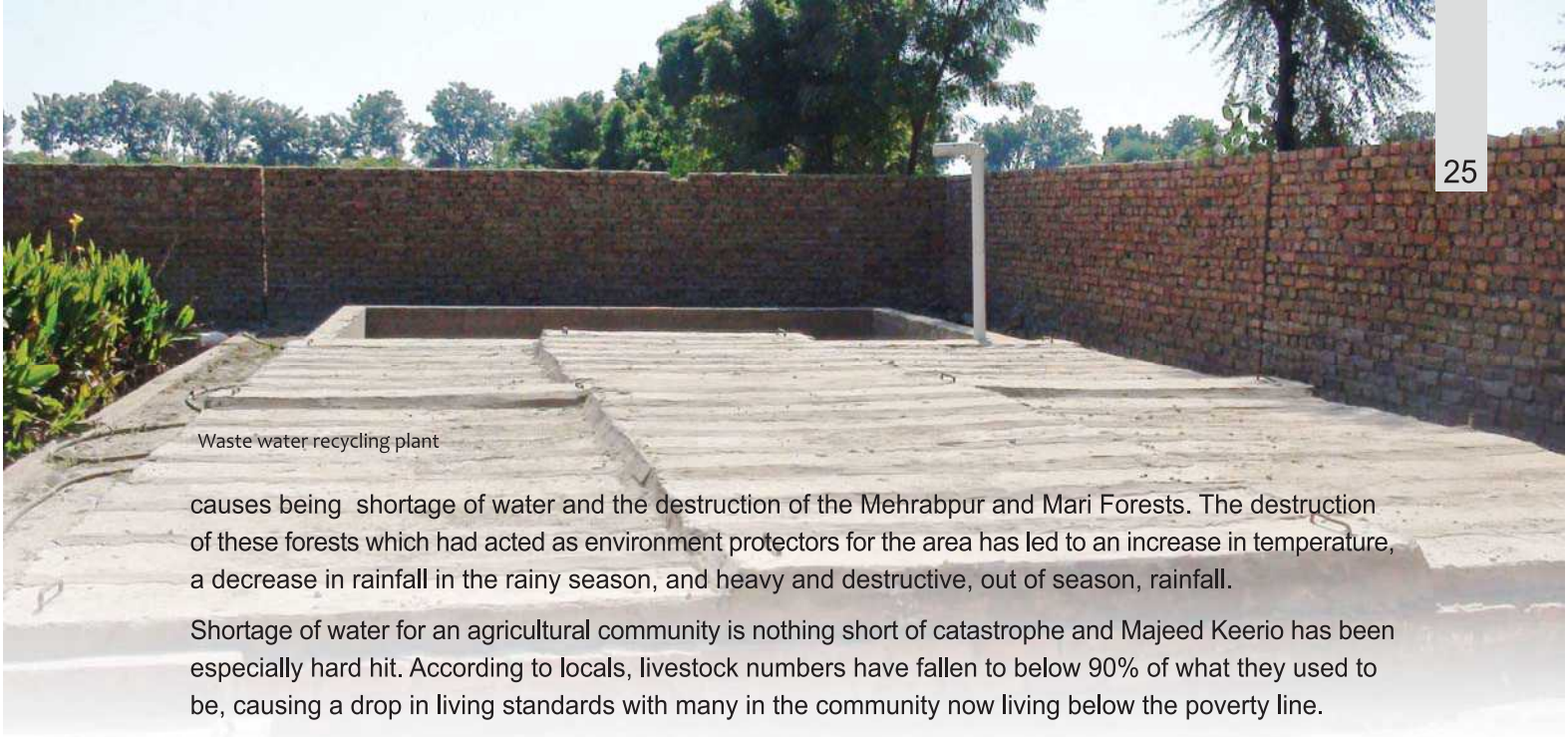
This is Majeed Keerio, village at the site of Pakistan's first biological wastewater treatment centre-a constructed wetland-where wetland plants are used to treat waste water for agricultural purposes.

The idea of using wetland plants to process wastewater was first put forward by Dr Kathe Seidel in the early 1950s. Experiments were carried out, and by the late 1960s, the earliest full scale systems were operational. Research continued in the 1970s and 1980s but the idea was slow to take on. It was not until the 1990s, that this technology gained international recognition. Today constructed wetlands, using subsurface systems as well as free water surface systems, are in popular usage in Europe, Australia and America.

Constructed wetlands, or wet parks as they are also called, have come to be recognized as an appropriate technology for the treatment of many types of wastewaters and are especially effective in arid and semi-arid conditions. This concept was however not introduced in Pakistan till 2009, when Sindhica Reforms Society, an NGO working in the outskirts of Nawabshah, decided to establish a constructed wetland in Majeed Keerio village.

One of the larger villages of Taluka Sakrand , Majeed Keerio is home to some 5000 people divided and subdivided into 29 castes. Situated on the left bank of the River Indus on the edge of Pai forest, the village is believed to be 700 years old. The prime occupation of the villagers is farming and livestock herding. A very few hold government jobs and some are engaged in private enterprises and trade.

Over the past few decades, living conditions in Majeed Keerio have deteriorated sharply, the two prime



Waste water recycling plant

causes being shortage of water and the destruction of the Mehrabpur and Mari Forests. The destruction of these forests which had acted as environment protectors for the area has led to an increase in temperature, a decrease in rainfall in the rainy season, and heavy and destructive, out of season, rainfall.

Shortage of water for an agricultural community is nothing short of catastrophe and Majeed Keerio has been especially hard hit. According to locals, livestock numbers have fallen to below 90% of what they used to be, causing a drop in living standards with many in the community now living below the poverty line.

Compounding the problems of Majeed Keerio was the environmental and health hazard caused by the non-functioning of the waste water disposal system that had been constructed by the government.

In 1988, the Government, under the Prime Minister's programme, had constructed a drainage system for Majeed Keerio which was then handed over to the Village Development Association (VDA) to operate. Unfortunately, the scheme was plagued by political patronage, corruption and mismanagement. Equipment, machinery and office supplies were misappropriated; failure to maintain the sewerage lines caused blockages leading to waste flowing on the streets causing a major environment and health hazard. Ultimately the whole system collapsed.

The Sindhica Reforms Society approached UN Habitat for guidance to manage the problem. Consultations between the two led to an agreement that Sindhica in partnership with the Indus for All Programme WWF Pakistan would see to the building of a Constructed Wetland for wastewater management with the technical support of UN Habitat and the Public Health Engineering Department of the District.

Today, the Majeed Keerio Constructed Wetland uses the drainage system of the village to treat and recycle 76,800 gallons of waste water per day. The treated water is then fed through a drip irrigation system to water two and a half acres of cotton. In addition treated water is also being used to irrigate the nearby Pai Forest.

The creation of the Constructed Wetland has immensely benefited the village of Majeed Keerio. Other than the primary aim of having a functional drainage system, which means a healthier lifestyle for the villagers, the use of treated wastewater for agriculture means that clean water that had previously been used for agriculture can now be used for domestic purposes and for livestock.

In addition, the treated water being pumped to the water-starved Pai Forest will help keep the forest flourishing and ensure the conservation of the natural habitat and protection of many species and the ecosystem. A not insignificant consequence of the Constructed Wetland project has been the interactive dialogue the project has generated within the community on environmental issues. This was evident at a community meeting where local residents seemed well aware of the problems caused by stagnant untreated water surrounding their homes and talked of the difference a proper water treatment facility had made in their lives.

Having succeeded in their primary goal of managing waste water disposal in Majeed Keerio village, Sindhica is now working as a resource organization promoting the concept of wet parks in other parts of the country. Visitors to Majeed Keerio realize that unlike urban centres where sanitation and waste disposal are managed through centralized systems with advanced treatment technologies, these systems may not be practical for remote areas as they tend to be expensive to set up and difficult to operate. Constructed Wetlands may be the solution to this pervasive issue.

At the moment, Sindhica is working as a consultant for fourteen projects in different parts of Sindh and the Punjab where the experiment carried out in Majeed Keerio will be replicated.

# Change laws to stop deforestation


Workshop defining the need to change forest laws

The decades old forest laws are finally undergoing a much needed transformation. The Sindh Forest Act, 2011, is a draft that has been drawn up with a view to government power protecting what little is left of our forests. It also comprises the establishment of a settlement committee which will work to determine the status of land and take measures to ensure participation by creating a sense of ownership and responsibility within the community.

Forests in Pakistan are in urgent need of protection and conservation. A semi-arid country with one of the highest rates of deforestation in the world, Pakistan has less than 2.5% of its area under forest cover as opposed to 33% at the time of Independence; barely 10% of Sindh is forested. "Unless the current rate of deforestation is not checked and the trend of land conversion from forest to other uses is not curtailed, the country will not be able to meet its commitment under the Millennium Development Goals of increasing its forest cover from 2.5 percent to 6 percent", warned Nasir Ali Panhwar, Programme Coordinator, Indus for All Programme WWF.

The issues that lead to forest degradation are many: widespread poverty, population pressure, lack of fuel wood alternatives, uncontrolled use of pesticides, diseases and damage by insects, and fire. The major threat in Pakistan is uncontrolled and unsustainable cutting due to poor planning, unrealistic forest working plans and weak implementation of forest protection laws. Elaborating on these issues, Aijaz Ahmed Nizamani, Additional Secretary at the Forest and Wildlife Department, stressed the need to adopt a pragmatic approach to conservation. He pointed out that social and political issues, a deteriorating law and order situation and water shortage have all been factors contributing to the depletion of forests. Unless opportunities are created for those most dependant on forests for survival, it will be difficult to stop our forests from disappearing.

Chief Conservator Forest Sindh, Mir Nadir Ali Talpur, is of the same opinion. He speaks of the necessity of ensuring community participation in forest management while meeting the requirements of local communities dependent on forest resources. It is only by amending the archaic Forest Act of 1927, that these issues can


Forest department and WWF officials confer to amend forest laws

be addressed and new concepts in forest management be introduced. Speaking at an earlier consultative workshop held in Hyderabad, Sindh on 31 May 2011, he also spoke of the imperative need to establish forest courts to expedite cases pertaining to forests. At the moment, encroachments on forest land is a major challenge and numerous cases relating to encroachment and illegal use of forest land and produce are pending in various courts but due to weak legal support, the department is losing cases.

It was this need to address Forest laws that prompted the Indus for All Programme, WWF Pakistan to award a Partnership Fund Project to the Sindh Forest Department for the purpose of reforming forestry governance in Sindh. This constituted the review, revision & updating of the Forest Act, 1927 by identifying gaps and weaknesses in existing forest policies. The present act which is obsolete, weak and inadequate to meet ground realities does not address sustainable management concepts and approaches and is inapplicable in present times. Local communities and stakeholders do not seem to have much of a role which has resulted in further deterioration of forest resources. Moreover, flaws in the regulations coupled with corrupt administration have also played a role in the destruction of woodlands in Pakistan on a large scale.

The existing legal framework of forest management was reviewed. New concepts in sustainable management were included. The following Acts were reviewed: Revised Act of NWFP (K.K) 2000, Amended Act of Punjab, 2010, Draft Revised Act of Balochistan, 2010, Amended Act of AJK, 2009 to help them identify the gaps in the present Act. At the initial meeting, the methodology, timeline and work plan were finalized.

The first draft of the revised Forest Act was presented on 31st May, 2011 in Hyderabad. The second review workshop was conducted in Sukkur on 14th July, 2011. On the basis of consultations, a revised final draft was submitted by K.K. consultants, a company of retired forest department officials at the final workshop on 3rd November, 2011 in Karachi where they emphasized the urgent need to amend and replace the old forest laws enacted in 1927.

Reviews of literature, revised Forest Acts of other areas including those of Bangladesh, India and Nepal and international obligations have provided guidelines to formulate the revised Act in line with International Agenda of Conservation, Protection and Management. New issues that have emerged at local, national and international levels during the last two decades have been addressed. Several revisions have been made: Objectives and guiding principles have been added. Forest settlement committees have been proposed to oversee forests instead of a single officer. Actions prohibited in reserve forests, penalties and fines for various offences have been revised. Preparation of forest management plans and sale and sawing of wood have been elaborated on in new chapters. The Act also gives the forest officers some powers so that they can issue search warrants, hold enquiries, use force or have the offender tried in court. Supreme Court evictions have been recommended to deal with encroachments in the forest areas.

The Sindh Forest Act, 2011 must be passed through the Sindh Assembly in order to halt deforestation; proper enactment of the revised laws in accordance with the present scenario will bring about a significant change in Pakistan's rapidly disappearing forested areas.

# Documenting change: the first step

Turtle caught in fishing net

Originating in the mountainous north of Pakistan and flowing down to the Arabian Sea in the south, the Indus River forms one of the major water systems of Asia. This vast aquatic ecosystem is rich in plant and animal life. Among other wildlife found here are eight species of freshwater turtle of both the soft and hard shell variety.

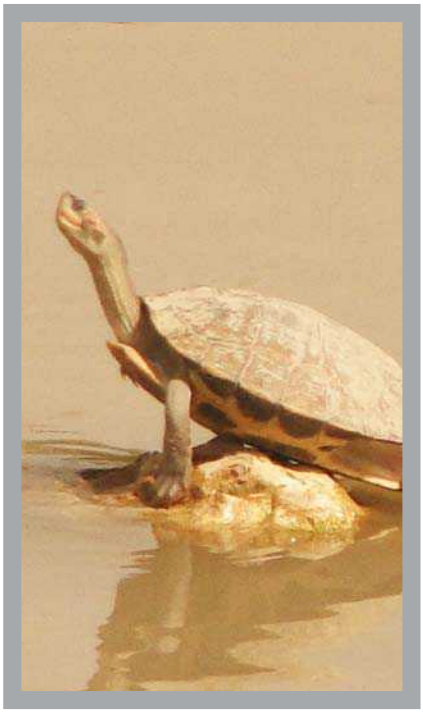
Till not too very long ago. the turtles were in no danger. On the contrary, the vast network of dams, barrages and headworks on the Indus had created excellent wetlands for turtles and other aquatic creatures. The area around Guddu Barrage in particular became known for the diversity and strength of marine life in general and fresh water turtles in particular.

Not hunted for sport nor having any food or medicinal value-only two people living along the banks of the Indus, the Mohanas and the Kails, consume turtle meat-soft shell turtles were by and large left alone. Consequently, they have never been threatened as a species.

However, this is no longer the case. A recent development changed the situation.

Fisher boy holding turtle

Endangered turtles on the banks of the River Indus



A turtle on a rock

The motorway connecting Lahore to Islamabad was built with the help of the Korean company Daewoo and the potential for export of turtle meat to Southeast Asia and the Far East became apparent. For soft shell turtles are regarded both as a delicacy and as a curative ingredient in those regions, unlike Pakistan.

Of the four soft shell species - the Ganges soft shell turtle, the Peacock soft shell turtle, the Indian narrow-headed turtle and the Indus mud turtle - all found in the Indus, the Ganges soft shell turtle is classified as vulnerable and the Indian narrow-headed turtle is endangered. It has to be noted that because turtles are long-lived-up to 350 years or so-and their growth rate is slow, it will be very difficult to revive their population once it falls below a certain level.

Paradoxically enough, while the dams and barrages on the Indus have created wonderful sanctuaries for fresh water turtles, the abundance of turtles found in these wetlands have made these favoured hunting grounds for poachers who use unethical hunting practices. No longer are turtles netted in the ones and twos. Instead they are now lured to the surface using poultry intestine as bait and killed in droves. An even more abhorrent practice used by poachers is poisoning the waters.

Speaking about the changed mode of hunting, Khurram Saeed, Project Coordinator for the Zoological Survey Department (ZSD) in Islamabad says, 'During a visit to the Pat Feeder Canal, off Guddu Barrage, in May 2010, I came across some 500 dead and mutilated turtles within a one kilometer radius; they had died as a result of poisoning by the poachers. I saw the same in another visit to the Sukkur Barrage. Our efforts to find the culprits behind this outrage failed because the villagers were reluctant to speak to officials.'

Saeed believes it is not the traditional fisherman who is responsible for the killing of these turtles but a mafia-like group that operates the turtle trade. Given the reluctance of the local community to identify those responsible for killing turtles makes it difficult to trace the culprits. Their reluctance to identify the killers is not due to their involvement in the trade; rather it is due to an inherent aversion to law enforcing agencies and government officials.

A second major threat to turtles is the increasing pollution of the River Indus which is destroying their habitat. This is a chicken and egg situation because the declining population of turtles is in itself a contributing factor to the growing pollution of the river since turtles are scavengers and help nature keep the waters pure by consuming dead fish and other pollutants.

So far efforts to protect fresh water turtles have been hampered both by a lack of interest in the public and



Turtle poisoned by poachers

private spheres as well as lack of precise data. While the ZSD has, as per its mandate, been carrying out surveys from time to time on the fauna of the Indus, no specific research had been done on freshwater turtles and information on these creatures was scant and scattered. Without accurate knowledge about the spatial distribution of turtle species and their population, it was not possible to formulate a policy for the effective management of turtles in their natural habitat.

It was this that prompted the ZSD in cooperation with Indus for All Programme, WWF Pakistan to initiate a study on the distribution and status of freshwater turtles in selected areas of the River Indus. The sites chosen for the study were Balloki, Sulemanki, Head Quaidirabad, Head Trimmu, Chashma Barrage, Jinnah Barrage, Taunsa Barrage and Head Punjnad.

The study revealed some interesting findings. It was found that contrary to the belief that the Indian narrow headed turtle was to be found only in Sindh, it was established that it is found in the Punjab also. Similarly, the Zoological survey was able to confirm for the first time the presence of the Peacock soft shell turtle in the lower reaches of the Indus. Prior to the study, the status of this species had been ambiguous. Difficult to spot as they are not given to basking, the survey team was able to lure these turtles out with poultry intestines and confirm their presence in two sites - Punjnad and Trimmu headworks.

The greatest achievement, however, undoubtedly is that the ZSD now has a definitive body of knowledge pertaining to fresh water turtles. They have been able to record the species found at different sites and their numbers and site specific threats have been identified.

It is now for the provincial governments to put this knowledge to the best use. As a first step it is essential that freshwater turtles be included in the list of protected animals in the provincial wildlife protection acts. Amendments to wildlife legislation and strict execution of laws regarding trade control will help conserve freshwater turtles.

There is also a need to improve inter-provincial coordination and set up an inter-provincial mechanism that will enable the provincial governments to take action against poachers. Lack of coordination between the provinces and also among the Centre and the provinces creates loopholes that allow this illegal trade to flourish.

Finally, there is the need to spread awareness about the importance of saving freshwater turtles. As things stand today, fresh water turtles evoke no interest among people in general. The ZSD's plan to publish a booklet on its findings can be taken as a first step in this direction.

# Saving the marsh crocodile

Chhuchh Lake

Once home to the hog deer, desert hare, wild boar, marsh crocodile and innumerable species of birds, Deh Akro II, is now almost barren of wildlife. Indiscriminate hunting and habitat destruction have forced wildlife to seek shelter elsewhere.

This unique desert wetland complex, lying 46 kilometers northeast of Nawabshah city, encompasses 32 lakes and four separate habitats: desert, wetland, marsh and agricultural lands. The lakes vary in size, shape and depth as well as in the quality of water. They are formed by the surfacing of ground water and are replenished by rain water and seepage from the Jamrau and Nara canals.

Because of its unique flora and fauna, Deh Akro II was declared a wildlife sanctuary in 1988, and in November 2002, it was declared a Ramsar site. Unfortunately, this rich ecosystem spreading over 20,500 ha is under enormous pressure due to the shrinking of the wetlands, deforestation and unbridled hunting.

A drought-like condition that has persisted over the last eight or so years has decreased ground water levels to a depth of 20 to 30 meters from its earlier depth of five to eight meters. Since the lakes of the wetland are dependent on ground and rain water for refilling, this has meant a reduction in the waters of the lakes by some 40 to 50 percent. The third source of water for the lakes, which is seepage from the Jamrau and Nara canals, has also been affected adversely due to canal water diversification to agricultural lands.

Cutting of wood for sale

In order to alert the wetland communities, local stakeholders and civil society to the rapid degradation and depletion of their habitat and to encourage their participation in conservation efforts, a community based wetland project was launched by the Sangat Development Foundation on 1 January 2010 with the support of the WWF Indus for All Programme.

Sangat was given the responsibility of rehabilitating the environment of two wetlands of Deh Akro II - Chhuchh and Yari Wari.

As a first step, Sangat Development Foundation undertook a baseline study of the flora and fauna of the area and identified four major reasons for the depletion of natural resources. These were overgrazing, deforestation, illegal hunting, and cutting of wood for sale and fuel. To battle these issues, Sangat began a series of mobilization meetings with local communities to create awareness among the villagers regarding the importance of the ecosystem in their lives and for building skills and capacities of the local community in this regard.

*Peshimams* of mosques and school teachers were encouraged to speak about the importance of conservation. Wetland Protection Committees and Village Based Wetland Protection Committees involving members of the local communities, project members and government officials such as the Game Warden and Deputy Conservator were set up to act as watchdogs against illegal hunting and the wood mafia which had earlier been acting with impunity.

A mound built mid-stream in Chhuchh

A view of the lake

To counter deforestation, 500 saplings of date palms and other trees were distributed among villagers. This had a positive effect and now a number of villages have started raising nurseries on their own lands in an effort to decrease their dependence on natural resources. However, it must be noted that most villagers are desperately poor and many continue to depend on the cutting and selling of wood to make a living. If deforestation is to be curbed, some effort will have to be made to provide alternate livelihood to these communities.

To spread the message of conservation, folk *kachahris* were held where speakers highlighted the importance of the wetlands. Nature study camps were set up for students from Jam Sahib High School so that from an early age children would develop an interest in environmental issues.

Eidan Bhatti, one of the villages targeted by Sangat for habitat conservation, has become an ideal example for environment preservation. Always mindful of nature-the villagers say they enjoy watching Animal Planet and National Geographic on TV rather than the more popular Indian soap channel, ZTV. These villagers have been instrumental in helping Sangat spread the message of conservation. During a community meeting, Ali Nawaz Bhatti, a member of the village support group, likens a tree to a human being and tells others that felling a tree is akin to taking a human life. Speaking enthusiastically of his efforts to protect the habitat, he recalls his confrontations with hunters and members of the timber mafia in the past year.

A major accomplishment of the Programme has been in the rescue and protection of the marsh crocodile which is prized for its skin which is used for the making of handbags and shoes. Once found abundantly in these parts, the number of these reptiles is now precariously low. According to Sangat's estimates there were only 500 to 600 crocodiles remaining in the area when it began its outreach campaign among the villagers and succeeded in convincing them to protect the animal.

Nasir Brohi, President of Sangat, lauds the efforts of Habibullah Kashkhelli, who persuaded the villagers of Eidan Bhatti who were keeping 15 baby crocodiles in captivity for sale, to release them into the Chhuchh. In another similar operation, the villagers of Yusuf Dahri were talked into releasing twelve baby crocodiles they had captured. With greater awareness, it is hoped that people themselves will stop the practice of trapping baby crocodiles for selling purposes.

Sadly, a number of projects taken up by Sangat have been badly affected by the heavy rains of 2010. A mound built mid-stream in Chhuchh by Sangat for birds and crocodiles to bask on, was washed away in the floods as was its tree plantation drive in Eidan Bhatti. But while the rains have spoilt the work carried out by Sangat, they carried a hidden blessing. The lakes have filled up again and the number of fish in the water has risen considerably providing the marsh crocodile with its natural diet.

# Protecting our dolphins

Dead dolphin lying on the Karachi shores

Rahman, a fisherman, is out at sea. The sky turns grey and he can sense a storm. He heads towards home. The sea is choppy and he loses his net. A few days later, close to the beach, Rahman recovers his lost net. As he tugs at it, he feels something heavy. He finds a dead baby dolphin that has gotten entangled in it.

There are two threatened Indus Delta Dolphin species, the Indo-Pacific humpback and the Indo-Pacific bottlenose found in moderate numbers in Pakistan's ocean area. Dolphins die in Pakistani waters due to a host of reasons. They occasionally get caught in ghost or discarded nets. They are also exposed to untreated sewage and effluents that are released in the water by industries located along the Karachi coast.

Negative human activities such as these and illegal fishing practices are proving detrimental to marine life. The fishing community does not realize that they disturb the environment by catching very small fish and selling them as poultry feed; they do not allow these fish to grow. The dolphins' food supply gets affected which in turn has other far reaching consequences.

Dr Mauvis Gore of MCI with members of the Cetacean Conservation Pakistan team

Some dolphins get hit by trawlers and die. Movement of ships and other traffic needs to be controlled in areas inhabited by dolphins, especially during their reproductive phase. Naval exercises that make use of sonar activities, deliberate hunting, habitat loss, and growing pollution, all contribute towards the stranding of dolphins.

The Indus Delta creek system and its biological resources have been found to be undergoing a rapid decline due to various stress factors. Major threats include a severe scarcity of freshwater due to the construction of upstream dams and barrages for irrigation purposes.

The protection of marine cetacean fauna is not only important for the purpose of protecting the health of the marine ecosystem but also for the coastal communities who depend on the already overcrowded fisheries for an alternative source of livelihood, that is, dolphin watching. The first step here, however, is to provide a proper policy for the conservation and long term viability of cetaceans in Pakistani waters. This involves increasing awareness amongst the masses regarding the need for such conservation.

The Cetacean Conservation Pakistan team joined hands with the Indus for All Programme of WWF Pakistan, Marine Conservation International and Pakistan Wetlands Program to take action and create a policy with the help of "Action Plan for Marine Cetaceans in Pakistan" (Gore, 2009).

Four key objectives were identified in order to attain the goal of this project: the general public be aware of the need to conserve all marine cetaceans and thereby protect the country's marine heritage and environment; cetacean conservation measures must be legally adopted and implemented throughout Pakistani waters; areas containing critical and endangered habitats must be identified and protected; and knowledge of cetacean biology and ecology is crucial to facilitate conservation measures.

During the project, boat surveys were undertaken and 151 humpback and 110 bottlenose dolphins were observed in the Indus delta extending up to Karachi. Data was also collected on the birds and marine traffic to determine the location of the dolphins. Local fishermen were educated about the negative effects of illegal fishing practices on the environment; public awareness was created about cetaceans through leaflets and news articles. Links were established with boat owners and the teams worked with two fisher families to develop dolphin watching enterprises.

However, the most important outcome of this project was the development of a comprehensive policy document to ensure effective protection and management of humpback and bottlenose dolphins. This was done on the basis of meetings and consultations with the Sindh Wildlife Department (SWD), Zoological Survey Department (ZSD), Sindh Fisheries, Marine Fisheries Department (MFD), National Institute of Oceanography and World Wildlife Fund (WWF). Meetings with Balochistan Fisheries, Environmental Protection Agency of Pakistan and Sindh Trawler Owners and Fishers Association are to be completed in the next 5 months and policy is to be tabled for legislation through the Marine Fisheries Department (MFD).

# Transferring technologies

Fruit trees abound in the Tando Hafiz Shah area

A hundred fruit trees grow in a four acre barren area in the vicinity of Tando Hafiz Shah. With no source of water nearby, this seemingly impossible task has been made possible with the help of the Research and Development Foundation (RedFound) in cooperation with WWF Pakistan. This is one of the success stories of RedFound, much of whose work on drip irrigation has been washed away in the floods of 2010.

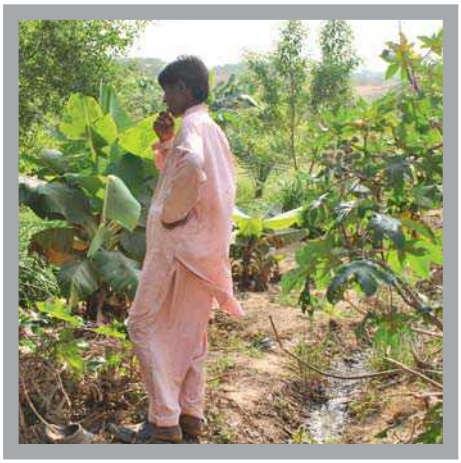
Sindh's perennial water shortage and the resultant decline in agricultural productivity and growing poverty prompted RedFound to look for ways to introduce a more efficient water management structure for Sindh. Research in sprinkler and drip irrigation conducted in many parts of the world shows that drip irrigation not only helps conserve water but is also a factor in securing higher crop yields. Although this system is characterized with high initial investment costs, these can be compensated for by savings in water and increase in production.

Sindh has been experiencing increasing water shortage over the years due to the damming of the Indus River and the diversion of its waters for agricultural purposes upstream. Especially hard-hit have been the areas lying downstream of the Kotri Barrage where large swathes of once fertile land now lie barren.

Ironically, while drought-like conditions plague the province on the one hand, on the other, waterlogging caused by decades of surface irrigation has also destroyed large tracts of agricultural land. By switching to drip irrigation farmers could ensure themselves an uninterrupted supply of water throughout the year and break free of their dependence on canal water which is available only for a few months of the year. Concomitantly, this efficient irrigation system would help reduce the ill effects of over irrigation and help reclaim agricultural land while increasing productivity and alleviating poverty. It was this that prompted RedFound to experiment in drip irrigation. The union councils of Jhirk and Tando Hafiz Shah in Thatta district were chosen to initiate their efforts.

Lying at an equi-distance of 40 km from both Thatta and Hyderabad, Jhirk and Tando Hafiz Shah share similar problems. Though not too far from the River Indus, neither benefit from Sindh's extensive irrigation system due to its hilly terrain and the unavailability of riverine water downstream of Kotri Barrage. Irrigation water reaches only a few locations while the rest of the area is drought-prone and dependent on shallow ground water for agricultural purposes.

Waterlogging and salinity are both issues here; several studies have indicated that more than 25 to 35 percent water loss takes place at the watercourse level and some 20 to 30 percent at the farm field level. Since both these issues impact the farming community, it is imperative to provide technical assistance and support to the community to minimize these losses and improve crop productivity.



A kitchen garden watered by drip irrigation

In both union councils, 50 percent of the population lives on subsistence farming and/or livestock raising; the rest are engaged in fishing and manual labour and a few are in private and public service.

RedFound's project was not limited to drip irrigation. It hoped to transfer a number of technologies to the communities anticipating that once the knowledge is passed on and the results are visible to all, others would replicate the process. Thus men were to receive training in drip irrigation, capacity building and better farming methods through exposure to newer technology; women were to be taught to manufacture smoke free stoves and to raise poultry. All in all, the project was to benefit 200 farming households, a total of 1,300 persons-men, women and children.

A smokeless stove

Sadly, the efforts to persuade farmers to adopt drip irrigation did not meet with the success it could have. There were several reasons for this. Niaz  Hussain Sial, Programme Coordinator at RedFound speaks of an important factor they had failed to anticipate. A large number of farmers were encouraged to plant orchards for their low maintenance and high yield. So mango, falsa and bair trees were planted. These trees take three years to mature and bear fruit. What RedFound had not anticipated was the low staying power of the farmers.

To bear the high initial cost of setting up a drip irrigation system and then manage running costs, which include buying water to irrigate the trees and diesel to run the pump, without immediate results was frustrating for most farmers. And many dropped out of the project. To overcome this, RedFound now encourages farmers to grow vegetables along with fruit trees since vegetables bring in instant results.

Another factor for the limited success of drip irrigation was one that no one could have foreseen-the unprecedented floods of 2010 which devastated large parts of Sindh. The floods washed away many of the systems set up by the NGO and the disaster-hit communities were unwilling to reinvest in the project.

In the village of Rawatiyun, Ghulam Rasool speaks of his experience with drip irrigation. RedFound had helped him set up a drip irrigation system in a 50 x 50 barren plot of land to grow vegetables. He planted mint, onions, tomatoes, spinach, bitter gourd as well as fruit bearing trees like lemon, guava, papaya and a variety of berries with the help of drip irrigation.

However, Ghulam Rasool found using the tube well to pump out ground water required energy costs which he felt were excessive. Also, he often had to buy water as ground water was not adequate for irrigating the garden. Disenchanted with drip irrigation but enamoured by the idea of growing his own vegetables, he let the machinery fall into disuse. Instead he got a water connection from Jhirk, for which he pays Rs100/- a month and continued growing vegetables for his own need and for that of the villagers. Seeing his success, other villagers are now beginning to start their own vegetable patches-though not with drip irrigation.

Unlike drip irrigation, the efforts to promote smokeless stoves met with immediate success. Forty smokeless stoves were supplied by the NGO and women were trained on how to manufacture stoves themselves. Today almost all households use these stoves in the village of Rawatiyun. Speaking of the advantages of the new stoves, the women say, 'We would get smoke in our eyes and it would fill our lungs. The children were always getting ill because of the smoke. It is so much better now.'

# Reviving Haleji for ecotourism

Haleji Lake after the deweeding

A decade ago, Haleji Lake was a tourist's paradise. Pelican island in the midst of Haleji Lake was a photographer's dream come true. It was dotted with pelicans so one could literally not even see the actual island. Birds and waterfowl were in abundance; there were approximately 30000 birds and waterfowl in the lake area.

However, in the last ten years there has been rapid deterioration and the wildlife population has reduced to a mere 3000 in number. Various factors have resulted in this. From1943 to1993, the freshwater lake used to be one of the major sources of water supply to the increasing population of Karachi. Water from the River Indus would flow into the lake and that water in turn would be directed towards the city. When the supply to Karachi stopped, the water was recycled back to the lake so there was no inflow and outflow. As a result, there was no fresh water anymore and the birds and fowl that lived in this area disappeared and moved to other areas. Also, the lake was covered fully with lotus and weeds so fish did not flourish in these waters.

The Indus For All programme supported the Sindh Wildlife Department in the improvement and rehabilitation of Haleji Lake from May 2009 to April 2011. De-weeding four kilometres of the lake and removal of typha resulted in a cleaner lake where water creatures began to abound again. As a result, there was water fauna and aquatic plants that the birds could feed on. Hence birds returned to the lake area once again. Now, coots and mallards swim up to the information centre and saaras cranes, green pigeons, cormorants and other birds are spotted around the lake area.

Haleji Lake after the dewatering

Construction of entrance gate


A WWF signboard publicising the project


Garbage cans installed by WWF

Approximately 3500 trees were planted alongside the lake in an area that stretched upto 4kms. *Shisham*, *tali*, *neem* and *bair* trees that were planted have now risen to a height of 6 to 7 feet. Birds need plants with fruits so plants with *khajoor* and jungle *jalebis* were also added in the lake areas so as to attract more bird population.

The shabby looking information centre which needed repairs was renovated. All the broken glass windows in the centre were replaced. The bathrooms in the information centre were tiled. A jetty platform to facilitate the landing of boats has been constructed in close proximity to the Information centre. Public toilets have been built for use by general visitors to the Haleji Lake area. Garbage cans have also been installed so that trash is eliminated in the right way and this in turn also helps in preventing the lake from being polluted further by all kinds of rubbish. An entrance gate is in the process of being constructed which marks the entrance to the lake area.

Mr Fazal Shah and Mr Rashid Ahmed, Game Officers of the Sindh Wildlife Department both reiterated the importance of WWF in facilitating and funding this project. It has hugely benefitted the wildlife department because by taking joint responsibility, they have been able to clean up the lake and work towards a more healthy environment for the wildlife to breed and flourish in.



Jetty constructed for landing of boats

# Glossary

| | |
|---|---|
| ***Ajrak*** | traditional block printed Sindhi cloth; regarded as a symbol of Sindhi culture |
| ***Chowrna*** | a round hut with a thatched roof |
| ***Kachahri*** | a gathering or community meeting |
| ***Kail*** | a nomadic community |
| ***Kashi*** | Persian tile work or mosaic |
| ***Landhi*** | a long room with a thatched roof and packed mud floor traditionally used as a meeting place for villagers |
| ***Mandani*** | a paddle used to churn water steeped in indigo |
| ***Mehndi*** | henna |
| ***Mohanas*** | a Sindhi tribe living along the waters of Lake Manchar; traditionally associated with fishing |
| ***Peshimam*** | prayer leader |
| ***Rilli*** | patchwork quilt |

## Our Mission

WWF- Pakistan aims to conserve nature and ecological processes by:

- Preserving genetic, species and ecosystem diversity
- Ensuring that the use of renewable natural resources is sustainable, both now and in the longer term.
- Promoting actions to reduce pollution and the wasteful exploitation and consumpation of resources and energy

## Vision of the Indus Ecoregion Programme

"People coexist with nature in complete harmony and biodiversity flourishes in its entirety"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